ANDREWS ENGINEERING

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Springfield, IL 62711

LETTER OF TRANSMITTAL

TO: Mr. Darin LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control
1021 North Grand Ave. East
Springfield, IL 62794 - 9276

Date:	9/9/2024	Job No.:	Log No. 2021-100001
Re:	Springfield CWLP		

We Are Sending You:

Copies	Date	No.	Description
1	9-09-2024	Log No. 2021-100001	Response to Agency comments regarding Log No. 2021-100001

THESE ARE TRANSMITTED as checked below:

Alicia Squire
BOW Admin

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☐ For approval ☒ For your use ☐ As requested

☐ For review and comment ☐ Return by _____

☐ Other: _____

REMARKS: This is a response to Agency comments for Application Log No. 2021-100001, which includes the Hydrogeolic Report, Groundwater Monitoring Program and Statistical Procedures, and the Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments.

Copies: 1

By: Brad Hunsberger

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CITY WATER, LIGHT AND POWER
CITY OF SPRINGFIELD, ILLINOIS
MISTY BUSCHER, MAYOR
DOUG BROWN, CHIEF UTILITY ENGINEER

September 9, 2024

Mr. Darin LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control
1021 North Grand Avenue East
PO Box 19276
Springfield, IL 62794-9276

Re: City Water, Light and Power – Lakeside and Dallman Ash Ponds
Log No. 2021-100001
Bureau ID #W1671200052
Coal Combustion Residuals Surface Impoundment Operating and Construction Permit Application Review Letter

Dear Mr. LeCrone:

Provided herein are responses and/or supporting documentation to address the comments in the Coal Combustion Residuals (CCR) Surface Impoundment Operating and Construction Permit Application Review Letter dated October 10, 2023 and the Comments on Statistical Methods Proposed in Initial Operating Permit dated January 17, 2024. The responses are provided in Attachment A and Attachment B, respectively. Application forms and certifications were provided in the original Operating Permit Application received by the Illinois EPA on October 28, 2021 and the Closure Construction Permit Application received by the Illinois EPA on February 1, 2022.

Documents cited in this response previously submitted separately to Illinois EPA as well as cited documents posted to our public Illinois CCR Rule Compliance and Data Information web site at www.cwlp.com/IllinoisCCRCompliance.aspx are incorporated by reference in this response and are intended to amend the original applications. Where needed, direct links to the web site are provided. For ease of reference and review, each of the comments received from Illinois EPA have been sequentially numbered.

As indicated in or response, City Water, Light & Power (CWLP) has completed a comprehensive geotechnical and environmental investigation of the surface impoundments between October 2023 and May 2024 to address comments presented by Illinois EPA in the referenced review letters. This information has been used to update the analysis of chemical constituents within the CCR surface impoundments, obtain geotechnical information of the soils beneath the CCR surface impoundments and update our *Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures*.

Dewatering and CCR material stabilization studies were initiated in April 2024 and are anticipated to continue into 2025. Information obtained from these studies will be used to update our pending Closure Construction Permit Application.

CWLP is unsure what information Illinois EPA is seeking in some of their comments and has responded as such. We would appreciate the opportunity for clarification or additional information so that we can address the comments accordingly.

If you have any questions or need additional information please contact Eric Staley of my staff at 217-757-8610 (ext. 1102).

Sincerely,

PJ Becker
Environmental Health and Safety Manager

Cc: Andrews Engineering

ATTACHMENT A
Responses to October 10, 2023
CCR Surface Impoundment Operating and Construction Permit Application Review Letter

1 INITIAL OPERATING PERMIT APPLICATION

1.1 History of Construction [35 Ill. Adm. Code 845.230(d)(2)(A)]

1.1.1 A survey of the extents of the Lakeside Ash Pond and Dallman Ash Pond and the data inputs that were utilized to create the final cover area estimates must be provided.

Response:

CWLP disagrees that a survey of the extents of the surface impoundments and data inputs utilized to create final cover area estimates are required as part of the History of Construction Report per 35 Ill. Adm. Code 845.220(a)(1) and requests clarification on this comment.

Available construction documentation of the Lakeside Ash Pond and Dallman Ash Pond were provided in the February 1, 2022 Closure Construction Permit Application. The extents of the Lakeside Ash Pond and Dallman Ash Pond were based on multiple surveys defining the extents of the perimeter berms for the impoundments. These include on-site surveys as well as aerial surveys. LiDAR surveys were conducted most recently in 2018 and 2023. The extent of the impoundments have not changed since construction of the berms.

The final cover design was based on the October 15, 2018 LiDAR survey. Drawings containing that information were provided in the Plans and Specifications located in Attachment 8 to the Closure Construction Permit Application.

Final cover construction details will be provided in a Construction Certification Report which will be signed and sealed by a licensed professional engineer in the State of Illinois.

In the meantime, now that no additional CCR or non-CCR material will be sent to the surface impoundments, CWLP has been able to engage an engineering firm to evaluate dewatering and material stabilization studies as well as evaluation of cover designs and options that will be used to update the final cover design provided to the Agency.

1.1.2 Impacts of the FEMA flood zone on the foundation and construction of the current CCR surface impoundment must be evaluated.

Response

The current FEMA flood zone map is inaccurate. The flood zone highlighted by FEMA is based on topographic contours from a USGS quadrangle map from 1965, which did not show the Lakeside impoundment that existed at that time. The Dallman Ash Pond was not shown as it had not been constructed yet. However, the FEMA floodplain elevations were based on the old topographic information.

FEMA identifies the 100-year floodplain at the Dallman Ash Pond as elevation 545 feet above mean sea level (msl). The berm elevation at the northwest corner of the Dallman Ash Pond (lowest point) is approximately 553 feet above msl. The perimeter berm elevations around the impoundments increase to the south by approximately 10 feet to transition to the top of dam/bridge elevation. Therefore, there is no chance the structures will be inundated by floodwaters from the Sugar Creek floodplain during a 100-year storm event.

The maximum surcharge pool analysis was not evaluated since the ash ponds are no longer in operation. Flooding around the ash ponds would be short term and would not lead to saturation of the embankment soils to an extent that would require additional stability modeling. CWLP has completed a comprehensive geotechnical investigation and has prepared an updated location restriction documentation for 35 Ill Adm. Code 845.340 Unstable Areas and Floodplains. The certification addressing the unstable areas and floodplains and construction of the CCR surface impoundments is provided in Appendix A of Attachment A.

1.2 Demonstration of Location Standards Compliance [35 Ill. Adm. Code 845.230(d)(2)(D)]

1.2.1 To comply with the application requirements of 35 Ill. Adm. Code 845.230(d)(2)(D), the applicant must provide a demonstration with certification from a qualified professional engineer attesting that the CCR surface impoundments meet the requirements in Part 845 Subpart C. Attachment 6 mentions that the CCR surface impoundments comply with four location standards, however, only two demonstrations and certifications were provided in the initial operating permit application. CCR surface impoundments meeting the location standards in Part 845 Subpart C must provide a demonstration and certification as part of the initial operating permit application.

Response

Certification provided in Attachment 6 included Wetlands and Fault Areas. CWLP has completed a comprehensive geotechnical investigation and has prepared updated location restriction documents for 35 Ill. Adm. Code 845.330 Seismic Impact Zones and 35 Ill Adm. Code 845.340 Unstable Areas and Floodplains. The certifications for these location restrictions are provided in Appendix A of Attachment A.

1.2.2 The Source Water Assessment Protection (SWAP) map indicates that there is an underground mine located under the Dallman Ash Pond. The structural integrity of the Dallman Ash Pond in an event of disruption due to an unstable area and local human-made feature must be addressed in accordance with Section 845.340.

Response

As part of the geotechnical investigation conducted between October 2023 and May 2024, CWLP completed a 100-foot boring in the northwest corner of Dallman Ash Pond. Within the 100-foot boring was approximately 32.5 feet of overburden with primarily shale and claystone bedrock. The Unstable Areas and Floodplains demonstration provided in Appendix A of Attachment A provides the breakthrough, pillar and floor failure analyses.

1.2.3 The underground mine must be addressed as specified in Sections 845.230(d)(2)(D) and 845.340(b)(3) by providing the data reports substantiating the statements regarding structural stability. Data may include the following:

- Rock core logs logged with details of discontinuities exhibiting that in the vicinity of the Dallman Ash Pond the rock was stable and did not have evidence of structural instability.
- Instrumentation data that monitors structural stability over time.

Response

As part of the geotechnical investigation conducted between October 2023 and May 2024, CWLP completed a 100-foot boring in the northwest corner of Dallman Ash Pond. Within the 100-foot boring was approximately 32.5 feet of overburden with primarily shale and claystone bedrock. The Unstable Areas and Floodplains demonstration provided in Appendix A of Attachment A provides the breakthrough, pillar and floor failure analyses.

There is no instrumentation that monitors structural stability over time.

1.3 Documentation and Maintenance of Slope Protection (35 Ill. Adm. Code 845.230(d)(2)(F)].

1.3.1 How are the slope protections for the Lakeside Ash Pond and Dallman Ash Pond meeting the performance standards in Section 845.430(b)?

Response:

CWLP is unsure what additional information Illinois EPA is requesting and seeks clarification.

Section 6, page 12 of the October 28, 2021 Initial Operating Permit Application discusses the manner in which the slopes and pertinent surrounding areas meet the performance standards of 35 IAC 845.430(b)(1-5). This includes a discussion on the grassy vegetation protection against surface erosion, wave action, adverse effects of rapid drawdown, maintenance for observation of and access to the slopes and pertinent surrounding areas during routine and emergency events, the removal of woody vegetation greater than ½ inch in diameter and maintenance of the vegetation at 12 inches in height.

Inspections are conducted by qualified personnel on a weekly and annual basis in accordance with 35 IAC 845.540(a) and (b) respectively. As indicated in the Annual Inspection Report for Coal Combustion Residuals Surface Impoundments that was prepared as part of the Annual Consolidated Report and the weekly inspections posted to CWLP's publicly accessible web site, routine inspections are being conducted of the slopes and pertinent surrounding areas and any observed deficiencies are being promptly addressed.

1.4 Waste Characterization and CCR Characterization (35 Ill. Adm. Code 845.230(d)(2)(B) and 845.230(d)(2)(C)]

The CCR waste characterization must include all waste streams as defined by SW846, incorporated by reference, which includes appropriate number of samples to characterize each waste type and identification of all waste types which includes solids, semi-solids, liquids, and air born parts that come from the CCR. SW846 Chapter 9 defines a minimum number of samples of each waste stream as totaling four and must include additional sampling as warranted. The Agency reviewed the data submitted and found that CWLP must provide, at a minimum, additional sampling for the following waste streams:

- CCR solids and semi-solids-Lakeside Ash Pond
- Non-CCR solids-Dallman Ash Pond
- Contaminated subsoils, if any are above the water table
- Leachate water—Lakeside Ash Pond
- Surface water-Lakeside Ash Pond and Dallman Ash Pond

- Scrubber sludge—Lakeside Ash Pond

Response:

A comprehensive description of the waste streams directed to the impoundments was provided in Section 3 of the Initial Operating Permit Application. The laboratory results were provided in Attachment 5 of the subject document.

For clarification purposes, CCR solids and semi-solids in Lakeside Ash Pond would consist of fly ash and bottom ash from the retired Lakeside Power Station, which ceased sending these materials in 2009. CCR solids exclusively sent to Lakeside Ash Pond consist of sludge from the Flue Gas Desulfurization Waste Water Treatment Plant (FGD WWTP). CCR solids and semi-solids exclusively sent to Dallman Ash Pond consists of bottom ash and fly ash generated from Dallman Units 31, 32 and 33.

Non-CCR solids exclusively sent to Lakeside Ash Pond consist of sludge from the Generating Facilities Waste Water Treatment Plant (FGD WWTP). Non-CCR solids in both Lakeside and Dallman Ash Ponds would consist of lime sludge from the water purification plant.

Analytical results for all of the referenced waste streams were provided in the initial application. Additionally, there is currently no surface water present in Lakeside Ash Pond. As such, no analytical information for these waste streams is available.

Dallman and Lakeside Ash Ponds ceased receiving all CCR and non-CCR waste streams on October 15, 2023. CWLP understands 35 Ill. Adm. Code 845.230(d)(2)(B) to require analysis of chemical constituents found within the CCR to be placed in the CCR surface impoundments. CWLP disagrees any additional analysis of chemical constituents found within the CCR to be placed in the CCR surface impoundments for all waste streams as defined by SW846, including TCLP/SPLP analysis is required or warranted per 35 Ill. Adm. Code 845.230(d)(2)(B). Additionally, CWLP disagrees there is a requirement to use SW 846 under 35 Ill Adm. Code 845.230(d)(2) for purposes of waste characterization of constituents found within the CCR to be placed in the CCR surface impoundments and requests clarification.

CWLP also disagrees that 35 Ill Adm. Code 845.230(d)(2)(B) or (C) requires leachate water analysis, surface water analysis or contaminated subsoils, if any above the water table and request further clarification.

CWLP agrees that additional geochemical analysis of in-place materials resulting from all waste streams contained within the surface impoundments is appropriate and warranted in accordance with 35 Ill Adm. Code 845.230(d)(2)(C). In May 2024, four borings were advanced in Lakeside Ash Pond (L1, L3, L4 and L5) and four borings were advanced in Dallman Ash Ponds (D1, D2, D3 and D4) for the purpose of obtaining representative samples of in place materials and porewater. Each boring was advanced with hollow stem augers and solids samples were collected via split barrel samplers. While drilling, a porewater sample was collected from the approximate midpoint of each boring. Once the final depth was obtained, a PVC monitoring well was constructed using 10-foot prepacked screens and isolated in the bottom 12 feet of the impoundment for the purpose of collecting additional porewater samples at a later date. As stated above, representative CCR materials and pore water were collected from each borehole and analyzed via TCLP for the parameters identified in Section 845.620(a)(1). A drawing showing the boring locations and the analytical results are provided in

Appendix B of Attachment A. A drawing showing the boring locations, boring logs, and well completion reports are provided in Appendix C to Attachment A (Groundwater Monitoring Program and Statistical Procedures).

Subsequent to well development, the four wells within Lakeside Ash Pond and the four wells in the Dallman Ash Pond were sampled on July 18, 2024. A final report from the testing laboratory has not been provided at this time. When complete, copies of the analyses will be provided to the Illinois EPA.

1.5 Emergency Action Plan (35 Ill. Adm. Code 845.230(d)(2)(G)]

1.5.1 The Emergency Action Plan must be updated to include the submittal of activation records to the Agency and documented in the operating record in accordance with Section 845.520(f).

Response

CWLP is unsure of what additional information Illinois EPA is seeking to be updated and requests clarification on this comment.

35 IAC 845.520(f) requires the owner or operator of the CCR surface impoundment to submit records documenting all activations of the EAP to the Agency and place the documentation in the facility's operating record as required by Section 845.800(d)(10).

The facility EAP would only be activated when events or circumstances involving the CCR surface impoundment that represent a safety emergency are detected, either by identifying conditions during structural stability assessments, annual inspections or inspections by qualified individuals.

To date, no such circumstances have warranted the activation of the EAP and therefore no such information is available or required to be provided to the Agency or placed in the facility operating record.

CWLP does conduct and document the annual face to face meetings and exercise with local emergency responders and this documentation is provided on our publicly available web site and is placed in our operating record.

1.5.2 The Emergency Action Plan must address floodplain areas as specified in Section 845.520.

Response

As stated in the response to the comment in 1.1.2 above, the FEMA flood zone map is incorrect. Additionally, there is no reference to floodplains in Section 845.520. Clarification is requested for this comment.

1.6 Fugitive Dust Control Plan [35 Ill. Adm. Code 845.230(d)(2)(H)]

1.6.1 The Fugitive Dust Control Plan must be updated to include procedures to log complaints from members of the public received by the applicant in accordance with Section 845.500(b)(2) and a description on how the owner or operator will periodically check the effectiveness of the Fugitive Dust Control Plan must be included in accordance-with Section 845.500(b)(3).

Response

The Fugitive Dust Control Plan has was updated in 2023 to include procedures to log complaints from the public and was placed on the facility website. The subject plan has been posted on the facility 845 public web site at https://www.cwlp.com/ILCCRHandler.ashx?imgID=2211. CWLP can provide a hard copy of the report if needed.

1.6.2 Multiple control measures to be used for the surface impoundments and surrounding areas are mentioned in the Fugitive Dust Control Plan. How are the measures appropriate and applicable for the site?

Response

The Fugitive Dust Control Plan has been updated to include narrative discussing the subject control measure and how such control measure is appropriate and applicable for the site. The plan has been placed in our operating record and is posted to our 845 public web site at https://www.cwlp.com/ILCCRHandler.ashx?imgID=2211. CWLP can provide a hard copy of the updated plan if needed.

1.7 Groundwater Monitoring Information [35 Ill. Adm. Code 845.230(d)(2)(1)]

The groundwater monitoring program must be amended as follows for the Agency to continue its review:

1.7.1 A multi-unit groundwater monitoring system, must be installed to determine the constituents and waste boundary of the CCR since Spring Creek and Lake Springfield are near the impoundments. The units to be monitored in accordance with Part 845 Subpart F must include the shallow clay that is in connection with Sugar Creek, unlithified aquifer (basal sand), and weathered shale (surficial shale unit).

Response

In the area of the CCR surface impoundments the basal sand/bedrock interface is identified as the uppermost aquifer for the site.

The bedrock at the project site consists of Pennsylvanian shales that are gray in color. The bedrock surface elevation varies from approximately 492 feet msl near the center of the existing landfill, to approximately 554 feet msl located on a bedrock outcrop near the landfill area (southeast corner of Cell 1). Along the down-gradient edge of the Dallman Ash Pond, the bedrock is at approximately 500 feet msl. In general, the bedrock surface slopes from the east and west towards the center of the landfill area.

The basal sand generally overlies the bedrock surface and underlies the lower cohesive deposit and is the lower-most unconsolidated deposit. There are some pockets of very hard, fine-grained silty clay to clay overlying bedrock in a few areas. The basal sand is present above these pockets of clayey deposits, thought to be weathered bedrock.

The basal sand is a gray colored, poorly graded, silty to clayey fine sand to well graded sand with minor amounts of fine gravel. This unit was encountered in a medium dense to dense condition. Across the CWLP facility (includes the Dallman and Lakeside Ash Ponds), the top elevation of the basal sand varies from 491 to 513 feet msl and is as much as 12.3 feet thick; however, it some locations it is absent, likely due to excessive erosion of the creek bottom. Along the down-gradient (northern) edge of the Dallman Ash Pond area, the basal sand was found to range from 3 to 11.5 feet in thickness, and have an average thickness of 7.3 feet.

At similar elevations as the basal sand, cohesive soils were encountered in the borings advanced within the limits of the former Sugar Creek channel. The location of the former Sugar Creek channel is depicted on the August 13, 1976 Grading Plan drawing from Burns & McDonnell (Drawing Y29 – Rev. 4). Borings conducted along the abandoned creek locations indicate that the creek fill materials consist of variable soils ranging from silty clays to silty sands. In some areas, the cohesive fill materials extended down to the top of bedrock. Where encountered, the granular fill materials are typically poorly graded silty to clayey sands and contain organics or wood fragments. In some areas, the granular fill materials also extended down to the top of bedrock. The referenced drawing (Drawing Y29 – Rev. 4) is included as Figure 3 in Appendix C of Attachment A (the August 2024, Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures document).

The uppermost aquifer is characterized as the basal sand overlying the shale bedrock. In some CCR landfill locations the creek fill materials, ranging from silty clays and organic silty clays to silty sands and clayey sands, were found to be in direct hydraulic communication with the basal sand that directly overlies the bedrock surface. Due to the highly variable hydraulic characteristics and random placement of the creek fill materials, further characterization is difficult.

The lower cohesive deposit overlies the basal sand and consists of brown, gray, and brownish gray silty clays, clayey silts, and clays, having very soft to stiff consistency. Across the CWLP facility, the lower cohesive deposit is as much as 22 feet thick with an average thickness of about 15 feet. However, along the down-gradient (northern) edge of the Dallman Ash Pond the thickness of the lower cohesive deposit was found to range from 12.6 to 26.3 feet in thickness, and have an average thickness of 19.4 feet. The deposit was not encountered in isolated areas along the abandoned creek, possibly due to excessive erosion of the creek bottom in these areas. The bottom of the CCR surface impoundment rests directly on top of the lower cohesive deposit.

The lower cohesive deposit is generally overlain by the shallow sand and underlain by the basal sand. However, within the abandoned creek area, the lower cohesive deposit was encountered directly below the creek fill. In some areas the basal sand is not present and the lower cohesive deposit directly overlies the bedrock.

The shallow sand overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and clayey silt. This unit is not continuous over the entire site. Its thickness ranges from one to three feet over most of the investigated area. The shallow sand does not underlay the CCR surface impoundment.

The upper cohesive deposit is an alluvial deposit consisting of brown, light brown to brownish-gray silty clays to clayey silts having soft to stiff consistency. The unit includes loess deposits and isolated pockets of fine-grained silty to clayey sand and at some location alluvial silts and silty

clays. The upper cohesive deposit is laterally adjacent to the sidewall of the CCR surface impoundment. Along the west perimeter of the impoundments, three wells are partially screened or the screen filter packs are located within the upper cohesive deposit. These include AP-2, AP-3, and AP-14. The screen intervals at AP-1 and AP-10 are close to the contact between the upper and lower cohesive soils. As described in the Site Geology and Site Hydrogeology sections of the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures (Attachment A), the soil characteristics of the upper and lower cohesive soils are very similar. Differentiating the two deposits for purposes of monitoring is not necessary.

The groundwater monitor well network was designed to monitor impoundments in the uppermost aquifer. No revisions to the network are necessary.

1.7.2 The waste boundary wells must be identified for comparison to the numerical values in Section 845.600(a)(1) and potential background values after review and approval by the Agency.

Response

The groundwater monitoring network consists of two upgradient monitoring wells AP-4 and AP-5 and eight downgradient monitoring wells RW-3, AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10 and AP-14. In addition to the eight downgradient wells, there are ten temporary assessment wells identified as AP-7, AP-9, AP-11, AP-12, AP-13, T1, T2, T4, T5 and T6. These wells assist in further evaluating groundwater quality pursuant to 35 IAC 845.650(d). The maps provided in Appendix C of Attachment A identify the upgradient, downgradient wells proximate to the waste boundary, the remaining downgradient wells and temporary assessment wells.

The temporary assessment wells may be sampled at alternate frequencies and for alternate constituents while further evaluating groundwater quality.

Appendix C of Attachment A provides the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, provides maps, boring logs and well completion reports for the monitoring wells used in the groundwater monitoring network.

1.7.3 The laboratory reports for the background data used in the statistical evaluations must be provided. If the data is from historic data, then an electronic data dump directly from the laboratory can be provided instead of the laboratory reports.

Response

The Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures has been updated and is provided in Appendix C of Attachment A. This updated program is intended to replace the program proposed in the original operating permit application. The updated program provides recalculated background concentrations, the laboratory analytical reports, statistical method and addition of groundwater monitoring wells.

Background concentrations have been recalculated using monitoring data from upgradient monitoring wells AP4 and AP5 from 2016 through 2017. For Antimony, Cobalt, Lead, Lithium and Thallium monitoring data from 2021 through 2022 was used.

CWLP is in the process of collecting additional groundwater data for total arsenic at a lower reporting limit. Groundwater analytical results for total arsenic prior to third quarter 2023 used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. To date, CWLP has collected seven of the eight required samples to calculate background concentrations. Once the additional groundwater data is collected, CWLP will provide an updated groundwater monitoring program with proposed backgrounds for total arsenic. .

1.7.4 Evidence that only upgradient wells were used in determining an alternative groundwater quality standard must be provided. Any alternative groundwater quality standards must not be used unless the groundwater protection standards have been reviewed and approved by the Agency.

Response

Pursuant to 35 IAC 845.640(d) background groundwater quality may be established at wells that are not located hydraulically upgradient from the CCR surface impoundment if it meets the requirements of Section 845.630(a)(1). Section 845.630(a)(1) states the performance standard, which in part is that the background wells must be installed at appropriate locations and depths to yield groundwater samples that accurately represent the quality of background groundwater that has not been affected by leakage from a CCR surface impoundment. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where hydrogeologic conditions do not allow the owner or operator of the CCR surface impoundment to determine what wells are hydraulically upgradient; or sampling at other wells will provide an indication of background groundwater quality that is demonstratively as representative or more representative than that provided by the upgradient wells.

Groundwater monitoring well AP4 is characterized as a background groundwater monitoring well based upon its location and groundwater quality. Pursuant to Groundwater Sampling and Analysis Requirement at Section 845.640(d), the owner or operator of the CCR surface impoundment must establish background groundwater quality in a hydraulically upgradient or background well for each of the constituents listed in Section 845.600. Background groundwater quality may be established at wells that are not located hydraulically upgradient from the CCR surface impoundment if it meets the requirements of the performance standard at Section 845.630(a)(1), that is, the owner or operator of a CCR surface impoundment must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples that:

1) Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR surface impoundment. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where:

A) Hydrogeologic conditions do not allow the owner or operator of the CCR surface impoundment to determine what wells are hydraulically upgradient; or

B) Sampling at other wells will provide an indication of background groundwater quality that is demonstratively as representative or more representative than that provided by the upgradient wells; and

2) Accurately represent the quality of groundwater passing the waste boundary of the CCR surface impoundment. The downgradient monitoring system must be installed at the waste

boundary that ensures detection of groundwater contamination. All potential contaminant pathways must be monitored.

Given the restraints of the physical boundaries of the facility, the choice of locations for positioning an upgradient/background monitoring well are limited. The position of wells AP-4 and AP-5 serve to represent background groundwater quality and were chosen in consultation with the Illinois EPA.

1.7.5 The groundwater monitoring program must exhibit that outliers will be evaluated after the collection and analysis of 32 or more samples. The dataset used to evaluate outliers must also have associated documentation required by Section 845.640(a).

Response

The Illinois EPA's direction to exhibit that outliers will be evaluated after the collection and analysis of 32 or more samples is not a regulatory requirement and furthermore is not statistically appropriate. CWLP requests additional clarification on this comment.

A narrative on the statistical treatment of outliers is provided in the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided as Appendix C of Attachment A. Documentation of the data set used to evaluate outliers is included in the narrative.

1.7.6 The permit application states that the background calculations are based on existing groundwater data for AP-4 and AP-5. Because reporting limits for arsenic and lead are above the Section 845.600(a)(l) numerical values, the data cannot be used to calculate background.

Response

CWLP is in the process of collecting additional groundwater data for total arsenic at a lower reporting limit. Groundwater analytical results prior to third quarter 2023 used a reporting limit for arsenic above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. Groundwater analytical results prior to the third quarter 2019 used a reporting limit for total lead above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. To date, CWLP has collected seven of the eight required samples to calculate background concentrations for arsenic. Once the additional groundwater data is collected, CWLP will provide an updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures with proposed background for total arsenic and total lead for Illinois EPA review.

1.7.7 The background values for each constituent must be based solely on total constituent concentration compliant with Section 845.640(i).

Response

Background values for each constituent are based solely on total concentrations. The updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C of Attachment A provides the laboratory analytical reports used to calculate background concentrations. As previously stated, CWLP is in the process of collecting additional background samples for total arsenic and will provide an updated Hydrogeologic Report,

Groundwater Monitoring Program and Statistical Procedures with proposed arsenic backgrounds for Illinois EPA review.

1.7.8 A certification from a qualified professional engineer stating the statistical method chosen is appropriate for evaluating groundwater monitoring data must be provided in accordance with Sections 845.640(f)(2) and 845.640(f)(3)(B).

Response

The updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C of Attachment A includes the required certification.

1.7.9 The groundwater sampling and analysis program did not address all the sampling requirements in Section 845.640(a). The items below must be address. Laboratory reports, field purging, and sampling documentation must be provided to sufficiently address the requirements of Section 845.640(a).

- Sample collection,
- Sample preservation and shipment,
- Analytical procedures,
- Chain of custody control,
- Quality assurance and quality control including field and laboratory QA/QC measures, and
- Field and laboratory QA/QC measures.

Response

A sampling and analyses procedures document has been prepared to address the sampling requirements of Section 845.640(a). The sampling and analyses procedures document is included as part of the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided as Appendix C of Attachment A.

1.7.10 Evidence that the aforementioned aquifers and clay unit that are monitored for groundwater quality are also characterized in accordance with Section 845.640(c);

- Rate and direction of groundwater flow,
- Groundwater elevations in the location of CCR within a time period to avoid climate fluctuations, and
- Groundwater elevations in each well before purging.

Response

Groundwater elevations are obtained at each groundwater monitoring well immediately prior to purging, and all groundwater elevations are collected within as short of time span as possible to eliminate the potential for influence to the potentiometric surface due to climate fluctuations (barometric pressures, precipitation events, or snowmelt events). Elevations of Lake Springfield, Sugar Creek, the Clarification pond and water within the surface impoundments are recorded

during groundwater sampling events and are included on potentiometric surface maps as needed. Evidence of characterization being conducted in accordance with 845.640(c) is documented in the Annual Groundwater Monitoring and Corrective Action Report which is provided as part of the Annual Consolidated Reports posted to our public web site at https://www.cwlp.com/IllinoisCCRCompliance.aspx.

Detailed hydrogeologic characteristics were presented and discussed in Attachments 11 and 12 of the Closure Construction Permit Application. These included the rate and direction of groundwater movement.

The overall direction of groundwater movement is to the north, along the alluvial valley in which Sugar Creek has formed. The hydraulic gradients immediately adjacent to the surface impoundments may be somewhat radial, outward from the surface impoundments to the adjacent Sugar Creek river valley.

Groundwater flow velocity (Darcy velocity), was calculated for the horizontal component of the average linear velocity of groundwater. The Darcy velocity provides a good estimate of the time of travel for most soluble constituents in ground water. The results will be used to verify the collection of independent samples. Additional information is also contained in detail as part of the revisions to the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C to Attachment A of this correspondence.

It is presumed the clay unit referenced in the comment applies to both the upper and lower cohesive deposits as identified in the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures. The subject report lists the vertical hydraulic conductivities ranging from $9.4x10^{-9}$ to $8.24x10^{-6}$cm/sec for the two clayey deposits. With these low values, the two deposits will not meet the definition of an aquifer as defined in Section 845.120. The lower cohesive deposit is largely in contact with the upper-most aquifer which is monitored by numerous wells. The upper cohesive deposit partially monitored by wells with screen intervals that encounter the upper deposit (AP-2, AP3, and AP-14).

1.7.11 The laboratory used during the time of groundwater sampling must be identified and it must be shown that the lab was using SW-846, incorporated by reference in Section 845.150, methods for the analysis.

Response

The laboratory analytical reports providing the requested information are provided in the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures which is provided as Appendix C of Attachment A.

1.7.12 In accordance with Part 845 Subpart F, evaluations of total metals and the appropriate statistical analyses in accordance with Section 845.640(i) and Section 845.640(f) and (g) are required. The statistical evaluations of total metals constituents must be provided for Agency review and approval. Please note that total metals data must be substantiated by laboratory reports as required by Section 845.640(a).

Response

CWLP disagrees that 845.640(a) requires the submittal of laboratory reports. However, the laboratory analytical reports providing the requested information as well as the statistical analysis used to develop the revised background concentrations are provided in the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures which is provided as Appendix C of Attachment A.

1.7.13 The appropriate minimum detection limits for each constituent must be used to evaluate the constituent statistically and to compare against the numerical groundwater protection standard in 35 IAC 845.600(a)(l).

- The following constituents have a calculated groundwater protection/background value that does not exhibit the correct use of the statistics:
  - Arsenic
  - Barium
  - Beryllium
  - Boron
  - Cadmium
  - Calcium
  - Chromium
  - Cobalt
  - Lead
  - Mercury
  - Molybdenum
  - Radium 226/228
  - Selenium
  - Thallium
- The following constituents have a reporting limit higher than the GWPSs in 35 IAC 845.600(a)(l):
  - Arsenic
  - Lead
- The following constituent numerical groundwater protection standard is incorrectly cited from 35 IAC 845.600(a)(l)(I):
  - Cobalt

Response

The updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C of Attachment A provides the laboratory analytical reports used to calculate the revised background concentrations. As previously stated, CWLP is in the process of collecting additional background samples for total arsenic and will provide updated background concentrations for arsenic and lead when available.

To comply with the application requirements of 35 Ill. Adm. Code 845.230(d)(2)(I)(i), the applicant must provide a full hydrogeologic assessment report and addenda that complies with Section 845.620. The

Hydrogeology Report must be amended as follows for the Agency to continue its review:

1.7.14 The permit application states that if any inadvertent leakage occurs that it will be minimal and would flow into the Sugar Creek. The permit application must provide data that substantiates this statement in a form that acknowledges and evaluates all possible human or ecological receptors and evaluates whether the constituents from the CCR are able to reach those receptors above accepted criteria based on known contaminant transport data available at the site.

Response

It appears the reference of inadvertent leakage was contained in Attachment 2 – CWLP 35 IAC 620 Ash Pond Assessment which is not part of the Hydrogeological Site Assessment and discusses inadvertent subsurface ash impoundment leakage of the ponds to groundwater. This report was written in 2010 at the request of Illinois EPA Bureau of Water Pollution Control to gauge compliance with 35 Ill. Adm. Code 620 groundwater quality standards. Subsequent investigations and reports detailed below provide assessments of impacts to human health and the environment.

Attachment 12 of the February 1, 2022 Closure Construction Permit Application characterizes impacts from the seepage of leachate to downgradient receptors. As characterized in Attachment 12, there are no receptors within the Sugar Creek basin within 3,400 feet of the CCR surface impoundments. Closure in place with a final cover system does not pose a risk to human health or the environment. The groundwater contaminant transport model demonstrates that concentrations detected above groundwater protection standards (GWPSs) will be limited in extent.

Such evaluation can be complex; however, this specific issue was addressed in the December 2014 USEPA document titled. Human and Ecological Risk Assessment of Coal Combustion Residuals[1]*. This document identified potential risks to human and ecological receptors from leaching of chemical constituents from CCR waste into surrounding environmental media. Risks to human health resulted from ingestion of ground water and fish, while risks to ecological receptors resulted from exposure to surface water. However, considerable dilution and attenuation would occur before constituent concentrations reach downgradient private wells and surface water bodies. As stated above, there are no receptors in the vicinity of the impoundments.*

1.7.15 The permit application states that the Lakeside Ash Pond base is at 535-feet asml and the Dallman Ash Pond base is at 533-feet asml. The FEMA flood insurance map indicates that flood zone AE encompasses the entirety of the Lakeside Ash Pond and the Dallman Ash Pond and is at an elevation of 546-feet asml and 545-feet asml, respectively. The permit application must provide the following:

- Boring logs or survey reports that verify the total depths of the ponds,
- Regular, temporal, or seasonal changes to the groundwater levels in relation to surface water levels in Lake Springfield,
- Events that would cause the flood plain to be inundated with flood waters, and
- Yearly minimums and maximums for groundwater elevations at the Lakeside Ash Pond and the Dallman Ash Pond.

[1] U.S. EPA. 2014. "Final Human and Ecological Risk Assessment of Coal Combustion Residuals." RIN: 2050-AE81. Prepared by the EPA Office of Solid Waste and Emergency Response. Washington, DC. December.

Response

As stated in the response to Comment 1.1.2, the FEMA flood insurance map is highly inaccurate. Any conclusions drawn based on the FEMA flood insurance map are suspect.

As part of the recent geotechnical investigations, CWLP advanced four borings in Lakeside Ash Pond and four borings in Dallman Ash Pond to confirm the bottom elevations of each impoundment. Borings L1, L3, L4 and L5 were advanced in Lakeside Ash pond where silty/clay materials were encountered at 534.5 feet msl, 530.5 feet msl, 553.0 feet msl and 530.0 feet msl, respectively. Borings D1, D2, D3 and D4 were advanced in Dallman Ash Pond where silty/clay materials were encountered at 526.0 feet msl, 523.0 feet msl, 526.2 feet msl and 529.5 feet msl respectively. A map depicting these locations and boring logs for these borings are provided in Appendix C of Attachment A.

Although monthly monitoring of groundwater elevations has been conducted since April 2021 per 35 Ill. Adm. Code 845.650(b)(2) and (3), the simultaneous recording of Sugar Creek did not begin until January 2023. Lake Springfield and Clarification Pond elevations were not collected until May 2023. Other historical elevations are available in the Annual Consolidated Reports for 2021 and 2022. Data for 2023 is provided below. It must be noted that the water levels within the impoundments may be below ground surface elevations of areas within the impoundments; i.e. the water levels are below grade. The Lakeside Ash Pond has been dry since October 2023. Available data for groundwater and surface water elevations for 2023 are as follows:

Unit	27-Jan-23	16-Feb-23	29-Mar-23	12-Apr-23	30-May-23	15-Jun-23	6-Jul-23	31-Aug-23	16-Sep-23	26-Oct-23	27-Nov-23	27-Dec-23
Lakeside Ash Pond	562.04	562	562.14	562.52	562.1	561.98	561.96	562.03	560.77	NM	NM	NM
Dallman Ash Pond	550.65	550.52	550.6	550.3	550.14	549.49	550.6	549.82	550.94	550.3	550.09	550.6
Sugar Creek	NM	NM	NM	NM	521.25	520.31	521.88	520.2	520.21	520.33	520.31	520.33
Lake Springfield	NM	NM	NM	NM	560.28	560.08	560.33	559.93	558.97	558.58	558.43	558.92
Clarification Pond	NM	NM	NM	NM	548.66	547.97	548.46	548.74	549.33	548.51	547.08	547.93
RW3	528.52	529.21	529.86	529.68	529.24	528.22	527.43	527.35	526.66	526.63	526.8	527.46
AP-1	525.48	526.15	526.63	525.45	525.28	524.31	525.18	524.24	523.88	523.95	524.16	524.64
AP-2	529.2	528.85	529.51	528.86	527.99	527.32	527.53	527.77	527.08	527.4	527.64	528.71
AP-3	525.93	526.31	526.52	525.77	525.74	525.33	524.69	524.41	525.24	525.31	525.31	525.81
AP-4	549.23	550.01	549.88	546.14	547.03	546.83	546.71	546.17	545.25	544.87	544.95	545.18
AP-5	569.03	568.43	570.86	570.85	570.33	569	569.82	568.88	566.63	565.73	565.16	566.1
AP-6	529.87	530	530.71	529.03	528.71	527.58	526.98	526.95	526.24	526.4	526.32	526.93
AP-7	NM	525.54	528.75	527.43	527.71	527.71	526.57	526.15	525.75	525.44	525.33	525.56
AP-8	532	532	533.21	535.95	535.38	533.99	533.56	533.4	532.42	532.23	532.77	533.72
AP-9	NM	529.27	529.34	525.07	524.94	523.74	524.72	523.61	523.19	523.33	523.65	524.48
AP-10	NM	534.82	535.01	534.45	533.74	532.44	532.54	532.29	531.29	530.93	531.67	532.67
AP-11	NM	524.49	525.4	523.9	524.29	522.77	523.39	522.69	522.27	522.14	522.82	522.98
AP-12	NM	524.49	526.14	525.64	525.68	523.58	523.97	522.66	522.42	522.16	522.72	523.03
AP-13	NM	523.3	529.36	528.09	527.28	524.67	524.43	523.52	522.53	522.12	522.68	523.02
AP-14	NM	538.58	538.23	537.2	537.66	537.23	538.12	537.57	536.41	535.88	536.52	537.56

The surface water level information along with the potentiometric surface data will be submitted to the Illinois EPA in the annual reports.

1.7.16 The hydrogeologic site characterization must address compliance with Sections 845.620(b)(2), 845.620(b)(6), 845.620(b)(11), 845.620(b)(13), 845.620(b)(15), and 845.620(b)(18) to demonstrate that floodplain inundation will not result in a release of CCR to Sugar Creek or other surface water bodies, public lands, or private lands.

Response

CWLP believes is has generally complied with the cited provisions. Based on the wording, it appears Illinois EPA means inundation of the floodplain as a result of surface water overbank flooding of Sugar Creek or other adjacent surface water bodies and the resultant impact of such flooding on the existing in-place CCR and the potential for redistribution of the CCR within the floodplain. The comment implies that floodplain inundation will occur.

As stated above, the FEMA Flood Insurance map is in error. While FEMA map shows there is

inundation during the 100-year storm event, the topographic information used in derivation of the flood elevations was highly inaccurate. There is no surface water inundation. In addition, CWLP updated its inflow design report in the 2023 Annual Consolidated Report to demonstrate that the ash ponds are designed and operated to contain a 1,000 year storm (previous demonstrations studied a 100 year storm). Attachment 5 of the 2023 Annual Consolidated Report also provides the Engineer Certification for the updated Inflow Design Flood Control System Plan.

Season fluctuations of the potentiometric surfaces as well as surface water body elevations were addressed in response to Comment 1.7.15 above. The hydrogeologic setting and potential migration pathways were discussed in detail in the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C to Attachment A of this document.

1.7.17 The climate aspects of the site including precipitation data, seasonal groundwater increases and decreases, and hydrologic effects of the Lake Springfield dam must be provided.

Response

CWLP is unsure of the regulatory citation for this information and requests additional clarification.

As documented in the 2024 Inflow Design Flood Control System Plan included as part of the Annual Consolidated Report, the impoundments are built in a manner in which there is no surficial flow of storm water into the impoundments during precipitation events. Therefore, only precipitation falling directly on the impoundments would be the precipitation entering the impoundments. The facility receives approximately 40 inches of precipitation annually according the National Weather Service web site https://www.weather.gov/ilx/spi2023.

Seasonal groundwater increases and decreases are provided above and on the potentiometric surface maps prepared for the Annual Consolidated Reports on our public web page at www.cwlp.com/IllinoisCCRCompliance.aspx. The CCR surface impoundments are separated from the hydraulic effects due to varying surface water elevations of Lake Springfield and by the presence of the Spaulding Dam.

1.7.18 Any potential migration pathways near both impoundments that have the potential for the CCR constituents listed in Section 845.600(a)(l) to leave the property or waste boundary.

Response

This is a reiteration of the requirement of 35 IAC 845.620(b)(11) - Identification of potential migration pathways. The pathways for migration have been identified as the basal sand/bedrock interface and where encountered the shallow intermittent silty/sandy intervals which is adequately monitored by the existing groundwater monitoring well network.

A significant amount of additional data were obtained as part of the geotechnical investigation and well installations that occurred within the impoundments and along the periphery of the impoundments. The hydrogeologic report contained within the original application has been updated to include the new information (Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures) and is provided in Appendix C of Attachment A to this

document.

1.7.19 The hydrogeologic site characterization must include the following:

- Boring to 100 feet in accordance with Section 845.620(b)(l3), boring must be logged for lithologic, stratigraphic, and fracture/discontinuity characteristics including rock type, fractures and other discontinuities in accordance with applicable ASTM methods,
- Updated geologic setting with data from 100-feet boring in accordance with Section 845.620(b)(6),
- Updated fracture/discontinuity and potential secondary flow characteristics with data from 100-feet boring in accordance with Section 845.620(b)(7),
- Updated geologic cross-sections with data from 100-feet boring, groundwater elevations in wells, and hydraulic gradients in accordance with Section 845.620(b)(9),
- Updated geochemical and physical properties of the geologic layers with data from 100-feet boring in accordance with Section 845.620(b)(15),
- Updated hydraulic characteristics of the shallow cohesive unit/shallow sand in accordance with Section 845.620(b)(16) and determine if there is a risk to human health or the environment through the shallow cohesive unit/shallow sand to the Sugar Creek, and
- Updated monitoring network to include monitoring wells in the shallow cohesive/shallow sand unit in accordance with 35 IAC 845.630(d).

Response

A comprehensive geotechnical investigation of the impoundments which included borings and cone penetration testing were completed in the fall of 2023 and February 2024, respectively. The 100-foot boring required by Section 845.620 was completed in April 2024; information from the boring was used to augment the hydrogeologic characteristics of the site.

The deep bedrock boring was advanced to a total depth of 103.5 feet bgs (429.5 ft msl). The materials encountered in the deep bedrock boring were continuously logged in the field by an Andrews Engineering professional geologist describing the lithologic, stratigraphic, and fracture/discontinuity characteristics including rock type, fractures and other discontinuities. The log for boring B100 is included in the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures document included as Appendix C of Attachment A. Minor weathering fractures were observed in the upper portion of the bedrock at this location. No secondary flow fractures were observed. No voids directly or indirectly associated with the underground mining at this location were observed.

Packer testing was completed within boring B100. A summary sheet of the packer testing is provided in Appendix C. Packer testing was completed at 7 intervals (i.e., 93 to 103.5 feet bgs, 82.5 to 93 feet bgs, 72 to 82.5 feet bgs, 61.5 to 72 feet bgs and 51 to 61.5 feet bgs and with the final 2 intervals overlapping 40.5 to 51 and 38.5 to 49 feet below surface). Test results indicate hydraulic conductivity below 482 feet msl is less than 1 x 10-9 cm/sec. The results for the intervals tested above 482 feet msl are invalid as a result of hydraulic fracturing of the bedrock and the resultant inability to establish a seal within the shallow bedrock portion of the borehole. The results confirm that bedrock below the weathered zone is relatively impermeable; the shallow weathered bedrock and in direct hydraulic communication with the overlying basal sand comprise the uppermost aquifer.

No new information has been collected which alters the understanding of the physical and/or chemical characteristics of the shallow cohesive/shallow sand. Our conclusions regarding the extent of the shallow cohesive/shallow sand has not changed.

1.7.20 The hydraulic characteristics must be updated with data from migration pathways and include the following:

- Water table depths,
- Effective and total porosities in each aquifer,
- Hydraulic conductivities in each aquifer,
- Direction and velocity of groundwater flow in each aquifer, and
- Updated map of potentiometric surfaces reflecting the different migration pathways being monitored-weathered bedrock and unlithified aquifer.

Response

These hydrogeologic characteristics, identified in 35 IAC 845.620(b)(16), where the information was available, were characterized in the initial operating permit Sections 2.1 and 2.2 of Attachment 11 of the Initial Operating Permit Application.

A comprehensive geotechnical investigation of the impoundments which included borings and cone penetration testing were completed in the fall of 2023 and February 2024, respectively. Additionally, further hydrogeologic characterization was completed in April/May of 2024 which included the boring and installation of additional wells at locations opposite the CCR surface impoundments, across Sugar Creek, a deep bedrock boring located along the northern edge of Dallman Ash Pond and the boring and installation of 4 leachate wells in each of the CCR surface impoundments. Information from these investigations was used to augment in the revised Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures included as Appendix C of Attachment A. The revised report includes a summary of groundwater elevations, geotechnical testing results, porosities, hydraulic conductivities, the direction and velocity of groundwater flow and updated map of potentiometric surfaces for the uppermost aquifer.

As stated above in the response to 1.7.10, the characteristics of clay deposits do not meet the definition of an aquifer and are not considered migration pathways.

1.7.21 The groundwater classification in accordance with Section 845.620(b)(17) must be addressed.

Response

Dependent upon the specific location, the groundwater may be Class I or Class II. The hydraulic conductivity of the uppermost aquifer will vary. Based on information provided in the revised Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures, where the basal sand present, the groundwater is Class 1. .Due to the low horizontal and vertical hydraulic

conductivities of the clay deposits (upper and lower cohesive deposits being less than $1x10^{-4}$ cm/sec), water that may be present within the pore space will be Class II groundwater.

1.8 Preliminary Written Closure Plan [35 IAC 845.230(d)(2)(J)]

The provided closure plan must be revised to include the following:

1.8.1 The dewatering activities seems to indicate that the CCR will no longer be saturated, which is not exhibited by data. However, no groundwater plume mitigation measures are proposed. An update with a means and methods to adequately address the groundwater plume mitigation exhibiting that saturated CCR will not impact groundwater past the waste boundary and will not discharge to the Sugar Creek or Lake Springfield. Alternatively, details to the dewatering and drainage section detailing how the CCR will be protected from interaction with the groundwater and surface water must be provided in accordance with Section 845.750(b).

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. The included plan as submitted in the Initial Operating Permit Application is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

Dewatering and CCR material stabilization studies at Lakeside and Dallman Ash Ponds began in April 2024 and are anticipated to continue into 2025. The information obtained from the studies will be used to update the Final Closure Plan and will be provided in a Closure Construction Permit Application at a later date.

1.8.2 CCR material stabilization does not seem achievable as proposed. Details on the grading and compaction plan that will ensure compaction and CCR stabilization being achieved even where CCR is fully saturated below the water table must be provided accordance with Sections 845.750(b)(l) and 845.750(c)(3).

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. The included plan as submitted in the Initial Operating Permit Application is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

Dewatering and CCR material stabilization studies at Lakeside and Dallman Ash Ponds began in

April 2024 and are anticipated to continue into 2025. The information obtained from the studies will be used to update the planned grading and compaction sections of the Final Closure Plan and will be provided in a Closure Construction Permit Application at a later date.

1.8.3 The hydraulic conductivity or permeability data collection records and data analysis records of the lower native unit or bottom liner must be provided for the Agency to adequately review and approve of the low permeability layer in accordance with Section 845.750(c)(1).

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. The included plan as submitted in the Initial Operating Permit Application is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

A comprehensive hydrogeological and geotechnical investigation were completed between October 2023 and April 2024 to obtain information on the in-situ materials beneath and adjacent to the impoundments. Four borings were advanced to the underlying material in each impoundment for a total of eight. One Shelby-tube sample was obtained from the bottom of each borehole immediately beneath the bottom of the impoundments. Laboratory vertical hydraulic conductivity testing was conducted on each Shelby tube sample. The results ranged from a high of $6.80x10^{-6}$ cm/sec to a low of $1.70x10^{-8}$ cm/sec. The geometric mean was $3.42x10^{-7}$cm/sec. The information obtained from these investigations, including the information requested for hydraulic conductivity are included in the geotechnical investigation report provided in Appendix A of Attachment A.

1.8.4 If saturated CCR is left in place without solidification to ensure that the CCR is stable, then details of means and methods that will be used to comply with Section 845.750(c)(3) must be provided.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. The included plan as submitted in the Initial Operating Permit Application is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

Dewatering and CCR material stabilization studies were initiated in April 2024 and are anticipated to be completed in 2025. The design of the final cover system accounts for potential settlement to ensure continued proper drainage throughout the post closure care period. The information obtained from the dewatering and CCR material stabilization studies will be used to amend the final closure plan as needed and would be provided in a Closure Construction Permit Application

at a later date.

1.8.5 The low permeability layer soils are not to be contaminated and will not pose a threat to human health and the environment in addition to being acceptable soil type and hydraulic conductivity. The material that is placed must be tested under compacted conditions to prove a minimum, not maximum, hydraulic conductivity of $1x10^{-7}$ cm/sec. CWLP must provide details on how they will comply with the hydraulic conductivity requirement and how often they will test to meet quality objectives and ensure that all soil types are determined to be acceptable geotechnically and environmentally.

- Borrow source sampling must be conducted using SW846 Test Method 1312 for SPLP for SVOCs, VOCs, and PCBs listed in 35 IAC 620 and Metals listed in 35 IAC 845.600; or, alternatively, the borrow source material must be certified "uncontaminated soil" to ensure that the borrow source material does not pose a risk to human health and the environment.
- Borrow source sampling must also include hydraulic conductivity, compaction, and soil type testing including hydraulic conductivity testing of compacted materials, Atterberg limits, and other soils testing to prove that the soils are adequate for the intended application.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. The included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

Although CWLP has historically used borrow materials from nearby properties, the borrow source area for procurement of the low permeability layer soils has not been determined. CWLP agrees borrow source testing should be a condition of the Closure Construction Permit but disagrees the preliminary written Closure Plan must be revised to include unavailable and indeterminate information.

Section 2.3.1 of the provided closure plan clearly states three-inch diameter Shelby tube samples will be collected from compacted soil layers and provides the minimum testing frequency for nuclear density testing, Atterberg Limits, Grain Size Distribution, Standard Proctor Density and Laboratory Permeability. CWLP is unsure what additional information Illinois EPA is seeking and requests clarification.

The maximum (not to exceed) hydraulic conductivity for the low permeability layer is $1x10^{-7}$ cm/sec. The use of minimum is incorrect

1.8.6 A detailed explanation of how the proposed erosion and final grading layers meet Section 845.750(c)(2) requirements for the final protective layer.

- Borrow source sampling must be conducted using SW846 Test Method 1312 for SPLP for

SVOCs, VOCs, and PCBs listed in 35 IAC 620 and Metals listed in 35 IAC 845.600 or alternatively, the borrow source material must be certified "uncontaminated soil" to ensure that the borrow source material does not pose a risk to human health and the environment.

- Borrow source sampling must also include soils testing to prove that the soils are adequate for the intended application.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. However, the included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

As stated above, although CWLP has historically used borrow materials from nearby properties, the borrow source area for procurement of the erosion and final grading layer soils has not been determined. CWLP agrees borrow source testing should be conducted and the results should be required to be submitted as a condition of the Closure Construction Permit.

1.8.7 Details on whether CCR generated at the facility for fill during the placement of the final cover will be used must be provided. Details of any CCR being beneficially reused on site in accordance with 35 IAC 845.750(d) must be provided.

Response:

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. However, the included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

CWLP will not be using the exemptions in 845.750(d) to bring additional CCR material on-site for closure purposes.

1.8.8 Data to substantiate the claims of capacity in Section 3 of the closure plan must be provided. A bottom depth of each CCR surface impoundment must be provided.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit

Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. However, the included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

Verification of the bottom depth of each CCR surface impoundment was completed in 2024. Details of the verification are provided in the geotechnical investigation report provided in Appendix A of Attachment A.

1.8.9 The data inputs that were utilized to create the final cover area estimates and a survey of the extents of Lakeside Ash Pond and Dallman Ash Pond must be provided.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. However, the included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

The final cover area estimates described in Section 3 provide the assumed final cover area based on existing conditions. The estimates provided are not intended to represent the area that will be placed under final cover during closure activities as the areas are subject to change upon completion of dewatering and CCR stabilization activities. The final cover design was based on the October 15, 2018 LiDAR survey. Drawings containing that information were provided in the Plans and Specifications located in Attachment 8 to the Closure Construction Permit Application. Available construction documentation of the Lakeside Ash Pond and Dallman Ash Pond were provided in the February 1, 2022 Closure Construction Permit Application. The extents of the Lakeside Ash Pond and Dallman Ash Pond were based on multiple surveys defining the extents of the perimeter berms for the impoundments. These include on-site surveys as well as aerial surveys. LiDAR surveys were conducted most recently in 2018 and 2023. The extent of the impoundments have not changed since construction of the berms.

Dewatering and CCR material stabilization studies were initiated in April 2024 and are anticipated to be completed in 2025. The information obtained from the dewatering and CCR material stabilization studies will be used to amend the final closure plan as needed and would be provided in a Closure Construction Permit Application at a later date. In addition, final cover construction details will be provided in a Construction Certification Report which will be signed and sealed by a licensed professional engineer in the State of Illinois.

1.8.10 A schedule for the closure of the Lakeside Ash Pond and the Dallman Ash Pond must be provided for the Agency to consider the closure schedule.

Response

Lakeside and Dallman Ash Ponds are required to close under 35 Ill Adm. Code 845.700(a)(1)(A) and therefore a Preliminary Written Closure Plan is not required pursuant to 35 IAC 845.720(a)(1). As a closure plan had already been developed for the Closure Construction Permit Application the general closure plan was provided as Attachment 8 of the Initial Operating Permit Application. However, the included plan is not intended to meet the requirements of 35 Ill Adm. Code 845.720 and no revisions to that plan will be proposed. However, CWLP will address and update relevant portions of the Closure Plan provided in the Construction Closure Permit Application as necessary.

The closure schedule is an estimate as the final cover system design is also being evaluated by the U.S. EPA. The actual closure schedule will depend upon approval of the design by both the U.S. EPA and the State of Illinois. Detail variations by either entity will cause changes to the schedule.

CWLP agrees that the closure schedule proposed in the Closure Construction Permit Application should be considered by Illinois EPA but disagrees we should be held to any preliminary schedule proposed in the Operating Permit Application.

1.9 Initial Written Post-Closure Care Plan [35 IAC 845.230(d)(2)(K)]

The Post-Closure Care Plan states that the end use of the Lakeside Ash Pond and Dallman Ash Pond is to be a natural area with passive vegetation and native grasses that will not disturb the final cover or system. How will this be met post-closure?

Response

CWLP believes this comment was answered in the original application and does not understand the nature of this question but would be happy to provide additional clarification.

The inspection and maintenance activities discussed in the Post Closure Care Plan describe methods to identify and repair any conditions that would affect the final cover including: filling of erosional features, revegetation, mowing, controlling vegetation with tap roots, etc. As required per 35 Ill Adm. Code 845.760(h), a deed restriction will be placed on the property restricting use during the post-closure care period and the Illinois EPA must be notified that said deed has been recorded.

1.10 Liner Status or Statement [35 IAC 845.230(d)(2)(L)]

The Liner Status Report must be revised to include comments made under the History of Construction section.

Response

CWLP is unsure of what additional comments must be included and requests clarification. A statement regarding the liner status was provided in October 28, 2021 Initial Operating Permit Application. Section 12 of the Initial Operating Permit Application states that no engineered liner system exists beneath either Lakeside or Dallman Ash Ponds meeting the requirements of 35 Ill Adm. Code 845.400(b) or (c).

1.11 Hazard Potential Classification Assessment and Certification [35 IAC 845.230(d)(2)(M)]

1.11.1 The Hazard Potential Classification Assessment must be revised to include comments made under the History of Construction section.

Response

CWLP is unsure what specific information from the History of Construction Report the Illinois EPA is seeking to have added and requests clarification.

The Hazard Potential Classification Assessment was updated in 2024 in accordance with 35 Ill. Adm. Code 845.440. This updated assessment was submitted as Attachment 2 of the 2023 Annual Consolidated Report. A digital copy of the application was uploaded to the following address https://www.cwlp.com/ILCCRHandler.ashx?imgID=2221. CWLP can provide a hard copy of the Hazard Potential Classification Assessment of needed.

1.11.2 The Hazard Potential Classification Assessment indicates a classification of a low hazard potential for the CCR surface impoundment in accordance with 8 IAC 3702.30(a)(1). The hazard potential classification assessment for the CCR surface impoundments must be in accordance with Section 845.440. Please explain how the provided hazard potential classification assessment meets Section 845.440.

Response:

The Hazard Potential Classification Assessment was updated in 2024. This updated assessment was conducted in accordance with 35 Ill. Adm. Code 845.440 and submitted as Attachment 2 of the 2023 Annual Consolidated Report. A digital copy of the application was uploaded to the following address https://www.cwlp.com/ILCCRHandler.ashx?imgID=2221. CWLP can provide a hard copy of the Hazard Potential Classification if needed.

1.12 Structural Stability Assessment and Certification [35 IAC 845.230(d)(2)(P)]

The Structural Stability Assessment must be revised to include comments made under the History of Construction and Documentation and Maintenance of Slope Protection sections.

Response

CWLP is unsure what specific information from the History of Construction Report the Illinois EPA is seeking to have added and requests clarification.

The Structural Stability Assessment was updated in 2024. This updated assessment and certification was submitted as part of the Annual Consolidated Report and is available on our publicly accessible web site at https://www.cwlp.com/ILCCRHandler.ashx?imgID=2221.

1.13 Inflow Design Flood Control System Plan and Certification [35 IAC 845.230(d)(2)(R)]

1.13.1 The Inflow Design Flood Control System Plan must be revised to include comments made under the History of Construction section.

Response

CWLP is unsure what specific information from the History of Construction Report the Illinois EPA is seeking to have added and requests clarification.

The Inflow Design Control System Plan and certification was updated in 2024. This updated plan was submitted as part of the Annual Consolidated Report and is also is available on our publicly accessible web site at https://www.cwlp.com/ILCCRHandler.ashx?imgID=2221.

1.13.2 The Inflow Design Flood Control System Plan must address floodplain areas, use a hazard potential classification in accordance with Section 845.440 for the inflow design flood, and specify how discharges from the CCR surface impoundments will be handled with in accordance with Section 845.110(b)(3).

Response

The Inflow Design Control System Plan and certification was updated in 2024. This updated plan was submitted as part of the Annual Consolidated Report and is also is available on our publicly accessible web site at https://www.cwlp.com/ILCCRHandler.ashx?imgID=2221.

1.13.3 The Safety and Health Plan must indicate where the hazard communication signs are located on the property in accordance with Section 845.530(f).

Response:

The Safety and Health Plan was updated in 2023 and includes the requested items. This plan is available on our publicly accessible web site at www.cwlp.com/IllinoisCCRCompliance.aspx. CWLP can provide a hard copy if needed.

1.13.4 A number of procedures are listed but does not make them available as attachments to the document. The health and safety plan must have clear instructions on what to do to upgrade PPE in the event of an emergency in accordance with Sections 845.530(c)(2)(C), (D), and (G).

Response

The Safety and Health Plan was updated in 2023 and includes the requested items. This plan is available on our publicly accessible web site at www.cwlp.com/IllinoisCCRCompliance.aspx.

2 CONSTRUCTION PERMIT APPLICATION

2.1 History of Construction [35 Ill. Adm. Code 845.220(a)(l)]

2.1.1 The History of Construction and other permit application documents do not provide adequate data to verify the claims within the permit application pertaining to the following:

- Total depth or elevation of the bottom of the Lakeside Ash Pond and the Dallman Ash Pond.
- Engineering properties and hydraulic properties of the materials underlying the Lakeside Ash Pond and Dallman Ash Pond.

Response

As part of the recent geotechnical investigations, CWLP advanced four borings in Lakeside Ash Pond and four borings in Dallman Ash Pond to confirm the bottom elevations of each impoundment. Borings L1, L3, L4 and L5 were advanced in Lakeside Ash pond where silty/clay materials were encountered at 534.5 feet msl, 530.5 feet msl, 553.0 feet msl and 530.0 feet msl, respectively. Borings D1, D2, D3 and D4 were advanced in Dalman Ash Pond where silty/clay materials were encountered at 526.0 feet msl, 523.0 feet msl, 526.2 feet msl and 529.5 feet msl respectively. The range of hydraulic conductivities for the silty/clay materials beneath Lakeside Ash Pond are from 6.8 x 10^{-6} cm/sec to 8.5 x 10^{-8} cm/sec with a geometric mean of 2.58 x 10^{-7} cm/sec. The range of hydraulic conductivities for the silty/clay materials beneath Dallman Ash Pond are from 2.1 x 10^{-6} cm/sec to 5.1 x 10^{-8} cm/sec with a geometric mean of 4.53 x 10^{-7} cm/sec. A map depicting these locations and boring logs for these borings are provided in Appendix C of Attachment A.

2.1.2 The types of CCR found in the Lakeside Ash Pond and what the usages were for the Lakeside Ash Pond and Dallman Ash Pond must be addressed.

Response

Lakeside Ash Pond historically received fly ash and bottom ash from the now retired Lakeside Power Station. Lakeside Ash Pond also historically received non-CCR sludge from the CWLP Water Purification Plant.

Dallman Ash Pond historically received fly ash and bottom ash from now retired Units 31, 32 and 33 at Dallman Power Station in addition to FGDS scrubber sludge and landfill leachate. Dallman Ash Pond also received non-CCR sludge from the Water Purification Plant and miscellaneous storm water.

2.1.3 A survey of the extents of the Lakeside Ash Pond and Dallman Ash Pond and the data inputs that were utilized to create the final cover area estimates must be provided.

Response

Available construction documentation of the Lakeside Ash Pond and Dallman Ash Pond were provided in the February 1, 2022 Closure Construction Permit Application. The extents of the Lakeside Ash Pond and Dallman Ash Pond were based on multiple surveys defining the extents of the perimeter berms for the impoundments. These include on-site surveys as well as aerial surveys. LiDAR surveys were conducted most recently in 2018 and 2023. The extent of the impoundments have not changed since construction of the berms.

The final cover design was based on the October 15, 2018 LiDAR survey. Drawings containing

that information were provided in the Plans and Specifications located in Attachment 8 to the Closure Construction Permit Application.

Dewatering and CCR material stabilization studies were initiated in April 2024 and are anticipated to be completed in 2025. The design of the final cover system accounts for potential settlement to ensure continued proper drainage throughout the post closure care period. The information obtained from the dewatering and CCR material stabilization studies will be used to amend the final closure plan as needed and would be provided in a Closure Construction Permit Application at a later date. Final cover construction details will be provided in a Construction Certification Report which will be signed and sealed by a licensed professional engineer in the State of Illinois.

2.2 Narrative Description of the Facility [35 Ill. Adm. Code 845.220(a)(2)]

The CCR waste characterization must include all waste streams as defined by SW846, incorporated by reference, which includes appropriate number of samples to characterize each waste type and identification of all waste types which includes solids, semi-solids, liquids, and air born parts that come from the CCR. SW846 Chapter 9 defines a minimum number of samples of each waste stream as totaling four and must include additional sampling as warranted. The Agency reviewed the data submitted and found that CWLP must provide, at a minimum, additional sampling for the following waste streams:

- CCR solids and semi-solids-Lakeside Ash Pond
- Non-CCR solids-Dallman Ash Pond
- Contaminated subsoils, if any are above the water table
- Leachate water--Lakeside Ash Pond
- Surface water-Lakeside Ash Pond and Dallman Ash Pond
- Scrubber sludge-Lakeside Ash Pond
- Any other wastestream as defined by SW846 Compendium

Response

A comprehensive description of the waste streams directed to the impoundments was provided in Section 3 of the Initial Operating Permit Application. The laboratory results were provided in Attachment 5 of the subject document.

For clarification purposes, CCR solids and semi-solids in Lakeside Ash Pond would consist of fly ash and bottom ash from the retired Lakeside Power Station, which ceased sending these materials in 2009. CCR solids exclusively sent to Lakeside Ash Pond consist of sludge from the Flue Gas Desulfurization Waste Water Treatment Plant (FGD WWTP). CCR solids and semi-solids exclusively sent to Dallman Ash Pond consists of bottom ash and fly ash generated from Dallman Units 31, 32 and 33.

Non-CCR solids exclusively sent to Lakeside Ash Pond consist of sludge from the Generating Facilities Waste Water Treatment Plant (FGD WWTP). Non-CCR solids in both Lakeside and Dallman Ash Ponds would consist of lime sludge from the water purification plant.

Analytical results for all of the referenced waste streams were provided in the initial application.

Additionally, there is currently no surface water present in Lakeside Ash Pond. As such, no analytical information for these waste streams is available.

Dallman and Lakeside Ash Ponds ceased receiving all CCR and non-CCR waste streams on October 15, 2023. CWLP understands 35 Ill. Adm. Code 845.230(d)(2)(B) to require analysis of chemical constituents found ***within the CCR to be placed in the CCR surface impoundments (emphasis added)****. CWLP disagrees any additional analysis of chemical constituents found within the CCR to be placed in the CCR surface impoundments for all waste streams as defined by SW846, including TCLP/SPLP analysis is required or warranted per 35 Ill. Adm. Code 845.230(d)(2)(B). Additionally, CWLP disagrees there is a requirement to use SW 846 under 35 Ill Adm. Code 845.230(d)(2) for purposes of waste characterization of constituents found within the CCR to be placed in the CCR surface impoundments and requests clarification.*

CWLP also disagrees that 35 Ill Adm. Code 845.230(d)(2)(B) or (C) requires leachate water analysis, surface water analysis or contaminated subsoils, if any above the water table and request further clarification.

CWLP agrees that additional geochemical analysis of in-place materials resulting from all waste streams contained within the surface impoundments is appropriate and warranted in accordance with 35 Ill Adm. Code 845.230(d)(2)(C). In May 2024, four borings were advanced in Lakeside Ash Pond (L1, L3, L4 and L5) and four borings were advanced in Dallman Ash Ponds (D1, D2, D3 and D4) for the purpose of obtaining representative samples of in place materials and porewater. Each boring was advanced with hollow stem augers and solids samples were collected via split barrel samplers. While drilling, a porewater sample was collected from the approximate midpoint of each boring. Once the final depth was obtained, a PVC monitoring well was constructed using 10-foot prepacked screens and isolated in the bottom 12 feet of the impoundment for the purpose of collecting additional porewater samples at a later date. As stated above, representative CCR materials and pore water were collected from each borehole and analyzed via TCLP for the parameters identified in Section 845.620(a)(1). A drawing showing the boring locations and the analytical results are provided in Appendix B of Attachment A. A drawing showing the boring locations, boring logs, and well completion reports are also provided in Appendix C to Attachment A (Groundwater Monitoring Program and Statistical Procedures).

Sampling of the new impoundment wells occurred July 18, 2024; the laboratory has not finalized the analytical data as of the date of this response. The will be provided subsequent to receipt of the laboratory results.

2.3 Groundwater Monitoring Program [35 Ill. Adm. Code 845.220(a)(7) and Subpart F]

The groundwater monitoring program must be amended as follows for the Agency to continue its review:

2.3.1 A multi-unit groundwater monitoring system, must be installed to determine the constituents and waste boundary of the CCR since Sugar Creek and Lake Springfield are near the impoundments. The units to be monitored in accordance with Part 845 Subpart F must include the shallow clay that is in connection with Sugar Creek, unlithified aquifer, weathered shale (surficial shale unit), and any other aquifer identified migration pathways.

Response

In the area of the CCR surface impoundments the basal sand/bedrock interface is the only saturated zone and is identified as the uppermost aquifer for the site.

The bedrock at the project site consists of Pennsylvanian shales that are gray in color. The bedrock surface elevation varies from approximately 492 feet msl near the center of the existing landfill, to approximately 554 feet msl located on a bedrock outcrop near the landfill area (southeast corner of Cell 1). Along the down-gradient edge of the Dallman Ash Pond, the bedrock is at approximately 500 feet msl. In general, the bedrock surface slopes from the east and west towards the center of the landfill area.

The basal sand generally overlies the bedrock surface and underlies the lower cohesive deposit and is the lower-most unconsolidated deposit. There are some pockets of very hard, fine-grained silty clay to clay overlying bedrock in a few areas. The basal sand is present above these pockets of clayey deposits, thought to be weathered bedrock.

The basal sand is a gray colored, poorly graded, silty to clayey fine sand to well graded sand with minor amounts of fine gravel. This unit was encountered in a medium dense to dense condition. Across the CWLP facility (includes the Dallman and Lakeside Ash Ponds), the top elevation of the basal sand varies from 491 to 513 feet mean sea level (msl) and is as much as 12.3 feet thick; however, it some locations it is absent, likely due to excessive erosion of the creek bottom. Along the down-gradient (northern) edge of the Dallman Ash Pond area, the basal sand was found to range from 3 to 11.5 feet in thickness, and have an average thickness of 7.3 feet.

At similar elevations as the basal sand, cohesive soils were encountered in the borings advanced with the limits of the former Sugar Creek channel. The location of the former Sugar Creek channel is depicted on the August 13, 1976 Grading Plan drawing from Burns & McDonnell (Drawing Y29 – Rev. 4). Borings conducted along the abandoned creek locations indicate that the creek fill materials consist of variable soils ranging from silty clays to silty sands. In some areas, the cohesive fill materials extended down to the top of bedrock. Where encountered, the granular fill materials are typically poorly graded silty to clayey sands and contain organics or wood fragments. In some areas, the granular fill materials also extended down to the top of bedrock. The referenced drawing (Drawing Y29 – Rev. 4) was included as Figure 3 of Attachment 2 of Attachment 11 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond and is provided in the updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures in Appendix C of Attachment A.

The uppermost aquifer is characterized as the basal sand overlying the shale bedrock. In some CCR landfill locations the creek fill materials, ranging from silty clays and organic silty clays to silty sands and clayey sands, were found to be in direct hydraulic communication with the basal sand that directly overlies the bedrock surface. Due to the highly variable hydraulic characteristics and random placement of the creek fill materials, further characterization is difficult.

The lower cohesive deposit overlies the basal sand and consists of brown, gray, and brownish gray silty clays, clayey silts, and clays, having very soft to stiff consistency. Across the CWLP facility, the lower cohesive deposit is as much as 22 feet thick with an average thickness of about 15 feet. However, along the down-gradient (northern) edge of the Dallman Ash Pond the thickness of the lower cohesive deposit was found to range from 12.6 to 26.3 feet in thickness, and have an average thickness of 19.4 feet. The deposit was not encountered in isolated areas along the abandoned creek, possibly due to excessive erosion of the creek bottom in these areas. The bottom of the CCR surface impoundment rests directly on top of the lower cohesive deposit.

The lower cohesive deposit is generally overlain by the shallow sand and underlain by the basal sand. However, within the abandoned creek area, the lower cohesive deposit was encountered directly below the creek fill. In some areas the basal sand is not present and the lower cohesive deposit directly overlies the bedrock.

The shallow sand overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and clayey silt. This unit is not continuous over the entire site. Its thickness ranges from one to three feet over most of the investigated area. The shallow sand does not underlay the CCR surface impoundment.

The upper cohesive deposit is an alluvial deposit consisting of brown, light brown to brownish-gray silty clays to clayey silts having soft to stiff consistency. The unit includes loess deposits and isolated pockets of fine-grained silty to clayey sand and at some location alluvial silts and silty clays. The upper cohesive deposit is laterally adjacent to the sidewall of the CCR surface impoundment.

Along the west perimeter of the impoundments, three wells are partially screened or the screen filter packs are located within the upper cohesive deposit. These include AP-2, AP-3, and AP-14. The screen intervals at AP-1 and AP-10 are close to the contact between the upper and lower cohesive soils. As described in the Site Geology and Site Hydrogeology sections of the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures (Attachment A), the soil characteristics of the upper and lower cohesive soils are very similar. Differentiating the two deposits for purposes of monitoring is not necessary.

The groundwater monitor well network was designed to monitor impoundments in the uppermost aquifer. No revisions to the network are necessary.

2.3.2 The groundwater sampling and analysis program did not address all the sampling requirements in Section 845.640(a). The items below must be address. Laboratory reports, field purging, and sampling documentation must be provided to sufficiently address the requirements of Section 845.640(a).

- Sample collection,
- Sample preservation and shipment,
- Analytical procedures,
- Chain of custody control,
- Quality assurance and quality control including field and laboratory QA/QC measures, and

- Field and laboratory QA/QC measures.

Response

The Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures has been updated to include the requested information and is provided in Appendix C of Attachment A. This updated program is intended to replace to program proposed in the original operating permit application. The updated program provides recalculated background concentrations, the laboratory analytical reports, statistical method and addition of groundwater monitoring wells.

2.3.3 Evidence that the aforementioned aquifers and clay unit that are monitored for groundwater quality are also characterized in accordance with Section 845.640(c).

- Rate and direction of groundwater flow,
- Groundwater elevations in the location of CCR within a time period to avoid climate fluctuations, and
- Groundwater elevations in each well before purging.

Response

Groundwater movement is controlled by recharge along topographic highs and discharge along the original stream valley. The pre-surface impoundment flow direction in the uppermost aquifer was dominantly horizontal from the adjacent banks toward the natural convergence along Sugar Creek, which formerly drained the site. The overall flow was from south to north with local deviations. This dominant flow pattern persists under present day conditions but with localized variation introduced by the hydrologic discontinuity created upon construction of the CCR landfill and CCR surface impoundments.

Existing wells at the site, including wells from the CCR landfill, were used to derive potentiometric surface maps. As discussed, overall groundwater flow is from south to north. The east perimeter of the Lakeside Ash Pond is largely up-gradient, and the west side is largely side-gradient where groundwater movement is parallel to the perimeter. Excavated areas within the landfill boundary act as a groundwater sink along the east side of the Dallman Ash Pond. Groundwater generally moves northward under the Dallman Ash Pond but also moves easterly towards the FGDS Landfill and westerly towards Sugar Creek. Groundwater beneath the Lakeside Ash Pond also moves northward and westerly along Sugar Creek.

The basal sand generally consists of 0% to 34% gravel, 50% to 91% sand, and 6% to 44% silt/clay; and exhibits a horizontal hydraulic conductivity of ranging from 6.4 x 10^{-4} to 7.64 x 10^{-2} cm/sec. The geometric mean hydraulic conductivity is 6.75 x 10^{-3} cm/sec. The basal sand was saturated in all locations where it was encountered.

The horizontal hydraulic gradient of the basal sand was calculated based on groundwater flow from well G120 to well RW-3. Using these wells, horizontal hydraulic gradients were calculated for four consecutive quarterly measurements dating from second quarter 2022 to first quarter 2024. As presented below, the horizontal hydraulic gradients within the basal sand ranges from 0.00825 to 0.0128. The average horizontal hydraulic gradient is 0.011.

For the basal sand, the effective porosity is based on the saturation water content data of sand. The range provided is from 37% to 49% (Sharp-Hansen et al., 1990). A mean effective porosity value of 43% was selected for the baseline model.

The average horizontal velocity within the Basal Sand is estimated to be 0.49 ft/day (i.e., $v_{in} = Ki/n_e$ = (0.000675 cm/sec · 0.011) / 0.43 = 0.000173 cm/sec · 0.0328 ft/cm · 86400 sec/day = 0.49 ft/day).

Additional information can be found is response to 1.7.10 above.

2.3.4 The laboratory used during the time of groundwater sampling must be identified and it must be shown that the lab was using SW-846, incorporated by reference in Section 845.150, methods for the analysis.

Response

The Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures has been updated to include the requested information and is provided in Appendix C of Attachment A. This updated program is intended to replace to program proposed in the original operating permit application. The updated program provides recalculated background concentrations, the laboratory analytical reports, statistical method and addition of groundwater monitoring wells.

2.3.5 The permit application states that there is no evidence of subsidence, altered groundwater flow patterns, bedrock fracturing from the underground mining that underlies Dallman Ash Pond. However, the Agency is unaware of any data substantiating this claim, Attachment 2 provides an engineering report on the proposed modifications to an existing embankment at Lakeside Ash Pond. Additionally, the underground mine is only mentioned in the Hydrogeologic Report. There is no previous monitoring of potential subsidence with any instrumentation or data presented exhibiting that the total overburden load once Dallman Ash Pond is closed with a final cover will not exceed the maximum load that can be supported by the bedrock. Evidence to prove that the Dallman Ash Pond is not at risk to subsidence or settlement must be provided.

Response

CWLP has completed a comprehensive geotechnical investigation and has prepared location restriction documentation for 35 Ill Adm. Code 845.340 Unstable Areas and Floodplains that addresses the underground mine in the area of Dallman Ash Pond, which is provided as Appendix A of Attachment A.

2.3.6 The permit application states that the Lakeside Ash Pond base is at 535-feet asml and the Dallman Ash Pond base is at 533-feet asml. The FEMA flood insurance map indicates that flood zone AE encompasses the entirety of the Lakeside Ash Pond and the Dallman Ash Pond and is at an elevation of 546-feet asml and 545-feet asml, respectively. The permit application must provide the following:

- Boring logs or survey reports that verify the total depths of the ponds,
- Regular, temporal, or seasonal changes to the groundwater levels in relation to

surface water levels in Lake Springfield,
- Events that would cause the flood plain to be inundated with flood waters, and
- Yearly minimums and maximums for groundwater elevations at the Lakeside Ash Pond and the Dallman Ash Pond.

Response

As stated in the response to Comment 1.1.2, the FEMA flood insurance map is highly inaccurate. Any conclusions drawn based on the FEMA flood insurance map are suspect.

As part of the recent geotechnical investigations, CWLP advanced four borings in Lakeside Ash Pond and four borings in Dallman Ash Pond to confirm the bottom elevations of each impoundment. Borings L1, L3, L4 and L5 were advanced in Lakeside Ash pond where silty/clay materials were encountered at 534.5 feet msl, 530.5 feet msl, 553.0 feet msl and 530.0 feet msl, respectively. Borings D1, D2, D3 and D4 were advanced in Dalman Ash Pond where silty/clay materials were encountered at 526.0 feet msl, 523.0 feet msl, 526.0 feet msl and 529.5 feet msl respectively. A map depicting these locations and boring logs for these borings are provided in Appendix C of Attachment A.

Although monthly monitoring of groundwater elevations has been conducted since April 2021 per 35 Ill. Adm. Code 845.650(b)(2) and (3), the simultaneous recording of Sugar Creek did not begin until January 2023. Lake Springfield and Clarification Pond elevations were not collected until May 2023. Other historical elevations are available in the Annual Consolidated Reports for 2021 and 2022. Data for 2023 is provided below. It must be noted that the water levels within the impoundments may be below ground surface elevations of areas within the impoundments; i.e. the water levels are below grade. The Lakeside Ash Pond has been dry since October 2023. Available data for groundwater and surface water elevations for 2023 are as follows:

Unit	27-Jan-23	16-Feb-23	29-Mar-23	12-Apr-23	30-May-23	15-Jun-23	6-Jul-23	31-Aug-23	16-Sep-23	26-Oct-23	27-Nov-23	27-Dec-23
Lakeside Ash Pond	562.04	562	562.14	562.52	562.1	561.98	561.96	562.03	560.77	NM	NM	NM
Dallman Ash Pond	550.65	550.52	550.6	550.3	550.14	549.49	550.6	549.82	550.94	550.3	550.09	550.6
Sugar Creek	NM	NM	NM	NM	521.25	520.31	521.88	520.2	520.21	520.33	520.31	520.33
Lake Springfield	NM	NM	NM	NM	560.28	560.08	560.33	559.93	558.97	558.58	558.43	558.92
Clarification Pond	NM	NM	NM	NM	548.66	547.97	548.46	548.74	549.33	548.51	547.08	547.93
RW3	528.52	529.21	529.86	529.68	529.24	528.22	527.43	527.35	526.66	526.63	526.8	527.46
AP-1	525.48	526.15	526.63	525.45	525.28	524.31	525.18	524.24	523.88	523.95	524.16	524.64
AP-2	529.2	528.85	529.51	528.86	527.99	527.32	527.53	527.77	527.08	527.4	527.64	528.71
AP-3	525.93	526.31	526.52	525.77	525.74	525.33	524.69	524.41	525.24	525.31	525.31	525.81
AP-4	549.23	550.01	549.88	546.14	547.03	546.83	546.71	546.17	545.25	544.87	544.95	545.18
AP-5	569.03	568.43	570.86	570.85	570.33	569	569.82	568.88	566.63	565.73	565.16	566.1
AP-6	529.87	530	530.71	529.03	528.71	527.58	526.98	526.95	526.24	526.4	526.32	526.93
AP-7	NM	525.54	528.75	527.43	527.71	527.71	526.57	526.15	525.75	525.44	525.33	525.56
AP-8	532	532	533.21	535.95	535.38	533.99	533.56	533.4	532.42	532.23	532.77	533.72
AP-9	NM	529.27	529.34	525.07	524.94	523.74	524.72	523.61	523.19	523.33	523.65	524.48
AP-10	NM	534.82	535.01	534.45	533.74	532.44	532.54	532.29	531.29	530.93	531.67	532.67
AP-11	NM	524.49	525.4	523.9	524.29	522.77	523.39	522.69	522.27	522.14	522.82	522.98
AP-12	NM	524.49	526.14	525.64	525.68	523.58	523.97	522.66	522.42	522.16	522.72	523.03
AP-13	NM	523.3	529.36	528.09	527.28	524.67	524.43	523.52	522.53	522.12	522.68	523.02
AP-14	NM	538.58	538.23	537.2	537.66	537.23	538.12	537.57	536.41	535.88	536.52	537.56

The surface water level information along with the potentiometric surface data will be submitted to the Illinois EPA in the annual reports.

2.3.7 The hydrogeologic site characterization must address compliance with Sections 845.620(b)(2), 845.620(b)(6), 845.620(b)(1 1), 845.620(b)(13), 845.620(b)(15), and 845.620(b)(18) to demonstrate that floodplain inundation will not result in a release of CCR to Sugar Creek or other surface water bodies, public lands, or private lands.

Response

CWLP believes it has generally complied with the cited provisions. Based on the wording, it appears Illinois EPA means inundation of the floodplain as a result of surface water overbank flooding of Sugar Creek or other adjacent surface water bodies and the resultant impact of such flooding on the existing in-place CCR and the potential for redistribution of the CCR within the floodplain. The comment implies that floodplain inundation will occur.

As stated above, the FEMA Flood Insurance map is in error. While FEMA map shows there is inundation during the 100-year storm event, the topographic information used in derivation of the

flood elevations was highly inaccurate. There is no surface water inundation. In addition, CWLP updated its inflow design report in the 2023 Annual Consolidated Report to demonstrate that the ash ponds are designed and operated to contain a 1,000 year storm (previous demonstrations studied a 100 year storm). Attachment 5 of the 2023 Annual Consolidated Report also provides the Engineer Certification for the updated Inflow Design Flood Control System Plan.

To comply with the application requirements of 35 Ill. Adm. Code 845.220(a)(7)(A), the Hydrogeology Report must be amended as follows for the Agency to continue its review:

2.3.8 The climate aspects of the site including any seasonal fluctuations that would affect the sampling procedures or the characterization of the groundwater must be provided in accordance with Section 845.620(b)(2).

Response

The local weather conditions and climate patterns specific to the location includes temperature, precipitation, humidity, wind patterns. The seasonal fluctuations of these climate characteristics are summarized on https://www.weather.gov/ilx/spi-climate. The only weather conditions which impact sampling procedures and groundwater sampling are freezing conditions and flooding conditions.

Seasonal fluctuations of the potentiometric surfaces as well as surface water body elevations were addressed in response to Comment 1.7.15 above. The hydrogeologic setting and potential migration pathways were discussed in detail in the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C to Attachment A of this document. The monitor wells are appropriately located to account for any seasonal variations.

2.3.9 Identify any potential migration pathways near both impoundments that could leak CCR into surface water, community wells, or private wells in accordance with Section 845.620(b)(11).

Response

Potential migration pathways are limited to the occurrence of seeps, and or the migration through the uppermost aquifer in the event of vertical seepage from the CCR surface impoundments. The two surface water intakes were identified in Section 3.3.1 of the hydrogeologic report are upgradient and disassociated with the surface impoundments. No community water supply wells or private potable water wells were identified within 2,500 feet of the impoundments.

Attachment 12 of the February 1, 2022 Closure Construction Permit Application characterizes impacts from the seepage of leachate to downgradient receptors. As characterized in Attachment 12, there are no receptors within the Sugar Creek basin within 3,400 feet of the CCR surface impoundments. Closure in place with a final cover system does not pose a risk to human health or the environment. The groundwater contaminant transport model demonstrates that concentrations detected above groundwater protection standards (GWPSs) will be limited in extent.

Such evaluation can be complex; however, this specific issue was addressed in the December 2014

USEPA document titled. Human and Ecological Risk Assessment of Coal Combustion Residuals[2]. This document identified potential risks to human and ecological receptors from leaching of chemical constituents from CCR waste into surrounding environmental media. Risks to human health resulted from ingestion of ground water and fish, while risks to ecological receptors resulted from exposure to surface water. However, considerable dilution and attenuation would occur before constituent concentrations reach downgradient private wells and surface water bodies. As stated above, there are no receptors in the vicinity of the impoundments.

2.3.10 Boring to 100 feet in accordance with Section 845.620(b)(13), boring must be logged for lithologic, stratigraphic, and fracture/discontinuity characteristics including rock type, fractures and other discontinuities in accordance with applicable ASTM methods.

Response

The deep bedrock boring was advanced to a total depth of 103.5 feet bgs (429.5 ft msl). The materials encountered in the deep bedrock boring were continuously logged in the field by an Andrews Engineering professional geologist noting the lithologic, stratigraphic, and fracture/discontinuity characteristics including rock type, fractures and other discontinuities. The log for boring B100 is included in the updated hydrogeologic report and groundwater monitoring program document included as Appendix C of Attachment A. Weathering fractures were observed in the upper portion of the bedrock at this location. No secondary flow fractures were observed. No voids directly or indirectly associated with the underground mining at this location were observed.

2.3.11 Updated geologic setting with data from 100-feet boring in accordance with Section 845.620(b)(6) .

Response

The 100-foot boring required by Section 845.620 was completed in April 2024; information from the boring was used to augment the hydrogeologic characteristics of the site. The updated hydrogeologic report and groundwater monitoring program document is included as Appendix C of Attachment A.

2.3.12 Updated fracture/discontinuity and potential secondary flow characteristics with data from 100-feet boring in accordance with Section 845.620(b)(7).

Response

The log for boring B100 is included in the updated hydrogeologic report and groundwater monitoring program document included as Appendix C of Attachment A. Weathering fractures were observed in the upper portion of the bedrock at this location. No secondary flow fractures were observed. No voids directly or indirectly associated with the underground mining at this

[2] U.S. EPA. 2014. "Final Human and Ecological Risk Assessment of Coal Combustion Residuals." RIN: 2050-AE81. Prepared by the EPA Office of Solid Waste and Emergency Response. Washington, DC. December.

location were observed.

2.3.13 Updated geologic cross-sections with data from 100-feet boring, groundwater elevations in wells, and hydraulic gradients in accordance with Section 845.620(b)(9).

Response

The log for boring B100 is included in the updated hydrogeologic report and groundwater monitoring program document included as Appendix C of Attachment A. The geologic cross-sections have been updated using data collected from the 100-feet boring. Groundwater elevations and hydraulic gradients have been summarized and calculated for the 2nd quarter 2022 through 1st quarter 2024.

2.3.14 Updated geochemical and physical properties of the geologic layers with data from 100-feet boring in accordance with Section 845.620(b)(15).

Response

Where applicable the information gathered from the 100-feet boring was used to update the hydrogeologic report and groundwater monitoring program document included as Appendix C of Attachment A.

2.3.15 Updated hydraulic characteristics of the shallow cohesive unit/shallow sand in accordance with Section 845.620(b)(16) and determine if there is a risk to human health or the environment through the shallow cohesive unit/shallow sand to the Sugar Creek.

Response

The migration pathway of concern in the area of the CCR surface impoundments is the basal sand/shallow bedrock interface. The shallow sand is the only other migration pathway present at the facility and was only encountered in a few shallow wells which monitor the FGDS landfill Disposal Area. A detailed discussion of the upper cohesive soils is provided in the response to Item 1.7.7 above.

2.3.16 Updated monitoring network to include monitoring wells in the shallow cohesive/shallow sand unit in accordance with 35 IAC 845.630(d).

Response

The shallow sand overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and clayey silt. This unit is not continuous over the entire site. Its thickness ranges from one to three feet where encountered. The shallow sand was not encountered in borings advanced in the vicinity of the CCR surface impoundments and does not underlay the CCR surface impoundments.

The shallow sand overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and

clayey silt. This unit is not continuous over the entire site. Its thickness ranges from one to three feet over most of the investigated area. The shallow sand does not underlay the CCR surface impoundment.

The upper cohesive deposit is an alluvial deposit consisting of brown, light brown to brownish-gray silty clays to clayey silts having soft to stiff consistency. The unit includes loess deposits and isolated pockets of fine-grained silty to clayey sand and at some location alluvial silts and silty clays. The upper cohesive deposit is laterally adjacent to the sidewall of the CCR surface impoundment. Along the west perimeter of the impoundments, three wells are partially screened or the screen filter packs are located within the upper cohesive deposit. These include AP-2, AP-3, and AP-14. The screen intervals at AP-1 and AP-10 are close to the contact between the upper and lower cohesive soils. As described in the Site Geology and Site Hydrogeology sections of the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures (Attachment A), the soil characteristics of the upper and lower cohesive soils are very similar. Differentiating the two deposits for purposes of monitoring is not necessary.

The groundwater monitor well network was designed to monitor impoundments in the uppermost aquifer. No revisions to the network are necessary.

2.3.17 The hydraulic characteristics must be updated with data from migration pathways and include the following:

- Water table depths,
- Effective and total porosities in each aquifer,
- Hydraulic conductivities in each aquifer,
- Direction and velocity of groundwater flow in each aquifer, and
- Updated map of potentiometric surfaces reflecting the different migration pathways.

Response

Where applicable the information gathered from the 2023 and 2024 investigations has been used to update the Groundwater Monitoring Program and Statistical Procedures included as Appendix C of Attachment A.

2.3.18 The groundwater classification in accordance with Section 845.620(b)(l7) must be addressed.

Response

The Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures has been updated to include the requested information and is provided in Appendix C of Attachment A. This updated program is intended to replace to program proposed in the original operating permit application. The updated program provides recalculated background concentrations, the laboratory analytical reports, statistical method and addition of groundwater monitoring wells.

2.4 Final Closure Plan [35 Ill. Adm. Code 845.220(d)(2)]

The Final Closure Plan must be revised to include the following:

2.4.1 The Closure Alternative Analysis in accordance with Section 845.710.

Response

CWLP is unsure what information in the Final Closure Plan must be revised and requests clarification. The Closure Alternatives Analysis was completed concurrently with the Assessment of Corrective Measures and was provided in Attachment 11 of the Closure Construction Permit Application.

2.4.2 The CCR surface impoundments must be closed in a manner that will preclude the probability of future impoundment of water, sediment, or slurry, provide major slope stability, and be completed in the shortest amount of time in accordance with Section 845.750(a).

Response

The final closure of the CCR surface impoundments will include a sloped final cover system to drain storm water off of and away from the impoundments, encapsulate the CCR and will be designed to prevent instability. Once given approval of the final closure plan leaving CCR in-place, closure will take approximately 18 to 24 months, weather dependent.

2.4.3 The dewatering activities seems to indicate that the CCR will no longer be saturated, which is not exhibited by data. However, no groundwater plume mitigation measures are proposed such as a slurry wall or other containment structures. Details to the dewatering and drainage section detailing how the CCR will be protected from interaction with the groundwater and surface water must be provided in accordance with Section 845.750(b).

Response

Dewatering and CCR material stabilization studies at Lakeside and Dallman Ash Ponds began in April 2024 and are anticipated to continue into 2025. The information obtained from the studies will be used to update the Final Closure Plan and will be provided in a Closure Construction Permit Application at a later date.

HELP modeling was provided to predict the rate of CCR surface impoundment head decrease in the Contaminant Transport Model, Attachment 2 of the Closure Alternatives Analysis of the Closure Construction Permit Application and conservatively assumed the full thickness of CCR material was present and saturated. Plume mitigation measures were evaluated as part of the Assessment of Corrective Measures which was completed concurrently with the Closure Alternatives Analysis. This included evaluation of vertical barriers, groundwater extraction and groundwater treatment. The Assessment of Corrective Measures evaluated the performance, reliability and ease of implementation for each option such as slurry walls, grout curtains, cut off walls and sheet pilings. No groundwater plume mitigation measures outside of closure with a final cover systems are proposed.

2.4.4 Details on the grading and compaction plan that will ensure compaction and CCR stabilization being achieved even where CCR is fully saturated below the water table must be provided accordance with Sections 845.750(b)(l) and 845.750(c)(3).

Response

Final grading and compaction plans have been developed but will likely be amended during the final engineering design as discussed in Attachment 13 of the Closure Construction Permit Application. Compaction and potential settlement of the CCR has been accounted for in the final cover system design. Any modifications to the final engineering design after upon completion of dewatering and stabilization activities will be submitted in a future Closure Construction Permit Application.

Dewatering and CCR material stabilization studies at Lakeside and Dallman Ash Ponds began in April 2024 and are anticipated to continue into 2025. The information obtained from the studies will be used to update the Final Closure Plan and will be provided in a Closure Construction Permit Application at a later date.

2.4.5 If saturated CCR is left in place without solidification to ensure that the CCR is stable, then details of means and methods that will be used to comply with Section 845.750(c)(3) must be provided.

Response

Dewatering and stabilization studies at Lakeside and Dallman Ash Ponds began in April 2024 and are anticipated to continue into 2025. The information obtained from the dewatering study will be used to update the Final Closure Plan and will be provided in a Closure Construction Permit Application at a later date.

2.4.6 A final protective layer is not proposed. The closure plan must be revised to include the following:

- Ensure that there is a final protective layer installed over the low permeability layer in accordance with Section 845.750(c)(2)(A),
- Ensure that the final protective layer is at least 3 feet thick in accordance with Section 845.750(c)(2)(B) or demonstrate that another final protective layer provides equivalent or superior performance,

Response

The final protective layer is discussed in Section 3.5 of the Final Closure Plan., which specifies a 3 feet thick final protective layer. CWLP is unsure what additional information is needed and requests clarification.

- The final protective layer soils must not be contaminated and must not pose a threat to human health and the environment. No analytical data is provided ensuring that the final protective layer (erosional layer) is uncontaminated. Soils for use in covering the CCR surface impoundments or other construction at the site must comply with the following:
  - Borrow source sampling must be conducted using SW846 Test Method 1312 for SPLP

for SVOCs, VOCs, and PCBs listed in 35 Ill. Adm. Code Part 620 and metals listed in Section 845.600 or, alternatively, the borrow source material must be certified "uncontaminated soil" to ensure that the borrow source material does not pose a risk to human health and the environment.

Response

Although CWLP has historically used nearby properties for borrow materials, the borrow source area for procurement of the final protective layer soils has not been determined. CWLP agrees this testing should be a condition of the closure construction permit.

- A certification by a professional engineer that the final cover system meets the requirements of Section 845.750 must be provided in accordance with Section 845.750(c)(4).

Response

See Attachment 9 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. CWLP believes this certification meets the requirements of 35 Ill Adm. Code 845.750. However, a separate certification can be prepared if needed.

2.4.7 Details on whether CCR generated at the facility for fill during the placement of the final cover will be used must be provided. Details of any CCR being beneficially reused on site in accordance with 35 IAC 845.750(d) must be provided.

Response

CWLP will not be using the exemptions in 845.750(d) to bring additional CCR material on-site for closure purposes. Only CCR material generated at the facility and located at the facility at the time closure was initiated will be used.

2.4.8 Modeling data and survey data to substantiate the claims of capacity in Section 4 of the Final Closure Plan must be provided. A bottom depth of each CCR surface impoundment must be provided.

Response

As part of the recent geotechnical investigations, CWLP advanced four borings in Lakeside Ash Pond and four borings in Dallman Ash Pond to confirm the bottom elevations of each impoundment. Borings L1, L3, L4 and L5 were advanced in Lakeside Ash pond where silty/clay materials were encountered at 534.5 feet msl, 530.5 feet msl, 553.0 feet msl and 530.0 feet msl, respectively. Borings D1, D2, D3 and D4 were advanced in Dalman Ash Pond where silty/clay materials were encountered at 526.0 feet msl, 523.0 feet msl, 526.2 feet msl and 529.5 feet msl, respectively. A map depicting these locations and boring logs for these borings are provided in the geotechnical report contained in Appendix A of Attachment A.

Evaluation of the CCR quantities is ongoing for purposes of final cover elevation revisions and

redistribution for the slope configurations for both impoundments. Once completed, the applicable data and design will be provided to the Illinois EPA for review.

2.4.9 The data inputs that were utilized to create the final cover area estimates and, for the purpose of construction and adequate estimation of costs, quantities of materials and quality control, a survey of the extents of the Lakeside Ash Pond and the Dallman Ash Pond must be provided.

Response

Available construction documentation of the Lakeside Ash Pond and Dallman Ash Pond were provided in the February 1, 2022 Closure Construction Permit Application. The extents of the Lakeside Ash Pond and Dallman Ash Pond were based on multiple surveys defining the extents of the perimeter berms for the impoundments. These include on-site surveys as well as aerial surveys. LiDAR surveys were conducted most recently in 2018 and 2023. The extent of the impoundments have not changed since construction of the berms.

The final cover design was based on the October 15, 2018 LiDAR survey. Drawings containing that information were provided in the Plans and Specifications located in Attachment 8 to the Closure Construction Permit Application.

Final cover construction details will be provided in a Construction Certification Report which will be signed and sealed by a licensed professional engineer in the State of Illinois.

In the meantime, now that no additional CCR or non-CCR material will be sent to the surface impoundments, CWLP has been able to engage an engineering firm to evaluate dewatering and material stabilization studies as well as evaluation of cover designs and options that will be used to update the final cover design provided to the Agency.

2.4.10 A schedule for the closure of the Lakeside Ash Pond and the Dallman Ash Pond must be provided for the Agency to consider the closure schedule.

Response

A closure schedule was provided on Pages 3-4 of the Final Closure Plan (see Attachment 13 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond.

CWLP has initiated dewatering and CCR material stabilization studies which are anticipated to be completed in 2025. CWLP can work on developing and submitting a more detailed construction schedule now that it has initiated closure by ceasing receipt of CCR material and applying for a closure permit. The new closure schedule will be based on activities to take place once the permit is issued.

Specific dates cannot be provided until a Closure Construction Permit is issued detailing the approved method of closure, i.e. closure with a final cover system or closure by removal. 35 Ill Adm. Code 845.760(a) would require the owner or operator to complete closure within the timeframe approved by the Agency, or within five years of obtaining a construction permit for closure, whichever is less. However, CWLP is open to providing additional details if Illinois EPA

clarifies what specifically was found lacking in the initial schedule.

- A certification by a professional engineer that the Final Closure Plan meets the requirements of Section 845.720(b) must be provided in accordance with Section 845.720(b)(5).

Response

See Attachment 9 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. CWLP believes this certification meets the requirements of 35 Ill Adm. Code 845.720. However, a separate certification can be prepared if needed.

2.5 Closure Alternatives Analysis and Corrective Action [35 Ill. Adm. Code 845.220(d)(2) and 845.220(c)]

The closure alternatives analysis must be revised to include the following:

2.5.1 The permit application does not discuss the long-term risks of closure with a final cover. The long-term risks of the Dallman Ash Pond and the Lakeside Ash Pond being in the FEMA flood zone, possibility of dam failure, and any other potential events that could cause a release of the CCR to the Spring Creek or other environmental release must be delineated. Additionally, because it is known that the CCR at the Dallman Ash Pond and the Lakeside Ash Pond are partially submerged in groundwater, an investigation, discussion and propose mitigation measures for the groundwater with the closure with a final cover must be provided.

Response

The current FEMA flood zone map is inaccurate. The flood zone highlighted by FEMA is based on topographic contours from a USGS quadrangle map from 1965, which did not show the Lakeside impoundment that existed at that time. The Dallman Ash Pond was not shown as it had not been constructed yet. However, the FEMA floodplain elevations were based on the old topographic information.

FEMA identifies the 100-year floodplain at the Dallman Ash Pond as elevation 545 feet above mean sea level (msl). The berm elevation at the northwest corner of the Dallman Ash Pond (lowest point) is approximately 553 feet above msl. The perimeter berm elevations around the impoundments increase to the south by approximately 10 feet to transition to the top of dam/bridge elevation. Therefore, there is no chance the structures will be inundated by floodwaters from the Sugar Creek floodplain during a 100-year storm event.

The impacts of the FEMA flood zone on the foundation and construction of the current CCR surface impoundments was presented in the February 1, 2022 Closure Construction Permit Application. However, further hydrogeologic characterization was completed in April/May of 2024 which included the boring and installation of additional wells at locations opposite the CCR surface impoundments, across Sugar Creek, a deep bedrock boring located along the northern edge of Dallman Ash Pond and the boring and installation of 4 leachate wells in each of the CCR surface impoundments. Information from these investigations was used to augment in the revised Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures included as Appendix C of Attachment A.

Neither impoundment is partially submerged. Since sluicing activities halted, water levels within the CCR at both impoundments have decreased. In addition, dewatering and material stabilization studies began in April 2024 and are expected to continue through 2025. Dewatering, in conjunction with material stabilization and grading and ultimately placement of the final cover system will reduce water levels within the impoundments.

The submitted contaminant transport modeling was based in part on the premise that pore water levels would decrease via gravity and that background concentrations or groundwater protection standards would be achieved. Inclusion of dewatering activities within the impoundments will shorten the time needed to achieve the background concentrations or groundwater protection standards.

2.5.2 A survey of the extents of the Lakeside Ash Pond and Dallman Ash Pond and the data inputs that were utilized to create the final cover area estimates must be provided.

Response

Available construction documentation of the Lakeside Ash Pond and Dallman Ash Pond were provided in the February 1, 2022 Closure Construction Permit Application. The extents of the Lakeside Ash Pond and Dallman Ash Pond were based on multiple surveys defining the extents of the perimeter berms for the impoundments. These include on-site surveys as well as aerial surveys. LiDAR surveys were conducted most recently in 2018 and 2023. The extent of the impoundments have not changed since construction of the berms. The final cover design was based on the October 15, 2018 LiDAR survey. Drawings containing that information were provided in the Plans and Specifications located in Attachment 8 to the Closure Construction Permit Application. Final design details will be based on actual field conditions at the time of construction.

CWLP has initiated dewatering and CCR stabilization studies which are anticipated to be completed in 2025.

As the final cover area is subject to change based on dewatering, material stabilization and material consolidation, final cover construction details will be provided in a Construction Certification Report which will be signed and sealed by a licensed professional engineer in the State of Illinois.

CWLP agrees that the submittal of final cover construction details should be a permit condition of an issued Closure Construction Permit.

2.5.3 The permit application states multiple short-term risks that might be posed to a community or environment through closure by removal. The closure alternatives must accurately address how those short-term risks are mitigated in accordance with OSHA standards and other existing regulations.

Response

35 Ill. Adm. Code 845.710(b) requires the applicant to examine the short term risk that might be posed to a community or the environment during a closure, including potential threats to human health and the environment associated with excavation, transportation and re-disposal of contaminants. The closure alternatives analysis accurately identified the short term risks

that might be posed as during closure by removal as required per regulation. CWLP disagrees that the closure alternatives analysis must address mitigation of short term risks to a community or environment with OSHA standards and requests clarification from Illinois EPA. OSHA standards set for the requirements for employers to protect employees from hazards. In general, protection of communities and environment during short term removal would incorporate best practices of tarping trucks, using wash pads to prevent tracking of materials onto roadways, etc.

The Closure Construction Permit application proposes closure by installation of a final cover system and not closure by removal. If closure by removal were to be required, CWLP agrees a Closure Construction Permit application would be required to address risk mitigation for employees, contractors and third party contractors as well as best practices for protection of communities and environment. Additionally, these factors would be addressed under the Safety and Health Plan as required per 35 Ill. Adm. Code 845.530.

2.5.4 The permit application must address the groundwater contamination nature and extent and provide a framework for measures that will be taken to prevent it from leaving the property.

Response

The nature, extent and measures taken to prevent migration of groundwater contamination are discussed in Section 3.2.1 of the Closure Alternatives Assessment and Assessment of Corrective Measures, Attachment 11 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. Closure in place with a final cover system was the framework selected corrective action to prevent further releases to the environment. The corrective action selected is closure in place with a final cover system which will achieve compliance with groundwater protection standards..

The Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures has been updated and is provided in Appendix C of Attachment A. This updated program is intended to replace to program proposed in the original operating permit application. The updated program provides recalculated background concentrations, the laboratory analytical reports, statistical method and discussions of the addition of groundwater monitoring wells on the periphery of the west and northern boundary of the impoundments.

CWLP is in the process of collecting additional groundwater data for total arsenic at a lower reporting limit. Groundwater analytical results for total arsenic prior to third quarter 2023 used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. To date, CWLP has collected four of the eight required samples to calculate background concentrations. Once the additional groundwater data is collected, CWLP will provide an updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures with proposed backgrounds for total arsenic.

2.5.5 The permit application states the extent to which containment practices will reduce further releases by closure in place with a final cover system. How the closure by removal will reduce further releases in the groundwater and from extreme events must be addressed.

Response

Both closure by removal and closure in place eliminate risk by eliminating the source of contaminants, either by complete removal or encapsulation which would ultimately prevent further solute migration. Closure by removal will result in the disruption of the redox conditions likely resulting in the potential for migration due to increased dissolution and chemical reactions mobilizing contaminant ions.

Extreme events would be related to a catastrophic failure of an earthen berm either as a result of seismic event or by flooding conditions along Sugar Creek which could compromise the berm integrity. These are conditions evaluated in the hazard analyses of the Safety Factor Assessment submitted as Attachment 3 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond and updated in 2024. Closure by removal would eliminate the berms, reducing the effects due to extreme events.

Contaminant transport modeling presented in the Closure Construction Permit Application addressed both closure methods result in achieving groundwater protection standards.

2.5.6 The permit application states that the Lakeside Ash Pond and the Dallman Ash Pond pose no risk to human health or the environment, so it is not necessary to use treatment technologies. Evidence that the Lakeside Ash Pond and the Dallman Ash pond pose no threat to human health or the environment must be provided.

Response

In its current state, and the conditions expected during in-place closure/capping, the threat to human health is reduced to groundwater ingestion and/or fugitive dust. Regarding groundwater ingestion, there are no groundwater receptors within the limits of the expected contaminant migration with closure in-place (see the Closure Alternatives Assessment and Assessment of Corrective Action included as Attachment 11 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond). Fugitive dust emissions should be minimized through closure in-place and would expected to be much greater as a result of closure-by-removal. In addition to potential threat to human health or the environment from the CCR material or leaching of CCR constituents to groundwater, the additional potential impacts/hazards are related to the loading and trucking of CCR material to a disposal facility.

Human health protections during closure will be covered by the Safety and Health plan pursuant to 35 Ill. Adm. Code 845.530.

2.5.7 A description and associated environmental data, data analyses, and recommendations pertaining to the contaminants and transport variations that could occur over time during each closure alternative, including seasonal variations must be provided.

Response

This was discussed in great detail in the assessment of corrective measures document. (See Section 2.3.of the Closure Alternatives Assessment and Assessment of Corrective Action which is Attachment 11 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond).

This discussion included, but was not limited to the long and short-term effectiveness, magnitude of reduction of existing risks, magnitude of residual risks, long term management, reliability of engineering and institutional controls, potential for future corrective action and potential for future releases. Given closure is required to be completed within five years of issuance of a closure construction permit, seasonal variations affecting contaminant transport would effectively be limited to dewatering activities and seasonal precipitation events. The contaminant transport model typically utilized worst-case input values which accounted for seasonal variability as discussed in the aforementioned document. Using a transient model will only reduce the solute transport over time. The model assumed an outward hydraulic gradient the entire model period, representing worst-case.

CWLP is unsure of what additional seasonal variation information is required and requests clarification.

2.5.8 The Corrective Action must be revised to include the following:

To comply with the application requirements of 35 Ill. Adm. Code 845.220(c)(1), the applicant must provide a corrective action plan. The permit application states that the corrective action plan is in various attachments. The corrective action plan must be compiled together in a single attachment.

Response

The corrective action plan is based on the assessment of corrective measures is contained in the Closure Alternatives Assessment and Assessment of Corrective Action which is Attachment 11 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. The corrective action being closure-in place with a final cover; as such, the closure plan is the corrective action plan.

35 Ill. Adm. Code 845.670(b) requires the owner/operator to submit a construction permit application that identifies the selected remedy within one year after completing the assessment of corrective measures and public meeting. The assessment of corrective measures identified closure in place with a final cover system as the selected remedy. CWLP is unsure how to proceed with this requirement and requests clarification as a determination of the Closure Alternatives Assessment is still under review by Illinois EPA.

2.5.9 A certification by a professional engineer that the corrective action demonstration is accurate and complete must be provided in accordance with Section 845.660(a)(2).

Response

See Attachment 9 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. . CWLP believes this certification is sufficient but can provide a separate certification if needed. Future corrective action permit applications will also contain appropriate professional engineer certifications.

2.5.10 The permit application states multiple methods that might be used for groundwater corrective action. Any corrective action taken must be compliant with Sections 845.660, 845.670, and 845.680.

Response

The Closure Alternatives Assessment and Assessment of Corrective Measures discusses the various corrective measures that were evaluated for groundwater corrective action. The groundwater corrective action to be implemented at the facility is based on the in-place closure of the CCR surface impoundments with a final cover system. Although other corrective actions were evaluated as part of the Assessment of Corrective Measures, this is the only proposed corrective action. This effort requires dewatering and capping of the CCR surface impoundments to mitigate infiltration. Contaminant transport modeling demonstrates that the impacts to groundwater will not migrate beyond the facility property and will achieve compliance with the groundwater protection standards following implementation.

CWLP is unsure what additional information Illinois EPA requires and requests clarification.

2.5.11 The permit application must apply appropriate minimum detection limits for each constituent in order to evaluate the constituent statistically and to compare against the numerical groundwater protection standard in 35 IAC 845.600(a)(l).

- The following constituents have a calculated groundwater protection/background value that does not exhibit the correct use of the statistics:
  - Arsenic
  - Barium
  - Beryllium
  - Boron
  - Cadmium
  - Calcium
  - Chromium
  - Cobalt
  - Lead
  - Mercury
  - Molybdenum
  - Selenium
  - Thallium
- The following constituents have a reporting limit higher than the GWPSs in 35 IAC 845.600(a)(l) that exceed the numerical value in 35 IAC 845.600(a)(l):
  - Arsenic
  - Lead
- The following constituent numerical groundwater protection standard is incorrectly cited from 35 IAC 845.600(a)(l)(I):
  - Cobalt

Response

CWLP is in the process of collecting additional groundwater data for total arsenic at a lower reporting limit. Groundwater analytical results for total arsenic prior to third quarter 2023 used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. To date, CWLP has collected four of the eight required samples to calculate background concentrations. Once the additional groundwater data is collected, CWLP will provide an updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures (Appendix C to Attachment A) with proposed backgrounds for total arsenic. Additionally, CWLP will use existing groundwater analytical data to propose a new background concentration for total lead per 35 Ill Adm. Code 845.600 for Illinois EPA review.

The updated Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures provided in Appendix C of Attachment A provides the laboratory analytical reports used to calculate the revised background concentrations. As previously stated, CWLP is in the process of collecting additional background samples for total arsenic and will provide updated background concentrations for arsenic and lead when available.

2.6 Post-Closure Care Plan [35 IAC 845.220(d)(5)]

2.6.1 The specific statistical procedures that have been proposed or at least the reference to the appropriate statistical procedure in Sections 845.640(f) or (g) must be cited.

Response

CWLP is not proposing to change any statistical procedures during post-closure care from the Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures. CWLP shall continue to use the appropriate certified statistical procedures as referenced in the Groundwater Monitoring Program of record. See Appendix E of Attachment 12 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. As stated in Attachment 12, the statistical analysis chosen is the site specific upper confidence limit in accordance with 35 Ill. Adm. Code 845.640(f)(1)(c) and 845.640(g).

2.6.2 Any change to future use would constitute an amendment of the written post-closure plan and must be submitted for review and approval by the Agency in accordance with Section 845.780(d)(3)(C). The text of Section 5.0 of the Post-Closure Care Plan must be amended to state that review and approval will be sought from the Agency prior to changes to the Post-Closure Care Plan are implemented.

Response

CWLP agrees with Illinois EPA's statement of the legal requirements to change future use of the impoundments and believes that Section 5.0 of the Post-Closure Plan reflects this understanding and is not deficient. Section 5 of the Post-Closure Care Plan specifically states that "If future use of the impoundments is considered, a demonstration must be made to the Illinois EPA prior to such use that no disturbance will occur resulting in an increase of potential threat to human health and environment". Section 5.0 further states "Any demonstration must be certified by a qualified professional engineer." This language clearly demonstrates the intent of CWLP to seek approval by the Agency prior to the change of any future use as required pursuant to 35 Ill Adm. Code 845.480(d)(3)(C).

2.6.3 A certification by a professional engineer that the Post-Closure Care Plan meets the requirements of Section 845.780 must be provided.

Response

See Attachment 9 of the February 1, 2022 Closure Construction Permit application for the Lakeside Ash Pond and Dallman Ash Pond. CWLP believes this certification of closure construction is sufficient. If Illinois EPA disagrees, a separate professional engineer certification can be provided.

APPENDIX A

Location Restrictions Certifications:

Seismic Impact Zones

Unstable Areas and Floodplains

Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments

EXECUTIVE SUMMARY

Andrews prepared demonstrations for the Springfield CWLP Ash Ponds submitted to the USEPA that also provides the required demonstrations for the IEPA. The Location Restrictions for 40 CFR 257.63 Seismic Impact Zones and 40 CFR 257.64 Unstable Areas were submitted to the USEPA in the attached report entitled Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments dated June 2024. The Location Restrictions for 40 CFR 257.63 Seismic Impact Zones and 40 CFR 257.64 Unstable Areas are Section 845.330 Seismic Impact Zones and Section 845.340 Unstable Areas and Floodplains, respectively, except of the floodplains.

To prepare the Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments, a geotechnical investigation was conducted for the ash ponds to obtain site specific information for the site. The results of the geotechnical investigation are included in the report. This report provides detailed information and analyses pertaining to the seismic impact zones location restriction requirements satisfying Section 845.330 Seismic Impact Zones; and, the unstable areas location restriction requirements satisfying Section 845.340 Unstable Areas and Floodplains.

In accordance with Section 845.330, existing CCR surface impoundments must not be located in seismic impact zones unless a demonstration is provided that all structural components meet the minimum safety factors. CWLP Lakeside Ash Pond and Dallman Ash Pond were not located within a seismic impact zone, although, included herein is the owner's demonstration that all structural components were designed to resist the maximum horizontal acceleration in lithified earth material for the site. In accordance with Section 845.340, existing CCR surface impoundments must not be located in an unstable area unless a demonstration is provided. CWLP herein demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

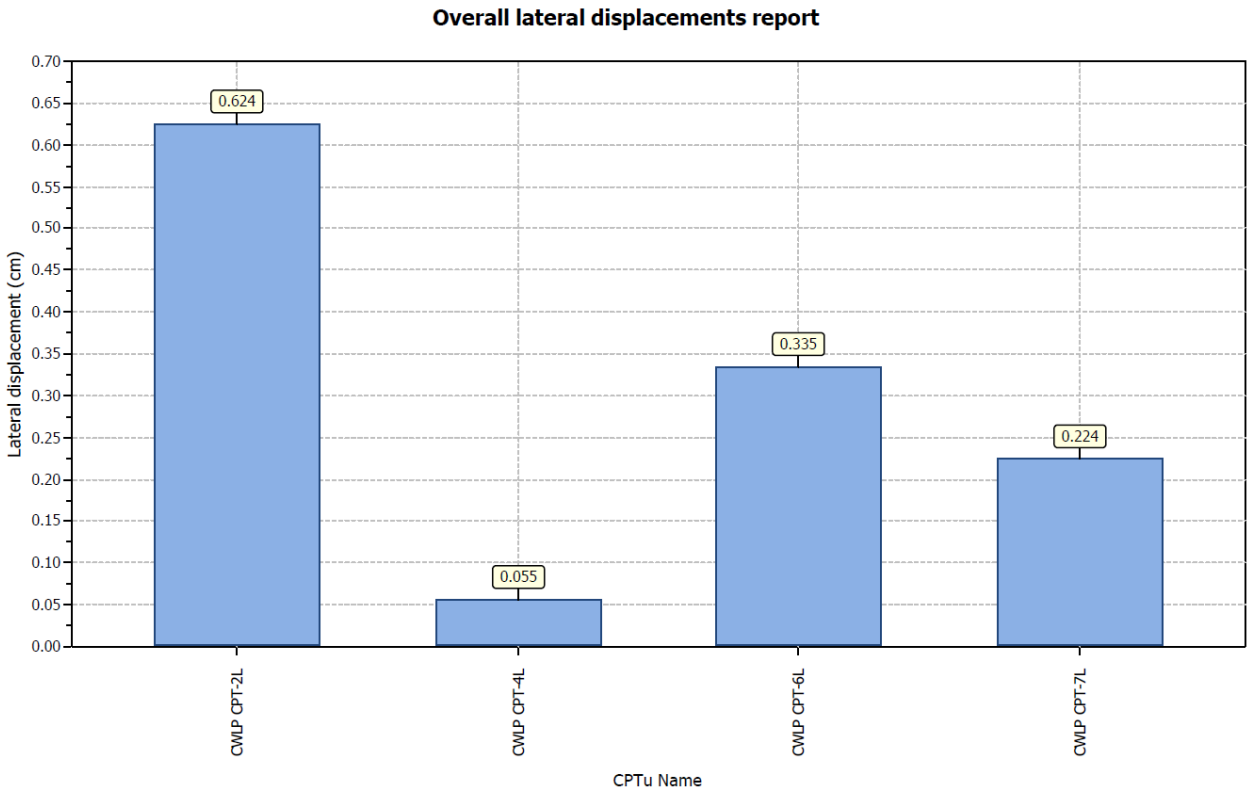
A safety factor assessments for each ash pond document whether the calculated factors of safety for each ash pond achieve the minimum safety factors. Contained herein are the safety factor assessments for Lakeside Ash Pond and Dallman Ash Pond. Based upon recent and historical geotechnical data and the existing conditions of the ash ponds, the factor of safeties exceed the regulatory minimum as demonstrated within this report. As detailed in Section 3 of the attached report, three subsurface investigations were conducted since October 2023 to characterize the geotechnical conditions of the site adjacent to and beneath the Dallman Ash Pond and Lakeside Ash Pond. The data obtained from the three additional investigations were conservatively incorporated into the geotechnical evaluations discussed in Sections 7 and 8 of the attached report. Below is a summary table providing the safety factors for the three cross sections

evaluated. The maximum surcharge pool analysis was not evaluated since the ash ponds are no longer in operation. Flooding around the ash ponds would be short term and would not lead to saturation of the embankment soils to an extent that would require additional stability modeling.

Factor of Safety

Condition	Minimum	Cross Section D-D'	Cross Section F-F'	Cross Section G-G'
Short Term Static	1.3	1.510	1.783	1.851
Long Term Static	1.5	2.126	2.006	2.236
Seismic	1.0	1.011	1.019	1.046

A liquefaction analysis was conducted on the embankments of the ash ponds using the data acquired during the CPT investigation. Below is a summary chart showing the limited displacement of the soils near the toe of the embankments.



The lateral displacement calculated at CPT-2L is approximately 6 millimeters with the remaining CPTs surrounding the ash ponds being significantly less. This amount of displacement would have no impact on the embankment integrity. With insignificant transitional displacement along the embankment and with no rigid structures within the earthen embankment, displacement would not result in a catastrophic release because of the self-healing nature of clay soils of which the embankment is constructed.

CERTIFICATION

I, Karl W. Finke, a qualified professional engineer in good standing in the State of Illinois, certify that the demonstration for the Seismic Impact Zones with a comprehensive Safety Factor Assessment for Ash Ponds was completed for CWLP by Andrews Engineering, Inc. contained in Appendix A of this response entitled "Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments" in accordance with the requirements under 35 IAC 845.330.

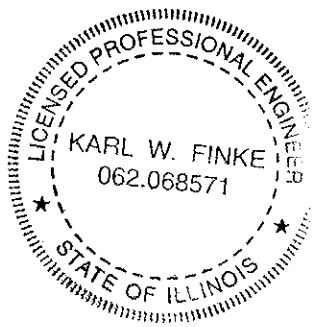
Signature: Karl Finke

Illinois P.E. No: 062.068571

Date: 09/05/24

CERTIFICATION

I, Karl W. Finke, a qualified professional engineer in good standing in the State of Illinois, certify that the demonstration for the Unstable Areas and Floodplains was completed for CWLP by Andrews Engineering, Inc. contained in Appendix A of this response entitled "Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments" including the Executive Summary in accordance with the requirements under 35 IAC 845.340.



Signature: _____

Illinois P.E. No: 062.068571

Date: 09/05/24

City Water, Light & Power
Ash Ponds
Springfield, Sangamon County, Illinois

Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments

June 2024

Prepared for:
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ILLINOIS | MISSOURI | INDIANA

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1. INTRODUCTION

City Water, Light and Power (CWLP) Lakeside Ash Pond and Dallman Ash Pond are coal combustion residuals (CCR) surface impoundments subject to the requirements of 40 CFR 257 Standards for the Disposal of Coal Combustion Residuals in Landfill and Surface Impoundments. This document provides detailed information and analyses pursuant to comments conveyed by the US EPA through written and oral communication pertaining to the seismic impact zones location restriction requirements of 40 CFR 257.63, the unstable areas location restriction requirements of 40 CFR 257.64 and the initial and periodic safety factor assessments requirements under 40 CFR 257.73.

In accordance with 40 CFR 257.63(a), existing CCR surface impoundments must not be located in seismic impact zones unless a demonstration is provided that all structural components meet the minimum safety factors. CWLP Lakeside Ash Pond and Dallman Ash Pond are not located within a seismic impact zone, although, included herein is the owner's demonstration that all structural components are designed to resist the maximum horizontal acceleration in lithified earth material for the site. In accordance with 40 CFR 257.64(a), existing CCR surface impoundments must not be located in an unstable area unless a demonstration is provided. CWLP herein demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. In accordance with 40 CFR 257.74(e)(1), safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors. Contained herein are the safety factor assessments for Lakeside Ash Pond and Dallman Ash Pond which exceed the minimum safety factors. Based upon recent and historical geotechnical data and the existing conditions of the ash ponds, the factor of safeties exceed the regulatory minimum as demonstrated within this report. As detailed in Section 3, three additional subsurface investigations were conducted since October 2023 to characterize the geotechnical conditions of the site adjacent to and beneath the CCR units (Dallman and Lakeside Ash Ponds). The data obtained from the three additional investigations were incorporated into the geotechnical evaluations discussed in Sections 7 and 8 below.

2. BACKGROUND

CWLP owns and operates two (2) existing CCR surface impoundments. The CWLP CCR surface impoundments are located north and east of the former Lakeside Power Generating Station and Dallman Power Generating Station in the Eastern ½ of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1). These CCR surface impoundments are identified as the Lakeside Ash Pond and the Dallman Ash Pond (see Figure 2).

The former Lakeside Power Generating Station and Dallman Power Generating Station are situated on the northwestern bank of Lake Springfield in Springfield, Illinois. The Lakeside Ash Pond is immediately north of Spaulding Dam at the northern end of Lake Springfield. The Dallman Ash Pond is immediately northwest of the Lakeside Ash Pond. Placed into service prior to 1958, the Lakeside Ash Pond is primarily a diked embankment. The Lakeside Ash Pond consists of four separate ponds (i.e., three ponds formerly used for storage of lime softening sludge and the settling pond) totaling approximately 35.0 acres. The three lime softening sludge ponds were taken out of service in September 2023 with the completion of the construction of the new lime softening sludge-processing area. The Lakeside Ash Pond ceased receiving ash in 2009. The Dallman Ash Pond was placed into service in approximately 1976 and is also a diked embankment. The Dallman Ash Pond is approximately 34.5 acres and ceased receiving ash in 2021.

As of October 13, 2023, all CCR and non-CCR waste streams ceased flowing into the Lakeside Ash Pond and Dallman Ash Pond.

3. SUBSURFACE CONDITIONS AT THE CCR IMPOUNDMENTS

The subsurface conditions of the area in and surrounding Lakeside and Dallman Ash Ponds have been characterized through multiple subsurface investigations, including the hydrogeologic investigation of the permitted Subtitle D landfill. These investigations were as follows:

- Professional Service Industries (PSI), June 1989. This investigation consisted of five soil borings within the east section of the south cell (Cell 1).
- Andrews Environmental Engineering, Inc., February 1990. This investigation was performed for Cell 2 and consisted of 13 soil borings. The drilling and testing were completed by PSI.
- Andrews Environmental Engineering, Inc., March 1990. This investigation was performed to install six wells at the Facility. The drilling and testing were completed by PSI.
- Patrick Engineering, Inc. (PEI), July 1992. This investigation was performed to further characterize the hydrogeology of the landfill setting. Approximately 44 soil borings and piezometers were installed by PEI.
- Stabilize, Inc. (SI), December 2008. This investigation installed three new monitoring wells as part of an assessment program for the landfill. The drilling, soil testing, and well construction was performed by Reynolds Well Drilling.
- City Water, Light and Power (CWLP), April 2010. This investigation was performed to install four piezometers on the west side of the CCR surface impoundments along Sugar Creek. The drilling and testing were completed by PSI.

- Stabilize, Inc. (SI), May 2011. This investigation installed four new monitoring wells to further the characterization of the CCR ash ponds. The drilling, soil testing, and well construction was performed by PSI.
- Andrews Engineering, Inc., January 2012. This investigation was performed to replace CCR ash pond wells and install an additional background well. The drilling and well installation were completed by TerraDrill.
- Andrews Engineering, Inc., July 2017. This project included drilling peripheral to the Dallman Ash Pond.
- Andrews Engineering, Inc., June 2019. This investigation advanced seven direct push borings peripheral to the Dallman Ash Pond and included the installation two new monitoring wells as part of an assessment program for the CCR ash impoundments.
- Andrews Engineering, Inc., October 2023. This investigation consisted of 34 borings adjacent to the ash ponds and four adjacent to landfill Unit 1, to investigate the CCR ash pond embankments' construction materials and the installation of 29 vibrating wire piezometers to characterize pore water pressure in the soils.
- Andrews Engineering, Inc., February 2024. This investigation consisted of 14 borings using cone penetrometer testing adjacent to and within the Dallman and Lakeside Ash Ponds.
- Andrews Engineering, Inc., April/May 2024. This investigation consisted of the geologic logging and installation of six monitoring wells on the periphery of Lakeside and Dallman Ash Ponds, the advancement and geologic logging of a 100-foot boring northwest of the Dallman Ash Pond, and advancement and geologic logging of four borings in each of the Lakeside and Dallman Ash Ponds – including Shelby tube samples of the underlying deposits. The Shelby tube samples were tested for vertical hydraulic conductivity, grain size/hydrometer, and Atterberg limits.

The occurrences of the deposits discussed below are variable due to the meandering nature of Sugar Creek prior to the development of Lake Springfield and Spaulding Dam. The meandering creek has resulted in sequential erosion and deposition (scour and fill) throughout much of the creek drainage system, both laterally and vertically.

3.1 SURFICIAL DEPOSITS

The shallow stratigraphy and lithology at the ash ponds include approximately 20 to 50 feet of Pleistocene sediments, dependent upon location. In ascending order these materials are identified as basal sand, lower cohesive deposit, shallow sand, upper cohesive deposit and fill material.

The overall tendency is for the finer-grained materials (clays, silty clays and silts) to overlie the coarser-grained materials (sands and gravels). This coarsening downward is present throughout much of the site. At the majority of the borehole locations, the coarser materials rest directly on

top of the weathered bedrock surface. The basal sand is largely present on the bedrock surface; however, finer-grained deposits may directly overlie the bedrock.

Basal Sand

In most locations, the basal sand is the lower-most surficial deposit. The basal sand is a gray colored, poorly graded, silty to clayey fine sand to well graded sand with minor amounts of fine gravel. This unit was encountered in a medium dense to dense condition. The top elevation of the basal sand varies from approximately 491 to 513 feet mean sea level (MSL) and the thickness ranges from about 0 to 12.3 feet. The unit was not encountered consistently, likely due to excessive erosion of the creek bottom.

The basal sand generally overlies the bedrock surface and underlies the lower cohesive deposit. There are some pockets of very hard, fine grained silty clay to clay overlying bedrock in a few areas. The basal sand is present above these pockets of clayey deposits, thought to be weathered bedrock.

The basal sand generally consists of 0% to 34% gravel, 50% to 91% sand, and 6% to 44% silt/clay; and exhibits a mean field hydraulic conductivity of 1.73×10^{-2} cm/sec. The basal sand was saturated in all locations where it was encountered.

Lower Cohesive Deposit

The lower cohesive deposit consists of brown, gray, and brownish gray silty clays, clayey silts, and clays, having very soft to stiff consistency. The lower cohesive deposit ranges in thickness from 0 to 22 feet with an average thickness of about 15 feet. The deposit was not encountered in isolated areas along the abandoned creek, possibly due to excessive erosion of creek bottom in these areas.

The lower cohesive deposit is generally overlain by the shallow sand and underlain by the basal sand. However, within the abandoned creek area, the lower cohesive deposit was encountered directly below the creek fill. In some areas the basal sand is not present and the lower cohesive deposit directly overlies the bedrock.

The soils in the lower cohesive deposit can be similar in color and texture to the soils in the upper cohesive deposit. The distinction between the two deposits was based on the presence or changes in soil consistency (as measured with a calibrated hand held penetrometer) and a marked difference in moisture content. The lower cohesive deposit is not exposed at the ground surface in the investigated area.

The lower cohesive deposit consists of 0% gravel, 5% to 48% sand, and 52% to 95% silt/clay; and has a relatively low hydraulic conductivity. The vertical hydraulic conductivity ranges from 1.3×10^{-8} to 1.8×10^{-6} cm/sec (triaxial permeameter).

Shallow Sand

The shallow sand overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and clayey silt. This deposit is limited in occurrence. Its thickness ranges from one to three feet over most of the investigated area.

Laboratory tests performed on representative samples collected from the shallow sand unit during previous investigations indicate the shallow sand contains 0% gravel, 50% to 52% sand, and 48% to 50% silt/clay. Two landfill piezometers were screened in the shallow sand unit to obtain groundwater surface information and conduct field hydraulic conductivity tests. The hydraulic conductivity of this unit based on the slug test results ranges from 3.6×10^{-3} to 2.9×10^{-2} cm/sec.

Upper Cohesive Deposit

The upper cohesive deposit has a relatively low hydraulic conductivity as determined by laboratory triaxial hydraulic conductivity tests from borings taken from the slurry impoundment and landfill investigations. The hydraulic conductivity values determined from the laboratory tests ranged from 1.6×10^{-5} cm/sec to 5.2×10^{-7} cm/sec. However, the upper cohesive deposit is an alluvial deposit and it is expected that the horizontal coefficient of hydraulic conductivity will be greater than the vertical coefficient. Based on test results for the lower cohesive deposit, it is anticipated that the horizontal hydraulic conductivity for the upper cohesive deposit is in the range of 10^{-6} to 10^{-5} cm/sec.

Creek Fill Material

The borings made along the abandoned creek locations indicate that the creek fill materials consist of variable soils ranging from silty clays to silty sands. Cohesive soils characterized as silty clays to organic silty clay were typically encountered. In some areas, the cohesive fill materials extended down to the top of bedrock. The granular fill materials are typically poorly graded silty to clayey sands and contain organics or wood fragments. In some areas, the granular fill materials also extended down to the top of bedrock.

The cohesive fill material contains 0% gravel, 2% to 48% sand, and 52% to 98% silt/clay. The hydraulic conductivity ranges from 7.6×10^{-8} cm/sec to 2.1×10^{-5} cm/sec. The granular fill materials contain 0 to 2% gravel, 55% to 65% sand and 33% to 45% silt/clay. Based on one laboratory hydraulic conductivity test performed on a Shelby tube sample obtained from berm fill, the hydraulic conductivity of the granular fill material is 3.3×10^{-8} cm/sec.

The creek fill materials identified during the previous investigations have a significant effect on the site hydrogeologic conditions. In some areas the till materials, consisting of either granular soils or organic silty clays, extend from existing grade to the bedrock surface and locally interconnect all three water bearing units. The upper and lower cohesive deposits are considered

to act as aquitards (where present) which restrict vertical flow into the water bearing units. For all practical purposes, the shale bedrock is considered to be an aquitard.

Fill materials encountered in the ash pond borings range from silty clays and organic silty clays to silty sands and clayey sands. These water level measurements indicate that groundwater movement within the creek fill materials is complicated because of the highly variable hydraulic characteristics of the fill materials and their random placement. In some areas, there appears to be direct hydraulic communication between fill materials, shallow sand, and basal sand.

Four landfill piezometers were screened into the fill materials. Of these, one piezometer was installed into cohesive fill material and the other piezometers were installed in granular till materials. Hydraulic conductivity of the granular fill materials is based on one field test resulting in a value of 6.1×10^{-2} cm/sec. The hydraulic conductivity of the cohesive fill material ranged from 7.1×10^{-5} cm/sec to 1.1×10^{-4} cm/sec. These values represent the hydraulic conductivity in the horizontal direction.

Laboratory hydraulic conductivity test performed on landfill cohesive fill materials ranged from 2.1×10^{-3} cm/sec to 3.3×10^{-8} cm/sec. The higher hydraulic conductivity values are believed to be typical of soils which contain organic matter (e.g. wood fragments).

3.2 UPPERMOST BEDROCK

The bedrock at the project site consists of Pennsylvanian shales which are gray in color. The bedrock surface elevation varies from approximately 492 feet MSL near the center of the existing landfill, to approximately 554 feet MSL located on a bedrock outcrop near the landfill area (southeast corner of Cell 1). In general, the bedrock surface slopes from the east and west towards the center of the landfill area.

4. UNSTABLE AREAS DEMONSTRATION

A review of the Illinois Mines Map appears to show areas of mined out coal beneath the Dallman Ash Pond. A 100 foot boring was conducted at the northwestern corner of Dallman Ash Pond. Within the 100 foot boring was approximately 32-1/2 feet of overburden with primarily shale and claystone bedrock. An Unstable Areas Demonstration has been conducted and is provided in Appendix B. The Unstable Areas Demonstration provides the breakthrough, pillar and floor failure analysis. These analyses resulted in factor of safeties exceeding 1.5. The 100 foot boring log is included in Appendix C.

5. GEOMETRY OF THE STRUCTURES

According to personal interviews with CWLP staff, the most recent change made to the CCR surface impoundment was a vertical expansion to the Lakeside Ash Pond system in 1988. The

vertical expansion consists of berms built on top and inside of the existing embankments in such a way that the toe of the outer slope of the expansion berms match up with the top of the inner slope of the existing embankments, typically identified as upstream construction. The vertical expansion berms are approximately ten feet in height.

A site map drawing containing an aerial photograph and approximate boundaries for the CWLP CCR ash ponds, including the clarification pond and landfill units, is provided in Appendix A.

No changes to the geometry of the structures are applicable for this report. No changes are apparent due to structure movement or deformation.

6. MATERIAL PROPERTIES

A geotechnical investigation was conducted in October 2023 to obtain site specific information for the soils surrounding and within the embankments for the Lakeside Ash Pond and Dallman Ash Pond. As part of the geotechnical investigation, split-spoons were driven recording blow counts, with visual identification of the samples and pocket penetrometers recorded for unconfined compressive strengths and jar samples collected for laboratory moisture content and additional Atterberg limits as needed for the liquefaction screening analysis. Shelby tubes were pushed with the samples analyzed in the laboratory for hydraulic conductivity, Atterberg limits, wet and dry densities, torvane, grain size distribution, and moisture content. Insitu field vane shear was used within the boreholes to determine the insitu shear strength of the soils and is recorded on the boring logs. A cone penetration test (CPT) sounding investigation was conducted in February 2024 as the split spoon test (SPT) results from the geotechnical investigation for the liquefaction screening analysis were inconclusive. The CPT soundings provided additional information about the soils surrounding the CCR ash ponds. An additional limited geotechnical investigation was conducted in April and May of 2024 to obtain samples of the clay directly below the CCR in Lakeside Ash Pond and Dallman Ash Pond as requested by the Illinois EPA. Laboratory analyses for hydraulic conductivity, Atterberg limits and grain size distribution were conducted on the clay liner samples collected from directly below the CCR in each ash pond. Included in Appendix C are copies of the boring logs, laboratory analysis, CPT soundings with shear strength calculations and cross sections that support the geotechnical parameters provided in Table 1 through Table 4.

The soil shear strengths were computed from the CPT soundings using the below equations:

$$S_u = (q_t - \sigma_{v)} / N_{kt}$$

where

$$N_{kt} = 10.5 – 4.6 \ln (B_q + 0.1)$$

These values were then graphed to approximate conservative values of shear strength for the soil profiles. These graphs are provided with the CPT sounds.

The silty clay fill soil strengths provided in the tables below for the embankments is conservative using a reduced strength with the strength parameters taken from the U.S. Department of Labor, Mine Safety and Health Administration's Engineering and Design Manual Coal Refuse Disposal Facilities, Second Edition. Water levels are based upon the maximum storage pool at full crest within the CCR. The water levels used for the rapid drawdown of the clarification pond is discussed in Section 7.3 Rapid Drawdown Analysis.

Conservative values for the impounded ash was taken from the fly ash technical paper included in Appendix D. These values were compared to those obtained during the multiple investigations.

TABLE 1

Lakeside Ash Pond Soil Strength Parameters

Profile D-D'

Soil Description	Density (pcf)	Total Strengths (Short Term)		Effective Strengths (Long Term)	
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)
CCR Wet Ash	100	15	0	25	0
CCR Moist Ash	95	30	0	30	0
Silty Clay Fill	124	0	1,800	28	270
Scrubber Sludge	125	0	750	30	0
Bottom Ash	100	35	0	35	0
Sandy Lean Clay	115	0	550	24	0
Brown Silty Clay	120	0	1,040	28	0
Gray Silty Clay	119	0	1,100	28	0
Silty Clay	124	0	450	28	0
Light Gray Silty Clay	124	0	840	28	0
Gray Clayey Silt	126.5	0	500	32	0
Clayey Silt	125	0	1,400	32	0
Sand	125	34	0	34	0
Shale	Bedrock (Impenetrable)				

TABLE 2

Dallman Ash Pond Soil Strength Parameters

Profile F-F'

Soil Description	Density (pcf)	Total Strengths (Short Term)		Effective Strengths (Long Term)	
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)
CCR Ash Moist	95	30	0	30	0
CCR Ash Wet	100	15	0	25	0
Lean Clay Fill	124	0	1,800	28	270
Clayey Silt	120	0	900	32	0
Silty Clay	124	0	700	28	0
Soft Clay	120	0	300	19	0
Sand	125	34	0	34	0
Shale	Bedrock (Impenetrable)				

TABLE 3

Dallman Ash Pond Soil Strength Parameters

Profile G-G'

Soil Description	Density (pcf)	Total Strengths (Short Term)		Effective Strengths (Long Term)	
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)
CCR Ash Layer	100	0	900	25	0
CCR Ash Moist	95	30	0	30	0
CCR Ash Wet	100	15	0	25	0
Lean Clay Fill	124	0	1,800	28	270
Clayey Silt	120	0	800	32	0
Silty Clay	124	0	1,200	28	0
Sand	125	34	0	34	0
Shale	Bedrock (Impenetrable)				

TABLE 4

Clarification Pond Soil Strength Parameters

Profile C-C'

Soil Description	Density (pcf)	Total Strengths (Short Term)		Effective Strengths (Long Term)	
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)
CCR Wet Ash	100	15	0	25	0
CCR Moist Ash	95	30	0	30	0
Silty Clay Fill	124	0	1,800	28	270
Scrubber Sludge	125	0	750	30	0
Bottom Ash	100	35	0	35	0
Clarification Pond Sediment	105	0	250	28	0
Brown Silty Clay	120	0	1,040	28	0
Gray Clayey Silt	126.5	0	500	32	0

7. SLOPE STABILITY ANALYSIS

The safety factor assessment requires that each CCR unit document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors. The calculated static factor of safety under the long-term, maximum storage pool loading condition must be equal to or exceed 1.50. The calculated static factor of safety under the maximum surcharge pool loading condition must be equal to or exceed 1.40. The calculated seismic factor of safety must be equal to or exceed 1.00.

The geotechnical investigation was used to determine the areas more susceptible to slope instability due to the nature of the insitu soils and the site geometry. In reviewing the geotechnical information and the site geometry, it was determined that for Lakeside Ash Pond, the most critical cross section was along the Profile D-D' as illustrated on Figure D-D' showing the cross section in plan and profile view provided in Appendix A. This cross-section had the greatest differential between the toe and top of slope elevation, assumed not to have a drainage blanket constructed within the berm, and had zero SPT blow counts for a run during the geotechnical investigation. Profile A-A' (Borings B-1LL, B-1L, B-1 & B-1U) was not determined to be a critical cross section due to it having a shallower slope and not have any zero SPT blow counts for a run during the geotechnical investigation. Profile B-B' (Borings B-2L, B-2, B-2U) was not determined to be a critical cross section due to it having a lower differential between the toe and crest of slope, and not have any zero SPT blow counts for a run during the geotechnical investigation.

For Dallman Ash Pond, two cross-sections were selected based upon the individual site features. Profile F-F' is shown on Figure F-F' showing the cross section in plan and profile view provided in Appendix A. This profile was selected due to the abandonment of the historical Sugar Creek underneath the embankment, a thin soft clay layer below the toe of the embankment, and multiple zero SPT blow counts during the geotechnical investigation. Profile G-G' is shown on Figure G-G' showing the cross section in plan and profile view provided in Appendix A. This cross section was selected due to the location of Sugar Creek being nearer the toe of slope, and multiple zero SPT blow counts during the geotechnical investigation. Profile E-E' (Borings B-5L, B-5 & B-5U) was not determined to be a critical cross section due to it having a lower differential between the toe and crest of slope, and the proximity to Sugar Creek being significantly further away than the other two alignments for Dallman Ash Pond.

Seismic Analysis

The static and seismic slope stability model utilized for the following analysis was the Morgenstern and Price Circular Search Method within the GeoStudio 2023.1.2 SLOPE/W computer-based slope stability modeling software. Morgenstern and Price satisfies all conditions of equilibrium.

CWLP is susceptible to potential seismic activity as provided by the USGS Earthquake Hazards Program. Included in Appendix E of this geotechnical engineering report is the USGS Earthquake

Hazards Program Unified Hazard Tool, Edition Dynamic: Conterminous U.S. 2014 for the site (Latitude 39.766 North, Longitude 89.596 West). The Peak Horizontal Ground Acceleration is approximately 0.0955 g with a mean magnitude of 6.62. The maximum acceleration of (aHmax = 0.10g) was selected for use in stability calculations.

7.1 Lakeside Ash Pond Slope Stability

The slope stability analysis was performed on Profile D-D' for the reasoning previously provided. A steady-state seepage analysis was conducted using GeoStudio 2023.1.2 SEEP/W and is the parent analysis for the long-term static slope stability analyses. The SEEP/W analysis is included in Appendix F-1. The strengths of materials are provided in Table 1 within the Materials Properties Section 6.

7.1.1 Long-Term Static Slope Stability Analysis

The long-term static slope stability analysis was performed on the Lakeside Ash Pond Profile D-D' using the geotechnical parameters as provided in Table 1. The long-term analysis utilizes the effective shear strength parameters, which are the drained condition. The long-term static slope stability analysis found that the factor of safety for Profile D-D' was 2.126. The critical failure surface and stability report are included in Appendix F-1. This analysis verifies that Lakeside exceeds the factor of safety for the long-term, maximum storage pool loading condition since the analysis was performed filled with ash and the pool elevation matching the top of the embankment.

7.1.2 Short-Term Static Slope Stability Analysis

The short-term static slope stability analysis was performed on the Lakeside Ash Pond Profile D-D' using the geotechnical parameters as provided in Table 1. The short-term analysis utilizes the total shear strength parameters, which are the undrained condition. The short-term static slope stability analysis found that the factor of safety for Profile D-D' was 1.510. The critical failure surface and stability report are included in Appendix F-2.

7.1.3 Seismic Slope Stability Analysis

The seismic slope stability analysis was performed on the Lakeside Ash Pond Profile D-D' using the geotechnical parameters as provided in Table 1. The seismic analysis utilizes the total shear strength parameters, which are the undrained condition since a seismic event occurs in a short period of time. In addition, a horizontal acceleration of 0.10g was utilized within the modeling to represent the peak horizontal ground acceleration anticipated for CWLP. The seismic slope stability analysis found that the factor of safety for Profile D-D' was 1.011. The critical failure surface and stability report are included in Appendix F-3. This analysis verifies that Lakeside exceeds the seismic factor of safety with maximum pool loading condition.

7.2 Dallman Ash Pond Slope Stability

The slope stability analysis was performed on two critical cross sections, profiles F-F' and G-G' for the reasoning previously provided. A seepage analysis was conducted using SEEP/W and is the parent analysis for each of the following slope stability analyses. The SEEP/W analysis is included in Appendix G and H. The strengths of materials are provided in Tables 2 and 3 within the Materials Properties section.

7.2.1 Long-Term Static Slope Stability Analysis

The long-term static slope stability analysis was performed on the Dallman Ash Pond profiles F-F' and G-G' using the geotechnical parameters as provided in Tables 2 and 3. The long-term analysis utilizes the effective shear strength parameters, which are the drained condition. The long-term static slope stability analysis found that the factor of safety for profile F-F' was 2.006 and for profile G-G' was 2.236. The critical failure surface and stability reports are included in Appendix G-1 and H-1. These analyses verify that Dallman exceeds the factor of safety for the long term, maximum storage pool loading condition since the analysis was performed filled with ash and the pool elevation matching the top of the embankment with some ash pilled above within the impoundment as shown on the critical cross sections.

7.2.2 Short-Term Static Slope Stability Analysis

The short-term static slope stability analysis was performed on the Dallman Ash Pond profiles F-F' and G-G' using the geotechnical parameters as provided in Tables 2 and 3. The short-term analysis utilizes the total shear strength parameters, which are the undrained condition. The short-term static slope stability analysis found that the factor of safety for profile F-F' was 1.783 and for profile G-G' was 1.851. The critical failure surface and stability report are included in Appendix G-2 and H-2.

7.2.3 Seismic Slope Stability Analysis

The seismic slope stability analysis was performed on the Dallman Ash Pond profiles F-F' and G-G' using the geotechnical parameters as provided in Tables 2 and 3. The seismic analysis utilizes the total shear strength parameters, which are the undrained condition since a seismic event occurs in a short period of time. In addition, a horizontal acceleration of 0.10g was utilized within the modeling to represent the peak horizontal ground acceleration anticipated for CWLP. The seismic slope stability analysis found that the factor of safety for profile F-F' was 1.019 and for profile G-G' was 1.046. The critical failure surfaces and stability reports are included in Appendix G-3 and H-3. This analysis verifies that Dallman exceeds the seismic factor of safety with maximum pool loading condition.

7.3 Clarification Pond Rapid Drawdown

A rapid drawdown analysis was requested as part of this stability analysis, although, it is not a statutory requirement within 40 CFR 257. The most credible rapid drawdown would be of the clarification pond; thus a critical cross section of the clarification pond was selected along the southern embankment adjoining Lakeside Ash Pond. Profile C-C' is shown on Figure C-C' showing the cross section in plan and profile view provided in Appendix A. This cross section has the greatest vertical relief since Lakeside Ash Pond has upstream construction. A catastrophic rapid drawdown of Lake Springfield is not credible, whereas, a rapid drawdown of up to 10 feet would be highly unlikely, it would not pose a threat to the Lakeside Ash Pond due to the geometry. The highest level ever recorded at Lake Springfield was 564.5 feet on April 12, 1994. The upstream face of the dam has approximately a 3 to 1 slope, crest of approximately 568 feet MSL, and a top width of at least 36 feet which includes East Lake Shore Drive.

7.3.1 Rapid Drawdown Analysis

The multi-staged rapid drawdown analysis was performed in SEEP/W on the Lakeside Ash Pond embankment adjoining the clarification pond using the geotechnical parameters as provided in Table 4. The steady-state seepage analysis was first utilized to develop the pore water pressures prior to the rapid rise due to an extreme storm event and then rapid drawdown due to a hypothetical breach of the clarification pond embankment. The steady-state seepage analysis developed the porewater conditions during typical operations, provided in Appendix I-1. A transient seepage analysis was performed for a rapid rise of the clarification pond to a pool level exceeding the minimum crest along the western embankment of the clarification pond by 0.5 feet over a 24-hour period, provided in Appendix I-2. Then a rapid drawdown transient seepage analysis was conducted over a two-day period with the clarification pond emptied of all free water within a 30 minute period, provided in Appendix I-3 for the undrained stability analysis, provided in Appendix I-4. Additionally, a rapid drawdown transient seepage analysis was conducted over a 14 day period with the clarification pond emptied of all free water within a 30 minute period, provided in Appendix I-5, for the long term stability analysis, provided in Appendix I-6. The input parameters were selected based upon conservative values of the hydraulic conductivities from the geotechnical investigation and saturated volumetric water contents based upon the Atterberg limits. Then the transient seepage analysis results were analyzed in SLOPE/W. The rapid drawdown analysis found that the factor of safety for profile C-C' undrained analysis exceeded a factor of safety of 3.3 and the drained analysis exceeded a factor of safety of 1.6 at 7 days after the hypothetical breach of the clarification pond. As the ash ponds are dewatered, the factor of safety for rapid drawdown will continue to improve.

8. LIQUEFACTION

8.1 Liquefaction Screening

A liquefaction screening was conducted on the embankments of the ash ponds. A review of the borings and laboratory testing from the Lakeside and Dallman Geotechnical Investigation conducted in October 2023 were undertaken. The liquefaction screening process followed the guidelines provided by Bray et al. (2004a) in "Evaluating The Potential For Liquefaction Or Cyclic Failure of Silts and Clays" by R. W. Boulanger and I. M. Idriss. Within the technical paper it states that "Bray et al. (2004a) concluded that soils with PI<=12 and water contents greater than 85% of the LL were susceptible to liquefaction". Additionally, Bray further concludes that "soils with 12<PI<20 and water contents greater than 80% of the LL were 'systematically more resistant to liquefaction but still susceptible to cyclic mobility".

Analysis of samples collected during the October 2023 geotechnical investigation were evaluated against the liquefaction screening guidelines. The liquefaction screening of the borings between the ash ponds and Sugar Creek were inconclusive, thus leading to another geotechnical investigation conducted with a CPT rig. The CPT investigation was conducted near geotechnical borings B-2, B-4, B-6 and B-7 surrounding the ash ponds with additional CPTs being pushed within the ash ponds. The CPT logs are included in Appendix C.

8.2 Liquefaction Analysis

A liquefaction analysis was conducted on the CPT soundings CPT-2L, CPT-4L, CPT-6L and CPT-7L for the perimeter of the ash ponds and on CPT-1CCR, CPT-2CCR, CPT-3CCR, CPT-4CCR, CPT-5CCR, CPT-6CCR, CPT-7CCR, CPT-10CCR, CPT-14CCR, and CPT-15CCR within the ash ponds for estimated liquefaction settlement. The liquefaction analysis was conducted using the CLiq software version 3.5.3.8, copyright by GeoLogismiki.

The liquefaction assessment calculation method employed within the CLiq software was Robertson 2009. The Robertson 2009 method for soil liquefaction is a deterministic model and provides liquefaction potential. The seismic parameters for the liquefaction analysis were obtained from the USGS Earthquake Hazards Program Unified Hazard Tool, Edition Dynamic: Conterminous U.S. 2014 as recommended by Dr. Robertson in his October 2021 short course. This tool provides the site specific peak ground acceleration of 0.0955g with a mean moment magnitude (Mw) of 6.62. The parameters entered into the CLiq software for the maximum acceleration was 0.10g and an earthquake moment magnitude (Mw) of 6.62. As recommended by Robertson, removing transition zones and weighting strains with depth generally obtains results that are less conservative while still being conservative based upon case histories. A factor of safety of 1.2 was entered into the CLiq software as required by 40 CFR 257.73(e)(1)(iv). The lateral displacement analysis utilized the level ground with free face as the insitu alluvial soils are approximately level with Sugar Creek being the free face. The liquefaction analysis reports are

provided in Attachment J. Provided below in Figure 4 is the calculated lateral displacement at each of the CPT soundings surrounding the Lakeside Ash Pond and Dallman Ash Pond. Figure 5 is the overall liquefaction potential index (LPI).

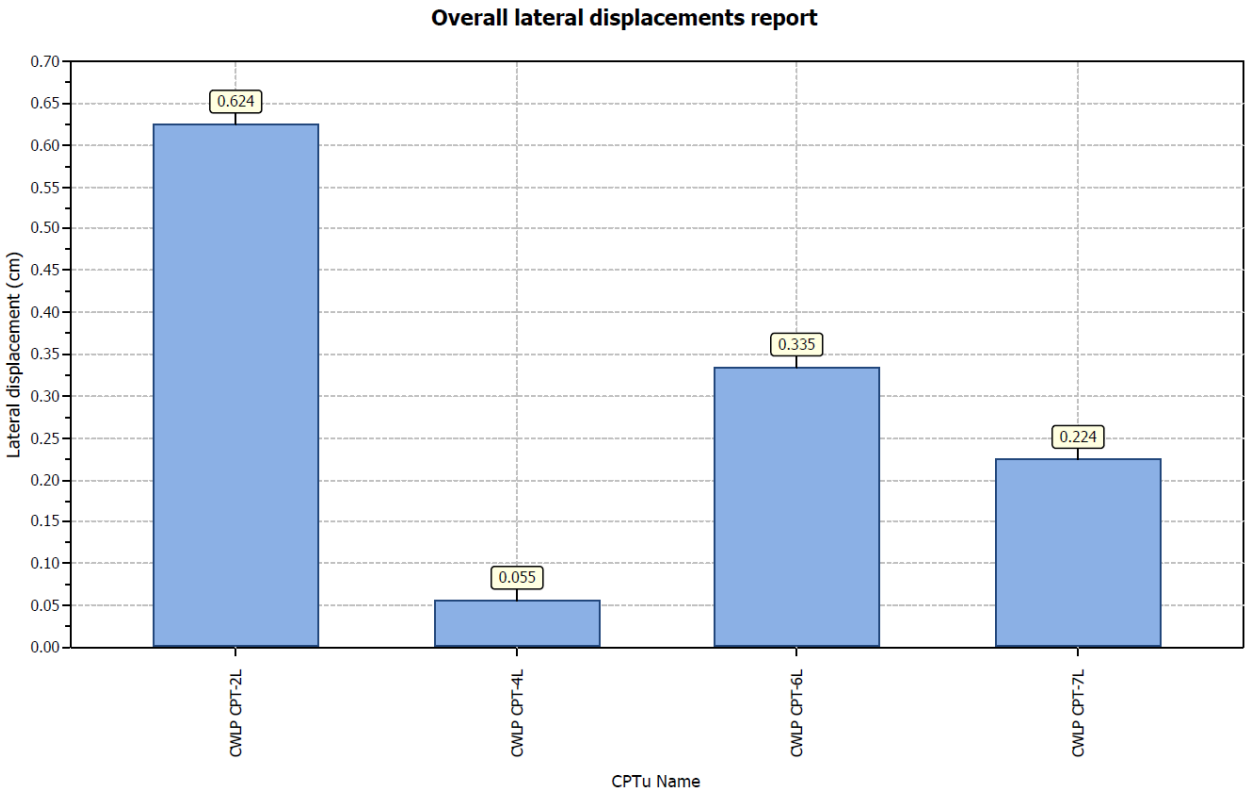

Figure 4

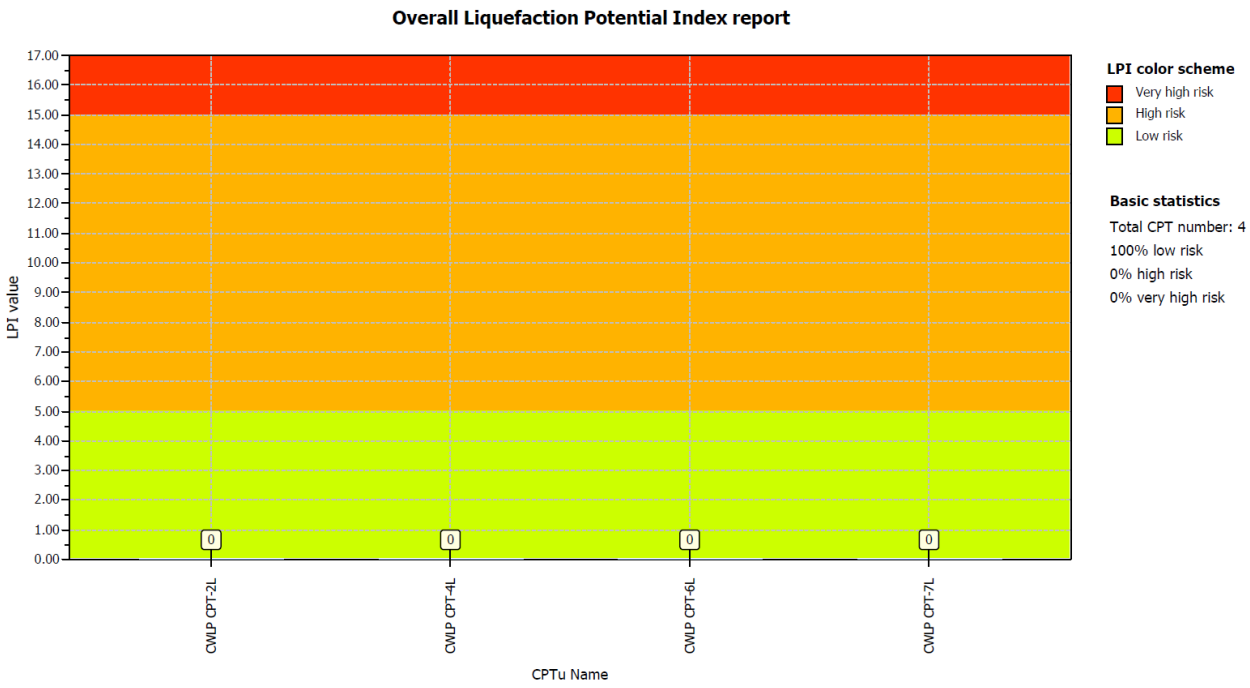

Figure 5

The lateral displacement calculated at CPT-2L is approximately 6 millimeters with the remaining CPTs surrounding the ash ponds being significantly less. This amount of displacement would have no impact on the embankment integrity. With insignificant transitional displacement along the embankment and with no rigid structures within the earthen embankment, displacement would not result in a catastrophic release because of the self-healing nature of clay soils of which the embankment is constructed.

The liquefaction risk as interpreted by Iwasaki is very low if the LPI is zero, low if the LPI is equal to or below five but greater than zero, high if the LPI is equal to or below 15 but greater than 5, and very high if the LPI exceeds 15. Using the Iwasaki criterion for liquefaction potential index, there is a very low risk of liquefaction within the soils investigated. Based upon this information, post-liquefaction slope stability analysis is deemed unnecessary.

9. SUMMARY

The Unstable Areas Demonstration provides the breakthrough, pillar and floor failure analysis. These analyses resulted in factor of safeties exceeding 1.5. The geotechnical analysis indicates that Lakeside Ash Pond and Dallman Ash Pond result in factors of safety equal to or greater than minimum values as required by 40 CFR 257.73(e)(1). This is predicated upon the assumption that cohesive and frictional shear strengths of materials meet or exceed those used in the analyses.

10. STATEMENT

This Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 40 CFR 257.73(e). These requirements have been met.

Signature: _____

Illinois L.P.E. No: 062.068571

Date: 06/28/24

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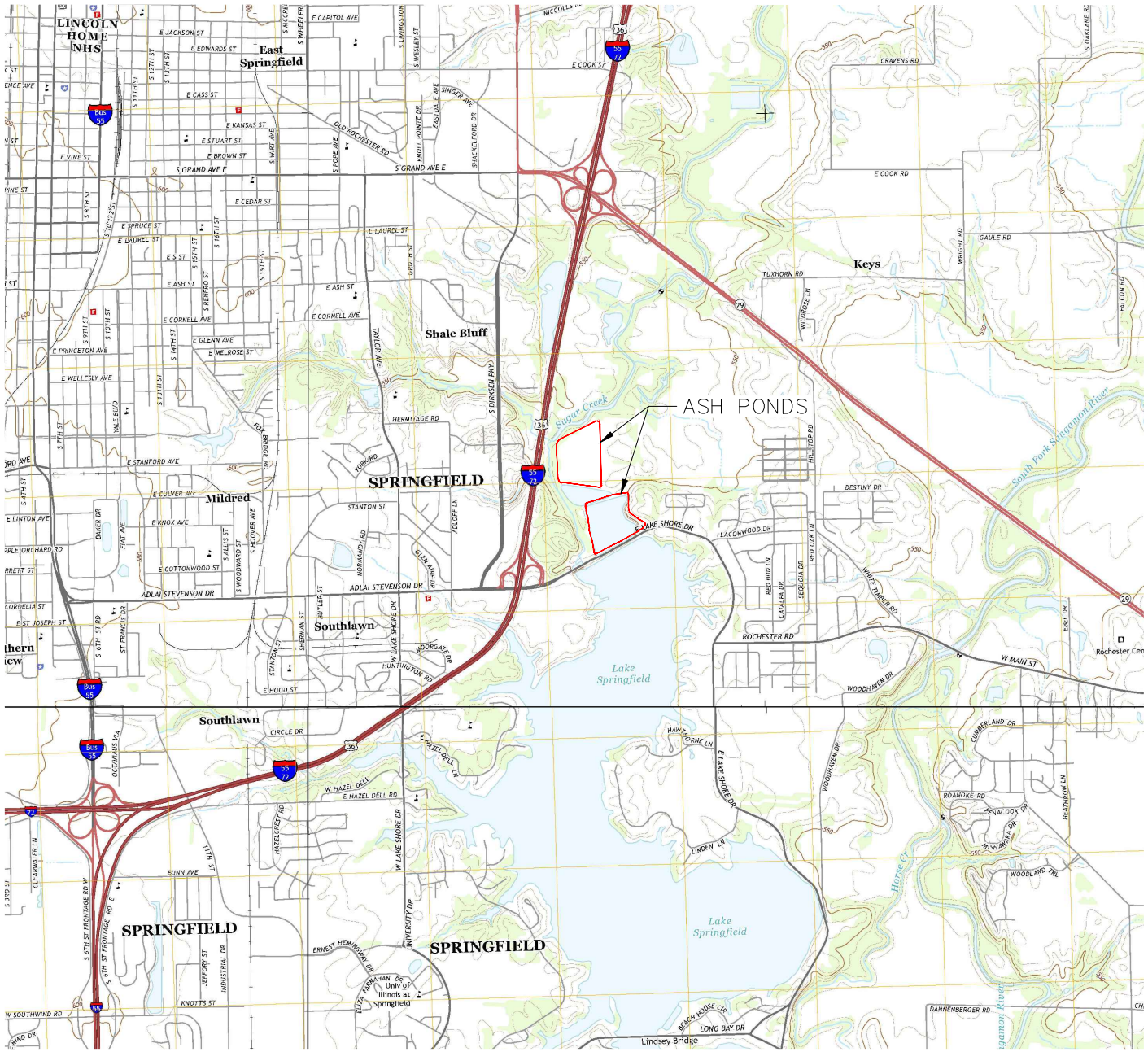

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NOTE:
BACKGROUND IMAGE COURTESY OF UNITED STATES GEOLOGICAL SURVEY.

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APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

SITE LOCATION

PLANS PREPARED FOR
CITY, WATER, LIGHT & POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 240227/0006

SHEET NUMBER:

FIGURE 1

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LEGEND

CCR ASH POND

NOTE

IMAGE SOURCE: GOOGLE EARTH PRO, IMAGE DATE FEBRUARY 24, 2024.

N

0 150 300 600

SCALE: IN FEET

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SITE DETAILS

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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 240227/0006

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FIG. 2

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Tab: Layout1 Last Saved: July 28, 2021 by Ben Karpus Plotted: Friday, June 28, 2024 10:36:37 AM
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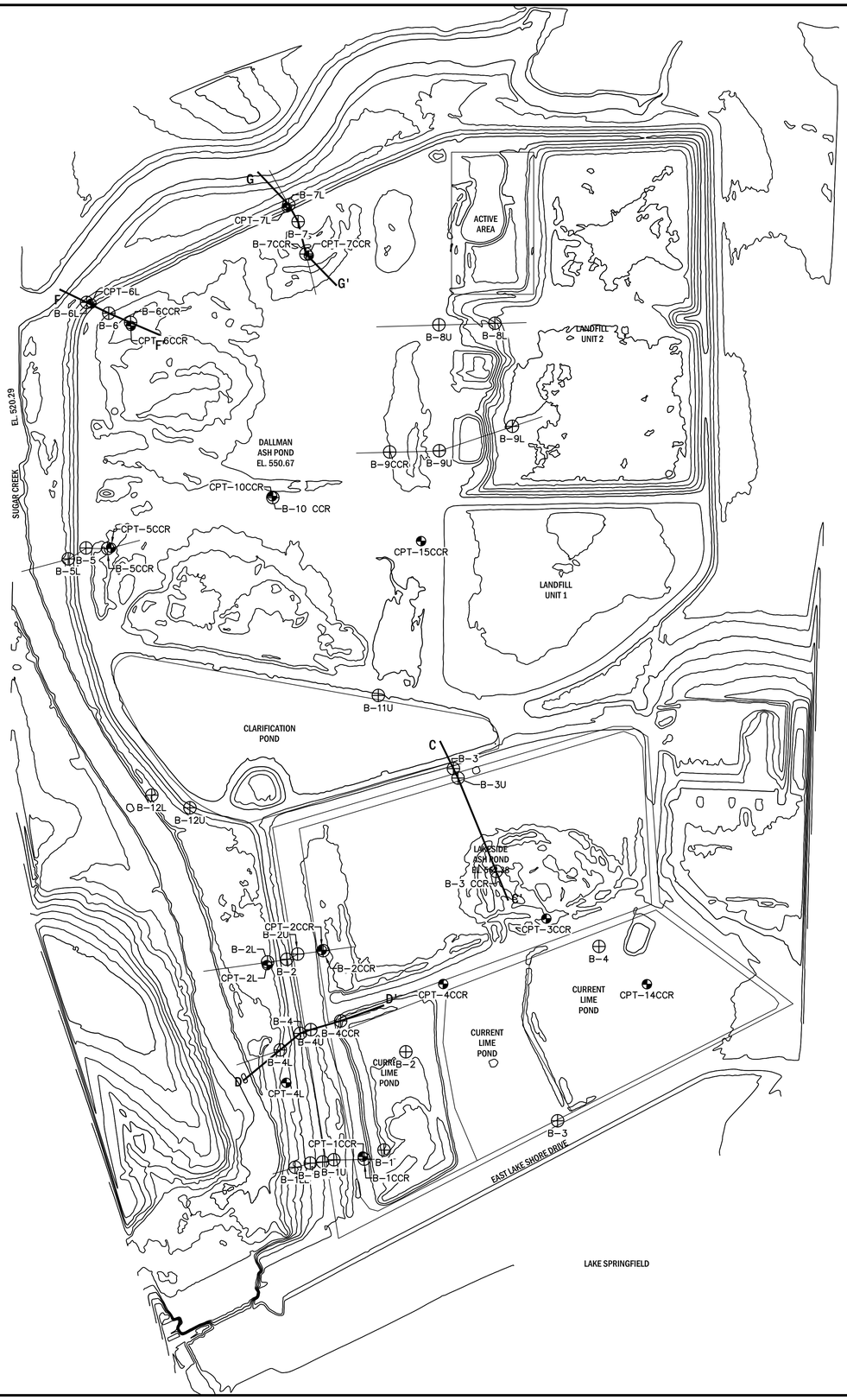

LEGEND

- ⊕ AS-BUILT BORING (2023-2024)
- ◓ AS-BUILT CPT

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON USGS GAGE 05576250 FOR 12/20/2022.

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AS-BUILT BORING LOCATIONS

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 240227/0006

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FIG. 3

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Tab: FIGURE 3 Last Saved: June 28, 2024, by Ben Karpus Plotted: Friday, June 28, 2024 10:48:03 AM
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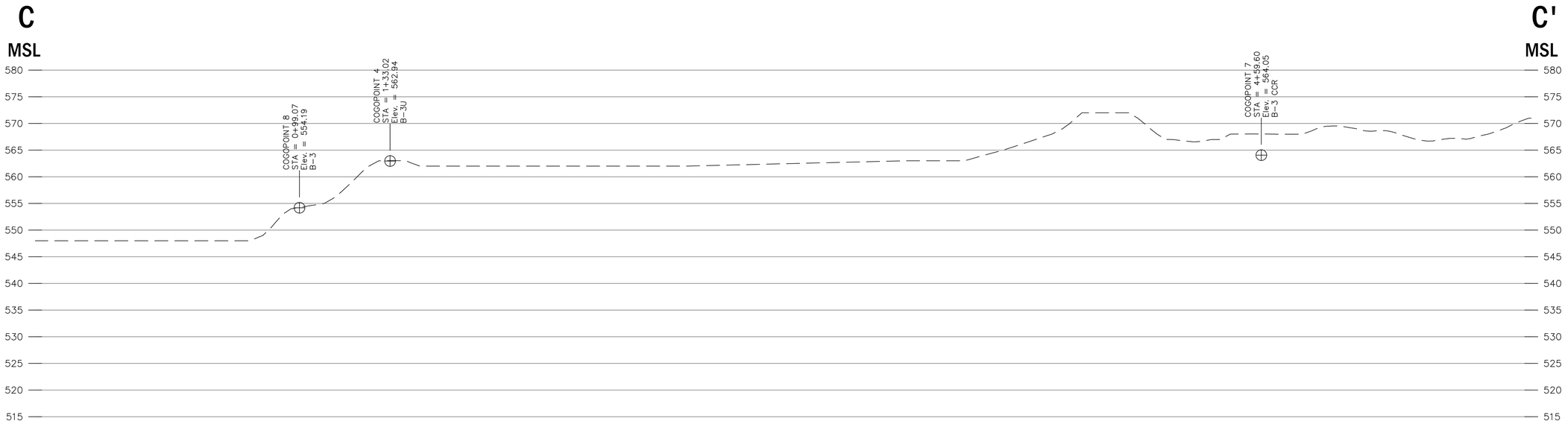
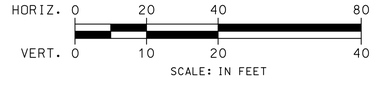
APPENDIX A:
Plan and Profile Figures



CROSS-SECTION LOCATION MAP



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PLAN AND PROFILE C-C'

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER: C-C'

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Tab: C SLOPE ANALYSIS Last Saved: June 26, 2024, by Ben Karpus Plotted: Thursday, June 27, 2024 8:34:45 AM
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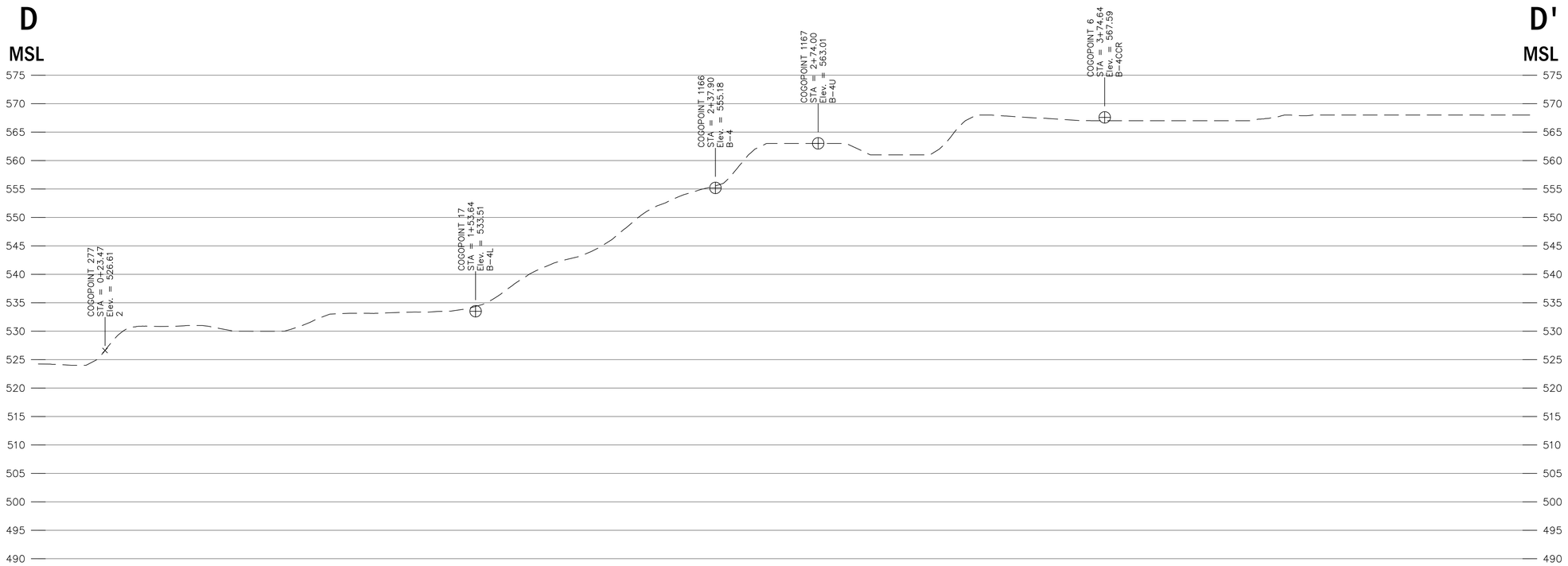

CROSS-SECTION LOCATION MAP

HORIZ. 0 20 40 80
VERT. 0 10 20 40
SCALE: IN FEET

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PLAN AND PROFILE D-D'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER:

D-D'

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Tab: D SLOPE ANALYSIS Last Saved: June 26, 2024, by Ben Karpus Plotted: Thursday, June 27, 2024 8:33:52 AM
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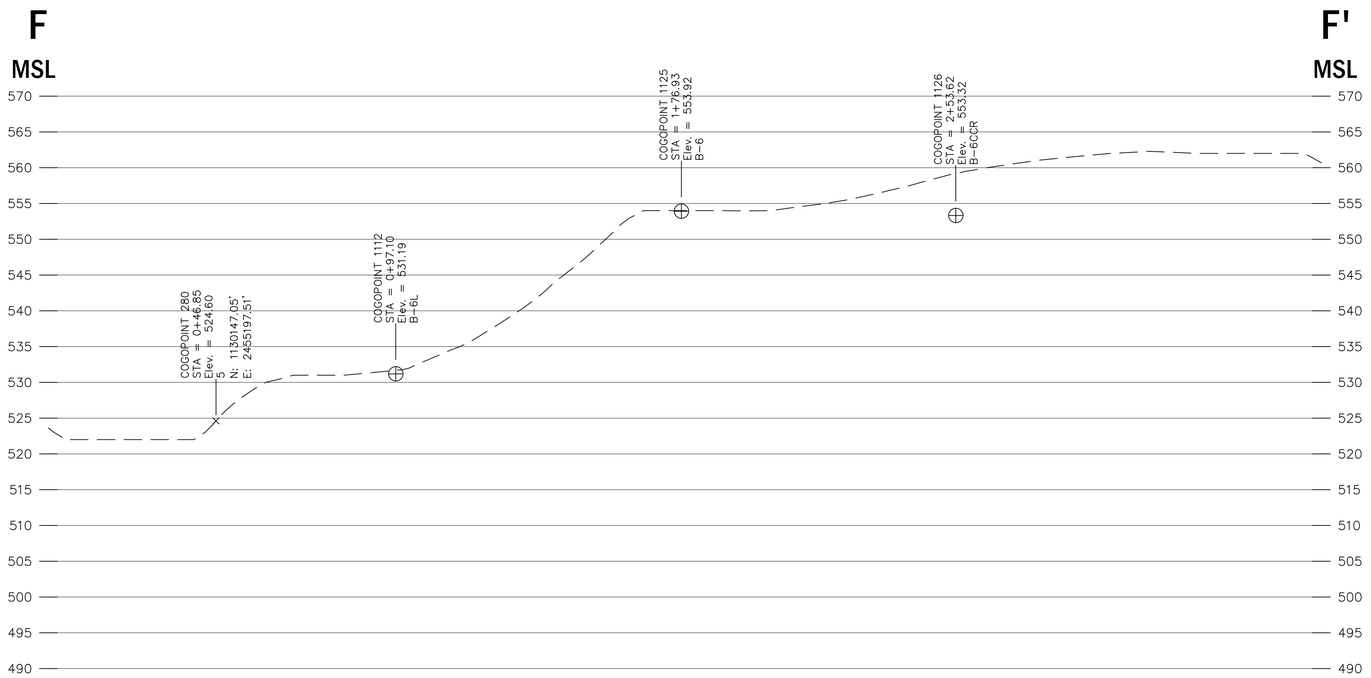
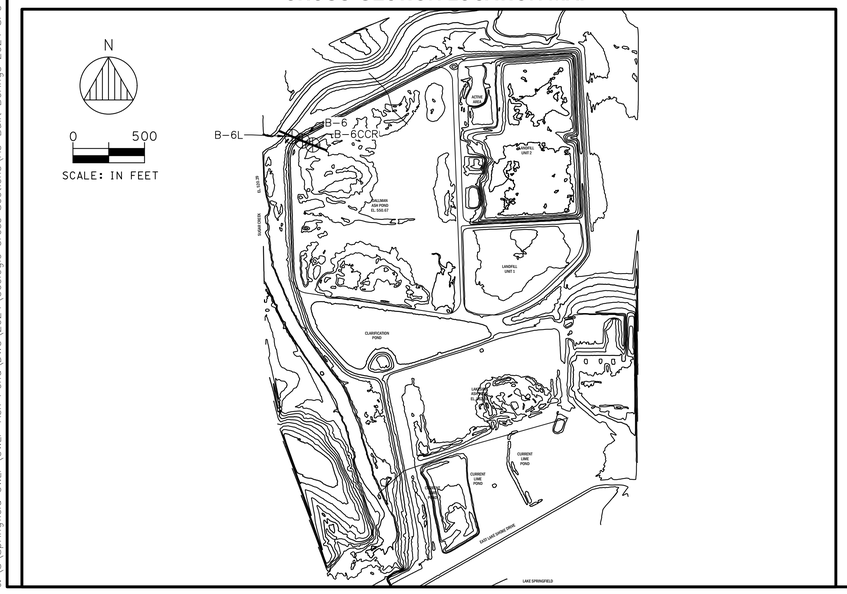
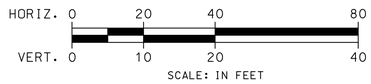


CROSS-SECTION LOCATION MAP





NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

PLAN AND PROFILE F-F'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER:

F-F'

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Tab: F SLOPE ANALYSIS Last Saved: June 26, 2024, by Ben Karpus Plotted: Thursday, June 27, 2024 8:28:28 AM
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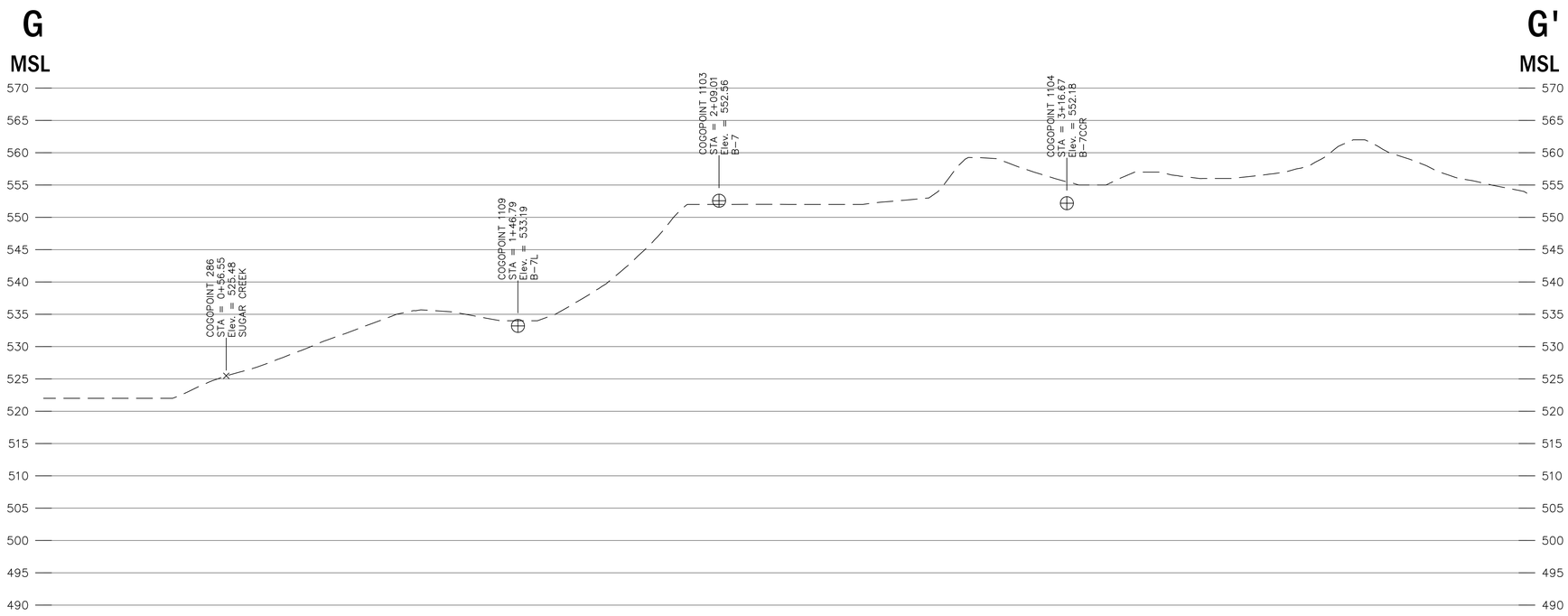

CROSS-SECTION LOCATION MAP

HORIZ. 0 20 40 80

VERT. 0 10 20 40

SCALE: IN FEET

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PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

PLAN AND PROFILE G-G'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER: G-G'

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Tab: G SLOPE ANALYSIS Last Saved: June 26, 2024, by Ben Karpus Plotted: Wednesday, June 26, 2024 4:55:05 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\As-Built Borings 2024 SPC KWF.dwg

APPENDIX B:
Unstable Areas Demonstration

City Water, Light & Power
Lakeside & Dallman Ash Ponds
Springfield, Sangamon County, Illinois

Lakeside and Dallman Ash Ponds Location Restrictions – Unstable Areas

June 2024

Prepared for:
City Water, Light & Power
3100 Stevenson Drive
Springfield, Illinois 62703

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

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3. Unstable Areas 1

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3.2 Estimated Extraction Rate 6
3.3 Breakthrough, Pillar and Floor Failure Analyses 7

4. STATEMENT 9

FIGURES

Figure 1: Site Map
Figure 2: Coal Mines in Illinois – Springfield East/West Quadrangle
Figure 3: Map of Brewerton Coal Company Mine No. 81
Figure 4: Dallman Ash Pond Grading Plan

ATTACHMENTS

Attachment 1: Coal Mines in Illinois; Springfield East/West Quadrangle, Sangamon County
Attachment 2: Brewerton Coal No. 81
Attachment 3: Dallman Ash Pond Grading Plan

1. Introduction

CWLP owns and operates two (2) existing CCR surface impoundments. The CWLP CCR surface impoundments are located north and east of the former Lakeside Power Generating Station and Dallman Power Generating Station in the Eastern ½ of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1). These CCR surface impoundments are identified as the Lakeside Ash Pond and the Dallman Ash Pond (see Figure 2).

The former Lakeside Power Generating Station and Dallman Power Generating Station are situated on the northwestern bank of Lake Springfield in Springfield, Illinois. The Lakeside Ash Pond is immediately north of Spaulding Dam at the northern end of Lake Springfield. The Dallman Ash Pond is immediately northwest of the Lakeside Ash Pond. Placed into service prior to 1958, the Lakeside Ash Pond is primarily a diked embankment. The Lakeside Ash Pond consists of four separate ponds (i.e., three ponds formerly used for storage of lime softening sludge and the settling pond) totaling approximately 35.0 acres. The three lime softening sludge ponds were taken out of service in September 2023 with the completion of the construction of the new lime softening sludge-processing area. The Lakeside Ash Pond ceased receiving ash in 2009. The Dallman Ash Pond was placed into service in approximately 1976 and is also a diked embankment. The Dallman Ash Pond is approximately 34.5 acres and ceased receiving ash in 2021.

As of October 13, 2023, all CCR and non-CCR waste streams ceased flowing into the Lakeside Ash Pond and Dallman Ash Pond.

2. Subsurface Investigations

The subsurface conditions of the area in and surrounding Lakeside and Dallman Ash Ponds have been characterized through multiple subsurface investigations, including the hydrogeologic investigation of the permitted Subtitle D landfill. These investigations were as follows:

- Professional Service Industries (PSI), June 1989. This investigation consisted of five soil borings within the east section of the south cell (Cell 1).
- Andrews Environmental Engineering, Inc., February 1990. This investigation was performed for Cell 2 and consisted of 13 soil borings. The drilling and testing were completed by PSI.
- Andrews Environmental Engineering, Inc., March 1990. This investigation was performed to install six wells at the Facility. The drilling and testing were completed by PSI.
- Patrick Engineering, Inc. (PEI), July 1992. This investigation was performed to further characterize the hydrogeology of the landfill setting. Approximately 44 soil borings and piezometers were installed by PEI.

- Stabilize, Inc. (SI), December 2008. This investigation installed three new monitoring wells as part of an assessment program for the landfill. The drilling, soil testing, and well construction was performed by Reynolds Well Drilling.
- City Water, Light and Power (CWLP), April 2010. This investigation was performed to install four piezometers on the west side of the CCR surface impoundments along Sugar Creek. The drilling and testing were completed by PSI.
- Stabilize, Inc. (SI), May 2011. This investigation installed four new monitoring wells to further the characterization of the CCR surface impoundments. The drilling, soil testing, and well construction was performed by PSI.
- Andrews Engineering, Inc., January 2012. This investigation was performed to replace CCR surface impoundment wells and install an additional background well. The drilling and well installation were completed by TerraDrill.
- Andrews Engineering, Inc., July 2017. This project included drilling peripheral to the Dallman Ash Pond.
- Andrews Engineering, Inc., June 2019. This investigation advanced 7 direct push borings peripheral to the Dallman Ash Pond and included the installation 2 new monitoring wells as part of an assessment program for the CCR ash impoundments.
- Andrews Engineering, Inc., October 2023. This investigation consisted of 34 borings next to the impoundments and 4 next to landfill Unit 1, to investigate the CCR ash surface impoundment berm construction materials and the installation of 29 vibrating wire piezometers to characterize pore water pressure in the soils.
- Andrews Engineering, Inc., February 2024. This investigation consisted of 14 borings using cone penetrometer testing adjacent to and within the Dallman and Lakeside Ash ponds.
- Andrews Engineering, Inc., April/May 2024. This investigation consisted of installation of six monitoring wells on the periphery of Lakeside and Dallman Ash Ponds, the advancement of a 100-foot boring northwest of the Dallman Ash Pond, and 4 borings in each of the ash ponds.

3. Unstable Areas

The United States Environmental Protection Agency (USEPA) promulgated new regulations for Coal Combustion Residual (CCR) slurry impoundments that took effect on October 14, 2015. By rule, existing CCR slurry impoundments were required to provide documentation that the slurry impoundment is not located in an unstable area unless the owner or operator demonstrates by October 17, 2018 that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR slurry impoundment to ensure that the integrity of the structural components of the CCR slurry impoundment will not be disrupted.

Pursuant to comments presented by the USEPA, Andrews Engineering, Inc. is providing the following analysis on the historic underground coal mining to address the unstable areas requirement (§257.64), demonstrating that the area of the CWLP Lakeside and Dallman Ash Ponds are stable.

3.1 Coal Mining

The CWLP property area is assumed to have underground mine works listed by the Illinois DNR Mine Database as Mine Index 122 – Brewerton Coal Company, Brewerton No. 81 Mine; formerly known as the Jefferson (Mine No. 81), Middle States (Mine No. 26), and Brewerton (Mine No. 1). The available information lists the mine as mining the Springfield No. 5 Coal Seam at a depth of 235 feet. The mine portal at the surface was reported at an elevation of 580 feet MSL. Subtracting the depth to the coal seam from the mine portal elevation provides the elevation of the top of coal seam as 345 feet MSL. The Springfield No. 5 Coal Seam in this mine was reported to have a thickness ranging from 5.0 feet to 6.0 feet and an average thickness of 5.5 feet. The mine map depicts 765 acres with an additional 25 acres mined-out after the map date. The Coal Mines in Illinois – Springfield East/West Quadrangle, Sangamon County map prepared by the Illinois State Geological Survey is included in Attachment 1 with the location and postulated extents of the Brewerton Coal Company Brewerton No. 81, Mine Index 122 portion of the Springfield East/West Quadrangle map shown as Figure 2.

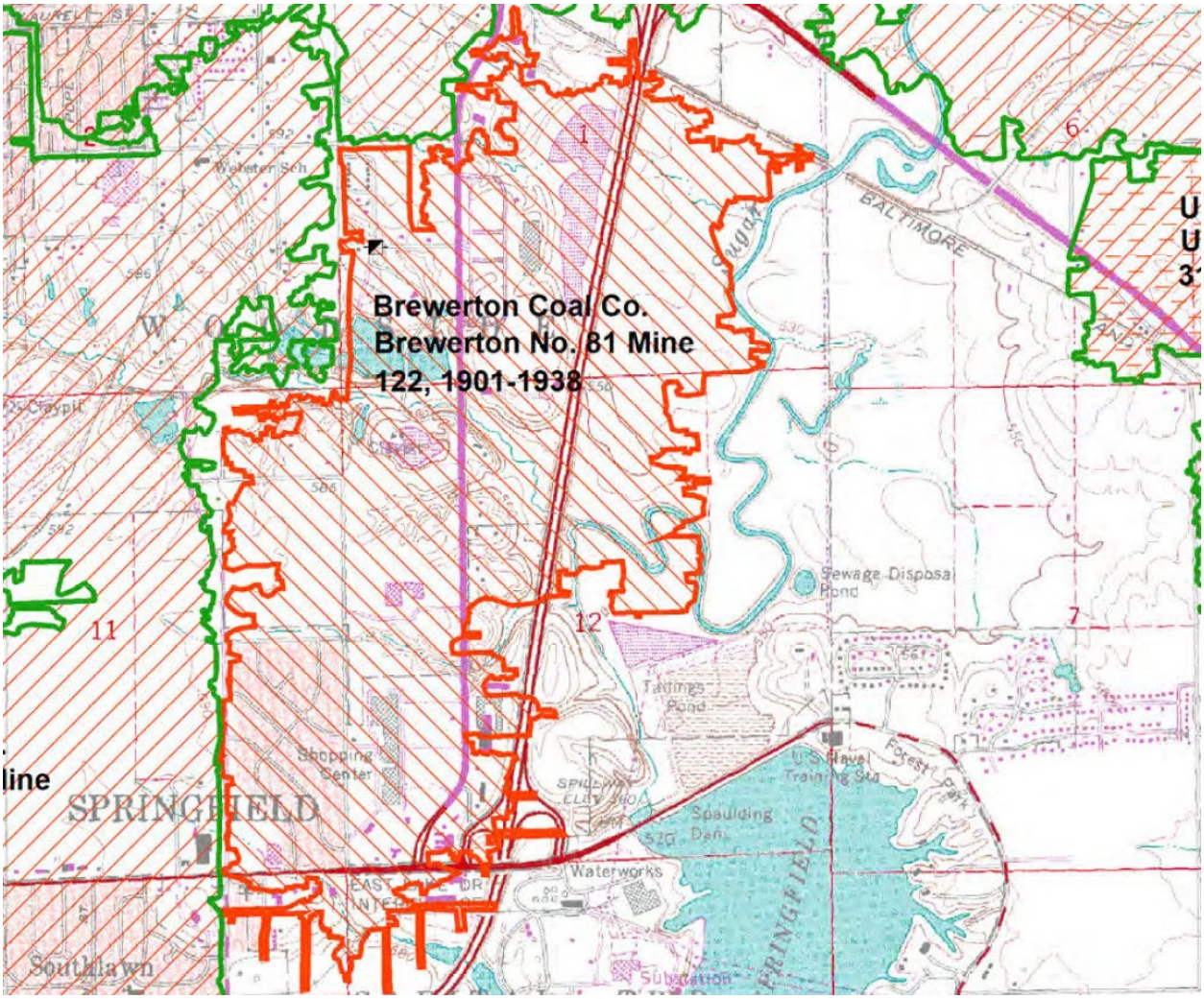

Figure 2. Excerpt from Coal Mines in Illinois – Springfield East/West Quadrangle, Sangamon County

The majority of Dallman Ash Pond is located within the boundary of the mineral rights for the coal mine and thus may have been undermined while Lakeside Ash Pond is clearly outside of the boundary of the mineral rights for the coal mine. Figure 3 below depicts a portion of the mined area directly beneath Dallman Ash Pond, including the limits of mining as presented in the Map of Brewerton Coal Company Mine No. 18 dated February 22, 1938. The available Map of Brewerton Coal Company Mine No. 81, February 22, 1938 is included in Attachment 2. Based upon the Map of Brewerton Coal Company Mine No. 81, February 22, 1938, the eastern half of the northeast quarter of Section 12 Township 15 North, Range 5 West is excluded from the mineral rights with no mining shown in the area.

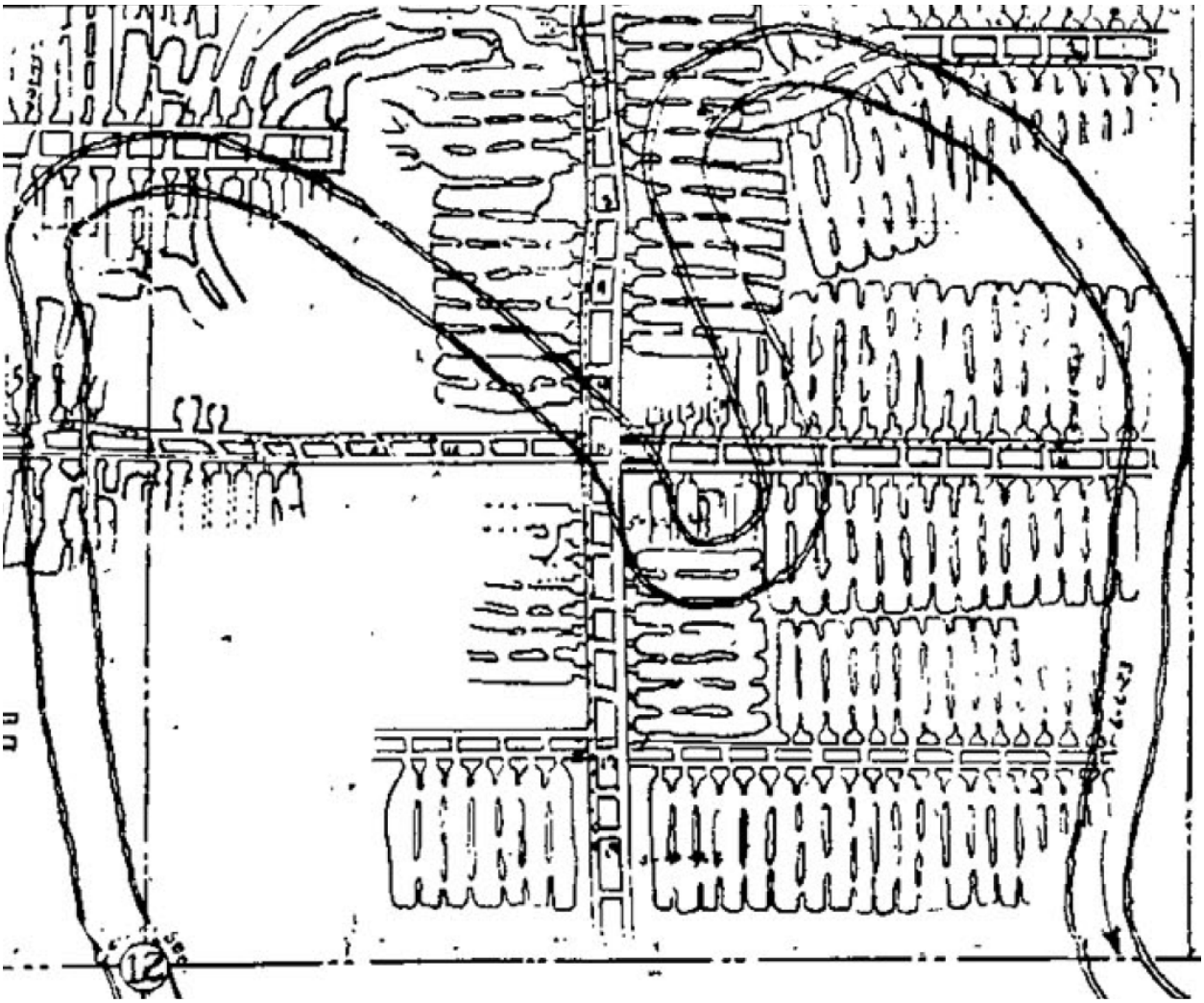

Figure 3. Excerpt from Map of Brewerton Coal Company Mine No. 81, February 22, 1938

The relationship of the former Sugar Creek channel as depicted in the mine map is similar to the channel as depicted in the Dallman Ash Pond Grading Plan dated August 13, 1976. The eastern berm of the Dallman Ash Pond is the eastern limits of the Brewerton Coal Company Mine No. 81 limits. Figure 4 depicts the same area as depicted in Figure 3 based upon the location of Sugar Creek. The Dallman Ash Pond Grading Plan dated August 13, 1976 is included in Attachment 3.

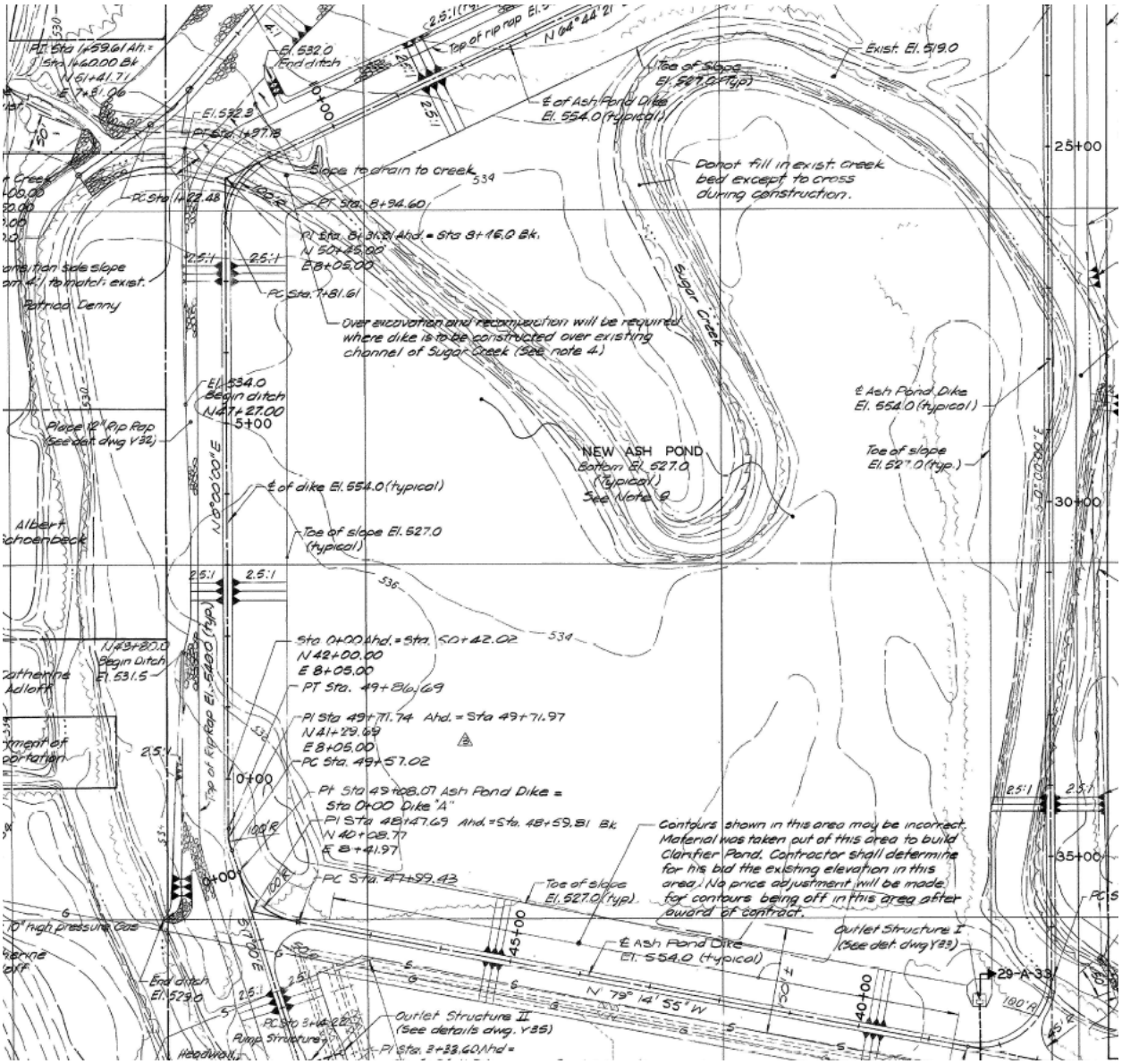

Figure 4. Excerpt from Dallman Ash Pond Grading Plan dated August 13, 1976

3.2 Estimated Extraction Rate

An estimate of the extraction rate was undertaken based upon the total production of the mine in tons of 4,099,901 tons provided in the production history and the average thickness of the mined seam of 5.5 feet. The total mined-out acreage that was shown is 765 acres with an approximate 25 additional acres mined after the map date for a total of 790 acres. A general extraction rate is computed by converting the tonnage to pounds and dividing that by the density of insitu bituminous coal estimated at 84 pounds per cubic foot to determine the total cubic footage mined. Then using the average seam thickness and the total area of the mine, an extraction rate is

approximated. The estimated general extraction rate is 0.54, which is within the expected range of extraction rate for a room-and-pillar panel mine.

3.3 Breakthrough, Pillar and Floor Failure Analyses

A breakthrough, pillar and floor failure analyses were completed relying upon much of the data available from past site investigations for the CWLP facilities and the IL DNR Mines Database. Using the guidelines for mining under or near bodies of water for room and pillar mining presented in Table 8.5 of the MSHA Design Manual 2009, the Babcock and Hooker, 1977 method was utilized. The average extraction thickness was presented as 5.5 feet, the entry width is noted as 24 feet on page 16 of 19 in the Mine Notes for Mine 122 available from IL DNR and the top elevation of the coal seam listed was 345 feet MSL. In the area of the northwest corner of Dallman Ash Pond, the minimum top of bedrock is 501 feet MSL based upon boring B100 drilled in April 2024 and the minimum top of bedrock is 496 feet MSL along the east side of Dallman Ash Pond in the area of Unit 2 Landfill. Taking the difference between the top of bedrock, conservatively 496 feet MSL, and the top of the coal seam, the minimum solid overburden is 151 feet. The criterion requires that both thicknesses of minimum solid overburden must be exceeded using the formulas of 10t and 5s. The minimum solid overburden required is calculated at 10 x 5.5 = 55 feet or 5 x 24 = 120 feet. The minimum solid overburden thickness is 151 feet which exceeds the 120 feet.

A pillar evaluation was conducted for both the pillar failure and the floor failure supporting the pillar. The average stress imposed on the pillars by the overburden was calculated based upon an estimated maximum final capped elevation of 580 feet. Based upon “The State-of-the-Art in Coal Pillar Design” by Chris Mark, the pillars of this mine would be considered between intermediate and slender pillars since the width to height is estimated at approximately 3 and maybe susceptible to pillar squeeze failure. The formula to determine the overburden stresses is provided in the MSHA Design Manual 2009 on page 8-25, formula (8-1) which is presented below.

$$S_p = 1.1 * H * [(w + B) / w] * [(L + B) / L]$$

$$S_p = 1.1 * (580 – 345) * [(15 + 24) / 15] * [(50 + 24) / 50]$$

$$S_p = 995 \text{ psi}$$

The pillar strength was calculated using the Mark-Bieniawski Rectangular Pillar Strength Formula provided below.

$$\sigma_p = \sigma_{cube} (0.64 + 0.36 \, w/h)$$

$$\sigma_p = 930 (0.64 + 0.36 (15 / 5.5)$$

$$\sigma_p = 1{,}508 \text{ psi}$$

The factor of safety against pillar failure is the pillar strength divided by the overburden stress. Below is the calculation for the factor of safety against pillar failure. The minimum factor of safety as provided on page 8-27 of the MSHA Design Manual is 1.5 for pillars with less than 750 feet of cover.

$$F.S. = \sigma_p / S_p$$

$$F.S. = 1{,}508 / 995 = 1.52$$

The floor failure analysis for pillar punching is presented below using the same data presented above and using the Vesic-Gadde Equation to determine the strength of the underclay. This mine is in the western shelf of the Illinois Basin as presented in the Murali Gadde, PhD dissertation titled “Weak Floor Stability in the Illinois Basin Underground Coal Mines”. The expected floor cohesion is calculated using equation (3.9) on page 144 combined with equation (3.17) on page 148 from Dr. Gadde’s dissertation. The average moisture of the Springfield No. 5 Coal underclay is 5.48% in the Illinois Western Basin. The underclay 12 feet in thickness, reported as fireclay (kaolin claystone).

$$c_1 = 1905e^{(-0.1MC)} / 6.17$$

$$c_1 = 178 \text{ psi} = 25{,}632 \text{ psf}$$

The underclay is assumed to have a friction angle of 19 degrees and a saturated unit weight of 120 pounds per cubic foot. The calculations for a floor failure analysis are provided on page 8-27 of the MSHA Design Manual formula (8-3) for pillars with an L to B ratio less than ten. Presented below are the calculations against a floor failure.

$$Q_u = ½(\gamma\ B\ N_1\ S_1) + (c \cot \phi\ N_q\ S_q – c \cot \phi)$$

$$N_q = [\exp(\pi \tan \phi)]\ [\tan^2(45 + \phi/2)] = 5.80$$

$$N_1 = 1.5(N_q + 1) \tan \phi = 3.51$$

$$S_1 = 1.0 – 0.4\ (B/L) = 0.808$$

$$S_q = 1.0 - \sin \phi\ (B/L) = 0.844$$

$$Q_u = ½(120 * 24 * 3.51 * 0.808) + (25{,}632 * \cot(19) * 5.80 * 0.844 – 25{,}632 * \cot(19))$$

$$Q_u = 293{,}625 \text{ psf} = 2{,}039 \text{ psi}$$

The factor of safety against a floor failure from pillar punching is calculated from the bearing capacity of the floor divided by the average pillar stress. The minimum factor of safety required against pillar punching into the floor is generally at least 1.5 for long-term stability.

$$F.S. = Q_u / S_p$$

$$F.S. = 2{,}039 / 995 = 2.05$$

Based upon all the mine analyses, the underground coal mine pillars will support the site features with a factor of safety exceeding 1.5.

4. STATEMENT

This Location Restrictions – Unstable Areas for Coal Combustion Residuals in Slurry Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 40 CFR 257.64. The requirements have been satisfied.

Signature: Karl Finke

Illinois L.P.E. No: 062.068571

Date: 06/28/24

FIGURE 1

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: JUNE 20, 2023).
2. BACKGROUND IMAGE FROM GOOGLE EARTH, DATED FEBRUARY 24, 2024.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: KWF | DRAWN BY: BCK | APPROVED BY: KWF

SITE PLAN MAP

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER:

FIG. 1

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Tab: Layout1 Last Saved: June 26, 2024, by Ben Karpus Plotted: Wednesday, June 26, 2024 2:30:58 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Site Map with February 2024 background.dwg

ATTACHMENT 1:

Coal Mines in Illinois
Springfield East/West Quadrangle
Sangamon County

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

For further information contact:
Prairie Research Institute
Illinois State Geological Survey
University of Illinois at Urbana-Champaign
615 East Peabody Drive
Champaign, Illinois 61820-6964
(217) 333-4747
http://www.isgs.illinois.edu

Coal Mines in Illinois
SPRINGFIELD EAST/WEST QUADRANGLE
SANGAMON COUNTY
Springfield Seam

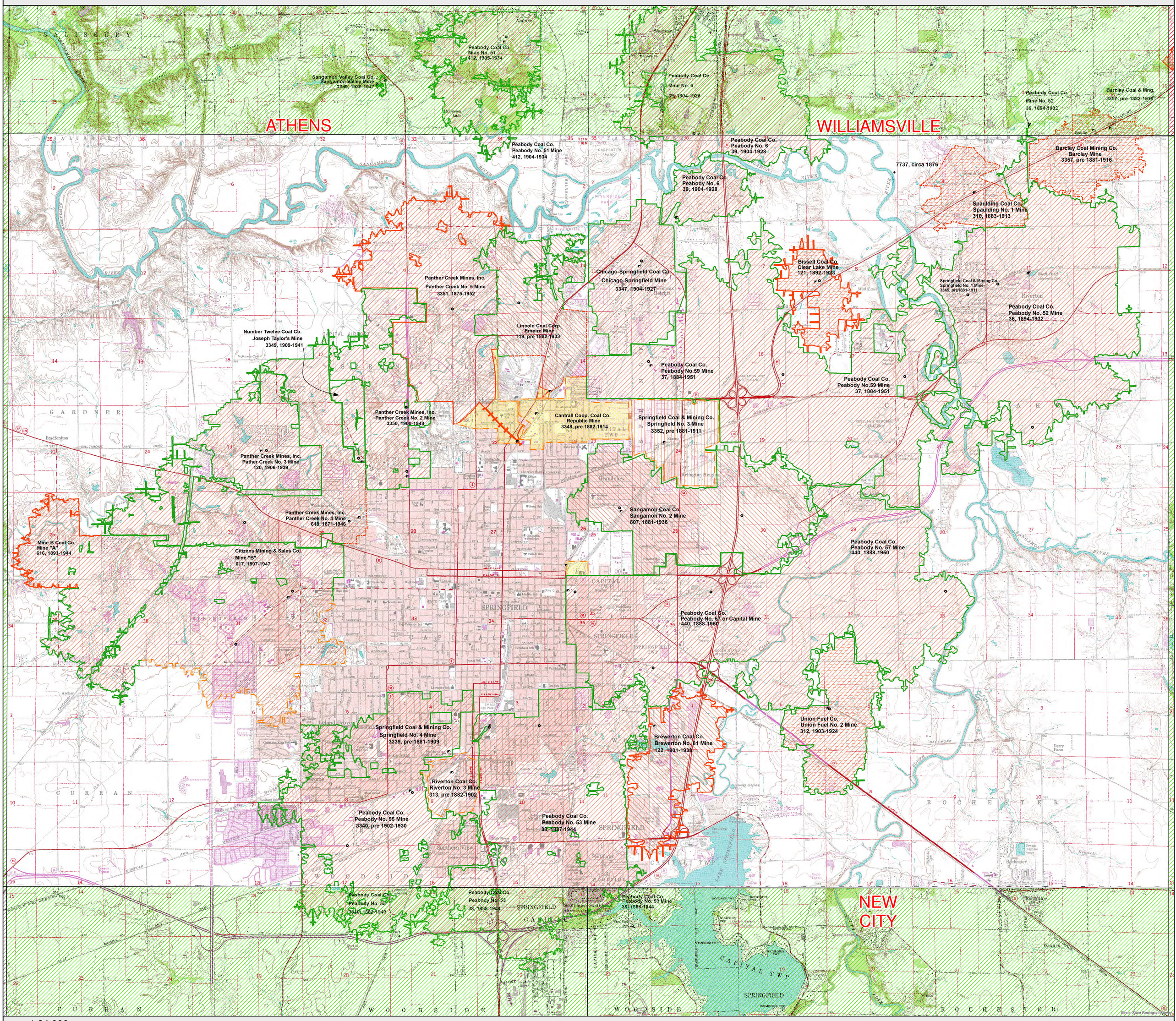
Mined Out Quadrangle Map Series

THIS MAP ACCOMPANIES THE COAL MINES DIRECTORY FOR THE SPRINGFIELD EAST/WEST QUADRANGLE. CONSULT THE DIRECTORY FOR A COMPLETE EXPLANATION OF THE INFORMATION SHOWN ON THIS MAP

The most recent mined out quadrangle maps are available as downloadable PDF files at: http://www.isgs.illinois.edu

Mine Outlines Compiled by
Margaret Bargh & C. Chenoweth
July 13, 1999 Revised 2014 & 2017

This product is under review and may not meet the standards of the Illinois State Geological Survey.



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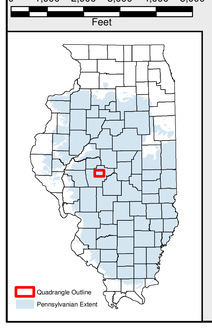

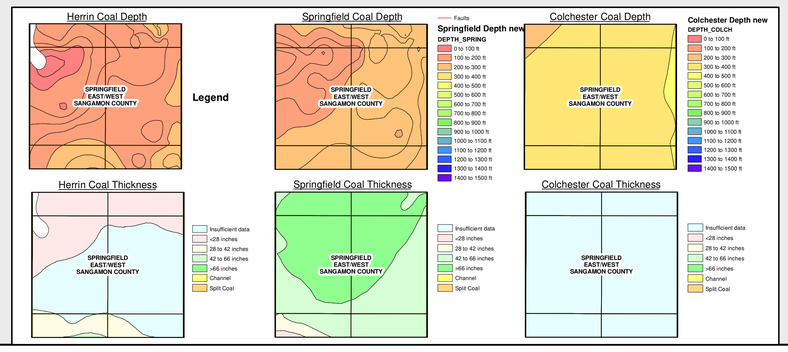

Completed Quadrangles
Mining Method
- Room & Pillar (RP)
- Room & Pillar Basic (RPB)
- Modified Room & Pillar (MRP)
- Room & Pillar Panel (RPP)
- Blind Room & Pillar (BRP)
- Checkerboard Room & Pillar (CRP)
- High Extraction Retreat (HER)
- Longwall (LW)
- Underground, Method Unknown
- Strip Mine
- Auger Mine
- General Area of Mining

Other Areas Depicted
- Non-Coal Mines

Point Locations
- Strip Mine Tipple - Active
- Strip Mine Tipple - Abandoned
- Mine Shaft - Active
- Mine Shaft - Abandoned
- Mine Slope - Active
- Mine Slope - Abandoned
- Mine Drift - Active
- Mine Drift - Abandoned
- Air Shaft
- Uncertain Location
- Uncertain Type of Opening
- Non-Coal Mines

Source of Mine Outline
- Final Mine Map
- Not Final Mine Map
- Undated Mine Map
- Incomplete Mine Map
- Secondary Source Map

Mine Annotation
(space permiting)
Company
Mine Name
ISGS Index No., Years of Operation

Status of Neighboring Mined Out Area Quadrangle
- Completed
- Not Completed
- No Known Mining

Not Completed Quadrangle Mining Type
- Underground
- Surface
- General Area of Mining

Other Points Depicted

Map Explanation

Note that each quadrangle scale mined-out area map requires the use of the associated text directory for full explanation of map features and mine attributes. Also note that some quadrangles have multiple seams of mining and therefore more than one map may be available for a particular quadrangle. Please take care to check for multiple maps, as extensive mining may exist in the other seams.

The maps and digital files used for these studies were compiled from data obtained from a variety of public and private sources and have varying degrees of completeness and accuracy. This compilation map presents reasonable interpretation of the geology of the area and is based on available data. Locations of some mine features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors. These data are not intended for use in site-specific screening or decision-making.

These maps were designed for use at 1:24,000. Enlarging the map may reduce accuracy, as the original scale of the source maps used to compile the outlines shown varies from 1:400 to 1:150,000, and some mine locations are known only from text descriptions. See the accompanying mine directory for the original scale of the source map used for a specific mine to check accuracy of a given portion of the map. Areas with no mines shown may still be undermined; see the unlocated mines list at the back of each mine directory.

The image of the U.S.G.S. topographic base map was projected from the original UTM to Lambert Conformal Conic.

Disclaimer

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.

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ATTACHMENT 2:

Brewerton Coal No. 81

PDF_0107

PAR
1 OF 2

MAP OF
BREWERTON COAL COMPANY
Mine No. 81

IN SEC. 1, 2, 11, 12, 13, 14 TWP. 15 N. R 5 W. 3RD. P M.
& SEC. 6. - TWP. 15 N. R 4 W. 3RD. P M.
SANGAMON CO, ILL.

SCALE 1 IN. = 200 FT.

Grady & Dan Engineers
224½ S. 5th Street
Springfield Illinois
Extended July '20

REFERENCE

& ——— DENOTES BOUNDARY LINE OF COAL RIGHT

THIS MAP EXTENDED TO [redacted]
June 13, 1923 - R.W. Lone
November 1, 1923 - R.W. Lone
February 5 1926 - R.W. Lone
North Side Extended 4-21-1928
South " " 11-8-1927
C.B. Drake,
1-24-1930
ENTRIES EXTENDED

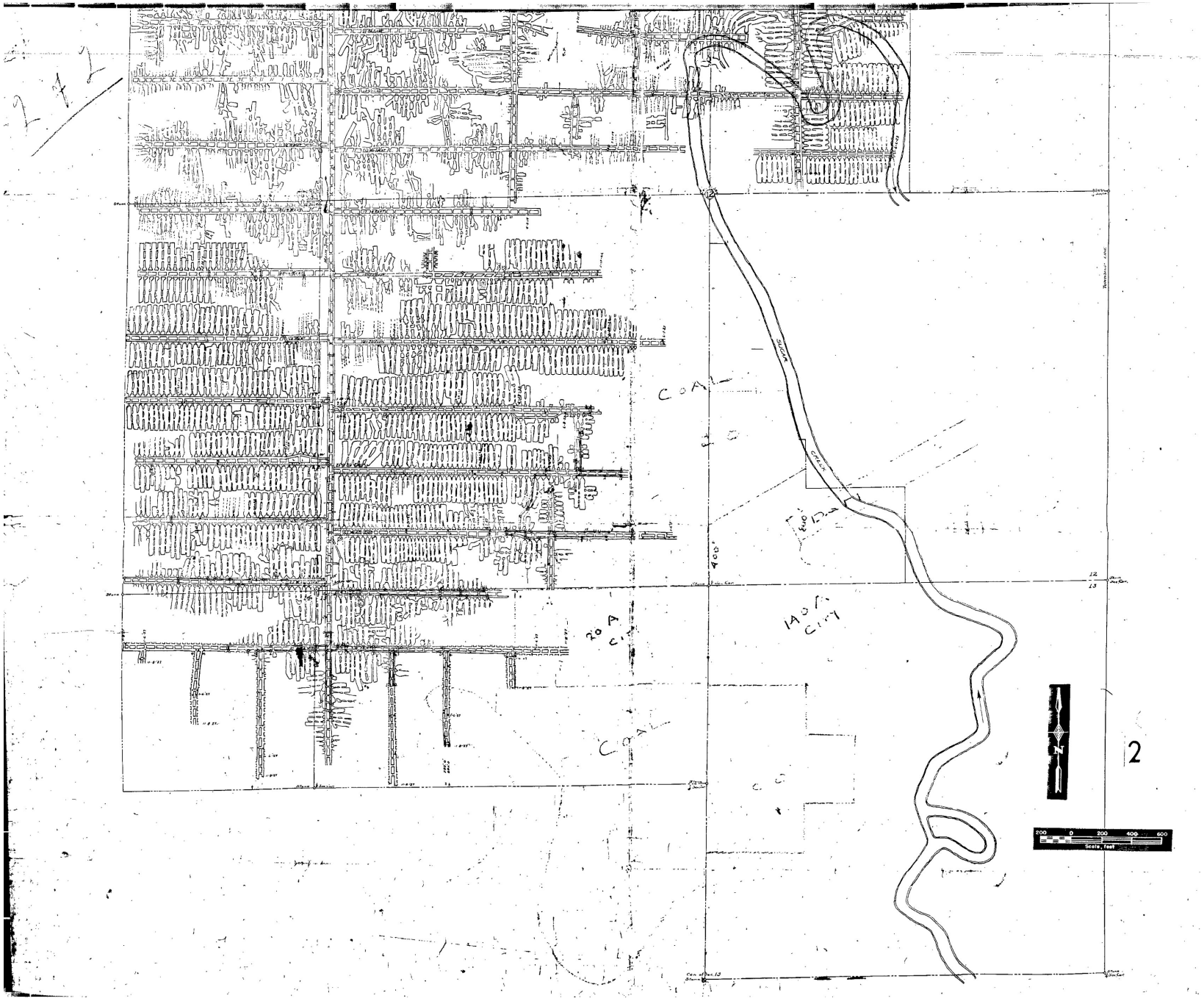
NORTH SIDE EXTENDED 2-21-35
NORTH SIDE EXTENDED 2-21-34
North Side Extended 2-15-35
R.W. Lone

200 0 200 400 600
Scale, feet

N

1

Worked Out
Worked Out
Worked Out


COAL
COAL
COAL
400'
12
13
2
200 0 200 400 600
Scale, feet

ATTACHMENT 3:
Dallman Ash Pond Grading Plan

PDF_0110

NO.	DATE	BY	REVISION
1	12-7-76	TKP	(M.T.) Added 6" topsoil to dike. (L, 18) Removed Bench Mark and note 8.
	12-10-76	LNB	ISSUED
2	4-27-77	MGH	Changed Dike Access Rd. and exist. dike alignments. Removed 300' pipe. Moved exist. pipe.
	4-27-77	LNB	ISSUED
3	5-26-77	DEJ	Revised dike alignment along So. side of Ash Pond.
	6-31-77	LNB	ISSUED
4	2-1-78	DLM	CONFORMING TO CONSTRUCTION RECORDS

CURVE DATA (Arc Def.) Δ = 43°15'23" D = 19°05'55" R = 300.00 L = 257.91 T = 135.55

CURVE DATA (Arc Def.) Δ = 60°00'00" D = 19°05'55" R = 300.00 L = 314.16 T = 173.21

CURVE DATA (Arc Def.) Δ = 60°00'00" D = 19°05'55" R = 309.60 L = 314.16 T = 173.21

CURVE DATA (Arc Def.) Δ = 14°15'23" D = 19°05'55" R = 300.00 L = 74.65 T = 37.52

CURVE DATA (Arc Def.) Δ = 50°00'00" D = 19°05'55" R = 300.00 L = 261.80 T = 139.89

Notes:

1. Two 36" Corregated Metal Pipe, 16 gauge, Bituminous coated, 2 2/3" x 1/2" corrugations, with 2 end sections required.
2. Excavate for Relocated Sugar Creek from Sta. 2+00 to Sta 19+00 leaving excavation isolated from Sugar Creek waters until excavation and Rip Rap is completed between the above mentioned stations.
3. Area is susceptable to Flooding
4. Over excavate at least 4.0 feet under dike below exist. channel banks and bottom. (See cross sections) Fill with cohesive material and compact to at least 90%
5. Form a greenbelt on both sides of Relocated Sugar Creek. Areas within Greenbelt which are cleared or disturbed during construction shall be topsoiled & seeded. Plant trees on 25Ctr. On ground above el. 540.0 10 trees shall be Hard Maple the rest shall be Sycamore. On ground that is below El. 540.0 10 trees shall be Pin Oak the rest shall be Sycamore. Do not plant trees on ash pond dike
6. Clearing Limits as shown outside of Purchasers property lines. Within Purchasers property clear as necessary for const. Keep clearing limits as close to work as possible
7. Waste area is north of Green Belt. Grade waste area to drain and to present a neat appearance. Seed and mulch Waste Area.
8. Borrow material for the Ash Pond Dikes shall come from center of pond and Relocated Sugar Creek. If in the opinion of the engineer material taken from the pond area is too wet to dry in a reasonable length of time the contractor will be permitted to borrow from the area directly north of Relocated Sugar Creek as long as the borrow area is topsoiled, seeded, and mulched, and graded to drain as directed by engineer.

CONTRACT NO. 3333
ASH POND
V.Y. DALLMAN POWER STATION - UNIT 33
SPRINGFIELD, ILLINOIS

GRADING PLAN

Burns & McDonnell
Engineers - Architects - Consultants
KANSAS CITY, MISSOURI

DATE AUG. 13, 1976	DRAWING NO. Y29 - 4 REV.
DESIGNED LNB	
DETAILED TRP	PROJECT [73-008-1]
CHECKED	SHEET OF SHEETS

M231 01874

APPENDIX C:

Boring Logs, Laboratory Results and CPT Soundings

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127375.6
Easting: 2456111.7

Weather: Sunny 62 F

Boring Information:
Boring No: B-1
Well No: B-1
Surf Elev.: 557.77

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	557.8
	1						CINDER and GRAVEL (fill)	
	2		0.3/1.5	3 4 2				555.0
	3							
5	4		0.2/1.5	1 2 1			CINDER (fill); dry; loose	
	5						Gray silty CLAY; with cinders; dry; medium stiff	
	6		0.5/1.5	1 3 2				550.0
	7							
10	8		0.9/1.5	1 2 8	1.0		Gray silty CLAY; with gravel and sand; moist; stiff; 20 mm VST@ 9.5' = 6.0, 3.2, 4.3	
	9							
	10		0.8/1.5	0 1 3	1.0		Gray sandy CLAY; moist; medium stiff	545.0
	11							
15	12		0.9/1.5	4 18 9			Gray SANDY LOAM	
	13						Black CINDER (fill); with gravel and silty clay; wet; loose	
	14		0.2/1.5	1 1 1				540.0
	15							
20	16		1.1/1.5	1 1 3	0.3		Gray SANDY LOAM; wet; slightly stiff	
	17							
	18		1.1/1.5	0 0 3			Gray SILTY LOAM; wet; soft; 20 mm VST@ 51.5' = 6.7, 2.3, 2.5	535.0
	19							
25	20		1.8/2.0				Gray SANDY LOAM; moist	
	21				0.7			
	22		1.2/1.5	2 3 5	1.5		Gray silty CLAY; moist; stiff	530.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127408.40
Easting: 2456167.19

Weather: Rainy 62 F

Boring Information:
Boring No: B-1U
Well No: B-1U
Surf Elev.: 564.17

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/13/2023
Finish: 10/13/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	564.2
	1						Black CINDERS; moist; loose	
	2		1.0/1.5	4 5 6	2.0		Dark brown silty CLAY; moist; stiff; some black cinders; trace organics; trace gravel	
	3							560.0
5	4		0.9/1.5	2 3 5	1.5			
	5							
	6		1.0/1.5	2 6 6	1.0		Black fly ASH with CINDERS; moist to wet; moderately stiff	
	7							555.0
10	8		0.8/1.5	2 5 6				
	9							
	10		0.8/1.5	1 2 1				
	11							550.0
15	12		1.4/1.5	0 1 1			Black fly ASH; wet; soft	
	13						CINDERS	
	14		1.1/1.5	1 2 3	0.25		Black fly ASH; wet; soft; laminated	
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127370.68
Easting: 2456072.07

Weather: Sunny 72 F

Boring Information:
Boring No: B-1L
Well No: B-1L
Surf Elev.: 552.56

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/11/2023
Finish: 10/11/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	552.6
	1						Brown silty CLAY; moist; stiff; some dark brown mottling; few organics; trace ash fragments; trace gravel	
	2		1.1/1.5	2 6 7	3.75			550.0
	3							
5	4		1.0/1.5	3 5 4	3.5			
	5							
	6		0.6/1.5	2 3 3	2.5			545.0
	7							
							16 mm VST@ 9.5' = 7.7, 2.4, 2.8	
10	8		0.6/1.5	1 4 3	2.25		Brown SAND; medium to coarse grained; moist; loose	
	9							
							Black coal ASH fragments; wet; loose	
	10		0.3/1.5	1 3 3				540.0
	11							
15	12		0.6/1.5	0 2 2				
	13							
	14		0.5/1.5	4 10 3				535.0
							Dark gray sandy SILT; wet; soft; trace gravel	
	15							
20	16		1.1/1.5	0 0 2	0.25		More clayey	
					0.5		Dark gray CLAY; moist; soft; some organic fragments; trace gravel	
	17							
							20 mm VST@ 22.0' = 13.0+, 3.9, 3.9	
	18		1.4/2.0					530.0
	19							
25					2.0		End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127355.19
Easting: 2456023.58

Weather: Sunny 65 F

Boring Information:
Boring No: B-1LL
Well No: B-1LL
Surf Elev.: 542.84

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	542.8
	1						Brown clayey SILT; with sand; moist; loose	
	2		0.2/1.5	6 8 8				540.0
	3							
5	4		0.2/1.5	6 5 5				
	5							
	6		0.6/1.5	4 4 5			Gray silty CLAY; with cinders; dark yellowish brown mottling; moist; stiff	535.0
	7				2.25			
10	8		0.6/1.5	7 9 10			Gray SAND; medium to coarse grained; wet; loose	
	9							
	10		0.7/1.5	3 5 5			Gray silty CLAY; with black organic varved material; few ash fragments	530.0
	11				2.75			
15	12		2.0/2				16 mm VST@ 14.5' = 8.5, 3.6, 4.2	
	13				0.5		Very soft	
	14		1.4/1.5	1 2 2	0.75			525.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127389.92
Easting: 2456246.00

Weather: Sunny 64 F

Boring Information:
Boring No: B-1CCR
Well No: B-1CCR
Surf Elev.: 568.03

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	568.0
	1						Black bottom ash and CINDERS; moist; loose	
	2		0.5/1.5	5 5 2				565.0
	3							
5	4		0.3/1.5	1 2 3				
	5						Black fly ASH; moist to wet	
	6		0.8/1.5	1 3 3	1.0			
	7						Black bottom ASH; moist to wet; moderately loose	560.0
10	8		1.0/1.5	1 1 1				
	9							
	10		1.2/1.5	1 0 1				555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black fly ASH; moist to wet; moderately firm	
	13						Black bottom ASH; wet; loose	
	14		0.9/1.5	2 6 7				550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128026.78
Easting: 2455971.03

Weather: Cloudy 62 F

Boring Information:
Boring No: B-2
Well No: B-2
Surf Elev.: 554.71

Depth Information:
Total: 30.0'
Auger: 30.0'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

Dates:
Start: 10/06/2023
Finish: 10/06/2023

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.7
0	1						Gray brown SILT; dry	
	2		0.4/1.5	3 5 5	4.75			
	3							
5	4		0.8/1.5	3 4 6	2.5		Becoming moist	550.0
	5							
	6		0.7/1.5	3 4 4	2.0		Brown silty CLAY; moist	
	7				2.5			
10	8		0.9/1.5	2 4 4				545.0
	9						Greenish brown silty CLAY; moist	
	10		1.0./1.5	2 3 4	1.5			
	11							
15	12		1.0/1.5	1 3 5	2.0		Brown silty CLAY; moist; trace black organics; 16 mm VST@ 14.5' = 7.0, 4.3, 4.2	540.0
	13							
	14		1.0/1.5	1 2 4	2.0			
	15							
20	16		1.4/1.5	1 3 4	2.5		Brownish gray silty CLAY; black/orange inclusions; organics; moist	535.0
	17							
	18		1.9/2.0					
	19							
25	20		1.5/1.5	1 3 4	1.0		Brownish/greenish gray silty CLAY; moist; trace brown organics; 16 mm VST@ 25.0' = 5.4, 3.2, 3.5	530.0
	21							
	22		1.5/1.5	0 2 2	<0.25		Becoming trace fine grained sand	
	23				<0.25		Orangish brown SILT; moist	
30								525.0
							End of Boring = 30 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128045.00
Easting: 2456005.51

Weather: Sunny 78 F

Boring Information:
Boring No: B-2U
Well No: B-2U
Surf Elev.: 562.33

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/12/2023
Finish: 10/12/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	562.3
0	1						Black coal ASH (cinders); moist; loose	
	2		0.4/1.5	2 5 1				560.0
	3							
5	4		0.2/1.5	1 1 2				
	5							
	6		0.8/1.5	2 4 8	2.0		Gray silty CLAY; some yellow brown mottling; some iron concretions; moist; stiff; trace gravel	555.0
	7							
10	8		0.4/1.5	2 5 4			Black coal ASH (cinders); wet; loose	
	9							
	10		1.5/1.5	1 2 11	<0.25		Black fly ASH; wet; soft; some cinders	550.0
	11							
15	12		1.0/1.5	1 0 2	<0.25		With cinders	
	13							
	14		0.4/1.5	3 3 4			Black coal ASH (cinders); wet; loose	545.0
	15							
20	16		0.5/2.0				Black fly ASH; wet; soft; 20 mm VST@ 19.5' = 3.0, 3.2, 3.8	
	17				<0.25			
	18		0.5/1.5	1 2 5			Black CINDERS; wet; loose	540.0
	19							
25	20		0.5/1.5	0 1 2	1.25		Olive brown CLAY; moist; stiff; some organics	
							End of Boring = 26 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128015.70
Easting: 2455909.16

Weather: Sunny 65 F

Boring Information:
Boring No: B-2L
Well No: B-2L
Surf Elev.: 536.92

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	536.9
0	1						Gray/brown silty CLAY; some iron concretions; moist; stiff; some organics; some ash fragments; some gravel	
	2		0.5/1.5	1 4 4	1.25			535.0
	3							
5	4		1.3/1.5	2 2 3	1.0			
	5							
	6		1.8/2.0				Light gray clayey SILT; few dark yellow brown mottling; moist; firm; trace iron concretions	530.0
	7				2.25			
10	8		1.5/1.5	1 2 2	0.75		20 mm VST@9.5' = 13.0, 3.2, 2.8	
	9				<0.25		Gray clayey SAND; wet; soft	
	10		1.5/1.5	0 1 1	<0.25			525.0
	11							
15	12		1.0/1.5	0 0 1	<0.25			
	13							
	14		1.0/1.5	0 1 1	0.25		Gray clayey SILT; laminated; moist to wet; soft	520.0
	15							
20	16		1.3/1.5	0 1 2			Brown SAND; medium to coarse grained; wet; loose	
	17							
	18		1.5/1.5	1 3 3	0.25		Dark gray clayey SILT; laminated; moist; soft; organic fragments	515.0
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128059.37
Easting: 2456087.51

Weather: Sunny 64 F

Boring Information:
Boring No: B-2CCR
Well No: B-2CCR
Surf Elev.: 566.77

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	566.8
	1						Mix of lime sludge, and fly and bottom ASH; some dark yellow brown mottling; moist; soft	
	2		1.3/1.5	1 1 1	0.25			565.0
	3							
5	4		1.6/1.5	1 0 1			More bottom ash	
	5							
	6		0.9/1.5	1 5 3	<0.25		Lime SLUDGE; wet; soft	560.0
	7							
10	8		1.5/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; some organic fragments	
	9							555.0
	10		1.5/1.5	0 0 0			Some bottom ash	
	11							
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		0.4/1.5	1 0 1			Black bottom ASH; wet; loose	550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128663.99
Easting: 2456486.97

Weather: Sunny 69 F

Boring Information:
Boring No: B-3
Well No: B-3
Surf Elev.: 554.19

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.2
0	1						Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	2		0.5/1.5	1 1 2	1.0			
	3							
5	4		0.9/1.5	2 2 2			Brown/gray SAND; coarse grained; moist to wet; loose	550.0
	5							
	6		0.8/1.5	1 2 3	2.57		Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	7							
10	8		1.5/2.0				16 mm VST@ 9.5' = 9.3, 5.3, 5.4	545.0
	9				1.5			
	10		1.0/1.5	1 3 3	1.5		Black/gray	
	11							
15	12		1.3/1.5	2 3 4	1.5			540.0
	13							
	14		1.2/1.5	1 2 5	1.25		With dark yellow brown mottling	
	15							
20	16		1.6/2.0				16 mm VST@ 19.5' = 11.8, 5.0, 5.1	535.0
	17				1.75			
	18		1.5/1.5	1 2 4			Manganese oxide concretions	
	19						Dark yellowish brown silty CLAY; more silty; organic staining; moist; stiff	
25	20		1.1/1.5	0 2 2	1.25		Yellow brownclayey SILT; some dark yellow brown mottling; laminated; some magnesium oxide concretions; moist; soft; 16 mm VST@ 24.5' = 9.1, 6.0, 5.9	530.0
	21							
	22		1.2/1.5	0 2 4	0.5			
	23				2.75		Yellow brown silty CLAY; some dark yellow brown mottling; few manganese oxide concretions; moist; stiff	
30							End of Boring = 29.5 Feet	525.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128634.05
Easting: 2456502.96

Weather: Sunny 64 F

Boring Information:
Boring No: B-3U
Well No: B-3U
Surf Elev.: 562.94

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	562.9
	1						Dark yellowish brown silty CLAY; some iron concretions; moist; stiff; trace gravel	
	2		0.8/1.5	2 4 7	3.25		GYPSUM; moist; loose	560.0
	3							
5	4		0.5/1.5	2 2 2				
	5							
	6		0.7/1.5	2 4 6	1.5		Olive gray silty CLAY; few dark yellow brown mottling; laminated; some bottom ash; moist; stiff; trace gravel	555.0
	7							
10	8		1.3/2.0				16 mm VST@ 9.5' = 0.8, 3.9, 4.2	
	9						Bottom ASH; moist to wet; loose	
	10		0.5/1.5	1 0 1			Fly ASH; wet; soft	550.0
	11							
15	12		1.5/1.5	0 1 0				
	13				0.5		Little bottom ASH	
	14		1.5/1.5	0 0 1	0.5			545.0
	15				<0.25			
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128336.73
Easting: 2456638.09

Weather: Sunny 65 F

Boring Information:
Boring No: B-3CCR
Well No: B-3CCR
Surf Elev.: 564.05

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	564.0
	1						Fly ash with bottom ASH; moist; moderately firm	
	2		0.7/1.5	1 3 4	1.0			
	3							560.0
5	4		1.5/1.5	1 0 0	<0.25		Light gray lime SLUDGE; with rootlets; some organics; moist; soft	
	5							
	6		0.9/1.5	0 1 1	<0.25			
	7							555.0
10	8		1.1/1.5	0 0 0	<0.25		Fly ASH; moist to wet; soft; strong petroleum odor	
	9						Some organic matter; strong petroleum odor	
	10		1.5/1.5	0 0 0	<0.25			
	11							550.0
15	12		1.4/1.5	0 0 0				
	13						Faint odor	
	14		1.5/1.5	0 0 0				
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127789.13
Easting: 2456023.78

Weather: Sunny 62 F

Boring Information:
Boring No: B-4
Well No: B-4
Surf Elev.: 555.18

Depth Information:
Total: 34.5'
Auger: 34.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.2
0	1						Gray silty CLAY; with cinders; dry; stiff	
	2		0.8/1.5	3 6 6	3.3		Brown silty CLAY; dry; stiff	
	3							
5	4		0.2/1.5	4 6 5	4.0		Gray silty CLAY; with cinders	550.0
	5							
	6		0.7/1.5	2 3 4	1.0		Brown/gray silty CLAY; moist; moderately stiff; trace cinders	
	7							
10	8		0.6/1.5	1 3 4			Gray silty CLAY; moist; moderately stiff; 16 mm VST@ 9.5' = 4.4, 2.5, 2.7	545.0
	9				1.0			
	10		0.8/1.5	0 1 2	0.5		Gray silty CLAY; moist; soft	
	11							
15	12		0.9/1.5	1 2 3	1.0		Brown/gray silty CLAY; mottling; moist; soft	540.0
	13							
	14		0.6/1.5	0 2 2	1.1			
	15							
20	16		1.3/2.0				Brown silty CLAY; oxidation staining; moist; moderately stiff; 16 mm VST@ 19.5' = 2.6, 1.7, 1.7	535.0
	17				2.1			
	18		0.8/1.5	0 0 1				
	19				0.5			
25	20		0.9/1.5	0 0 1	0.2-0.5		Soft	530.0
	21							
	22		1.5/1.5	0 1 2	0.1		Brown/gray silty LOAM; wet; soft; trace sand	
	23							
30	24		1.5/1.5	0 0 0	0.1		Brown sandy LOAM; wet; very soft	525.0
	25							
	26		1.5/1.5	0 0 0	0.5		Brown/gray silty CLAY; wet; soft	
	27							
35							End of Boring = 34.5 Feet	520.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127802.23
Easting: 2456057.41

Weather: Sunny 78 F

Boring Information:
Boring No: B-4U
Well No: B-4U
Surf Elev.: 563.01

Depth Information:
Total: 29.0'
Auger: 29.0'
Core: -

Dates:
Start: 10/12/2023
Finish: 10/12/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	563.0
	1						Black CINDERS; moist; loose	
	2		0.4/1.5	3 6 1				560.0
	3						Black silty CLAY; with fly ash; moist; stiff; some organic fragments	
5	4		0.7/1.5	1 0 1	2.75			
	5						Olive gray silty CLAY; some dark yellow brown mottling; moist; stiff	
	6		0.7/1.5	1 2 2	1.75		Black CINDERS; wet; loose	555.0
	7							
10	8		0.8/1.5	1 0 0	<0.25		Black fly ASH; wet; soft	
	9							
	10		1.0/1.5	2 4 3				550.0
	11							
15	12		0.9/1.5	0 2 2				
	13							
	14		1.1/1.5	1 3 6				545.0
	15						Black CINDERS; wet; loose	
20	16		0.7/1.5	2 3 4				
	17						Light gray/black fly ASH	
	18		1.2/1.5	0 0				540.0
	19						Olive gray silty CLAY; some dark yellow brown mottling; moist; moderately stiff; trace organics	
25	20		0.4/1.5	0 0 1	1.25			
	21							
	22		1.9/2.0					535.0
					1.25		End of Boring = 29 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127732.94
Easting: 2455960.98

Weather: Sunny 65 F

Boring Information:
Boring No: B-4L
Well No: B-4L
Surf Elev.: 533.51

Depth Information:
Total: 21.5'
Auger: 21.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.5
0	1						Dark gray silty CLAY; some dark yellow brown mottling; some organic fragments; moist; soft; some gravel; trace coal fragments	
	2		0.4/1.5	3 2 1	0.25			
	3							530.0
5	4		0.7/1.5	1 1 1	<0.25			
	5						Grading to light gray	
	6		1.4/1.5	1 2 2	0.25		Light gray silty CLAY; some dark yellow brown mottling; few iron concretions; moist; soft	
	7							525.0
10	8		1.5/1.5	1 1 2	0.75			
	9							
	10		1.2/2.0				16 mm VST@ 12.0' = 5.6, 2.6, 2.4	
	11				1.75			520.0
15	12		1.4/1.5	0 1 2	0.5		Gray clayey SILT; some dark yellow brown mottling; trace iron concretions; laminated; moist to wet; soft	
	13							
	14		1.5/1.5	0 0 0	<0.25		Light gray silty CLAY; some dark yellow brown mottling; moist; soft	
	15							515.0
20	16		0.0/2.0				Shelby tube attempted but no recovery; 20 mm VST@ 19.5' = 4.2, 1.4, 1.6	
							End of Boring = 21.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127834.10
Easting: 2456152.87

Weather: Sunny 64 F

Boring Information:
Boring No: B-4CCR
Well No: B-4CCR
Surf Elev.: 567.59

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	567.6
0	1						Dark yellow brown silty CLAY; moist; stiff; some bottom ash	
	2		0.8/1.5	1 3 3	1.75			565.0
	3						Dark gray fly ash with bottom ASH; moist; moderately loose	
5	4		0.4/1.5	2 2 2				
	5						Gray lime SLUDGE; with layers of fly ash; wet; soft; few organic fragments	
	6		1.2/1.5	2 3 3	<0.25			560.0
	7							
10	8		1.4/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; trace to some organic fragments	
	9							
	10		1.5/1.5	1 0 0	<0.25			555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black bottom ash with fly ASH; wet; moderately loose; some organic fragments	
	13				<0.25		Black fly ash with bottom ASH; wet; moderately soft; some organic fragments	
	14		0.2/1.5	0 1 1				550.0
	15							
20	16		0.9/1.5	0 1 3			Black bottom ASH; wet; loose	
							End of Boring = 21 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129302.48
Easting: 2455281.11

Weather: Cloudy, 62 F

Boring Information:
Boring No: B-5
Well No: B-5
Surf Elev.: 553.62

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 10/06/2023
Finish: 10/06/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	553.6
	1						Greenish brown SILT; dry	
	2		0.9/1.5	3 7 7	4.5			
	3							550.0
5	4		0.7/1.5	3 4 8	3.5		Greenish brown silty CLAY	
	5							
	6		0.5/1.5	2 2 4	2.5		Brown mottling	
	7							545.0
10	8		0.9/1.5	2 4 5	1.5			
	9							
	10		0.9/1.5	2 5 6	3.5			
	11							540.0
15	12		0.8/1.5	3 4 7				
	13				3.0		16 mm VST@15.0' = 1.3, 3.3, 3.2	
	14		0.7/1.5	2 5 6	3.5			
	15							535.0
20	16		0.9/1.5	1 5 8	4.5			
	17						Dark gray clayey SILT; moist; wood chucks	
	18		0.9/1.5	2 5 5	2.0			
	19							530.0
25	20		1.9/2.0				16 mm VST@ 24.0' = 3.7-3.8	
	21							
	22		1.3/1.5	0 1 2	0.5		Brown silty CLAY; moist	
	23							525.0
30	24		1.2/1.5	0 0 1	<0.25		Saturated	
	25							
	26		1.2/1.5	0 1 2	0.5		Brown silty CLAY; trace greenish gray and dark brown mottling	
	27							520.0
35	28		1.5/1.5	0 2 2	0.25			
	29						BroVery little silt	
	30		1.5/1.5	0 0 2				
	31							515.0
40							End of Boring = 39.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129295.29
Easting: 2455215.62

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5L
Well No: B-5L
Surf Elev.: 534.00

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	534.0
	1						Dark brown silty CLAY; dry; stiff	
	2		0.5/1.5	4 6 5	>4.5			
	3							530.0
5	4		1.0/1.5	5 5 7				
	5				2.7			
	6		0.2/1.5	2 2 2				
	7						Soft	525.0
10	8		1.6/2.0				Gray silty CLAY; soft; 20 mm VST@ 9.5' = 5.8, 2.5, 2.9	
	9				0.5			
	10		1.5/1.5	0 2 1	0.2-0.7		Gray CLAY; very soft	
	11							520.0
15	12		1.5/1.5	0 1 2				
	13				0.2-0.5			
	14		1.5/1.5	0 0 0			Gray sandy CLAY; very soft	
	15				0.1			
							Gray SAND; 20 mm VST@19.0' = 7.2, 3.2, 3.2	515.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129333.75
Easting: 2455341.56

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5CCR
Well No: B-5CCR
Surf Elev.: 552.59

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Bottom ASH	
	2		0.9/1.5	14 12				550.0
	3				4.5		Dark gray sandy LOAM; stiff	
5	4		1.4/1.5	3 2 3	1.0		Dark gray SAND; bottom ash; wet	
	5							
	6		1.5/1.5	1 1 1	1.0		Dark gray sandy LOAM; bottom ash	545.0
	7							
10	8		0.6/1.5	1 4 6			Black SAND; bottom ash; wet	
	9							
	10		0.4/1.5	5 9 4				540.0
	11							
15	12		0.2/1.5	0 1 1			Black SAND; coarse grained; bottom ash; wet	
	13							
	14		0.2/1.5	3 2 3				535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130126.84
Easting: 2455243.51

Weather: Sunny, 85 F

Boring Information:
Boring No: B-6L
Well No: B-6L
Surf Elev.: 531.19

Depth Information:
Total: 23.5'
Auger: 23.5'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	531.2
0	1				1.5		Grayish brown silty CLAY; moist; firm; trace sand	530.0
	2		0.5/1.5	4 7 7				
	3							
5	4		0.5/1.5	3 2 3	1.5		Reddish brown silty CLAY; moist; firm; trace sand	525.0
	5							
	6		0.1/2.0					
	7							
10	8		0.6/1.5	W 1 1			20 mm VST@ 10.0' = 5.2, 2.8, 3.0	
	9				0		Gray clayey SILT; soft; moist	520.0
	10		1.5/1.5	W 1 1	0.5		Gray/reddish brown clayey SILT; soft; moist	
	11							
15	12		0.9/1.5	1 2 2				
	13				0-0.5		Gray SILT to reddish brown SAND; fine to coarse grained; moist	515.0
	14		1.1/1.5	W W W	0.25		Gray silty clay to clayey SILT; moist; soft; some organics, wood, bark, and ash	
	15							
20	16		0.9/1.5	W 1 2	3.9		20 mm VST@ 20.0' = 7.2, 3.9	
	17				0.5		Gray clayey SILT; moist	510.0
	18		0.9/1.5	W W W	0.5			
							End of Boring = 23.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130094.72
Easting: 2455316.59

Weather: Mostly Cloudy, 71 F

Boring Information:
Boring No: B-6
Well No: B-6
Surf Elev.: 553.93

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/05/2023
Finish: 10/05/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.9
0	1		1.3/2.0	5 15 37 33			Dark brown SILTY (fill)	
	2		0.8/2.0	5 5 6 7	+4.5		Dark brown silty CLAY; moist	
	3							550.0
5	4		0.7/1.5	2 3 5	2.25			
	5							
	6		0.8/1.5	1 3 7	2			545.0
	7							
10	8		0.8/1.5	5 8 7			8.2 mm VST@ 9.5' = 1.3-1.4	
	9				4.0			
	10		0.9/1.5	3 4 6	4.0			540.0
	11							
15	12		1.2/1.5	2 4 6	3.0		13 mm VST@ 15.0' = 4.7-4.6	
	13							
	14		2.0/2.0					
	15		1.4/2.0	2 5 6 10	2.7			535.0
20	16		1.5/2.0	5 10 11 12	4.2		Dark greenish gray silty CLAY; moist	
	17		1.3/2.0	2 4 6 8	3.0		Gray CLAY and SAND; with coal; brown mottling	
								530.0
25	18		1.6/2.0	1 5 6 6	2.0		Gray silty CLAY; 6.1 mm VST@ 25.5' = 4.0-3.9	
	19		2.0/2.0	1 1 2 2	1.0		Gray clayey SILT	
								525.0
30	20		1.9/2.0	0 0 0 2	0.25			
	21							
	22		2.0/2.0	0 0 0 2	<0.25		Gray silty CLAY; yellow brown mottling	520.0
35	23		2.0/2.0	0 0 0 0	<0.25		Brown CLAY; mottling light brown; trace sand	
	24		1.8/2.0	0 2 2 3	1.0		Light gray clayey sandy SILT; mottling yellow brown	
								515.0
40	25							
							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130067.17
Easting: 2455388.17

Weather: Sunny, 65 F

Boring Information:
Boring No: B-6CCR
Well No: B-6CCR
Surf Elev.: 553.32

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	553.3
	1						Gray fly ASH; moist; friable; some gypsum; trace bottom ash	
	2		1.0/1.5	3 13 12				550.0
	3							
5	4		0.9/1.5	5 3 2			Bottom ASH; moist; loose	
	5							
	6		1.1/1.5	2 2 2	<0.25			
	7						Fly ASH; moist to wet; soft	545.0
10	8		1.5/1.5	1 0 0	<0.25			
	9						Fly ASH; wet; soft	
	10		0.6/1.5	0 0 0	<0.25			
	11							540.0
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			
	15							535.0
20	16		1.5/1.5	0 0 0	<0.25			
	17							
	18		1.5/1.5	0 0 0	<0.25			
	19							530.0
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130413.91
Easting: 2455917.71

Weather: Haze, 79 F

Boring Information:
Boring No: B-7
Well No: B-7
Surf Elev.: 552.56

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	552.6
	1						Brown/gray sandy CLAY; mottling; dry; very stiff	
	2		0.6/1.5	3 5 6	>4.5			550.0
	3						Brown silty CLAY; slightly moist; very stiff	
5	4		0.5/1.5	3 4 7	2.5			
	5						BrowGray silty LOAM; slightly moist; stiff	545.0
	6		0.7/1.5	3 4 5	2.5			
	7						Gray silty CLAY; 16 mm VST@ 9.5' = 13+, 5.2, 5.2	
10	8		0.7/1.5	2 3 6	2.4		Gray silty LOAM	
	9							540.0
	10		0.8/1.5	2 4 7	2.2		Gray silty LOAMSlightly moist; fractured	
	11							
15	12		0.9/1.5	2 4 7	2.3			
	13						Brown sandy LOAM; moist; stiff	535.0
	14		0.5/1.5	2 4 5	2.5			
	15						Brown/gray silty LOAM; mottling; moist; stiff; 16 mm VST@ 19.5' = 11.4, 6.1, 6.2	
20	16		2.0/2.0					
	17				2.1		Brown/gray silty CLAY; mottling; moist; stiff	530.0
	18		1.2/1.5	2 3 5	1.6			
	19						Red brown SAND; moist; loose	
25	20		1.4/1.5	2 3 5	1.7		Brown sandy LOAM; wet; soft	
	21							525.0
	22		1.5/1.5	0 1 2	0.2		Brown/gray silty LOAM; with sand; moist; soft	
	23							
30	24		1.5/1.5	0 2 2	0.5 1.2			
	25							520.0
	26		1.5/1.5	0 1 1	0.2			
	27							
35	28		1.5/1.5	0 0 2	0.5			
	29							
	30		1.5/1.5	1 1 1	0.8		Gray SILT; very moist; soft	515.0
	31							
40							End of Boring = 39.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130467.06
Easting: 2455885.37

Weather: Sunny, 85 F

Boring Information:
Boring No: B-7L
Well No: B-7L
Surf Elev.: 533.19

Depth Information:
Total: 20.0'
Auger: 20.0'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	533.2
	1				3.5		Gray silty CLAY; dry; very firm; trace sand	
	2		0.5/1.5	3 5 7				530.0
	3							
5	4		0.5/1.5	3 4 7	1.5		Reddish brown clayey SILT; moist; trace sand	
	5							
	6			3 3 3	1.0		Brownish red SAND; wet	525.0
	7							
10	8		0.6/1.5	W 3 2			20 mm VST@ 10.0' = 3.8, 1.2	
							Brownish red SAND with dark black SILT; ash	
	9				0.25			
	10		1.5/1.5	2 1 2			ASH	
	11				0.25		Gray silty CLAY; wet; soft	520.0
15	12		0.9/1.5	W W W	0.25		Gray clayey SILT; moist; soft	
	13							
	14		1.1/1.5	W W W	0			515.0
	15						20 mm VST@ 20.0' = 6.7, 3.0, 3.1	
20							End of Boring = 20 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130310.33
Easting: 2455947.06

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-7CCR
Well No: B-7CCR
Surf Elev.: 552.18

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	552.2
	1						Fly ash, bottom ASH and cinder (fill); moist to wet; soft	
	2		1.0/1.5	3 2 2	0.25			550.0
	3							
5	4		1.0/1.5	0 1 1	<0.25		Bottom ASH; moist; loose	
	5							
	6		0.6/1.5	0 0 0	<0.25		Fly ASH; wet; soft	545.0
	7							
10	8		1.1/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 0	<0.25			540.0
	11							
15	12		1.3/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130083.21
Easting: 2456391.16

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-8U
Well No: B-8U
Surf Elev.: 551.74

Depth Information:
Total: 33.5'
Auger: 33.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	551.7
	1						Dark gray to brown silty CLAY; moist; moderatyely firm; some organic fragments; some bottom ash	
	2		0.8/1.5	1 2 2	1.0			550.0
	3							
5	4		0.9/1.5	3 5 5	4.0			
	5							
	6		1.0/1.5	3 5 6	4.5			545.0
	7							
10	8		1.8/2.0				16 mm VST@ 9.5' = 10.0, 3.8, 3.9	
	9				0.75			
	10		1.1/1.5	2 2 5	1.5		Color grades to light brown; more clayey; some dark yellow brown mottling; some iron oxide modules	540.0
	11							
15	12		0.8/1.5	2 3 5	1.5		Black/dark brown silty CLAY; moist; stiff; trace coal fragments	
	13							
	14		0.9/1.5	2 4 7	3.0			535.0
	15							
20	16		1.7/2.0				16 mm VST@ 19.5' = 11.2, 4.0, 3.8	
	17				2.25			
	18		1.0/1.5	3 6 7	2.5		Trace organic fragments	530.0
	19							
25	20		1.3/1.5	1 1 3	0.5		16 mm VST@ 24.5' = 5.8, 3.2, 3.0	
	21						More silty; some organics	
	22		1.5/1.5	1 1 2	0.5		Dark gray clayey SILT; moist to wet; moderately soft; some organics	525.0
	23							
30	24		1.3/1.5	1 1 2	0.75			
	25							
	26		1.5/1.5	0 1 1	0.5			520.0
							End of Boring = 33.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130109.51
Easting: 2456566.64

Weather: Haze, 79 F

Boring Information:
Boring No: B-8L
Well No: B-8L
Surf Elev.: 530.62

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	530.6
	1						Brown silty LOAM; dry; hard	
	2		0.8/1.5	4 6 7	>4.5			
	3							
5	4		0.2/1.5	4 3 4			Brown silty CLAY; moist; stiff	525.0
	5							
	6		1.1/1.5	1 1 1	0.1		Wet; soft	
	7							
10	8		1.5/1.5	1 1 1			20 mm VST@9.5' = 5.4, 3.4, 3.8	
	9				0.0-0.1		Wet; very soft	520.0
	10		1.6/2.0				Some mottling; wet; soft	
	11				0.5			
15	12		1.4/1.5	1 1 1	0.5		Brown sandy LOAM; wet; soft	
	13						Gray sandy LOAM; wet; soft	515.0
	14		1.1/1.5	0 1 3			Gray SAND; loose; trace clay	
	15							
20	16		1.4/1.5	0 0 1				
	17				0.2		Gray SILT; wet; soft	510.0
	18		1.5/1.5	0 0 0			20 mm VST@ 22.0' = 6.8, 3.4, 3.8	
	19				0.1		Gray sandy LOAM; wet; soft	
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129690.26
Easting: 2456402.29

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-9U
Well No: B-9U
Surf Elev.: 552.15

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.2
0	1						Dark brown/gray silty CLAY; moist; stiff	
	2		0.7/1.5	3 7 7	4.0			550.0
	3							
5	4		1.0/1.5	3 4 6	3.75			
	5							
	6		0.5/1.5	3 3 6	2.25			545.0
	7						More clayey; trace bottom ash fragments	
10	8		1.7/2.0				Yellow brown silty CLAY; moist; stiff; laminated; trace iron nodules; 16 mm VST@ 9.5' = 7.5, 4.1, 3.5	
	9				1.0			
	10		0.8/1.5	2 4 5	2.75			540.0
	11						Black silty CLAY; few cinders (bottom ash); moist; stiff	
15	12		0.8/1.5	3 5 8	3.0			
	13							
	14		0.7/1.5	2 4 6	2.5			535.0
	15							
20	16		1.9/2.0				16 mm VST@ 19.5' = 11.3, 6.0, 5.6	
	17				3.25			
	18		0.8/1.5	2 5 7	2.25		Trace organic fragments; trace coal fragments	530.0
	19							
25	20		0.9/1.5	1 4 5	2.25		16 mm VST@ 24.5' = 7.0, 3.8, 3.5	
	21		1.1/2.0	2 5 6 7	2.5 0.75		Light brown silty clay to CLAY; moist; stiff; some iron oxidized nodules; trace organic fragments; rootlets; more clayey at 26.5'	525.0
	22		1.2/2.0	3 4 5 6	0.75		Gray CLAY	
30	23		1.5/2.0	1 2 4 5	1.0		Some dark yellow brown mottling; some iron oxidized nodules	
	24		1.6/2.0	0 1 2 3	0.5		Black to dark gray clayey SILT; moist; soft; trace organic fragments	520.0
35	25		1.7/2.0	0 2 3 4	0.5			
	26		2.0/2.0	0 1 3 3	1.0		Dark gray clayey SILT; moist; moderately stiff; with organic fragments; some coal; glauconite the last 0.3'	515.0
	27		2.0/2.0	0 1 2 4	0.75		Dark gray clayey SAND; moist; moderately stiff; trace coal fragments	
40							Dark gray sandy CLAY; moist; moderately stiff; trace coal fragments	
							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129778.29
Easting: 2456635.89

Weather: Haze, 79 F

Boring Information:
Boring No: B-9L
Well No: B-9L
Surf Elev.: 524.07

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	524.1
	1						Brown silty LOAM; moist; soft	
	2		1.4/1.5	1 2 2	1.0 0.5			
	3							520.0
5	4		1.5/1.5	1 1 1	1.0			
	5				0.1			
							Brown SAND; medium grained; moist; soft	
	6		2.0/2.0					
	7							515.0
10	8		1.0/1.5	0 0 1	0.1		Brown sandy CLAY; wet; soft; gray at 10.5'	
	9							
							Gray silty CLAY; wet; soft	
	10		0.9/1.5	0 1 2	0.5			
	11							510.0
15	12		1.5/1.5	0 0 1	0.5 0.2			
	13							
	14		1.5/1.5	0 0 0	0.3			
	15							
							16 mm VST@19.5' = 5.4, 2.9, 3.1	505.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129680.19
Easting: 2456242.16

Weather: Sunny, 69 F

Boring Information:
Boring No: B-9CCR
Well No: B-9CCR
Surf Elev.: 553.97

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.0
0	1						Bottom ASH; moist	
	2		0.3/1.5	1 6 4				
	3							550.0
5	4		1.5/1.5	0 1 0	<0.25		Fly ASH; wet; soft	
	5							
	6		1.5/1.5	0 0 0	<0.25			
	7							545.0
10	8		1.5/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 1	<0.25			
	11							540.0
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			
	15							535.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129518.55
Easting: 2455869.56

Weather: Sunny, 65 F

Boring Information:
Boring No: B-10CCR
Well No: B-10CCR
Surf Elev.: 555.35

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.4
0	1						Bottom ASH; moist to wet; loose	
	2		0.8/1.5	4 5 3				
	3							
5	4		0.8/1.5	2 7 12			Moist; loose	550.0
	5							
	6		1.3/1.5	1 2 1	<0.25		Fly ASH; moist to wet; soft; some bottom ash	
	7							
10	8		1.4/1.5	1 0 1	<0.25		Trace bottom ash	545.0
	9							
	10		1.3/1.5	0 0 0	<0.25		Wet; soft	
	11							
15	12		1.1/1.5	4 1 2			Bottom ASH; wet; loose	540.0
	13							
	14		0.9/1.5	0 0 0	<0.25		Fly ASH; wet; soft	
	15							
20	16		1.5/1.5	0 0 0	<0.25			535.0
	17							
	18		1.5/1.5	0 0 0	<0.25			
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128891.26
Easting: 2456234.99

Weather: Sunny, 69 F

Boring Information:
Boring No: B-11U
Well No: B-11U
Surf Elev.: 552.27

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.3
0	1						Black silty CLAY; with sand and gravel; moist; moderately stiff	
	2		0.3/1.5	1 3 10/3"				550.0
	3							
5	4		0.4/1.5	1 1 2	1.25		Yellow brown silty CLAY; some dark yellow mottling; some iron oxide nodules; moist; moderately stiff	
	5							
	6		0.8/1.5	1 2 3	2.5			545.0
	7							
10	8		2.0/2.0				16 mm VST@ 9.5' = 9.2, 2.8, 2.8	
	9				2.0			
	10		1.2/1.5	2 4 5				540.0
	11				3.5		Gray	
15	12		0.9/1.5	4 7 7	2.25		Organic fragments	
	13						Dark gray clayey SILT; moist; moderately firm; some organic fragments	
	14		1.3/1.5	1 4 6	2.0			535.0
	15							
20	16		1.8/2.0				Dark gray brown silty CLAY; moist; stiff; 16 mm VST@19.5' = 13+, 7.4, 7.6	
	17				2.5			
	18		1.5/1.5	0 3 4	1.25		Yellow brown silty CLAY; some dark yellow brown mottling; iron oxide and manganese oxide concretions; moist; moderately stiff	530.0
	19						16 mm VST@ 24.5' = 4.9, 3.1, 3.1	
25	20		1.5/1.5	0 0 0	<0.25		Yellow brown clayey silt to SILT; wet; soft	
	21							
	22		1.5/1.5	0 0 0				525.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128504.92
Easting: 2455639.11

Weather: Sunny, 74 F

Boring Information:
Boring No: B-12U
Well No: B-12U
Surf Elev.: 553.41

Depth Information:
Total: 8.5'
Auger: 8.5'
Core: -

Dates:
Start: 10/23/2023
Finish: 10/23/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.4
0	1						Dark yellow brown silty CLAY; some bottom ash; moist; stiff; trace iron oxide nodules	
	2		1.1/1.5	5 6 7	3.75			550.0
	3							
5	4		1.0/1.5	5 5 6	3.25			
	5							
	6		1.5/1.5	3 5 5	2.75			545.0
							End of Boring = 8.5 Feet	
10								540.0
15								535.0
20								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128504.92
Easting: 2455639.11
Weather: Sunny, 74 F

Boring Information:
Boring No: B-12U-
Well No: B-12U-
Surf Elev.: 553.41

Depth Information:
Total: 8.5'
Auger: 8.5'
Core: -

Dates:
Start: 10/23/2023
Finish: 10/23/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.4
0	1						Dark yellow brown silty CLAY; some bottom ash; moist; stiff; some organic fragments; trace iron oxide nodules	
	2		0.3/1.5	5 5 6	3.25			550.0
	3							
5	4		1.0/1.5	3 4 5	4.0			
	5							
	6		0.7/1.5	3 3 3	1.5			545.0
	7							
10	8		1.5/2.0		1.5		16 mm VST@ 9.5' = 10.8, 5.0, 4.3	
	9							
	10		0.8/1.5	2 5 9	3.5			540.0
	11							
15	12		0.9/1.5	2 5 7	3.25		Light gray silty cLAY; with bottom ash; moist; stiff	
	13							
	14		1.0/1.5	1 4 8	4.0			535.0
	15							
20	16		1.7/2.0		2.5		Yellow brown silty CLAY; moist; moderately stiff; few manganese oxide nodules; 16 mm VST@ 19.5' = 13+, 6.0, 6.0	
	17							
	18		1.4/1.5	1 2 3	1.5			530.0
	19							
25	20		1.5/1.5	1 2 4	0.75		16 mm VST@ 24.5' = 9.5, 4.0, 3.7	
	21							
	22		1.5/1.5	2 2 3	0.75			525.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128541.37
Easting: 2455514.61

Weather: Sunny, 87 F

Boring Information:
Boring No: B-12L
Well No: B-12L
Surf Elev.: 533.69

Depth Information:
Total: 23.0'
Auger: 23.0'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.7
0	1						Brown silty CLAY; dry; very stiff	
	2		0.4/1.5	4 8 7	4			
	3							530.0
5	4		0.6/1.5	2 5 5				
	5				4.0			
	6		1.2/1.5	2 2 3	0.7		Brown silty CLAY; moist; soft	
	7							525.0
10	8		1.2/1.5	1 2 3			20 mm VST@ 10.0' = 3.8, 3.9	
	9				1.0			
	10		1.4/1.5	1 2 3	1.2		Moist; stiff	
	11							520.0
15	12		2.0/2.0					
	13				4.5		Gray/brown silty CLAY; mottling; stiff	
	14		1.5/1.5	1 2 4	0.5			
	15						Gray SILT; soft	515.0
20	16		1.0/1.5	0 6 7			Brown SAND; saturated; 20 mm VST@ 19.5' = 3.8, 1.5, 1.4	
	17						Gray sandy CLAY; moist	
	18		1.4/1.5	5 25 50/4.5	>4.5		Gray SHALE; dry; hard	
							End of Boring = 23.5 Feet	510.0
25								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13BS
Well No: B-13BS
Surf Elev.: 0

Depth Information:
Total: 10.5'
Auger: 10.5'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Dark brown clayey silt to silty CLAY; moist; very firm; trace iron oxide nodules; trace rootlets	
	2		1.0/1.5	4 4 5	4.5+			
	3							
5	4		0.5/1.5	4 5 6	4.5			-5.0
	5							
	6		1.1/1.5	3 7 9	4.5+		Grades to dark gray; trace organics; trace rootlets; 16 mm VST@8.5' = 13+, 6.5, 5.8	
	7		1.5/2.0					
10					3.5			-10.0
							End of Boring = 10.5 Feet	
15								-15.0
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13BN
Well No: B-13BN
Surf Elev.: 0

Depth Information:
Total: 10.5'
Auger: 10.5'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Light brown clayey silt to silty CLAY; moist; firm; few dark yellow brown mottling; trace iron oxide nodules	
	2		1.0/1.5	3 5 6	4.25			
	3							
5	4		0.7/1.5	4 4 7	3.75			-5.0
	5							
	6		1.0/1.5	5 8 11	4.75+		Brown silty CLAY; moist; very firm; trace iron oxide nodules 16 mm VST@ 8.0' = 13+, 6.7, 6.5	
10	7		1.7/2.0		3.5			-10.0
							End of Boring = 10.5 Feet	
15								-15.0
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13L
Well No: B-13L
Surf Elev.: 0

Depth Information:
Total: 16.0'
Auger: 16.0'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Dark brown clayey silt to silty CLAY; moist; very firm	
	2		1.0/1.5	4 5 6	4.5+			
	3							
5	4		1.0/1.5	4 5 7	4.5			-5.0
	5							
	6		1.4/1.5	3 7 10	3.75		Some rootlets; some manganese oxide nodules	
	7							
10	8		1.5/1.5	4 6 10	3.5		Trace rootlets; some manganese oxide nodules	-10.0
	9							
	10		1.5/1.5	3 6 8	2.5		Trace rootlets; some iron oxide nodules	
	11							
15	12		1.3/1.5	4 4 7	2.25		Light gray silty CLAY; moist; firm; some organics; some iron staining; few iron oxide nodules	-15.0
							End of Boring = 16 Feet	
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Sunny, 74 F

Boring Information:
Boring No: B-13LF
Well No: B-13LF
Surf Elev.: 0

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/23/2023
Finish: 10/23/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Yellow brown clayey SILT; dry; stiff	
	2		0.2/1.5	5 7 5				
	3							
5	4		0.8/1.5	4 5 6	3.75		Light gray silty CLAY; moist; stiff	-5.0
	5							
	6		0.5/1.5	5 50/4"			GYPSUM; dry; loose	
	7							
10	8		0.3/1.5	27 0/3.5				-10.0
	9							
	10		0.8/1.5	35 50/5"				
	11							
15	12		0.7/1.5	37 50/4"				-15.0
	13							
	14		0.4/1.5	0/4.5				
	15							
20	16		1.2/1.5	13 34 50/3"	3.75		Dark yellow brown silty CLAY; moist; firm	-20.0
	17						GYPSUM	
	18		0.6/1.5	50/5"				
	19							
25	20		0.4/1.5	50/5"				-25.0
							End of Boring = 26 Feet	

Notes:

GEOTECHNICS
Soil & Material Testing
A DIVISION OF KLINGNER
4510 Paris Gravel Road • Hannibal, MO 63401 • voice 573.221.7714 • fax 573.221.7762

January 4, 2024 23-1071

Andrews Engineering
101 East Walton
Warrenton, MO 63383

Attn: Mr. Karl Finke, P.E., R.G.

RE: Geotechnical Drilling Services: Andrews - Springfield Ash Ponds Revision 1

Dear Mr. Finke:

In accordance with your request, we have completed the geotechnical drilling and laboratory analysis for the Springfield Ash Ponds in Springfield, Illinois with additional Atterberg testing.

Scope of Services

The scope of our services for this project consisted of investigating the site's subsurface conditions by drilling thirty-nine (39) test borings and installing and completing twenty-nine (29) Vibrating Wire Piezometers (VW Piezo) near the requested locations in Springfield, Illinois. The test borings were drilled to depths of 8½ to 40 feet below the existing ground surface and the VW Piezo's were installed to depths of 18 to 41.1 feet below top of casing. The locations of the borings were determined by Andrews Engineering and staked in the field by Andrews. The proposed borings locations drawing provided to us is enclosed.

The scope of services consisted of exploratory geotechnical borings to help classify and determine the subsurface materials and groundwater conditions in the vicinity of the proposed site, with a field and laboratory testing program. The borings and samples were logged in the field by Andrews personnel with the samples retained by us for laboratory testing analysis. The laboratory testing results are enclosed.

Conclusions

The geotechnical investigation, including exploration, testing, and laboratory analyses has been completed for the exploratory geotechnical investigation borings for the Springfield Ash Pond project in Springfield, Illinois. Laboratory testing results, based on the investigation, have been included in this report.

These data are supplied for the benefit of the designers and owner and do not express or imply any warranty of the subsurface conditions. The scope of our services does not include environmental assessment of investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

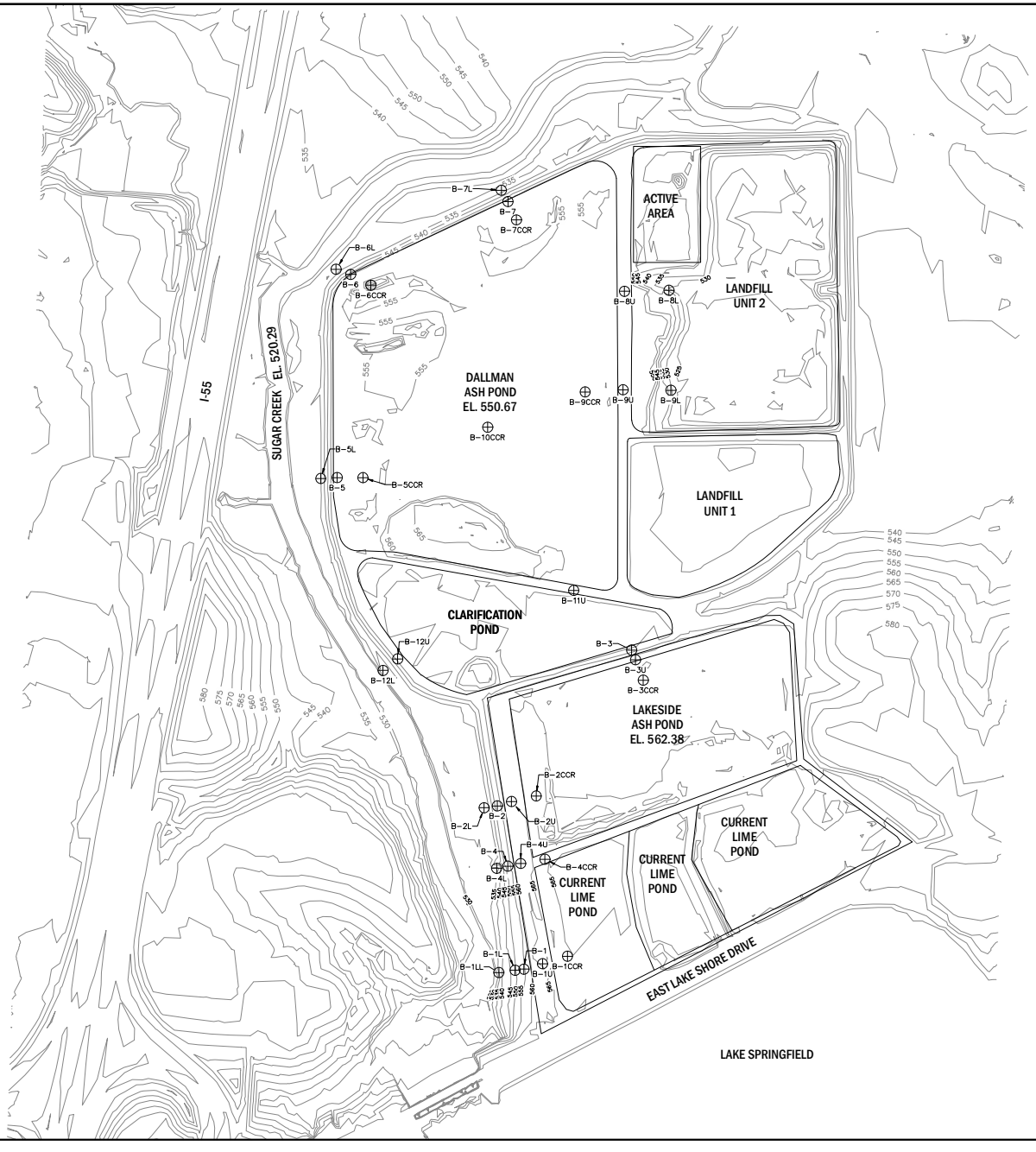
As always, if you have any questions do not hesitate to contact us.

Sincerely,

GEOTECHNICS, A DIVISION OF KLINGNER

Brian Joseph Sick, P.E.
Geotechnical Services Department Manager

Encl. Proposed Boring Locations, Laboratory Data Summary, Laboratory Test Result Reports



LEGEND

⊕ PROPOSED BORING

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON USGS GAGE 05576250 FOR 12/20/2022.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH: (217) 787-2334 WWW.ANDREWSENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

PROPOSED BORING LOCATIONS

PREPARED FOR

CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2023

PROJECT ID: 220408/0029

SHEET NUMBER:

FIG. 1

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Tab: Layout1 Last Saved: July 28, 2023, by Ben Korpus Plotted: Friday, July 28, 2023 8:40:22 AM
\\Land-Fs2\JOBS\Springfield CWLP\Proposed Borings.dwg

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Moisture Content (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
1	2.5-3	14.5								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	5-5.5	10.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	7.5-8	19.8								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
1	10-10.5	21.7								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	13-13.5	21.3								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	15.5-16	24.8								Sandy Lean Clay (CL), Light Brown mottled Gray, Silty
1	17.5-18	47.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1	20.5-21	25.6								Lean Clay (CL), Gray mottled Greenish Gray, Black Oxidation, Silty
1	22.5-23	27.1								Lean Clay (CL), Gray mottled Light Gray, Silty
1 ST	24.5-26.5	27.9	127.7	99.8	0.49	85.70	65.7/20.0	30 / 17	1.23×10^{-6}	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist
1	28-28.5	25.5								Fat Clay (CL), Gray, Silty
1	32.5-33	26.0								Sandy Lean Clay (CL), Light Gray/Gray mottled Yellow Brown, Silty
1L	2-3.5	18.5								Fat Clay (CH), Yellow Brown mottled Brown
1L	4.5-6	21.4								Fat Clay (CH), Yellow Brown mottled Brown
1L	7-8.5	21.4								Lean Clay (CL), Yellow Brown mottled Brown, Silty
1L	9.5-11	17.7								Sandy Lean Clay (CL), Yellow Brown, Silty
1L	12-13.5	23.4								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	14.5-16	19.7								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	17-18.5	n/a								
1L	19.5-21	30.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1L ST-18	22-24	30.7	118.9	91.0	0.57	97.60	63.0/34.6	43/21	5.84×10^{-6}	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
1LL	2-3.5	11.7								Sandy Lean Clay with Gravel (CL), Yellow Brown mottled Brown, Silty
1LL	4.5-6	13.4								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	7-8.5	20.1								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	9.5-11	17.8								Poorly Graded Sand (SP), Yellow Brown, Fine to Medium
1LL	12-13.5	22.1								Fat Clay (CH), Gray mottled Light Gray
1LL ST-12	14.5-16.5	24.7	125.2	100.4	0.26	84.40	64.5/19.9	39/21	6.02×10^{-6}	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist
1LL	17-18.5	26.2								Fat Clay (CH), Light Brown, Silty
1U	2-3.5	14.6								Lean Clay (CL), Brown mottled Light Gray/Reddish Brown, Silty, With Coal
1U	4.5-6	21.0								Lean Clay (CL), Brown mottled Light Brown/Light Gray, Silty, Trace Gravel
1U	7-8.5	36.5								Silt (ML), Black, Clayey, With Coal
1U	9.5-11	6.1								Coal, Black, With Silt
1U	12-13.5	32.2								Coal, Black
1U	14.5-16	59.2								Silt (ML), Black, Clayey, With Coal
1U	17-18.5	68.6								Silt (ML), Black, With Coal and Ash
1CCR	2-3.5	10.7								Cinders, Black
1CCR	4.5-6	11.3								Cinders, Black
1CCR	7-8.5	22.2								Cinders/Ash Black
1CCR	9.5-11	21.5								Cinders/Ash Black
1CCR	12-13.5	20.1								Cinders. Black
1CCR	14.5-16	53.5								Cinders, Black, With Clayey Silt
1CCR	17-18.5	22.2								Cinders, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
2	2-3.5	18.5								Fat Clay (CH), Brown mottled Light Gray
2	4.5-6	22.0								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2	7-8.5	27.0								Fat Clay (CH), Dark Brown mottled Brown
2	9.5-11	24.9								Fat Clay (CH), Yellow Brown mottled Brown
2	12-13.5	28.4								Fat Clay (CH), Light Gray mottled yellow Brown
2	14.5-16	25.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
2	17-18.5	27.2								Fat Clay (CH), Light Gray mottled Yellow Brown
2	19.5-21	27.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2 ST	22-24	26.8	123.1	97.1	0.50	91.70	57.8/33.9	57/21	$6.87x10^{-8}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
2	24.5-26	24.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
2	27-27.5	21.2								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2	27.5-28.5	22.4								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2L	2-3.5	21.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
2L	4.5-6	28.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2L ST 6	7-9'	25.5	126.5	100.8	0.33	87.70	74.3/13.4	27/21	$8.24x10^{-6}$	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist
2L	9.5-11	22.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
2L	12-13.5	22.0								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty
2L	14.5-16	23.6						20/16		Sandy Silty Clay (CL), Yellow Brown mottled Light Gray
2L	17-18.5	21.1								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown/Brown, Silty
2L	19.5-21	21.4								Poorly Graded Sand (SP), Yellow Brown, Fine, With Clay Seams
2L	22-23.5	29.0								Lean Clay (CL), Light Gray, Silty
2U	2-3.5	8.1								Cinders, Dark Brown
2U	4.5-6	8.3								Cinders, Dark Brown
2U	7-8.5	20.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2U	9.5-11	11.0								Cinders/Silt, Dark Brown
2U	12-13.5	65.7								Sandy Silt (ML), Dark Brown
2U	14.5-16	46.3								Sandy Silt (ML), Dark Brown
2U	17-18.5	24.6								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
2U	19.5-21	53.1								Coal, Dark Gray
2U	22-23.5	31.7								Poorly Graded Sand (SP), Dark Gray, Fine to Coarse
2U	24.5-26	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray
2CCR	2-3.5	58.6								Lean Clay (CL), Light Gray mottled Yellow Brown/Brown, Silty, Trace Coal
2CCR	4.5-6	23.5								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	7-8.5	238.7								Ash, Light Gray
2CCR	9.5-11	107.7								Coal/Ash, Black
2CCR	12-13.5	86.4								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	14.5-16	54.5								Coal, Black, Clayey, With Organics
2CCR	17-18.5	86.8								Coal, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
3	2-3.5	25.9								Fat Clay (CH), Brown mottled reddish Brown
3	4.5-6	20.6								Poorly Graded Sand (SP), Brown, Fine to Medium
3	7-8.5	22.2								Lean Clay (CL), Light Brown mottled Brown
3 ST 8	9.5-11.5	25.8	122.9	97.7	0.67	98.10	67.6/30.5	60/24	$8.50x10^{-9}$	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist
3	12-13.5	26.6								Fat Clay (CH), Brown mottled Light Gray/Reddish Brown
3	14.5-16	24.8								Fat Clay (CH), Brown, Reddish Oxidation
3	17-18.5	27.1								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown
3 ST16	19.5-21.5	25.8	121.6	96.7	0.62	95.00	65.7/29.3	43/20	$4.27x10^{-7}$	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist
3	22-23.5	29.0								Fat Clay (CH), Light Gray mottled Yellow Brown, Silty
3	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Black Oxidation, Silty
3	27-28.5	28.9								Fat Clay (CH), Light Brown mottled Light Gray
3U	2-3.5	16.0								Lean Clay (CL), Brown mottled Yellow Brown/Light Brown, Silty, Trace Sand
3U	4.5-6	27.7								Ash, Yellow Brown
3U	7-8.5	20.7								Lean Clay (CL), Brown mottled Light gray, With Coal
3U ST 8	9.5-11.5	21.3	122.6	101.0	0.55	81.10	65.5/15.6	38/22	$1.52x10^{-8}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist
3U	12-13.5	37.2								Coal, Black
3U	14.5-16	32.0								Silt (ML), Brown, Clayey
3U	17-18.5	62.6								Silt (ML), Brown, Clayey
3CCR	2-3.5	22.7								Lean Clay (CL), Brown, Silty, Trace Coal
3CCR	4.5-6	91.2								Ash, Light Gray, With Clay Seams
3CCR	7-8.5	51.6								Ash, Light Gray, With Clay Seams
3CCR	9.5-11	113.5								Coal, Black
3CCR	12-13.5	86.9								Coal, Black, With Organics/Clay Seams
3CCR	14.5-16	61.1								Coal, Black, With Clay Seams
3CCR	17-18.5	65.8								Coal, Black, With Clay Seams
4	3-3.5	16.5								Lean Clay (CL), Light Gray mottled Yellow Brown
4	5.5-6	18.2								Lean Clay (CL), Yellow Brown mottled Brown
4	7.5-8	23.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	10.5-11	26.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	12.5-13	26.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	14.5-16	26.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation, Trace Sand
4	17.5-18	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4 ST	19.5-21.5	28.3	124.0	96.7	0.95	97.20	64.8/32.4	49/22	$6.53x10^{-8}$	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4	22-22.5	30.1								Fat Clay (CH), Yellow Brown/Light Brown mottled Brown, Silty
4	25-25.5	33.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
4	27-27.5	22.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
4	30-30.5	23.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
4L	2-3.5	31.7								Lean Clay (CL), Dark Brown, Silty over Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Gravel
4L	4.5-6	27.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4L	7-8.5	27.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
4L	9.5-11	29.8								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
4L ST10	12-14'	27.4	124.2	97.5	0.42	87.90	71.7/16.2	32/20	$9.53x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist
4L	14.5-16	25.7								Lean Clay with Sand (CL), Yellow Brown mottled Light gray
4L	17-18.5	27.4						31/23		Lean Clay (CL/ML), Light Gray, Silty
4U	2-3.5	6.5								Cinders, Black
4U	4.5-6	30.8								Fat Clay (CH), Yellow Brown mottled Gray, Silty
4U	7-8.5	23.0								Fat Clay (CH), Yellow Brown mottled Gray, Silty, With Cinders
4U	9.5-11	36.4								Silt (ML), Black, With Cinders
4U	12-13.5	24.5								Cinders, Black
4U	14.5-16	38.0								Cinders, Black, Silty
4U	17-18.5	24.8								Cinders, Black
4U	19.5-21	18.0								Coal, Black
4U	22-23.5	59.2								Ash, Light Gray
4U	24.5-26	28.0								Fat Clay (CH), Yellow Brown mottled Light Gray
4U ST22	27-29	26.9	125.3	98.7	0.53	97.10	69.6/27.5	62/24	$9.17x10^{-9}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4CCR	2-3.5	21.0								Lean Clay (CL), Yellow Brown, With Brick
4CCR	4.5-6	23.0								Silt (ML), Brown, Clayey, With Clay Seams
4CCR	7-8.5	56.0								Ash, Light Gray
4CCR	9.5-11	91.3								Cinder/Ash, Black
4CCR	12-13.5	83.6								Cinder/Ash, Black
4CCR	14.5-16	59.3								Cinders/Silt, Black
4CCR	17-18.5	33.0								Cinders, Black
4CCR	19.5-21	59.5								Ash/Cinders, Black
5	2-3.5	14.8								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	4.5-6	16.7								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	7-8.5	13.6								Lean Clay with Sand (CL), Yellow Brown mottled Light Gray,
5	9.5-11	22.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
5	12-13.5	21.0								Fat Clay (CH), Yellow Brown mottled Light Gray
5	14.5-16	22.8								Fat Clay (CH), Brown mottled Yellow Brown
5	17-18.5	21.2								Lean Clay (CL), Brown mottled Light Brown
5	19.5-21	21.8								Fat Clay (CH), Brown, Silty
5	22-23.5	19.4								Sandy Lean Clay (CL), Light Gray mottled Gray/Yellow Brown
5 ST	24.5-26.5	24.3	124.0	99.8	0.25	90.20	67.3/22.9	43/22	$2.67x10^{-7}$	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist
5	27-28.5	25.6								Lean Clay (CL), Yellow Brown mottled Light Gray
5	29.5-31	24.5								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	32-33.5	24.7								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	34.5-36	24.6								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	37-38.5	23.6								Sandy Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
5L	3-3.5	18.9								Fat Clay (CH), Brown mottled Light Brown
5L	5-6'	23.1								Fat Clay (CH), Brown mottled Yellow Brown
5L	8-8.5	22.5								Fat Clay (CH), Brown mottled Light Gray
5L ST	9.5-11	28.8	119.9	93.1	0.51	94.60	73.2/21.4	46/24	$5.18x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
5L	13-13.5	30.1								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	15.5-16	30.9								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	17-17.5	28.3						39/22		Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
5CCR	3-3.5	24.6								Silt with Sand (ML), Light Gray
5CCR	5.5-6	24.2								Sandy Lean Clay (CL), Gray, Silty
5CCR	7-7.5	27.8								Sandy Silt (ML), Gray
5CCR	9.5-10	13.5								Silty Sand (SM), Dark Brown, Trace Gravel
5CCR	15-15.5	9.8								Coal, Black
5CCR	17.5-18	13.9								Coal, Black
6	0-2	7.3								Clayey Sand with Gravel (SC), Brown
6	2-4'	21.3								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	5-7.5	24.0								Lean Clay (CL), Brown mottled Gray, Trace Sand, Fat Seams
6	7.5-9	20.5								Lean Clay (CL), Gray mottled Light Brown, Trace Sand/Coal
6	10-11.5	20.5								Fat Clay (CH/CL), Light Gray mottled Gray/Light Brown,
6	12.5-14	20.9								Lean Clay (CL), Brown, Silty
6	15-16.5	19.9								Lean Clay (CL), Light Gray mottled Light Brown, Silty
6 ST	17-19	21.9	128.6	105.5	0.95	90.20	61.9/28.3	34/19	$4.25x10^{-8}$	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
6	19-21	n/a								Lean Clay (CL), Brown, Silty, With Organics
6	21-23	22.0								Lean Clay (CL), Brown/Gray, Silty
6	23-25	20.6								Lean Clay with Sand (CL), Gray mottled Brown, With Coal
6	25-27	31.3								Lean Clay (CL), Gray, Silty
6	27-29	27.1								Sandy Silt (ML), Gray, Clayey
6	29-31	29.9								Silt (ML), Gray, Clayey
6	31-33	n/a								
6	33-35	28.2								Lean Clay (CL), Gray mottled Yellow Brown, Silty
6	35-37	27.1								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	37-39	21.0								Sandy Silt (ML), Light Gray mottled Yellow Brown, Clayey
6L	2.5-4	17.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
6L	5-6.5	21.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
6L ST1	7.5-9	26.6	121.9	96.3	0.44	91.60	74.1/17.5	41/23	$5.47x10^{-7}$	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist
6L	10-11.5	27.5								Lean Clay with Sand (CL), Brown, Silty
6L	12.5-14	23.5								Silty Clayey Sand (SC-SM), Light Gray mottled Yellow Brown
6L	15-16.5	24.9								Clayey Sand (SC), Yellow Brown mottled Light Gray
6L	17.5-19	35.9						31/19		Lean Clay (CL), Gray, Trace Organics
6L	20-21.5	21.1								Silty Clayey Sand (SC-SM), Gray
6L	22.5-24	24.0								Silty Clayey Sand (SC-SM), Light Gray mottled Light Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
6CCR	2-3.5	15.5								Ash/Cinders, Black, Clayey
6CCR	4.5-6	13.3								Ash/Cinders/Coal, Black, Clayey
6CCR	7-8.5	29.4								Ash, Gray
6CCR	9.5-11	39.1								Silt (ML), Brown mottled Light Gray
6CCR	12-13.5	44.4								Silt (ML), Light gray
6CCR	14.5-16	51.6								Silt (ML), Light Gray mottled Brown
6CCR	17-18.5	87.7								Silt (ML), Dark Brown mottled Light Brown
6CCR	19.5-21	106.5								Silt (ML), Dark Brown
6CCR	22-23.5	97.4								Silt (ML), Dark Brown mottled Brown
7	2.5-3	15.1								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray
7	4.5-5	21.8								Lean Clay (CL), Light Brown/Brown mottled Yellow Brown, With Fat Clay Seams
7	7.5-8	21.1								Fat Clay (CH), Light Brown mottled Light Gray, Silty, With Lean Clay Seams
7	10-10.5	21.3								Lean Clay (CL), Light Brown mottled Brown/Light Gray, Silty
7	12-12.5	24.7								Lean Clay (CL), Brown mottled Light Brown, Silty
7	15-15.5	21.1								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, With Organics
7	17.5-18	19.5								Sandy Lean Clay (CL), Brown mottled Light Gray
7 ST	19.5-21.5	25.8	120.2	95.5	0.55	97.70	62.2/35.5	63/20	$1.71x10^{-8}$	Fat Clay (CH), Brown/ Yellow Brown mottled Light Gray, Silty, Stiff, Moist
7	23-23.5	24.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
7	25-25.5	26.1								Fat Clay (CH/CL), Light Gray mottled Yellow Brown
7	27.5-28	28.6								Silty Clayey Sand (SC-SM), Brown mottled Yellow Brown
7	30-30.5	30.7								Sandy Silt (ML), Light Brown, With Fat Clay Seams
7	32.5-33	38.1								Fat Clay (CH), Light Gray, With Silty Sand Seams
7	35-36.5	32.4								Silt (ML), Gray, Clayey
7	37-37.5	39.2								Silt (ML), Brown, Clayey
7CCR	2-3.5	26.5								Silt (ML), Brown, Clayey
7CCR	4.5-6	46.8								Silt (ML), Brown, Clayey, With Cinders
7CCR	7-8.5	54.9								Silt (ML), Brown, Clayey
7CCR	9.5-11	55.5								Sandy Silt (ML), Light Gray
7CCR	12-13.5	42.7								Silt (ML), Light Gray
7CCR	14.5-16	49.5								Silt (ML), Light Gray mottled Dark Brown
7CCR	17-18.5	45.8								Silty Sand (SM), Light Gray
7L	2-3.5	16.8								Fat Clay (CH), Yellow Brown mottled Light Gray
7L	4.5-6	14.6								Fat Clay (CH), Light Gray mottled Brown over Sandy Lean Clay (CL), Yellow Brown mottled Light Brown
7L	7-8.5	24.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown over Poorly Graded Sand (SP), Yellow Brown, Fine, Silty
7L	9.5-11	27.3								Fat Clay (CH), Light Brown mottled Brown, Silty, Trace Sand
7L	12-13.5	37.7								Silt (ML), Brown
7L	15-16.5	29.2						33/25		Silt (ML), Brown, Trace Sand
7L	17-18.5	26.0								Fat Clay (CH/CL), Brown, Silty, Trace Sand

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
8L	3-3.5	15.5								Fat Clay (CH), Yellow Brown mottled Light Brown
8L	5.5-6	14.1								Lean Clay (CL), Yellow Brown mottled Brown
8L	7.5-8	27.2								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L	10.5-11	27.8								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L ST5	12-14'	23.8	126.4	102.1	0.33	69.80	56.6/13.2	26/19	$3.41x10^{-6}$	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist
8L	15.5-16	29.8								Sandy Lean Clay (CL), Light Gray, Silty
8L	17.5-18	33.5								Sandy Lean Clay (CL), Light Gray, Silty, With Organics
8L	20.5-21	32.3						39/26		Silt (ML), Gray, With Lean Clay (CL) Seams
8L	22.5-23	26.7						31/21		Lean Clay (CL), Gray, Silty
8U	2-3.5	24.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	4.5-6	22.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	7-8.5	23.8								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
8U ST8	9.5-11.5	24.0	125.7	101.4	0.55	90.60	68.1/22.5	48/21	$2.25x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
8U	12-13.5	22.5								Fat Clay (CH), Light Gray mottled Yellow Brown
8U	14.5-16	23.9								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray
8U	17-18.5	21.9								Lean Clay (CL), Brown mottled Yellow Brown Light Gray, Silty
8U ST16	19.5-21.5	25.7	127.1	101.1	0.80	95.50	79.7/15.8	45/19	$9.40x10^{-9}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
8U	22-23.5	27.8								Lean Clay (CL), Brown, Silty
8U	24.5-26	31.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	27-28.5	31.7								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	29.5-31	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	32-33.5	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
9L	2-2.5	23.6								Sandy Lean Clay (CL), Light Brown mottled Light Gray
9L	4.5-5	24.6								Lean Clay with Sand (CL), Light Brown mottled Light Gray/Yellow Brown, Silty
9L ST	7-9'	28.0	126.5	98.8	0.15	79.90	65.0/14.9	26/17	$2.55x10^{-6}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist
9L	10.5-11	55.9								Silty Clayey Sand (SC-SM), Gray, With Organics
9L	13-13.5	27.2								Sandy Silt (ML), Gray, Clayey
9L	15.5-16	28.1						33/22		Lean Clay (CL), Gray, Silty
9L	18-18.5	28.6						46/21		Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
9U	2-3.5	19.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
9U	4.5-5	20.3								Fat Clay (CH), Brown mottled Light GrayYellow Brown
9U	7-8.5	19.9								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	9.5-11	n/a								
9U	12-13.5	25.5								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	14.5-16	22.2								Fat Clay (CH), Gray mottled Yellow Brown
9U	17-18.5	23.6								Lean Clay with Sand (CL), Brown mottled Light Brown/Light Gray
9U ST 16	19.5-21.5	22.4	125.2	102.3	0.95	96.00	78.6/17.4	46/22	$2.63x10^{-8}$	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist
9U	22-23.5	21.3								Lean Clay (CL), Brown mottled Light Gray/Yellow Brown
9U	24.5-26	25.2								Fat Clay (CH), Gray mottled Yellow Brown, Trace Coal
9U	26-28	23.3								Fat Clay (CH), Yellow Brown mottled Light Brown/Light Gray
9U	28-30	28.7								Fat Clay (CH), Yellow Brown mottled Light Gray
9U	30-32	29.4								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	32-34	29.5								Fat Clay (CH/CL), Gray mottled Light Gray, Silty
9U	34-36	29.7								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9U	36-38	29.5								Sandy Lean Clay (CL), Gray mottled Light Gray
9U	38-40	24.6								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9CCR	2-3.5	15.0								Sandy Lean Clay (CL), Gray mottled Light Brown
9CCR	4.5-5	42.3								Silt (ML), Gray mottled Light Gray
9CCR	7-8.5	64.2								Silt (ML), Gray mottled Light Gray
9CCR ST8	9.5-11.5	23.2	126.9	103.0	0.72	94.50	66.6/27.9	46/21	$9.55x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist
9CCR	12-13.5	46.9								Silt (ML), Gray mottled Light Gray
9CCR	14.5-16	41.4								Silt (ML), Gray mottled Light Gray
9CCR	17-18.5	41.0								Silt (ML), Gray mottled Light Gray
10CCR	2-3.5	25.9								Ash/Cinders, Gray
10CCR	4.5-5	13.8								Ash/Cinders, Gray
10CCR	7-8.5	28.7								Ash, Brown/Light Gray
10CCR	9.5-11	38.2								Ash, Brown/Light Gray
10CCR	12-13.5	58.1								Ash, Brown/Light Brown
10CCR	14.5-16	27.2								Ash/Cinders, Dark Gray mottled Light Brown
10CCR	17-18.5	52.9								Ash, Brown/Gray
10CCR	19.5-21	59.5								Ash/Cinders, Gray mottled Brown
10CCR	22-23.5	58.0								Ash/Cinders, Gray mottled Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
11U	2-3.5	18.0								Sandy Lean Clay (CL), Dark Brown
11U	4.5-5	20.4								Lean Clay with Sand (CL), Yellow Brown mottled Brown
11U	7-8.5	23.5								Fat Clay (CH), Light Gray mottled Yellow Brown, Trace Sand
11U ST8	9.5-11.5	21.8	129.9	106.7	0.80	92.50	52.4/40.1	36/20	$1.38x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
11U	12-13.5	23.2								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray, Trace Sand
11U	14.5-16	20.7								Lean Clay (CL), Brown mottled Yellow Brown
11U	17-18.5	28.6								Lean Clay (CL), Brown mottled Light Brown
11U ST16	19.5-21.5	25.7	123.1	97.9	0.50	95.90	66.8/29.1	48/21	$3.04x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist
11U	22-23.5	25.8								Fat Clay (CH), Yellow Brown mottled Brown
11U	24.5-26	28.3						34/21		Lean Clay (CL), Yellow Brown mottled Brown, Silty
11U	27-28.5	25.9								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
12L	3.5-4	14.5								Fat Clay (CH), Brown mottled Light Brown
12L	5.5-6	17.4								Fat Clay (CH), Brown mottled Light Brown/Yellow Brown
12L	8.5-9	23.2								Fat Clay (CH/CL), Yellow Brown mottled Light Gray
12L	11.5-12	24.5								Fat Clay (CH), Brown mottled Light Gray/Yellow Brown
12L	14-14.5	24.5								Lean Clay (CL), Light Gray mottled Yellow Brown/Gray
12L ST	14.5-16	23.2	127.7	103.6	0.55	87.10	71.6/15.5	30/19	$9.69x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
12L	19-19.5	22.9								Lean Clay (CL), Light Gray mottled Yellow Brown
12L	20-20.5	10.0								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown
12L	23-23.5	13.0								Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
12U	2-3.5	19.0								Lean Clay (CL), Brown, Silty
12U	4.5-5	17.1								Lean Clay (CL), Brown mottled Light Brown/Reddish Brown, Black Oxidation, Silty
12U	7-8.5	20.0								Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
12U ST8	9.5-11.5	21.8	129.5	106.2	0.75	95.20	69.6/25.6	45/22	$3.13x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	12-13.5	17.3								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
12U	14.5-16	15.2								Lean Clay (CL), Brown, With Lime Fines, Trace Gravel
12U	17-18.5	18.9								Lean Clay (CL), Brown, With Ash/Coal
12U ST16	19.5-21.5	21.6	123.3	101.4	0.95	96.10	73.0/23.1	42/22	$1.03x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	22-23.5	25.6								Lean Clay (CL), Brown mottled Reddish Brown, Silty
12U	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Reddish Oxidation, Silty
12U	27-28.5	25.2								Lean Clay (CL), Light Gray mottled Yellow Brown/Light Brown, Reddish Oxidation, Silty
13L	2-3.5	15.9								Lean Clay (CL), Brown
13L	4.5-5	17.4								Lean Clay (CL), Brown
13L	7-8.5	19.3								Lean Clay (CL), Brown mottled Yellow Brown
13L	9.5-11	19.6								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13L	12-13.5	23.5								Lean Clay (CL), Brown mottled Reddish Brown
13L	14.5-16	27.4								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown, Black Oxidation

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

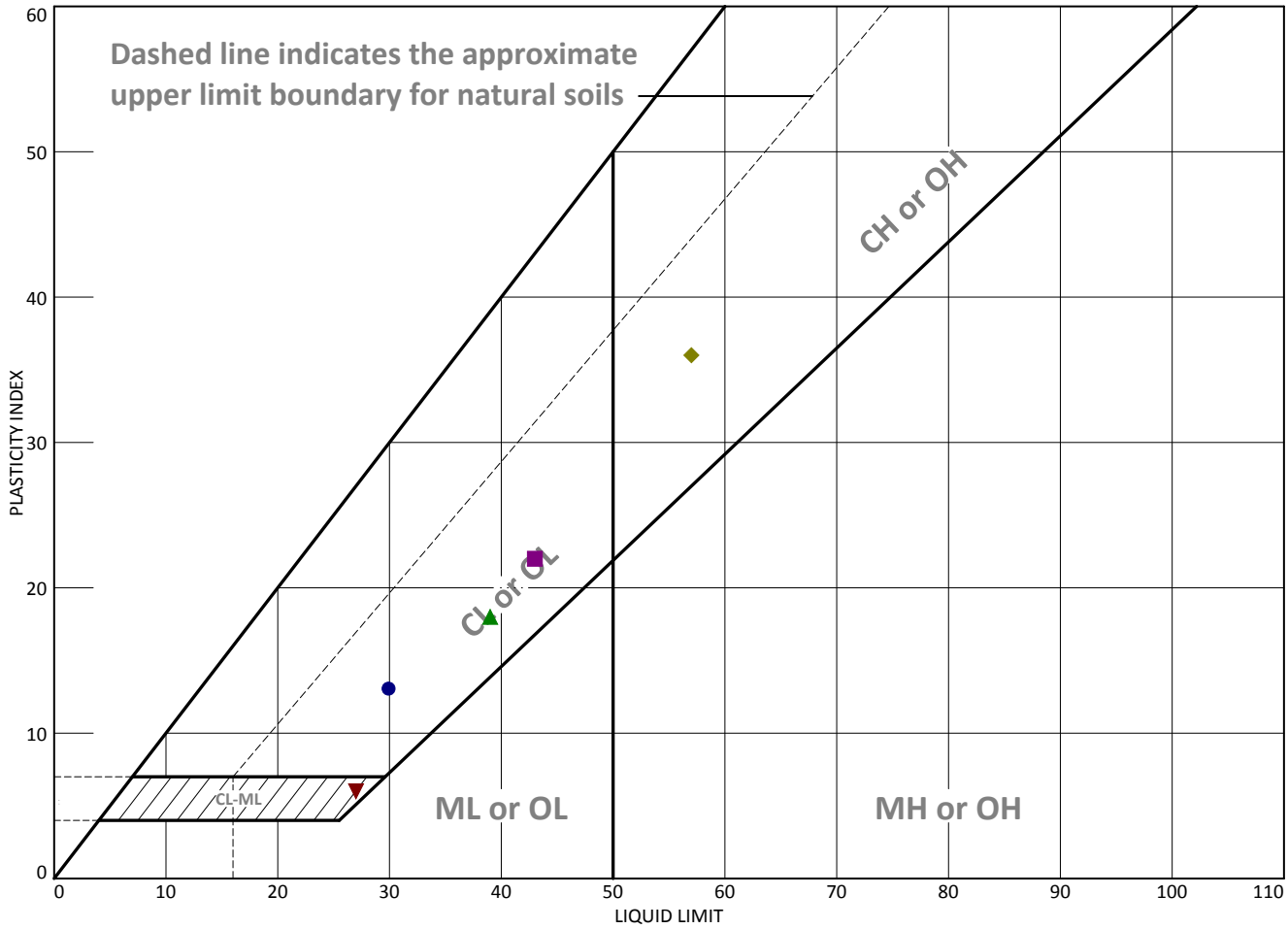
* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
13BN	2-3.5	18.6								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Silty
13BN	4.5-5	21.1								Lean Clay (CL), Light Brown mottled Reddish Brown
13BN	7-8.5	15.5								Lean Clay (CL), Light Brown mottled Reddish Brown, Silty
13BN ST7	8.5-10.5	18.4	132.2	111.6	0.95	90.90	74.9/16.0	34/20	$8.84x10^{-9}$	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist
13BS	2-3.5	16.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	4.5-5	15.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	7-8.5	19.1								Lean Clay (CL), Brown mottled Light Brown/Light Gray
13BS ST7	8.5-10.5	21.1	127.5	105.3	0.95	94.90	78.6/16.3	52/25	$2.32x10^{-8}$	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist
13LF	2-3.5	12.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13LF	4.5-5	22.3								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams
13LF	7-8.5	21.0								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams, Over Light Gray Ash
13LF	9.5-11	21.4								Ash, Light Gray
13LF	12-13.5	21.1								Ash, Light Gray
13LF	14.5-16	19.1								Ash, Light Gray
13LF	17-18.5	20.9								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Over Light Gray Ash
13LF	19.5-21	21.6								Ash, Yellow Brown mottled Light Gray
13LF	22-23.5	24.8								Ash, Yellow Brown
13LF	24.5-26	28.3								Ash, Yellow Brown

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist	30	17	13	98.2	85.7	CL
■	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist	43	21	22	99.8	97.6	CL
▲	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist	39	21	18	99.6	84.4	CL
◆	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	57	21	36	98.1	91.7	CH
▼	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist	27	21	6	98.3	87.7	CL-ML

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 1	**Depth:** 24½-26½ ft.	**Sample Number:**
■	**Location:** Boring 1L	**Depth:** 22-24 ft.	**Sample Number:** 18
▲	**Location:** Boring 1 LL	**Depth:** 14½-16½ ft.	**Sample Number:** 12
◆	**Location:** Boring 2	**Depth:** 22-24 ft.	**Sample Number:** 8
▼	**Location:** Boring 2L	**Depth:** 7-9 ft.	**Sample Number:** 6

Remarks:

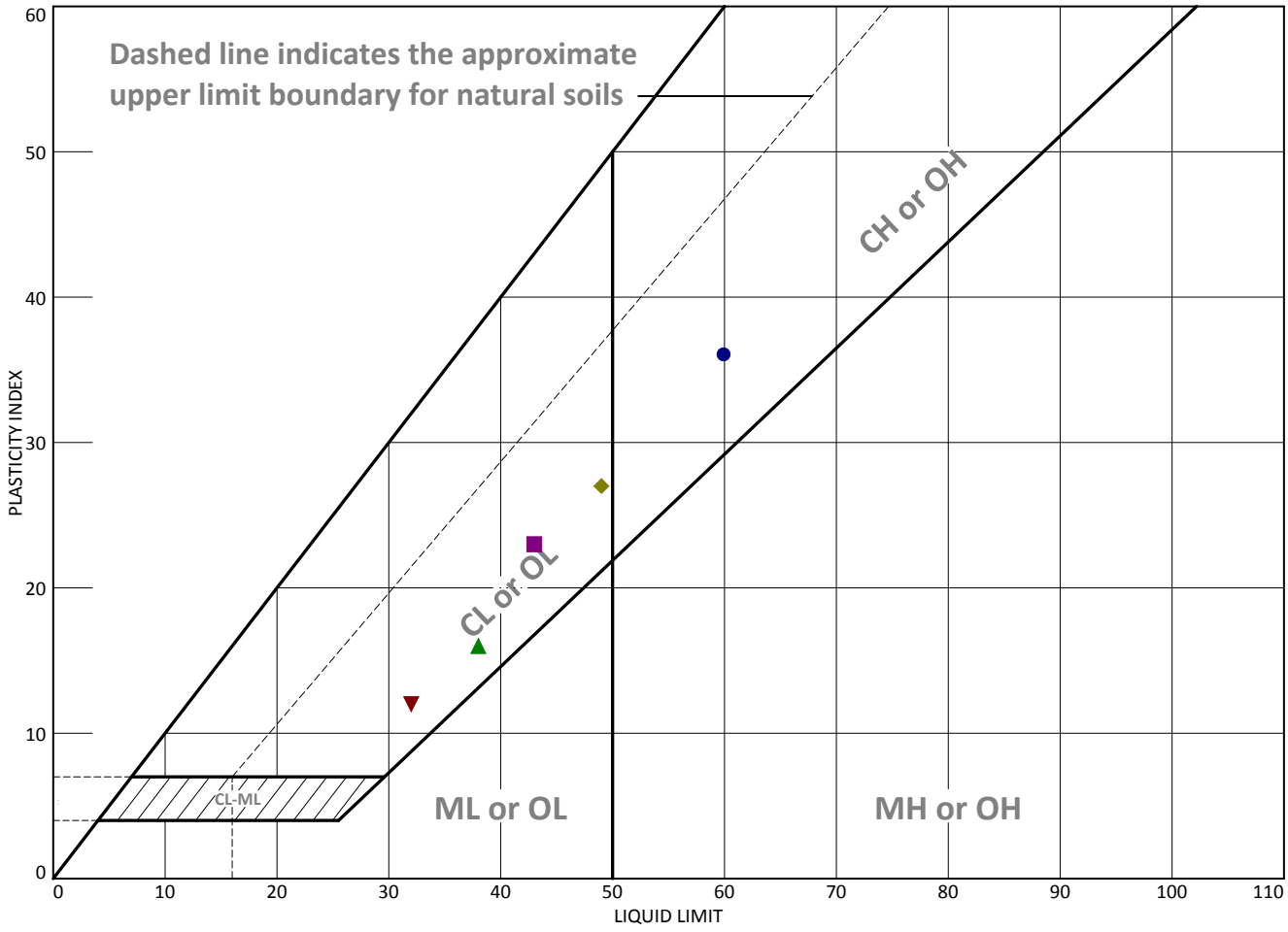
- ● Natural Moisture = 27.9%
- ■ Natural Moisture = 30.7%
- ▲ Natural Moisture = 24.7%
- ◆ Natural Moisture = 26.8%
- ▼ Natural Moisture = 25.5%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-1

Tested By: ○ DAW □ MAS △ DAW ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist	60	24	36	99.3	98.1	CH
■	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist	43	20	23	98.5	95.0	CL
▲	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist	38	22	16	90.3	81.1	CL
◆	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	49	22	27	99.5	97.2	CL
▼	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist	32	20	12	97.4	87.9	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 3 ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
■	**Location:** Boring 3 ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
▲	**Location:** Boring 3U ST8	**Depth:** 9½-11 ft.	**Sample Number:** 8
◆	**Location:** Boring 4	**Depth:** 19½-21½ ft.	**Sample Number:**
▼	**Location:** Boring 4L	**Depth:** 12-14 ft.	**Sample Number:** 10

Remarks:

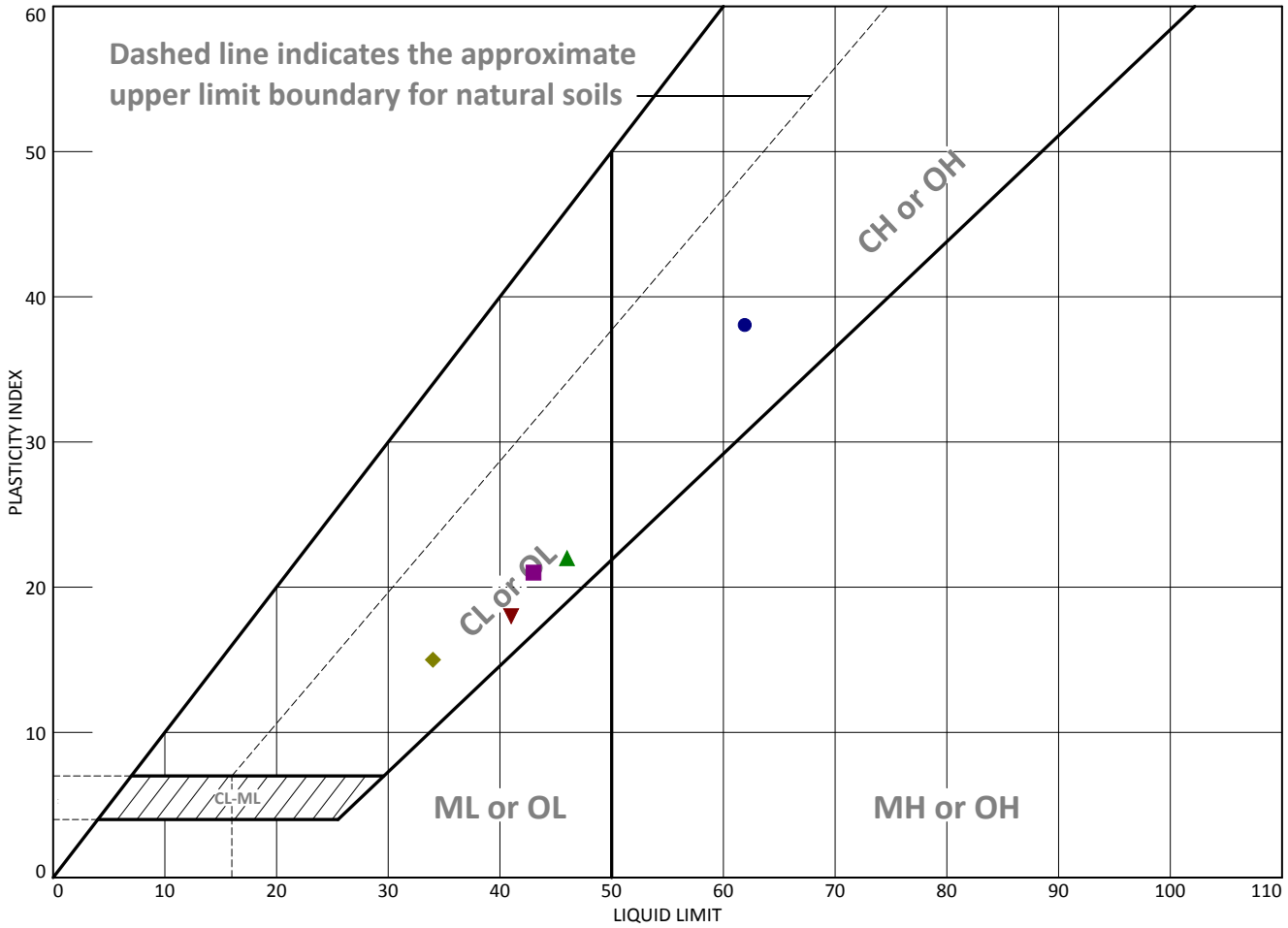
- ● Natural Moisture = 25.8%
- ■ Natural Moisture = 25.8%
- ▲ Natural Moisture = 21.3%
- ◆ Natural Moisture = 28.3%
- ▼ Natural Moisture = 27.4%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-2

Tested By: ○ DAW □ BRH △ DAW ◇ DAW ▽ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	62	24	38	99.4	97.1	CH
■	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist	43	22	21	98.7	90.2	CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	46	24	22	98.3	94.6	CL
◆	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	19	15	99.0	90.2	CL
▼	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist	41	23	18	99.6	91.6	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 4U	**Depth:** 27-29 ft.	**Sample Number:** 22
■	**Location:** Boring 5	**Depth:** 24½-26½ ft.	**Sample Number:** 10
▲	**Location:** Boring 5L	**Depth:** 9½-11 ft.	**Sample Number:**
◆	**Location:** Boring 6	**Depth:** 17-19 ft.	**Sample Number:** 8
▼	**Location:** Boring 6L	**Depth:** 7½-9 ft.	**Sample Number:** ST1

Remarks:

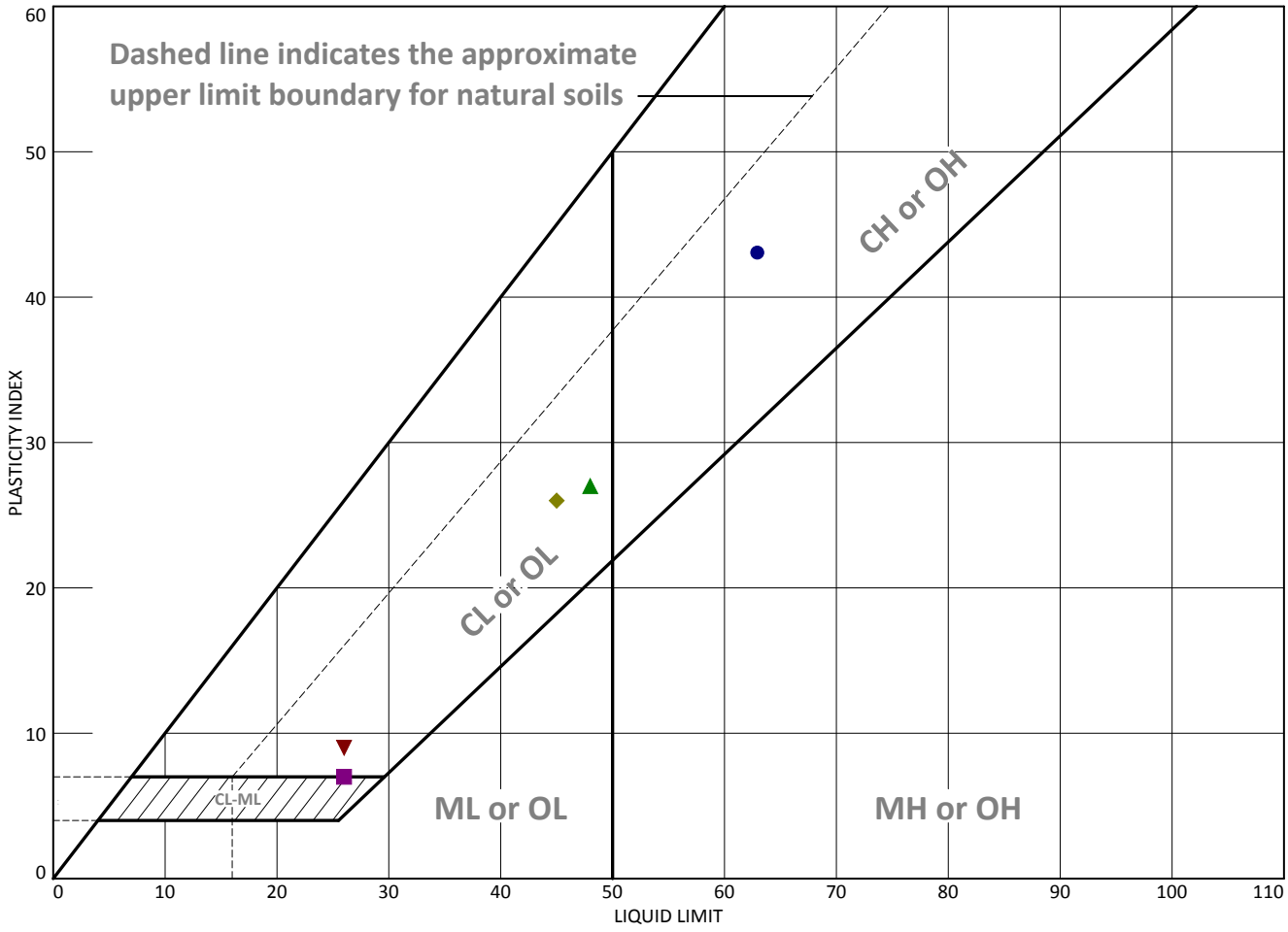
- ● Natural Moisture = 26.9%
- ■ Natural Moisture = 24.3%
- ▲ Natural Moisture = 28.8%
- ◆ Natural Moisture = 21.9%
- ▼ Natural Moisture = 26.6%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-3

Tested By: ○ MAS □ DAW △ DAW ◇ DAW ▽ BRH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist	63	20	43	98.8	97.7	CH
■	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist	26	19	7	99.8	69.8	CL-ML
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	48	21	27	96.6	90.6	CL
◆	Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist	45	19	26	99.3	95.5	CL
▼	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist	26	17	9	98.4	79.9	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 7	**Depth:** 19½-21½ ft.	**Sample Number:** 7
■	**Location:** Boring 8L	**Depth:** 12-14 ft.	**Sample Number:** 5
▲	**Location:** Boring 8U ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
◆	**Location:** Boring 8U ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
▼	**Location:** Boring 9L	**Depth:** 7½-9 ft.	**Sample Number:**

Remarks:

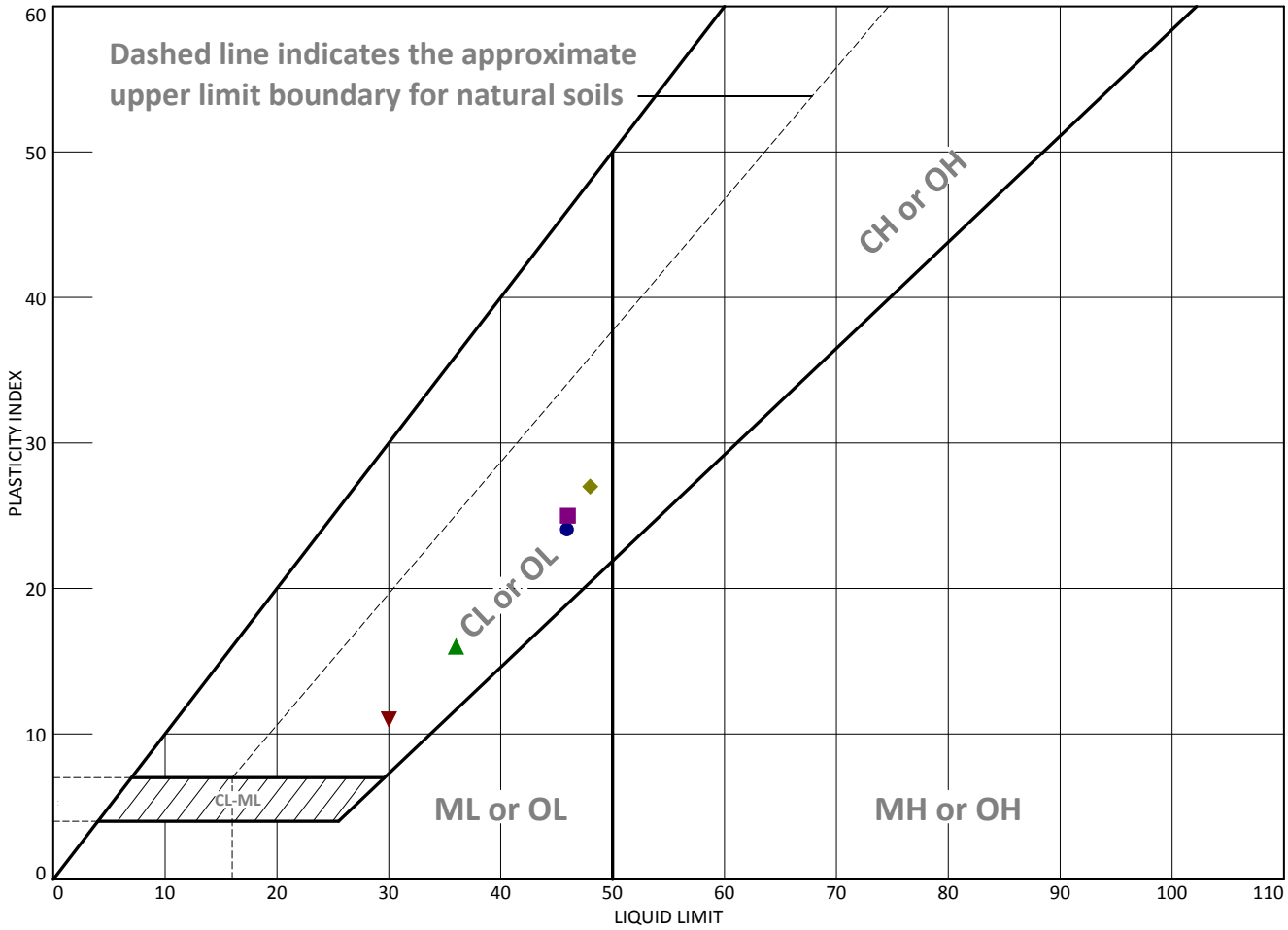
- ● Natural Moisture = 25.8%
- ■ Natural Moisture = 23.8%
- ▲ Natural Moisture = 24.0%
- ◆ Natural Moisture = 25.7%
- ▼ Natural Moisture = 28.0%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-4

Tested By: ○ DJS □ DAW △ BRH ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist	46	22	24	99.7	96.0	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist	46	21	25	99.2	94.5	CL
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	36	20	16	98.2	92.5	CL
◆	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist	48	21	27	99.2	95.9	CL
▼	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	30	19	11	99.8	87.1	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 9U ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
■	**Location:** Boring 9 CCR ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
▲	**Location:** Boring 11U ST8	**Depth:** 9½-11½ ft.	**Sample Number:**
◆	**Location:** Boring 11U ST16	**Depth:** 19½-21½ ft.	**Sample Number:**
▼	**Location:** Boring 12L	**Depth:** 14½-16 ft.	**Sample Number:**

Remarks:

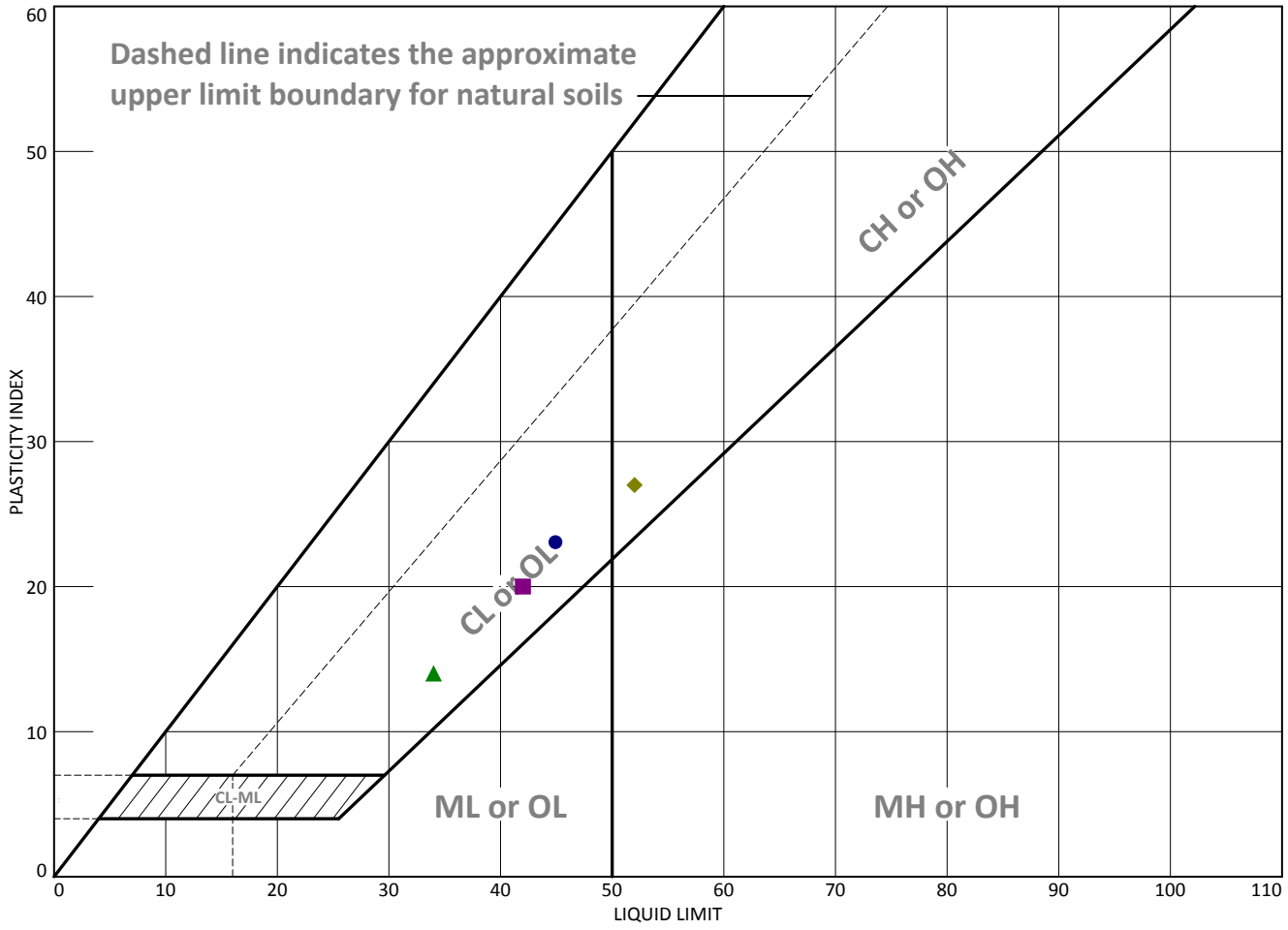
- ● Natural Moisture = 22.4%
- ■ Natural Moisture = 23.2%
- ▲ Natural Moisture = 21.8%
- ◆ Natural Moisture = 25.7%
- ▼ Natural Moisture = 23.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-5

Tested By: ○ NPP □ NPP △ MAS ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	45	22	23	99.6	95.2	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	42	22	20	99.3	96.1	CL
▲	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	20	14	99.9	90.9	CL
◆	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist	52	25	27	99.3	94.9	CH

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 12U ST8 **Depth:** 9½-11½ ft. **Sample Number:** 8

■ **Location:** Boring 12U ST16 **Depth:** 19½-21½ ft. **Sample Number:** 16

▲ **Location:** Boring 13 BN ST7 **Depth:** 8½-10½ ft. **Sample Number:** 7

◆ **Location:** Boring 13 BS ST7 **Depth:** 8½-10½ ft. **Sample Number:** 7

Remarks:

● Natural Moisture = 21.8%

■ Natural Moisture = 21.6%

▲ Natural Moisture = 18.4%

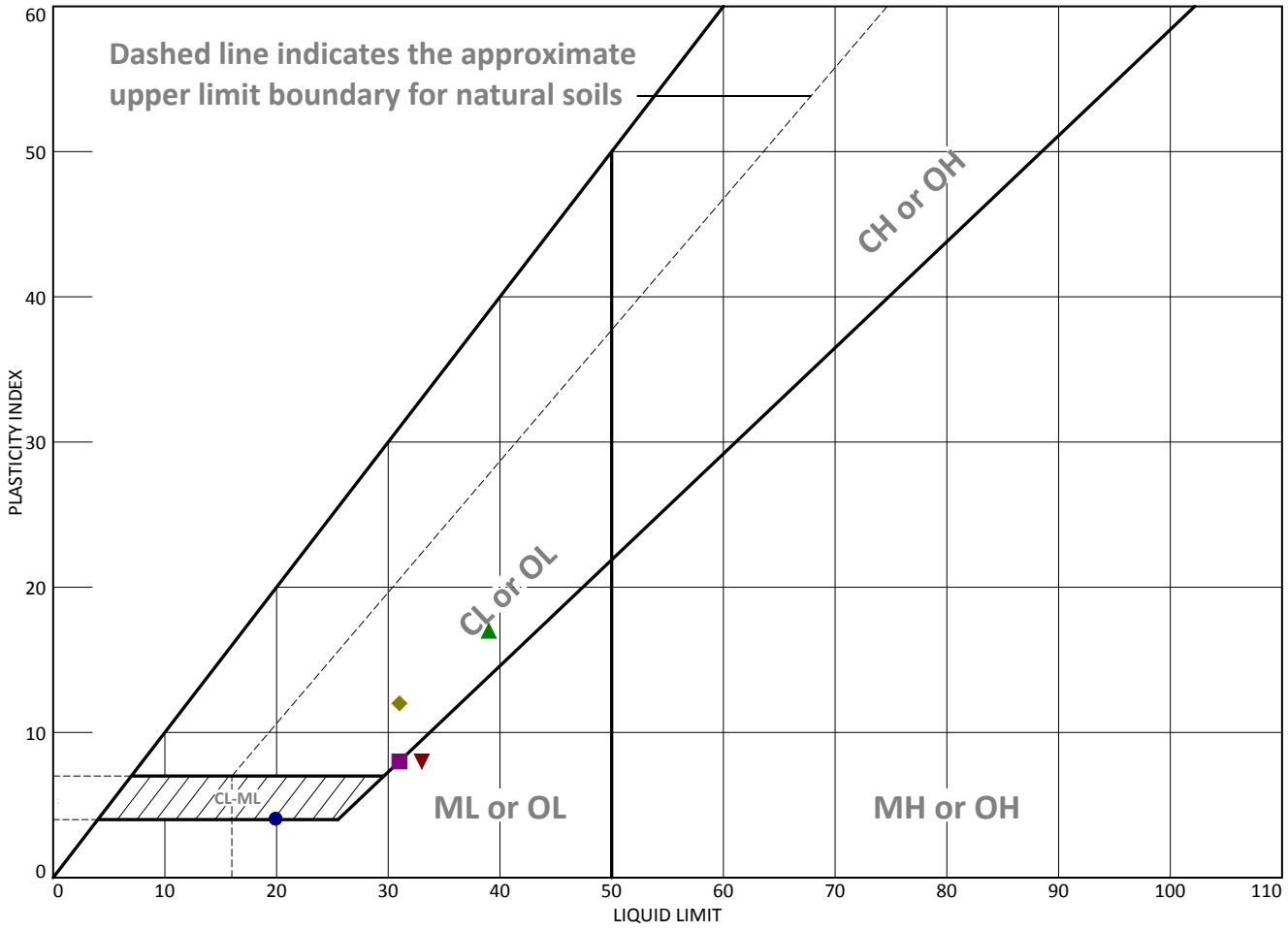
◆ Natural Moisture = 21.1%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-6

Tested By: ○ DAW □ DAW △ MAS ◇ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Moist	20	16	4			CL-ML
■	Lean Clay (CL/ML), Yellow Brown mottled Light Gray, Black Oxidation	31	23	8			CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty	39	22	17			CL
◆	Lean Clay (CL), Gray, Trace Organics	31	19	12			CL
▼	Silt (ML), Brown, Trace Sand	33	25	8			ML

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 2L **Depth:** 14½-16 **Sample Number:**

■ **Location:** Boring 4L **Depth:** 17-18½ ft. **Sample Number:**

▲ **Location:** Boring 5L **Depth:** 17-17½ ft. **Sample Number:**

◆ **Location:** Boring 6L **Depth:** 17½-19 ft. **Sample Number:** 7

▼ **Location:** Boring 7L **Depth:** 15-16½ ft. **Sample Number:** 6

Remarks:

● Natural Moisture = 23.6%

■ Natural Moisture = 27.4%

▲ Natural Moisture = 28.3%

◆ Natural Moisture = 35.9%

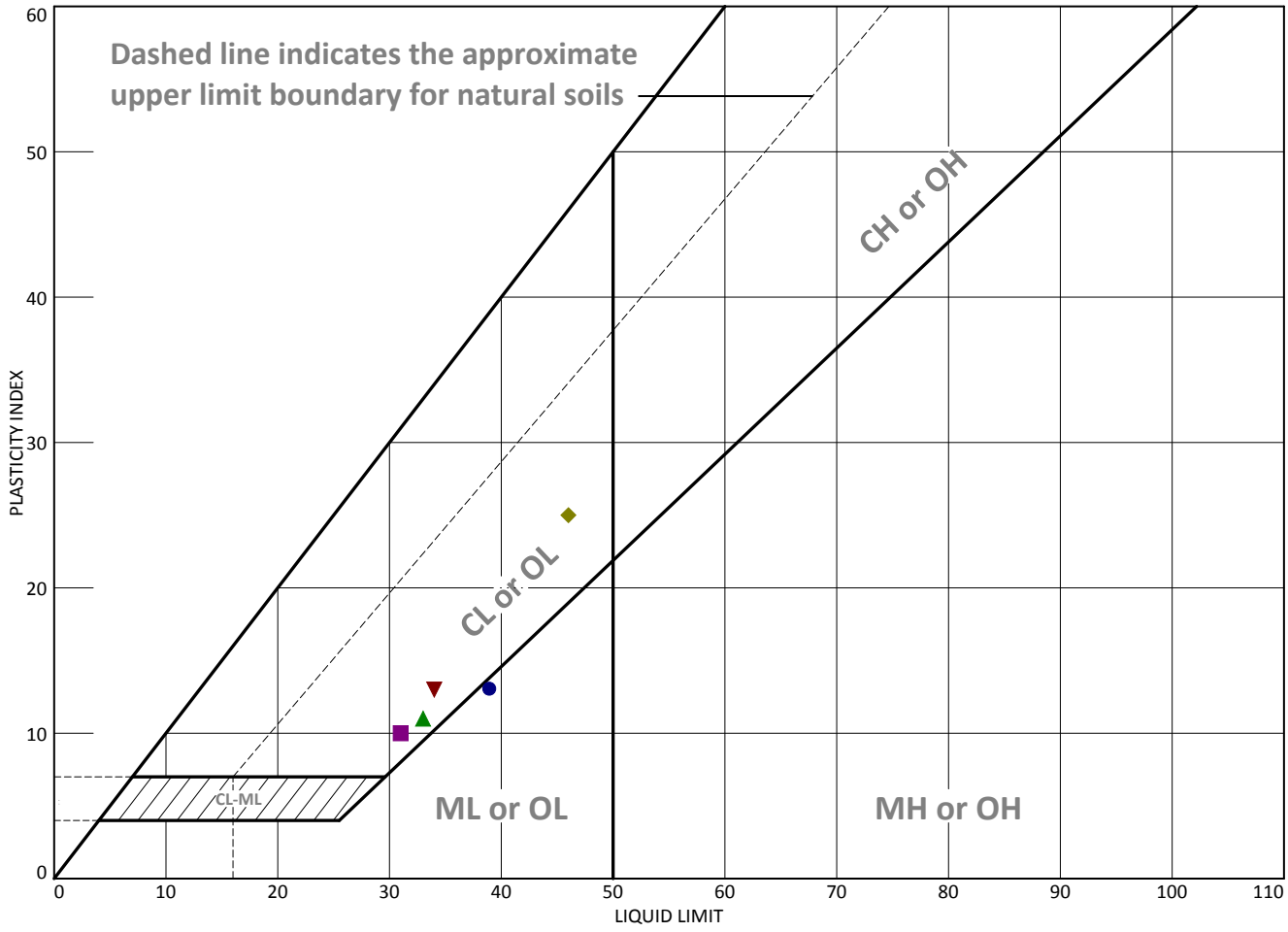
▼ Natural Moisture = 29.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-7

Tested By: DAW **Checked By:** NAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt (ML), Gray, With Lean Clay (CL) Seams	39	26	13			ML
■	Lean Clay (CL), Gray, Silty	31	21	10			CL
▲	Lean Clay (CL), Gray, Silty	33	22	11			CL
◆	Lean Clay (CL), Gray, Silty	46	21	25			CL
▼	Lean Clay (CL), Yellow Brown mottled Brown, Silty	34	21	13			CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 8L **Depth:** 20½-21 ft.
■ **Location:** Boring 8L **Depth:** 22½-23 ft.
▲ **Location:** Boring 9L **Depth:** 15½-16 ft.
◆ **Location:** Boring 9L **Depth:** 18-18½ ft.
▼ **Location:** Boring 11U **Depth:** 24½-26 ft.

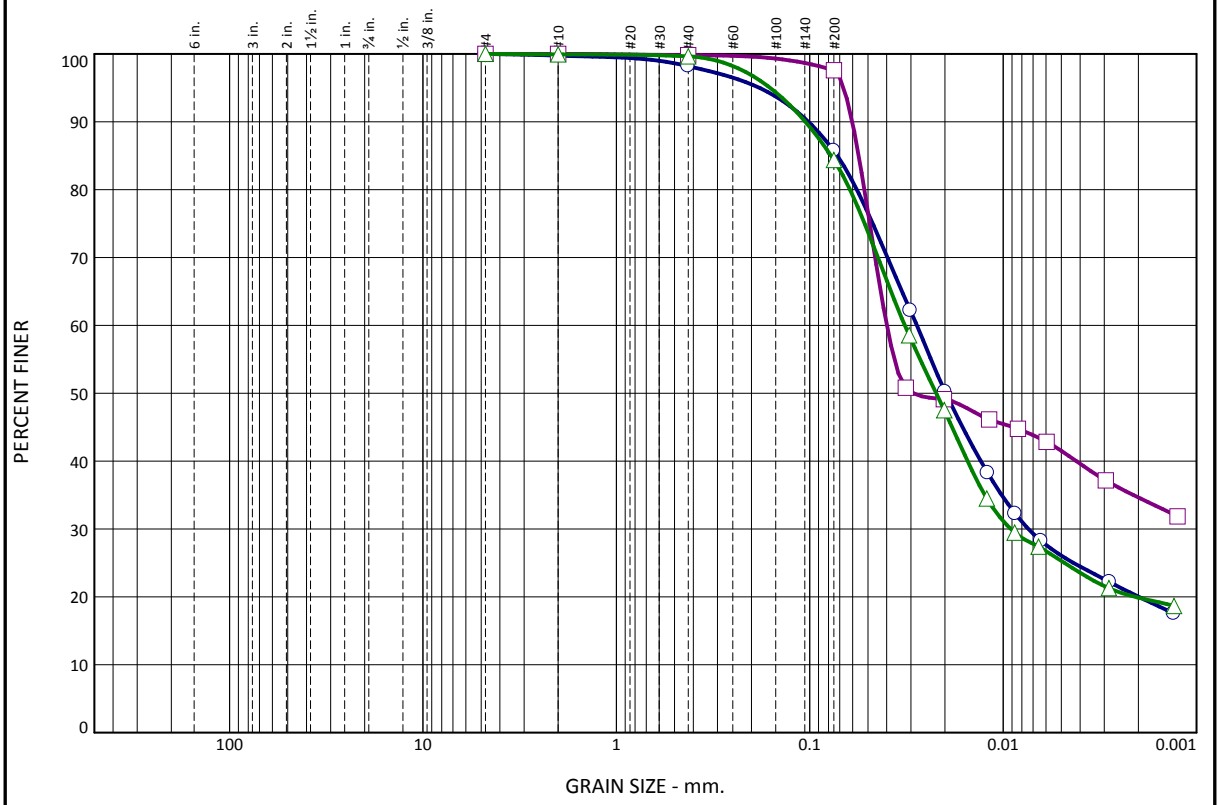
Remarks:
● Natural Moisture = 32.3%
■ Natural Moisture = 26.7%
▲ Natural Moisture = 28.1%
◆ Natural Moisture = 28.6%
▼ Natural Moisture = 28.3%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-8

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	14.3	65.7	20.0	CL	30	17	13
□	0.0	0.0	2.4	63.0	34.6	CL	43	21	22
△	0.0	0.0	15.6	64.5	19.9	CL	39	21	18

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0279	0.0399	0.0322
D_{30}	0.0074		0.0091
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	100.0	100.0
#10	99.7	100.0	99.9
#40	98.2	99.8	99.6
#200	85.7	97.6	84.4

Material Description

○ Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist

□ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist

△ Lean Clay with Sand (CL), Gray, Silty, Medium, Moist

REMARKS:

○ Natural Moisture = 27.9%

□ Natural Moisture = 30.7%

△ Natural Moisture = 24.7%

○ Location: Boring 1 Depth: 24½-26½ ft. Sample Number:

□ Location: Boring 1L Depth: 22-24 ft. Sample Number: 18

△ Location: Boring 1 LL Depth: 14½-16½ ft. Sample Number: 12

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

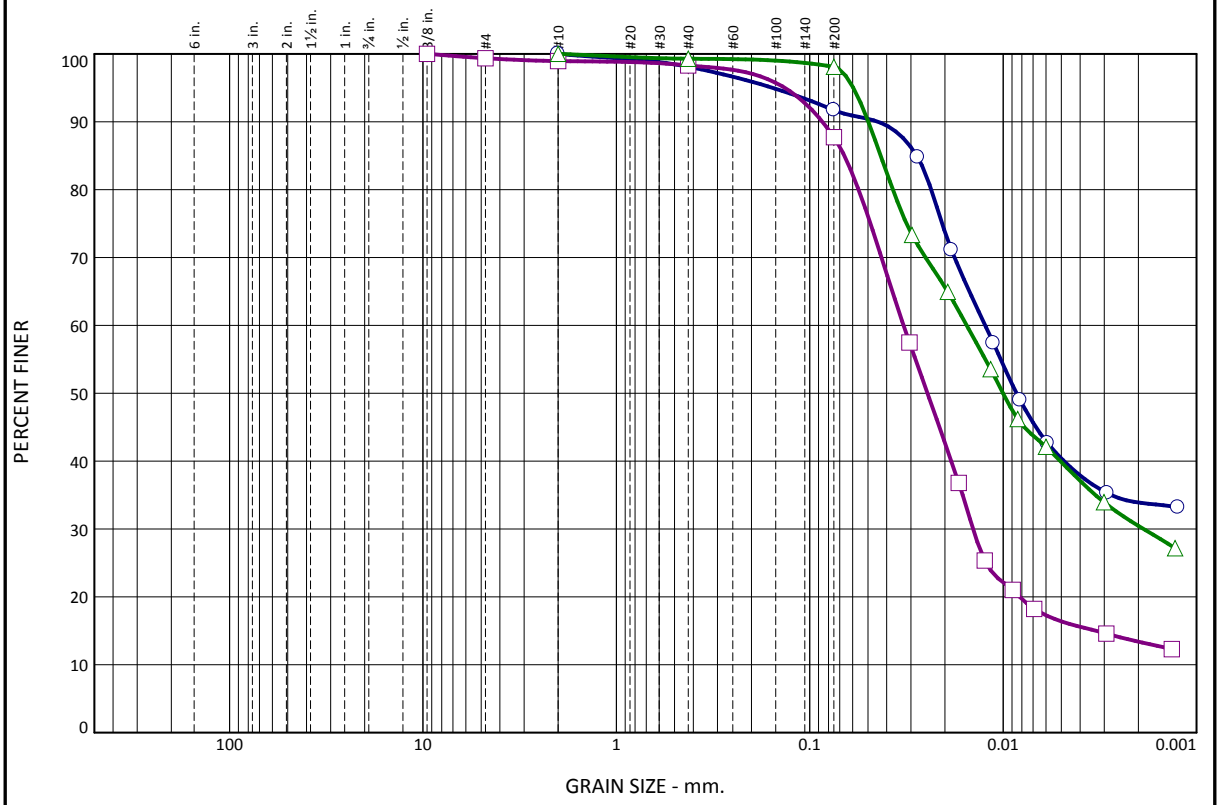
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-1

Tested By: DAW / DJS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	8.3	57.8	33.9	CH	57	21	36
□	0.0	0.6	11.7	74.3	13.4	CL-ML	27	21	6
△	0.0	0.0	1.9	67.6	30.5	CH	60	24	36

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
GRAIN SIZE			
D_{60}	0.0124	0.0328	0.0154
D_{30}		0.0143	0.0019
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4		99.4	
#10	100.0	98.9	100.0
#40	98.1	98.3	99.3
#200	91.7	87.7	98.1

Material Description

○ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

□ Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist

△ Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 26.8%

□ Natural Moisture = 25.5%

△ Natural Moisture = 25.8%

○ Location: Boring 2 Depth: 22-24 ft. Sample Number: 8

□ Location: Boring 2L Depth: 7-9 ft. Sample Number: 6

△ Location: Boring 3 ST8 Depth: 9½-11½ ft. Sample Number: 8

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

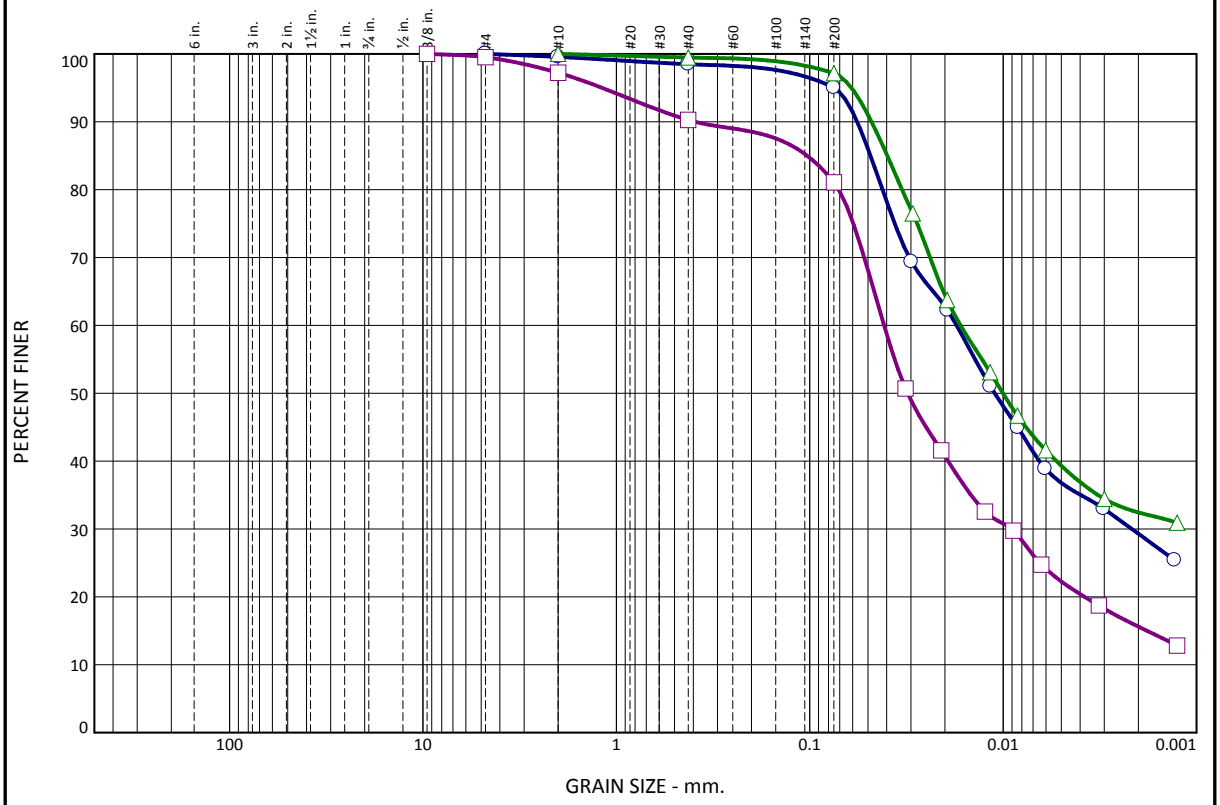
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-2

Tested By: ○ DAW □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.0	65.7	29.3	CL	43	20	23
□	0.0	0.5	18.4	65.5	15.6	CL	38	22	16
△	0.0	0.0	2.8	64.8	32.4	CL	49	22	27

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
GRAIN SIZE			
D_{60}	0.0174	0.0413	0.0166
D_{30}	0.0022	0.0090	
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.5	
#10	99.6	97.2	100.0
#40	98.5	90.3	99.5
#200	95.0	81.1	97.2

Material Description

○ Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist

△ Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 21.3%

△ Natural Moisture = 28.3%

○ Location: Boring 3 ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 3U ST8 Depth: 9½-11 ft. Sample Number: 8

△ Location: Boring 4 Depth: 19½-21½ ft. Sample Number:

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

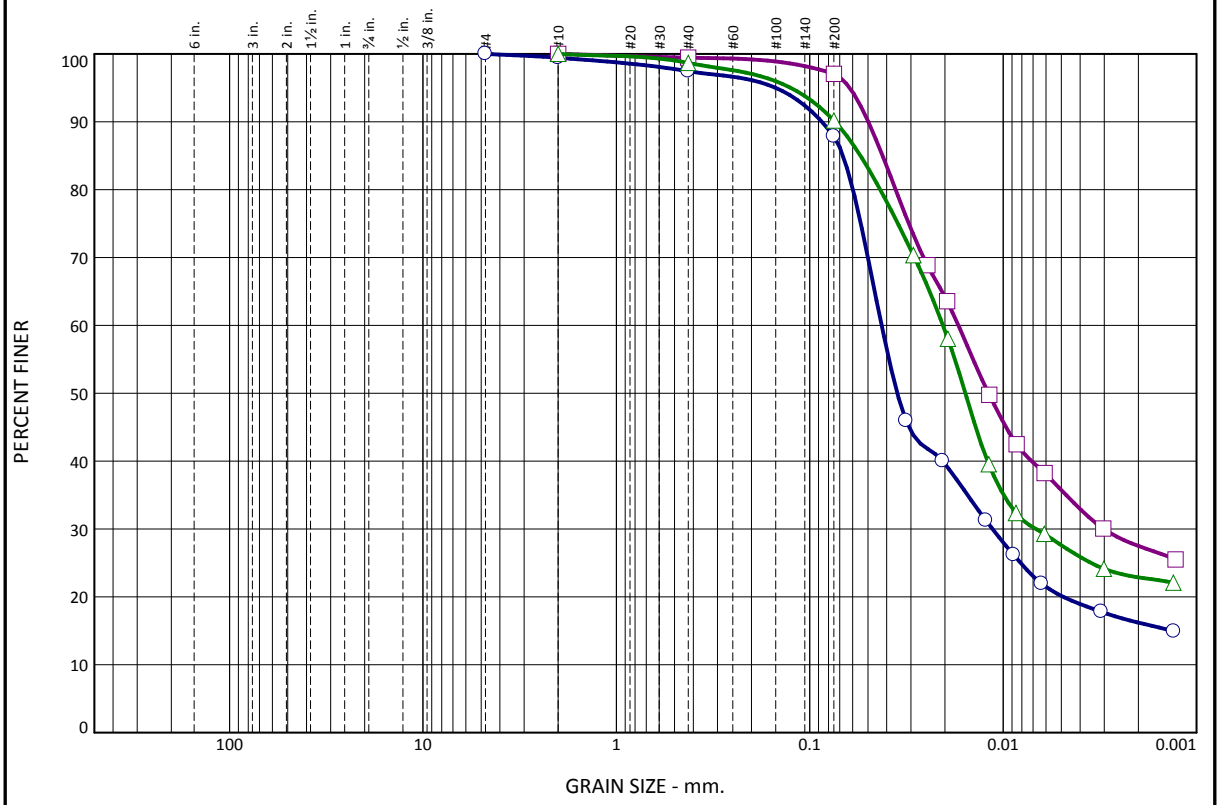
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-3

Tested By: ○ DAW □ DAW △ DAW / MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.1	71.7	16.2	CL	32	20	12
□	0.0	0.0	2.9	69.6	27.5	CH	62	24	38
△	0.0	0.0	9.8	67.3	22.9	CL	43	22	21

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0425	0.0170	0.0205
D_{30}	0.0114	0.0030	0.0068
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		
#10	99.4	100.0	100.0
#40	97.4	99.4	98.7
#200	87.9	97.1	90.2

Material Description

○ Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist

□ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Gray/ Yellow Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 27.4%

□ Natural Moisture = 26.9%

△ Natural Moisture = 24.3%

○ Location: Boring 4L Depth: 12-14 ft. Sample Number: 10

□ Location: Boring 4U Depth: 27-29 ft. Sample Number: 22

△ Location: Boring 5 Depth: 24½-26½ ft. Sample Number: 10

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

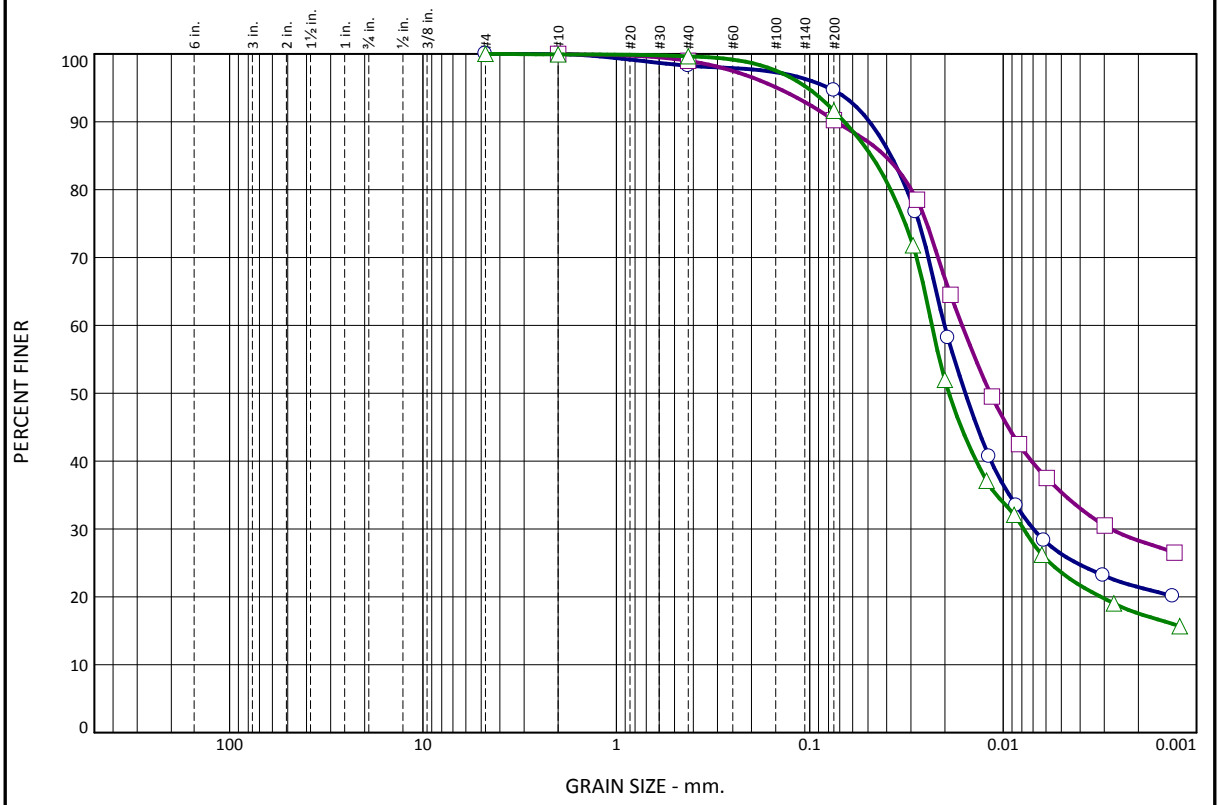
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-4

Tested By: ○ DAW / DJS □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.4	73.2	21.4	CL	46	24	22
□	0.0	0.0	9.8	61.9	28.3	CL	34	19	15
△	0.0	0.0	8.4	74.1	17.5	CL	41	23	18

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0201	0.0163	0.0234
D_{30}	0.0070	0.0028	0.0078
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	100.0	100.0	99.9
#40	98.3	99.0	99.6
#200	94.6	90.2	91.6

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 28.8%

□ Natural Moisture = 21.9%

△ Natural Moisture = 26.6%

○ Location: Boring 5L Depth: 9½-11 ft. Sample Number:

□ Location: Boring 6 Depth: 17-19 ft. Sample Number: 8

△ Location: Boring 6L Depth: 7½-9 ft. Sample Number: ST1

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

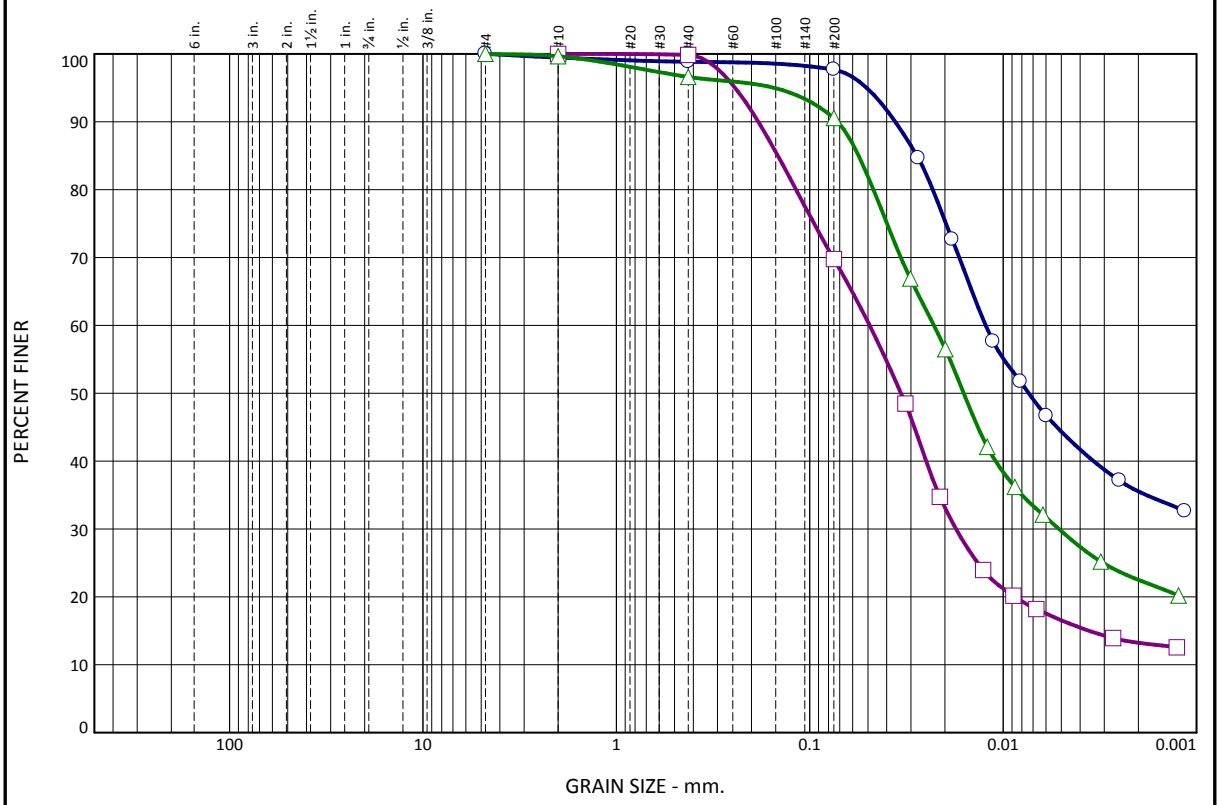
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-5

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	2.3	62.2	35.5	CH	63	20	43
□	0.0	0.0	30.2	56.6	13.2	CL-ML	26	19	7
△	0.0	0.0	9.4	68.1	22.5	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0123	0.0491	0.0228
D_{30}		0.0175	0.0052
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.5	100.0	99.6
#40	98.8	99.8	96.6
#200	97.7	69.8	90.6

Material Description

○ Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist

□ Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 23.8%

△ Natural Moisture = 24.0%

○ Location: Boring 7 Depth: 19½-21½ ft. Sample Number: 7

□ Location: Boring 8L Depth: 12-14 ft. Sample Number: 5

△ Location: Boring 8U ST8 Depth: 9½-11½ ft. Sample Number: 8

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

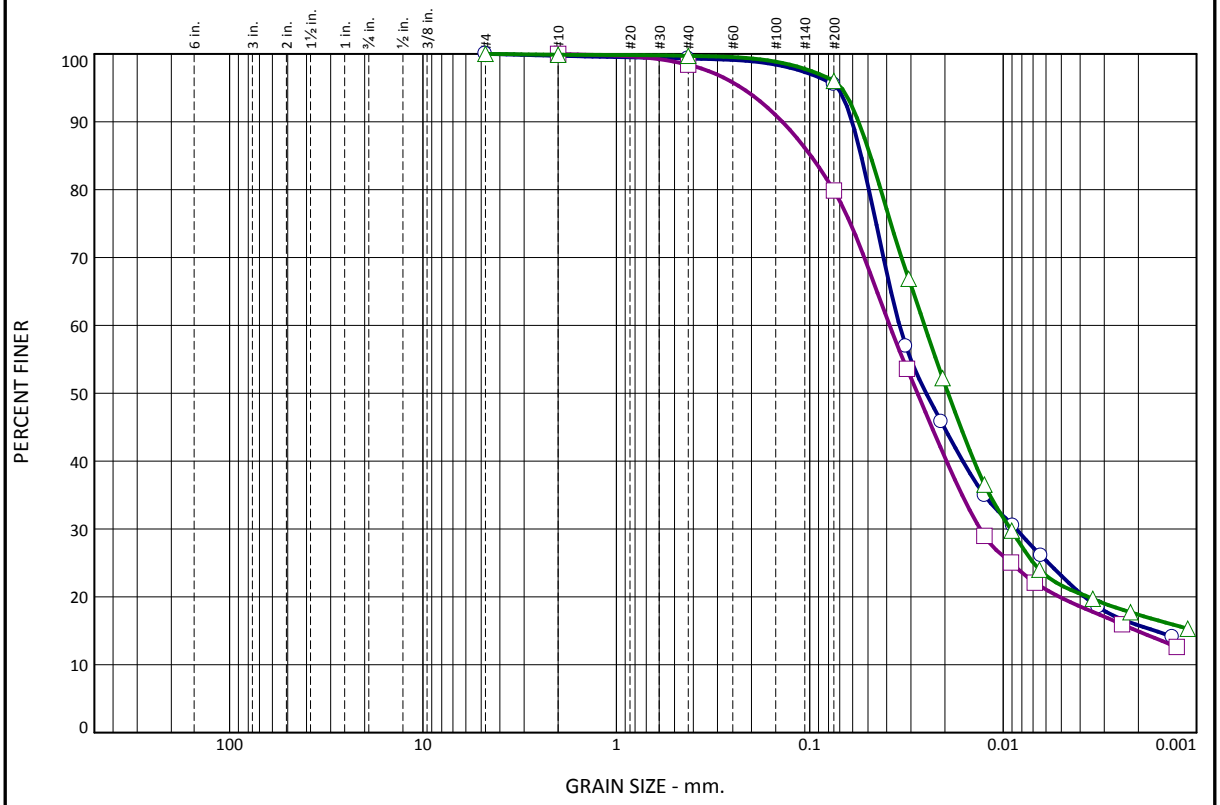
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-6

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	4.5	79.7	15.8	CL	45	19	26
□	0.0	0.0	20.1	65.0	14.9	CL	26	17	9
△	0.0	0.0	4.0	78.6	17.4	CL	46	22	24

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0343	0.0386	0.0255
D_{30}	0.0086	0.0131	0.0091
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.7	100.0	99.9
#40	99.3	98.4	99.7
#200	95.5	79.9	96.0

Material Description

○ Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist

△ Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.7%

□ Natural Moisture = 28.0%

△ Natural Moisture = 22.4%

○ Location: Boring 8U ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 9L Depth: 7½-9 ft. Sample Number:

△ Location: Boring 9U ST16 Depth: 19½-21½ ft. Sample Number: 16

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

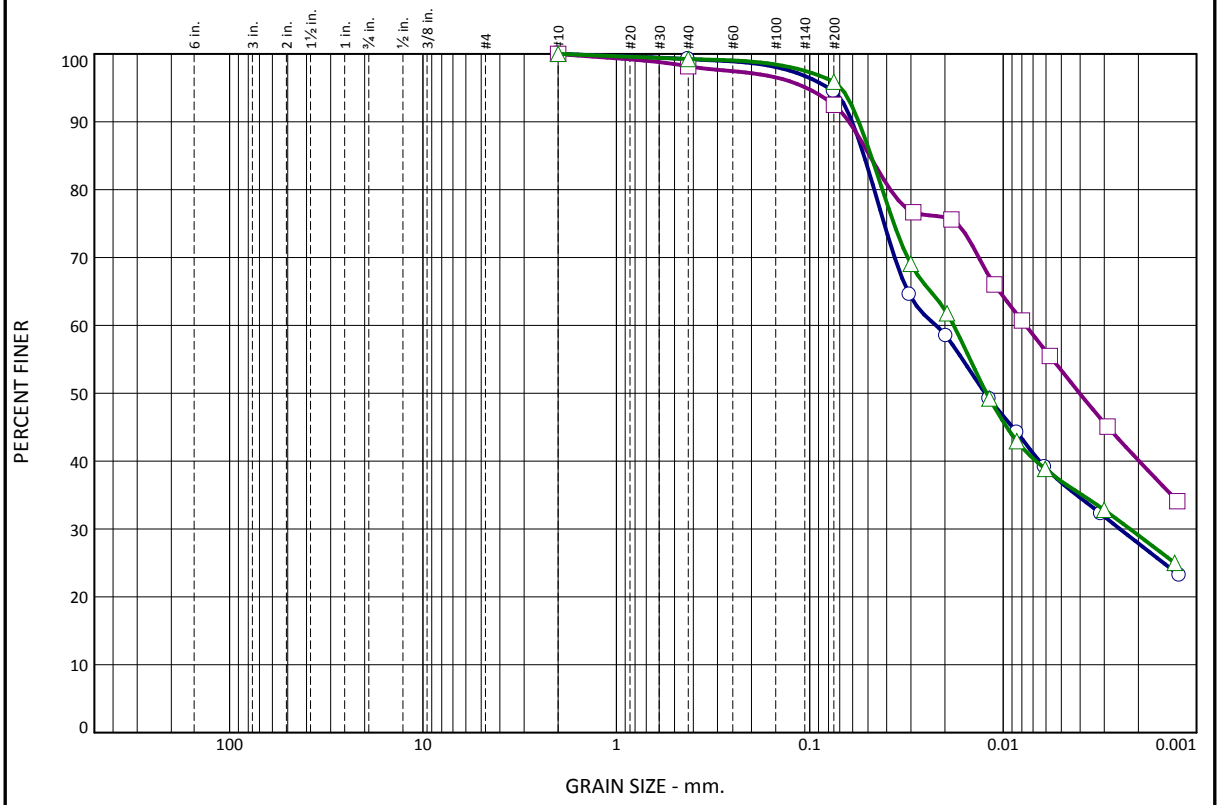
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-7

Tested By: ○ DAW □ DAW △ MAS **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.5	66.6	27.9	CL	46	21	25
□	0.0	0.0	7.5	52.4	40.1	CL	36	20	16
△	0.0	0.0	4.1	66.8	29.1	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0222	0.0077	0.0180
D_{30}	0.0025		0.0022
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.2	98.2	99.2
#200	94.5	92.5	95.9

Material Description

○ Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 25.7%

○ Location: Boring 9 CCR ST8 Depth: 9½-11½ ft. Sample Number: 8

□ Location: Boring 11U ST8 Depth: 9½-11½ ft. Sample Number:

△ Location: Boring 11U ST16 Depth: 19½-21½ ft. Sample Number:

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

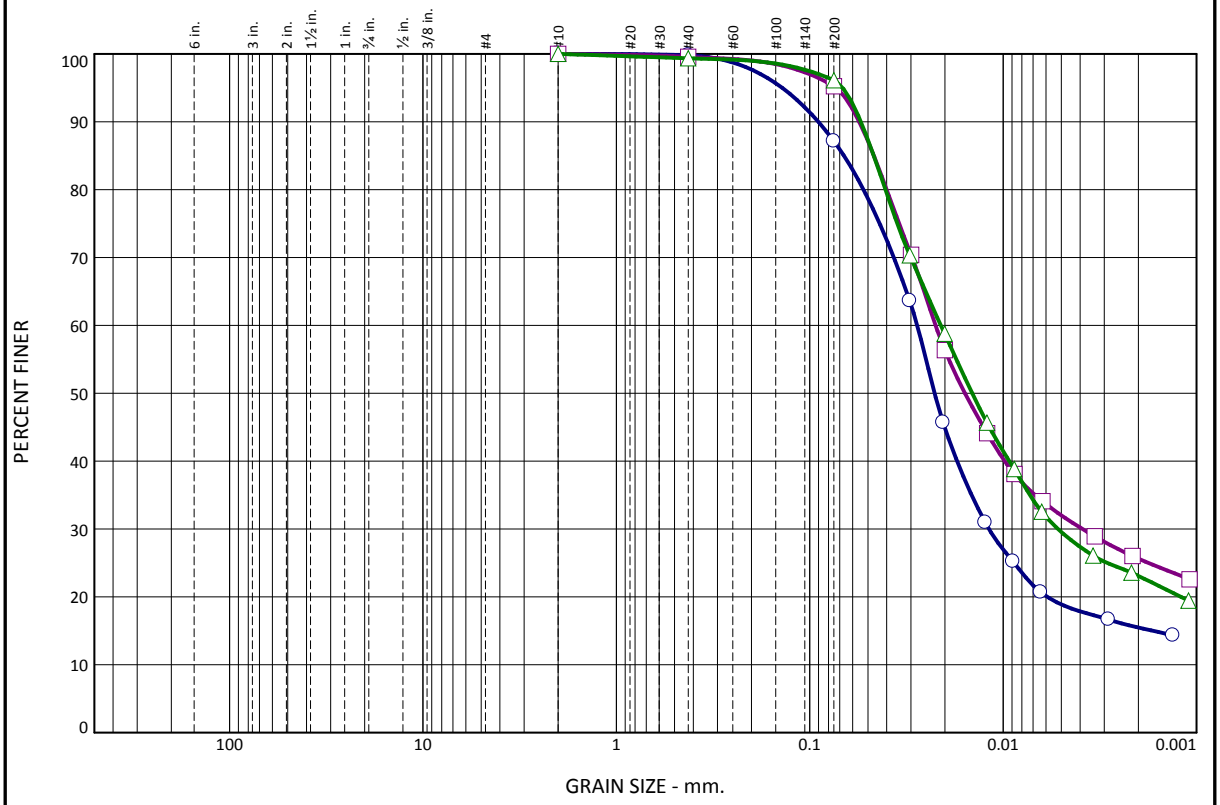
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-8

Tested By: DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.9	71.6	15.5	CL	30	19	11
□	0.0	0.0	4.8	69.6	25.6	CL	45	22	23
△	0.0	0.0	3.9	73.0	23.1	CL	42	22	20

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0278	0.0224	0.0210
D_{30}	0.0119	0.0039	0.0052
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.8	99.6	99.3
#200	87.1	95.2	96.1

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 21.6%

○ Location: Boring 12L Depth: 14½-16 ft. Sample Number:

□ Location: Boring 12U ST8 Depth: 9½-11½ ft. Sample Number: 8

△ Location: Boring 12U ST16 Depth: 19½-21½ ft. Sample Number: 16

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

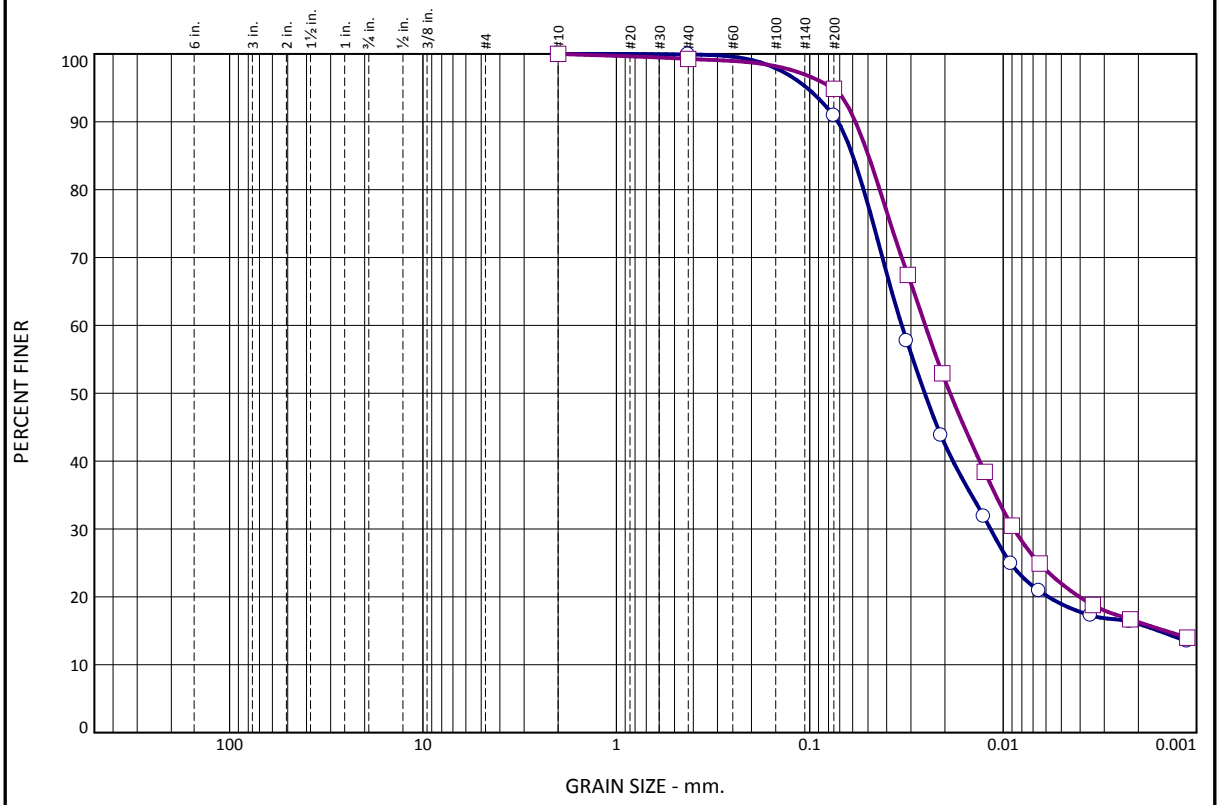
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-9

Tested By: ○ DAW □ MAS △ MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	9.1	74.9	16.0	CL	34	20	14
□	0.0	0.0	5.1	78.6	16.3	CH	52	25	27

SIEVE inches size	○	□
GRAIN SIZE		
D_{60}	0.0335	0.0253
D_{30}	0.0116	0.0088
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	○	□
#10	100.0	100.0
#40	99.9	99.3
#200	90.9	94.9

Material Description

○ Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 18.4%

□ Natural Moisture = 21.1%

○ Location: Boring 13 BN ST7 Depth: 8½-10½ ft. Sample Number: 7

□ Location: Boring 13 BS ST7 Depth: 8½-10½ ft. Sample Number: 7

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-10

Tested By: MAS

Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **17** P.I. **13**

BORING NO. **Boring 1** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **26.2%** INITIAL DRY DENSITY **100.8 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:12:00 PM		0.200	7.214	40.438		2.89	7.04	20.750	210.9		231.650		
3:12:00 PM	3:33:00 PM	0.200	7.214	40.438	1260	5.00	4.94	-0.300	210.9	1.00	210.600	1.35E-06	1.27E-06
3:33:00 PM	3:53:00 PM	0.200	7.214	40.438	1200	6.77	3.17	-18.000	210.9	1.00	192.900	1.31E-06	1.23E-06
3:53:00 PM	4:34:00 PM	0.200	7.214	40.438	2460	9.89	0.04	-49.250	210.9	1.00	161.650	1.28E-06	1.21E-06
													1.23E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.23 E-06 CM/SEC

REMARKS: Testing Completed 11/2/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **21** P.I. **22**

BORING NO. **Boring 1L** SAMPLE NO. **ST 18**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.4%** INITIAL DRY DENSITY **114.0 P.C.F.**

FINAL WATER CONTENT **16.1%** FINAL DRY DENSITY **117.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:42:00 PM		0.200	7.330	41.980		4.60	5.36	3.800	70.3		74.100		
12:42:00 PM	12:50:00 PM	0.200	7.330	41.980	480	5.82	4.15	-8.350	70.3	0.99	61.950	6.51E-06	6.14E-06
12:50:00 PM	1:32:00 PM	0.200	7.330	41.980	2520	9.50	0.50	-45.000	70.3	0.99	25.300	6.21E-06	5.85E-06
1:32:00 PM	1:42:30 PM	0.200	7.330	41.980	630	9.99	0.01	-49.900	70.3	1.00	20.400	5.97E-06	5.62E-06
													5.84E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.84 E-06 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Gray, Silty, Medium, Moist**

LIQUID LIMIT **39** PLASTIC LIMIT **21** P.I. **18**

BORING NO. **Boring 1LL** SAMPLE NO. **ST 12**

SAMPLE TYPE **ST** DEPTH **14½-16½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.8%** INITIAL DRY DENSITY **102.1 P.C.F.**

FINAL WATER CONTENT **22.8%** FINAL DRY DENSITY **103.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:32:00 PM		0.200	7.391	41.543		0.14	10.00	49.300	70.3		119.600		
2:32:00 PM	2:46:00 PM	0.200	7.391	41.543	840	3.35	6.78	17.150	70.3	1.00	87.450	6.63E-06	6.25E-06
2:46:00 PM	2:54:00 PM	0.200	7.391	41.543	480	4.75	5.38	3.150	70.3	1.00	73.450	6.47E-06	6.09E-06
2:54:00 PM	3:10:00 PM	0.200	7.391	41.543	960	6.82	3.31	-17.550	70.3	1.00	52.750	6.14E-06	5.78E-06
													6.02E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.02 E-06 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **57** PLASTIC LIMIT **21** P.I. **36**

BORING NO. **Boring 2** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.5%** INITIAL DRY DENSITY **101.8 P.C.F.**

FINAL WATER CONTENT **23.0%** FINAL DRY DENSITY **102.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:39:00 AM		0.200	6.980	41.931		4.53	4.63	0.500	210.9		211.400		
6:39:00 AM	6:52:00 AM	0.200	6.980	41.931	780	4.60	4.56	-0.200	210.9	1.00	210.700	7.08E-08	6.67E-08
6:52:00 AM	7:30:00 AM	0.200	6.980	41.931	2280	4.81	4.34	-2.350	210.9	1.05	208.550	7.49E-08	7.05E-08
7:30:00 AM	7:48:00 AM	0.200	6.980	41.931	1080	4.90	4.24	-3.300	210.9	1.11	207.600	7.04E-08	6.63E-08
													6.87E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.87 E-08 CM/SEC

REMARKS: Testing Completed 10/14/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist**

LIQUID LIMIT **27** PLASTIC LIMIT **21** P.I. **6**

BORING NO. **Boring 2L** SAMPLE NO. **6**

SAMPLE TYPE **ST** DEPTH **7.0-9.0 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **101.9 P.C.F.**

FINAL WATER CONTENT **23.5%** FINAL DRY DENSITY **103.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:28:00 PM		0.200	7.005	41.254		3.97	6.85	14.400	70.3		84.700		
3:28:00 PM	3:40:00 PM	0.200	7.005	41.254	720	6.71	4.10	-13.050	70.3	1.00	57.250	9.24E-06	8.70E-06
3:40:00 PM	3:50:00 PM	0.200	7.005	41.254	600	8.30	2.50	-29.000	70.3	1.01	41.300	9.24E-06	8.71E-06
3:50:00 PM	4:02:00 PM	0.200	7.005	41.254	720	9.47	1.33	-40.700	70.3	1.00	29.600	7.86E-06	7.40E-06
													8.24E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.24 E-06 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **60** PLASTIC LIMIT **24** P.I. **36**

BORING NO. **Boring 3** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **100.2 P.C.F.**

FINAL WATER CONTENT **26.1%** FINAL DRY DENSITY **99.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:53:00 AM		0.200	7.163	42.028		1.50	7.88	31.900	210.9		242.800		
5:53:00 AM	7:13:00 AM	0.200	7.163	42.028	4800	1.56	7.82	31.300	210.9	1.00	242.200	8.79E-09	8.28E-09
7:13:00 AM	7:38:00 AM	0.200	7.163	42.028	1500	1.58	7.80	31.100	210.9	1.00	242.000	9.39E-09	8.84E-09
7:38:00 AM	8:29:00 AM	0.200	7.163	42.028	3060	1.62	7.76	30.700	210.9	1.00	241.600	9.21E-09	8.68E-09
													8.50E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.50 E-09 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **20** P.I. **23**

BORING NO. **Boring 3** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.8%** INITIAL DRY DENSITY **95.1 P.C.F.**

FINAL WATER CONTENT **29.5%** FINAL DRY DENSITY **93.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:10:00 PM		0.200	7.432	42.077		5.34	4.67	-3.350	210.9		207.550		
12:10:00 PM	12:30:00 PM	0.200	7.432	42.077	1200	6.00	4.01	-9.950	210.9	1.00	200.950	4.76E-07	4.48E-07
12:30:00 PM	12:54:00 PM	0.200	7.432	42.077	1440	6.72	3.29	-17.150	210.9	1.00	193.750	4.48E-07	4.22E-07
12:54:00 PM	1:25:00 PM	0.200	7.432	42.077	1860	7.60	2.40	-26.000	210.9	1.01	184.900	4.44E-07	4.18E-07
													4.27E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.27 E-07 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist**

LIQUID LIMIT **38** PLASTIC LIMIT **22** P.I. **16**

BORING NO. **Boring 3U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.4%** INITIAL DRY DENSITY **101.2 P.C.F.**

FINAL WATER CONTENT **21.4%** FINAL DRY DENSITY **102.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:55:00 PM		0.200	7.483	41.834		2.21	6.92	23.550	351.5		375.050		
8:55:00 PM	7:04:00 AM	0.200	7.483	41.834	42180	3.58	5.53	9.750	351.5	1.01	361.250	1.59E-08	1.50E-08
7:04:00 AM	8:38:00 AM	0.200	7.483	41.834	5640	3.78	5.33	7.750	351.5	1.00	359.250	1.76E-08	1.66E-08
8:38:00 AM	12:03:00 PM	0.200	7.483	41.834	12300	4.18	4.92	3.700	351.5	1.03	355.200	1.65E-08	1.55E-08
													1.52E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.52 E-08 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **49** PLASTIC LIMIT **22** P.I. **27**

BORING NO. **Boring 4** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.5%** INITIAL DRY DENSITY **96.4 P.C.F.**

FINAL WATER CONTENT **23.8%** FINAL DRY DENSITY **100.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:09:00 PM		0.200	7.437	41.205		3.74	5.94	11.000	210.9		221.900		
7:09:00 PM	8:29:00 PM	0.200	7.437	41.205	4800	4.13	5.51	6.900	210.9	1.10	217.800	7.01E-08	6.61E-08
8:29:00 PM	9:00:00 PM	0.200	7.437	41.205	1860	4.30	5.34	5.200	210.9	1.00	216.100	7.60E-08	7.16E-08
9:00:00 PM	9:28:00 PM	0.200	7.437	41.205	1680	4.42	5.22	4.000	210.9	1.00	214.900	5.98E-08	5.64E-08
													6.53E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.53 E-08 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **32** PLASTIC LIMIT **20** P.I. **12**

BORING NO. **Boring 4L** SAMPLE NO. **ST 10**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.7%** INITIAL DRY DENSITY **100.7 P.C.F.**

FINAL WATER CONTENT **24.6%** FINAL DRY DENSITY **101.8 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:16:00 PM		0.200	7.397	41.013		1.20	8.82	38.100	140.6		178.700		
12:16:00 PM	1:03:00 PM	0.200	7.397	41.013	2820	3.75	6.23	12.400	140.6	1.02	153.000	9.93E-07	9.35E-07
1:03:00 PM	2:23:00 PM	0.200	7.397	41.013	4800	7.39	2.55	-24.200	140.6	1.01	116.400	1.03E-06	9.68E-07
2:23:00 PM	3:26:00 PM	0.200	7.397	41.013	3780	9.59	0.32	-46.350	140.6	1.01	94.250	1.01E-06	9.49E-07
													9.53E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.53 E-07 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS**

COMPUTED BY: **BJS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **62** PLASTIC LIMIT **24** P.I. **38**

BORING NO. **Boring 4U** SAMPLE NO. **ST 22**

SAMPLE TYPE **ST** DEPTH **27-29 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.8%** INITIAL DRY DENSITY **94.6 P.C.F.**

FINAL WATER CONTENT **28.1%** FINAL DRY DENSITY **95.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:47:00 PM		0.200	7.706	42.077		2.33	6.84	22.550	210.9		233.450		
12:47:00 PM	1:08:00 PM	0.200	7.706	42.077	1260	2.35	6.82	22.350	210.9	1.00	233.250	1.25E-08	1.17E-08
1:08:00 PM	2:20:00 PM	0.200	7.706	42.077	4320	2.42	6.74	21.600	210.9	1.14	232.500	1.37E-08	1.29E-08
2:20:00 PM	4:43:00 PM	0.200	7.706	42.077	8580	2.50	6.66	20.800	210.9	1.00	231.700	7.36E-09	6.93E-09
													9.17E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.17 E-09 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **22** P.I. **21**

BORING NO. **Boring 5** SAMPLE NO. **10**

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.5%** INITIAL DRY DENSITY **99.8 P.C.F.**

FINAL WATER CONTENT **23.7%** FINAL DRY DENSITY **100.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:59:00 PM		0.200	6.904	41.883		2.62	6.29	18.350	210.9		229.250		
1:59:00 PM	2:35:00 PM	0.200	6.904	41.883	2160	3.48	5.40	9.600	210.9	1.03	220.500	2.97E-07	2.80E-07
2:35:00 PM	3:06:00 PM	0.200	6.904	41.883	1860	4.16	4.69	2.650	210.9	1.04	213.550	2.84E-07	2.67E-07
3:06:00 PM	3:47:00 PM	0.200	6.904	41.883	2460	5.00	3.84	-5.800	210.9	1.01	205.100	2.71E-07	2.55E-07
													2.67E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.67 E-07 CM/SEC

REMARKS: Testing Completed 10/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **24** P.I. **22**

BORING NO. **Boring 5L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **29.0%** INITIAL DRY DENSITY **94.4 P.C.F.**

FINAL WATER CONTENT **28.4%** FINAL DRY DENSITY **94.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:33:00 PM		0.200	7.696	40.869		0.08	9.97	49.450	210.9		260.350		
12:33:00 PM	2:12:00 PM	0.200	7.696	40.869	5940	4.13	5.77	8.200	210.9	1.04	219.100	5.47E-07	5.15E-07
2:12:00 PM	2:38:00 PM	0.200	7.696	40.869	1560	5.12	4.77	-1.750	210.9	1.01	209.150	5.61E-07	5.28E-07
2:38:00 PM	3:21:00 PM	0.200	7.696	40.869	2580	6.62	3.24	-16.900	210.9	1.02	194.000	5.49E-07	5.17E-07
													5.18E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.18 E-07 CM/SEC

REMARKS: Testing Completed 10/16/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **19** P.I. **15**

BORING NO. **Boring 6** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **17-19 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.5%** INITIAL DRY DENSITY **106.8 P.C.F.**

FINAL WATER CONTENT **20.7%** FINAL DRY DENSITY **106.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:10:00 AM		0.200	8.199	42.418		3.33	6.20	14.350	210.9		225.250		
7:10:00 AM	8:01:00 AM	0.200	8.199	42.418	3060	3.49	6.04	12.750	210.9	1.00	223.650	4.50E-08	4.24E-08
8:01:00 AM	9:31:00 AM	0.200	8.199	42.418	5400	3.76	5.76	10.000	210.9	1.04	220.900	4.43E-08	4.17E-08
9:31:00 AM	10:31:00 AM	0.200	8.199	42.418	3600	3.95	5.57	8.100	210.9	1.00	219.000	4.64E-08	4.37E-08
													4.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.25 E-08 CM/SEC

REMARKS: Testing Completed 10/23/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **41** PLASTIC LIMIT **23** P.I. **18**

BORING NO. **Boring 6L-ST1** SAMPLE NO. **ST1**

SAMPLE TYPE **ST** DEPTH **7½-9ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **27.5%** INITIAL DRY DENSITY **95.2 P.C.F.**

FINAL WATER CONTENT **26.0%** FINAL DRY DENSITY **96.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:42:00 AM		0.200	7.625	39.301		1.80	7.77	29.850	210.9		240.750		
10:42:00 AM	11:10:00 AM	0.200	7.625	39.301	1680	2.98	6.56	17.900	210.9	1.03	228.800	5.88E-07	5.54E-07
11:10:00 AM	11:59:00 AM	0.200	7.625	39.301	2940	4.88	4.61	-1.350	210.9	1.03	209.550	5.80E-07	5.46E-07
11:59:00 AM	12:16:00 PM	0.200	7.625	39.301	1020	5.49	3.98	-7.550	210.9	1.03	203.350	5.71E-07	5.38E-07
													5.47E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.47 E-07 CM/SEC

REMARKS: Testing Completed 10/20/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **63** PLASTIC LIMIT **20** P.I. **43**

BORING NO. **Boring 7** SAMPLE NO. **7**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.4%** INITIAL DRY DENSITY **95.5 P.C.F.**

FINAL WATER CONTENT **27.4%** FINAL DRY DENSITY **94.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:32:00 PM		0.200	7.478	40.869		0.20	9.40	46.000	210.9		256.900		
1:32:00 PM	3:08:00 PM	0.200	7.478	40.869	5760	0.35	9.25	44.500	210.9	1.00	255.400	1.86E-08	1.75E-08
3:08:00 PM	3:45:00 PM	0.200	7.478	40.869	2220	0.40	9.20	44.000	210.9	1.00	254.900	1.62E-08	1.52E-08
3:45:00 PM	4:16:00 PM	0.200	7.478	40.869	1860	0.45	9.15	43.500	210.9	1.00	254.400	1.93E-08	1.82E-08
													1.71E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.71 E-08 CM/SEC

REMARKS: Testing Completed 10/26/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **19** P.I. **7**

BORING NO. **Boring 8L** SAMPLE NO. **5**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.0%** INITIAL DRY DENSITY **101.1 P.C.F.**

FINAL WATER CONTENT **24.7%** FINAL DRY DENSITY **101.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:24:00 PM		0.200	7.620	41.302		4.90	5.01	0.550	70.3		70.850		
2:24:00 PM	3:27:00 PM	0.200	7.620	41.302	3780	8.66	1.24	-37.100	70.3	1.00	33.200	3.70E-06	3.49E-06
3:27:00 PM	3:48:00 PM	0.200	7.620	41.302	1260	9.36	0.54	-44.100	70.3	1.00	26.200	3.47E-06	3.27E-06
3:48:00 PM	4:08:00 PM	0.200	7.620	41.302	1200	9.90	0.00	-49.500	70.3	1.00	20.800	3.55E-06	3.34E-06
													3.41E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.41 E-06 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yelllow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 8U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.0%** INITIAL DRY DENSITY **102.4 P.C.F.**

FINAL WATER CONTENT **23.3%** FINAL DRY DENSITY **102.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:58:00 AM		0.200	7.280	41.398		5.13	4.40	-3.650	210.9		207.250		
10:58:00 AM	12:10:00 PM	0.200	7.280	41.398	4320	5.25	4.27	-4.900	210.9	1.08	206.000	2.46E-08	2.32E-08
12:10:00 PM	3:07:00 PM	0.200	7.280	41.398	10620	5.54	3.96	-7.900	210.9	1.07	203.000	2.43E-08	2.29E-08
3:07:00 PM	3:54:00 PM	0.200	7.280	41.398	2820	5.61	3.89	-8.600	210.9	1.00	202.300	2.15E-08	2.03E-08
													2.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.25 E-08 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **19** P.I. **26**

BORING NO. **Boring 8U** SAMPLE NO. **ST16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **100.9 P.C.F.**

FINAL WATER CONTENT **25.4%** FINAL DRY DENSITY **100.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:39:00 AM		0.200	7.732	41.398		1.13	7.78	33.250	210.9		244.150		
8:39:00 AM	9:05:00 AM	0.200	7.732	41.398	1560	1.15	7.76	33.050	210.9	1.00	243.950	9.81E-09	9.24E-09
9:05:00 AM	10:02:00 AM	0.200	7.732	41.398	3420	1.19	7.72	32.650	210.9	1.00	243.550	8.96E-09	8.44E-09
10:02:00 AM	12:04:00 PM	0.200	7.732	41.398	7320	1.29	7.62	31.650	210.9	1.00	242.550	1.05E-08	9.89E-09
													9.40E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.40 E-09 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **21** P.I. **25**

BORING NO. **Boring 9CCR** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.9%** INITIAL DRY DENSITY **102.9 P.C.F.**

FINAL WATER CONTENT **23.2%** FINAL DRY DENSITY **103.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:05:00 AM		0.200	7.336	41.350		2.15	7.14	24.950	210.9		235.850		
9:05:00 AM	10:59:00 AM	0.200	7.336	41.350	6840	2.24	7.05	24.050	210.9	1.00	234.950	9.92E-09	9.34E-09
10:59:00 AM	12:10:00 PM	0.200	7.336	41.350	4260	2.30	6.99	23.450	210.9	1.00	234.350	1.06E-08	1.00E-08
12:10:00 PM	3:06:00 PM	0.200	7.336	41.350	10560	2.44	6.85	22.050	210.9	1.00	232.950	1.01E-08	9.48E-09
													9.55E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.55 E-09 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **17** P.I. **9**

BORING NO. **Boring 9L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **7½-9 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.3%** INITIAL DRY DENSITY **101.3 P.C.F.**

FINAL WATER CONTENT **20.1%** FINAL DRY DENSITY **106.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:24:00 PM		0.200	7.112	40.391		4.13	5.83	8.500	70.3		78.800		
5:24:00 PM	6:08:00 PM	0.200	7.112	40.391	2640	6.89	3.06	-19.150	70.3	1.00	51.150	2.88E-06	2.72E-06
6:08:00 PM	6:26:00 PM	0.200	7.112	40.391	1080	7.63	2.30	-26.650	70.3	1.03	43.650	2.59E-06	2.44E-06
6:26:00 PM	6:40:00 PM	0.200	7.112	40.391	840	8.09	1.85	-31.200	70.3	0.98	39.100	2.31E-06	2.17E-06
													2.55E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.55 E-06 CM/SEC

REMARKS: Testing Completed 11/9/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **22** P.I. **24**

BORING NO. **Boring 9U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **102.5 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.7 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:13:00 PM		0.200	7.681	42.077		0.88	8.68	39.000	210.9		249.900		
3:13:00 PM	3:58:00 PM	0.200	7.681	42.077	2700	0.99	8.57	37.900	210.9	1.00	248.800	2.98E-08	2.81E-08
3:58:00 PM	4:25:00 PM	0.200	7.681	42.077	1620	1.06	8.50	37.200	210.9	1.00	248.100	3.17E-08	2.99E-08
4:25:00 PM	4:58:00 PM	0.200	7.681	42.077	1980	1.12	8.44	36.600	210.9	1.00	247.500	2.23E-08	2.10E-08
													2.63E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.63 E-08 CM/SEC

REMARKS: Testing Completed 11/22/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **36** PLASTIC LIMIT **20** P.I. **16**

BORING NO. **Boring 11U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.1%** INITIAL DRY DENSITY **104.4 P.C.F.**

FINAL WATER CONTENT **22.3%** FINAL DRY DENSITY **105.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:46:00 AM		0.200	7.244	41.834		2.04	7.38	26.700	210.9		237.600		
7:46:00 AM	8:57:00 AM	0.200	7.244	41.834	4260	2.12	7.30	25.900	210.9	1.00	236.800	1.37E-08	1.29E-08
8:57:00 AM	9:30:00 AM	0.200	7.244	41.834	1980	2.16	7.26	25.500	210.9	1.00	236.400	1.48E-08	1.39E-08
9:30:00 AM	10:41:00 AM	0.200	7.244	41.834	4260	2.25	7.17	24.600	210.9	1.00	235.500	1.55E-08	1.46E-08
													1.38E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.38 E-08 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 11U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.2%** INITIAL DRY DENSITY **97.4 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:17:00 PM		0.200	7.498	42.028		0.50	9.38	44.400	210.9		255.300		
12:17:00 PM	12:30:00 PM	0.200	7.498	42.028	780	0.84	9.02	40.900	210.9	1.06	251.800	3.16E-07	2.97E-07
12:30:00 PM	12:40:00 PM	0.200	7.498	42.028	600	1.10	8.77	38.350	210.9	0.96	249.250	3.03E-07	2.85E-07
12:40:00 PM	1:03:00 PM	0.200	7.498	42.028	1380	1.73	8.12	31.950	210.9	1.03	242.850	3.36E-07	3.17E-07
													3.04E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.04 E-07 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yelllow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **19** P.I. **11**

BORING NO. **Boring 12L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **14½-16 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **104.3 P.C.F.**

FINAL WATER CONTENT **22.0%** FINAL DRY DENSITY **105.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:25:00 PM		0.200	7.203	41.447		5.54	3.60	-9.700	70.3		60.600		
5:25:00 PM	5:40:00 PM	0.200	7.203	41.447	900	5.83	3.30	-12.650	70.3	1.03	57.650	9.64E-07	9.08E-07
5:40:00 PM	5:52:00 PM	0.200	7.203	41.447	720	6.09	3.02	-15.350	70.3	1.08	54.950	1.16E-06	1.09E-06
5:52:00 PM	5:58:00 PM	0.200	7.203	41.447	360	6.20	2.92	-16.400	70.3	0.91	53.900	9.31E-07	8.77E-07
													9.69E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.69 E-07 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **22** P.I. **23**

BORING NO. **Boring 12U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.7%** INITIAL DRY DENSITY **107.5 P.C.F.**

FINAL WATER CONTENT **21.6%** FINAL DRY DENSITY **106.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:14:00 AM		0.200	7.457	41.785		1.48	7.91	32.150	210.9		243.050		
8:14:00 AM	9:34:00 AM	0.200	7.457	41.785	4800	1.50	7.89	31.950	210.9	1.00	242.850	3.06E-09	2.88E-09
9:34:00 AM	11:39:00 AM	0.200	7.457	41.785	7500	1.54	7.85	31.550	210.9	1.00	242.450	3.92E-09	3.70E-09
11:39:00 AM	1:09:00 PM	0.200	7.457	41.785	5400	1.56	7.83	31.350	210.9	1.00	242.250	2.73E-09	2.57E-09
													3.13E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.13 E-09 CM/SEC

REMARKS: Testing Completed 11/24/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **42** PLASTIC LIMIT **22** P.I. **20**

BORING NO. **Boring 12U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **100.1 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:31:00 AM		0.200	7.366	42.126		1.62	8.07	32.250	210.9		243.150		
6:31:00 AM	8:42:00 AM	0.200	7.366	42.126	7860	1.74	7.96	31.100	210.9	0.92	242.000	1.05E-08	9.93E-09
8:42:00 AM	10:53:00 AM	0.200	7.366	42.126	7860	1.86	7.84	29.900	210.9	1.00	240.800	1.11E-08	1.04E-08
10:53:00 AM	4:03:00 PM	0.200	7.366	42.126	18600	2.13	7.55	27.100	210.9	1.07	238.000	1.10E-08	1.04E-08
													1.03E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.03 E-08 CM/SEC

REMARKS: Testing Completed 11/25/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **20** P.I. **14**

BORING NO. **Boring 13BN** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.0%** INITIAL DRY DENSITY **109.7 P.C.F.**

FINAL WATER CONTENT **18.8%** FINAL DRY DENSITY **110.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:06:00 AM		0.200	7.219	41.785		5.27	4.64	-3.150	210.9		207.750		
9:06:00 AM	10:18:00 AM	0.200	7.219	41.785	4320	5.32	4.59	-3.650	210.9	1.00	207.250	9.64E-09	9.08E-09
10:18:00 AM	12:22:00 PM	0.200	7.219	41.785	7440	5.40	4.51	-4.450	210.9	1.00	206.450	8.98E-09	8.46E-09
12:22:00 PM	1:18:00 PM	0.200	7.219	41.785	3360	5.44	4.47	-4.850	210.9	1.00	206.050	9.97E-09	9.39E-09
													8.84E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.84 E-09 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **52** PLASTIC LIMIT **25** P.I. **27**

BORING NO. **Boring 13BS** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.1%** INITIAL DRY DENSITY **109.6 P.C.F.**

FINAL WATER CONTENT **18.2%** FINAL DRY DENSITY **110.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:54:00 PM		0.200	5.476	41.013		1.24	8.79	37.750	210.9		248.650		
12:54:00 PM	2:26:00 PM	0.200	5.476	41.013	5520	1.51	8.52	35.050	210.9	1.00	245.950	2.64E-08	2.49E-08
2:26:00 PM	4:58:00 PM	0.200	5.476	41.013	9120	1.90	8.12	31.100	210.9	1.03	242.000	2.37E-08	2.23E-08
4:58:00 PM	6:40:00 PM	0.200	5.476	41.013	6120	2.18	7.86	28.400	210.9	0.93	239.300	2.45E-08	2.31E-08
													2.32E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.32 E-08 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127471.67
Easting: 2456542.99

Weather: Sunny 72 F

Boring Information:
Boring No: L1
Well No: L1
Surf Elev.: 568.96

Depth Information:
Total: 38.0'
Auger: 38.0'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	569.0
0							Light gray SLUDGE (fill)	
	1							
								565.0
5	2		0.8/2	3 3 3 4				
	3							
								560.0
10	4		1.4/2	WOH				
	5							
								555.0
15				1				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.4/2	1 2 1 3			Light gray SLUDGE (fill)	
	7							550.0
20	8		1.5/2	4 4 3 5			20.0' Water sample collected	
	9							545.0
25	10		1.6/2	2 3 4 5				
	11							540.0
30				WH				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		1.1/2	WH 1 1 2				
	13							535.0
35	14		1.5/1.5	5 6 8	0.75		Olive green silty CLAY; dark brown mottling; saturated	
	15		2.0/2					
							End of Boring = 38 Feet	530.0
40								
								525.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128216.45
Easting: 2456765.72

Weather: Sunny 72 F

Boring Information:
Boring No: L3
Well No: L3
Surf Elev.: 563.02

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	563.0
0							Dark gray ASH (fill)	
	1							
								560.0
5	2		0.22	WH WH 1 1				
	3							555.0
							9.5' Free water	
10	4		2.0/2	WH				
	5							550.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WH				
	7							545.0
20	8		1.6/2	1 1 1 1			20.0' Water sample collected; saturated	
	9							540.0
25	10		1.6/2	1 1 1 1				
	11							535.0
30	12		0.8/1	WH				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12			WH				
	13							
	14		1.5/1.5	WH 3 4 6			Brown silty CLAY; greenish gray mottling	530.0
35	15		1.8/2		0.75			
							End of Boring = 36.5 Feet	525.0
40								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127968.18
Easting: 2457141.08

Weather: Sunny 72 F

Boring Information:
Boring No: L4
Well No: L4
Surf Elev.: 568.58

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	568.6
0							Gray ASH (fill)	
	1							565.0
5	2							
	3							560.0
10	4							
	5							555.0
15								

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: L4 Boring No: L4 Well No: L4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.4/2	1 1 4 6	1.0		Gray ASH (fill) Brown silty CLAY; gray mottling; moist	
	7		1.5/2					550.0
20	8		1.5/2	6 8 10 12	4.75			
							End of Boring = 21 Feet	545.0
25								
								540.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128308.56
Easting: 2456118.23

Weather: Cloudy 61 F

Boring Information:
Boring No: L5
Well No: L5
Surf Elev.: 565.19

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

Dates:
Start: 05/03/2024
Finish: 05/03/2024

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	565.2
0	1						Gray silty CLAY (fill)	
5	2		1.5/2				Light gray LIME SLUDGE (fill)	560.0
	3							
10	4		2.0/2				Dark gray to black COAL ASH (fill)	555.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2				16.0' Free water	
	7							
20	8		2.0/2					545.0
	9							
25	10		2.0/2					540.0
	11		3.0/3					
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		3.0/3					
	13		2.0/2				Light gray LIME SLUDGE (fill); Sample CA 32.5-35.2'	
35	14		3.0/3		1.0		Brown silty CLAY; greenish gray mottling	530.0
	15		2.0/2					
40							End of Boring = 39.5 Feet	525.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129934.00
Easting: 2455460.00

Weather: Cloudy 59F

Boring Information:
Boring No: D1
Well No: D1
Surf Elev.: 564.0

Depth Information:
Total: 40.5'
Auger: 40.5'
Core: -

Dates:
Start: 04/29/2024
Finish: 04/29/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.0
0							Dark gray ASH (fill)	
	1							
								560.0
5	2		2.0/2	WH				
	3							
								555.0
10	4		1.5/2	3 21 23 24				
	5							
								550.0
15				W				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.3/2	W 1 3 W			Dark gray ASH (fill) Saturated	
	7							545.0
20	8		2.0/2	WOH				
	9							540.0
25	10		2.0/2	2 3 1 1			Groundwater sample at 25.0'	
	11							535.0
30				W				

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2	W W 1 1				
	13							530.0
35	14		2.0/2	W W 1 1				
	15		2.0/2	W W 3 4				
	16		1.9/2		1.0		Dark gray clayey SILT	525.0
40							End of Boring = 40.5 Feet	
								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130169.00
Easting: 2456076.00

Weather: Cloudy 59F

Boring Information:
Boring No: D2
Well No: D2
Surf Elev.: 558.0

Depth Information:
Total: 37.5'
Auger: 37.5'
Core: -

Dates:
Start: 04/29/2024
Finish: 04/29/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	558.0
0	1						Dark gray ASH (fill)	
5	2		0.0/2	WOH				555.0
	3							550.0
10	4		2.0/2	WOH				
	5							545.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Dark gray ASH (fill)	
	7							540.0
20	8		2.0/2	W W 1 1			Groundwater sample at 20.0'	
	9							535.0
25	10		2.0/2	WOH				
	11							530.0
30								

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		0.0/2	WOH				
	13		0.0/2	WOH				525.0
	14		2.0/2	W W W 6				
35							Gray clayey SILT; brown mottling; saturated	
	15		1.5/2					
							End of Boring = 37.5 Feet	520.0
40								
								515.0
45								

Notes:

Andrews Engineering, Inc.
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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129640.00
Easting: 2455918.00

Weather: Sunny 66F

Boring Information:
Boring No: D3
Well No: D3
Surf Elev.: 554.9

Depth Information:
Total: 31.5'
Auger: 31.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.9
0							Dark gray ASH (fill); wet	
	1							
5	2		2.0/2	2 2 2 3				550.0
	3							
10	4		2.0/2	WH				545.0
	5						Free water at 12.0'	
15								540.0

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		0.2/2	WH 1				
	7							
20	8		0.1/2	WH			Groundwater sample at 20.0'	535.0
	9							
25	10		0.3/2	WH				530.0
	11		2.0/2					
30					0.75		Brown silty CLAY; greenish gray mottling; Jar Sample SS6A	525.0

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					
							End of Boring = 31.5 Feet	
35								520.0
40								515.0
45								510.0

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129248.00
Easting: 2455777.00

Weather: Sunny 66F

Boring Information:
Boring No: D4
Well No: D4
Surf Elev.: 561.00

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	561.0
0							Dark gray ASH (fill); dry	
	1							560.0
5	2		1.2/2	W 1 2 3				555.0
	3							
10	4		0.5/2	WOH			Moist	550.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Wet	
								545.0
	7							
							Free water at 19.5'; Groundwater sample at 20.0'	
20	8		2.0/2	WOH				
								540.0
	9							
							Saturated	
25	10		2.0/2	WOH				
								535.0
	11							
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					530.0
	13		3.0/3	WH 2 3 2 1 1	0.75		Brown silty CLAY; greenish gray mottling	
35	14		2.0/2					525.0
							End of Boring = 36.5 Feet	
40								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130314.00
Easting: 2455461.00

Weather: Sunny 54F

Boring Information:
Boring No: B100
Well No: B100
Surf Elev.: 533.00

Depth Information:
Total: 106.00'
Auger: 106.00'
Core: -

Dates:
Start: 04/22/2024
Finish: 04/22/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.0
0					2.0		Dark brown silty CLAY (topsoil); organics Brownish green silty CLAY; mottling; moist	
	1		5.0/5					530.0
5								
	2		5.0/5		2.0		Saturated Silt seam	525.0
10							Trace organics	
	3		5.0/5				Sample CS3A	520.0
							Gray silty CLAY; saturated Sample CS3B	
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	4		4.2/5		0.5			515.0
20	5		4.6/5		1.0			510.0
25	6		5.0/5		1.5			505.0
							Gray silty SAND; very fine grained	
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray silty SAND; fine grained; saturated	
	7		5.0/5				Gray SHALE; weathered; trace black organics; fracture 35.1, 35.6, 35.7, 36.0, 36.1, 36.2, 36.6, 36.65, 36.85, 36.9, 37.15, 37.2, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.3, 38.9, 39.1, 39.65, 40.4, 40.75, 40.9, 41.3, 41.4, 41.5, 41.6, 41.7, 41.75, 41.8, 41.85, 41.95, 42.1, 42.2, 42.4, 42.5, 42.6, 42.7, 43.0, 43.2, 43.4, 44.7, 45.9, 45.1, 46.8, 47.2, 47.4, 47.9	500.0
35	8		1.0/1					
	9		5.0/5					495.0
40	10		5.0/5					490.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray CLAYSTONE; less fissle; fractured 48.0, 48.35, 49.5, 49.6	485.0
	11		5.0/5					
50								
								480.0
	12		5.0/5					
55								
								475.0
	13		5.0/5					
60								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Dark gray SHALE; fractured 61.4, 61.7, 61.8, 61.95, 62.0, 62.15, 62.2, 62.3, 62.35, 62.4 62.5, 62.7, 62.85, 63.6, 64.1, 64.2, 64.25, 64.3, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.15, 65.2, 65.3, 65.6, 65.8, 66.8, 67.1, 67.65, 67.9, 68.6, 68.7, 69.6, 69.85, 70.0, 70.1	470.0
	14		5.0/5					
65								
	15		5.0/5					465.0
70							Dark gray CLAYSTONE; trace mica; fractured 70.5	
							Fractured 72.3, 72.7, 74.3, 75.2, 76.2, 76.9	460.0
	16		5.0/5					
75								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Light gray SANDSTON bedding with CLAYSTONE; fine grained	
							Dark gray CLAYSTONE; fractured 77.8, 79-79.2	455.0
	17		5.0/5					
80								
								450.0
	18		5.0/5					
							Dark gray SHALE and CLAYSTONE	
85								
								445.0
	19		5.0/5					
90								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
								440.0
	20		5.0/5					
95								
							Sandstone lens	435.0
	21		5.0/5					
100								
							Light gray LIMESTONE; fossils (shells)	
							Dark gray limey SHALE; fossils (shells)	
								430.0
	22		5.0/5					
105								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

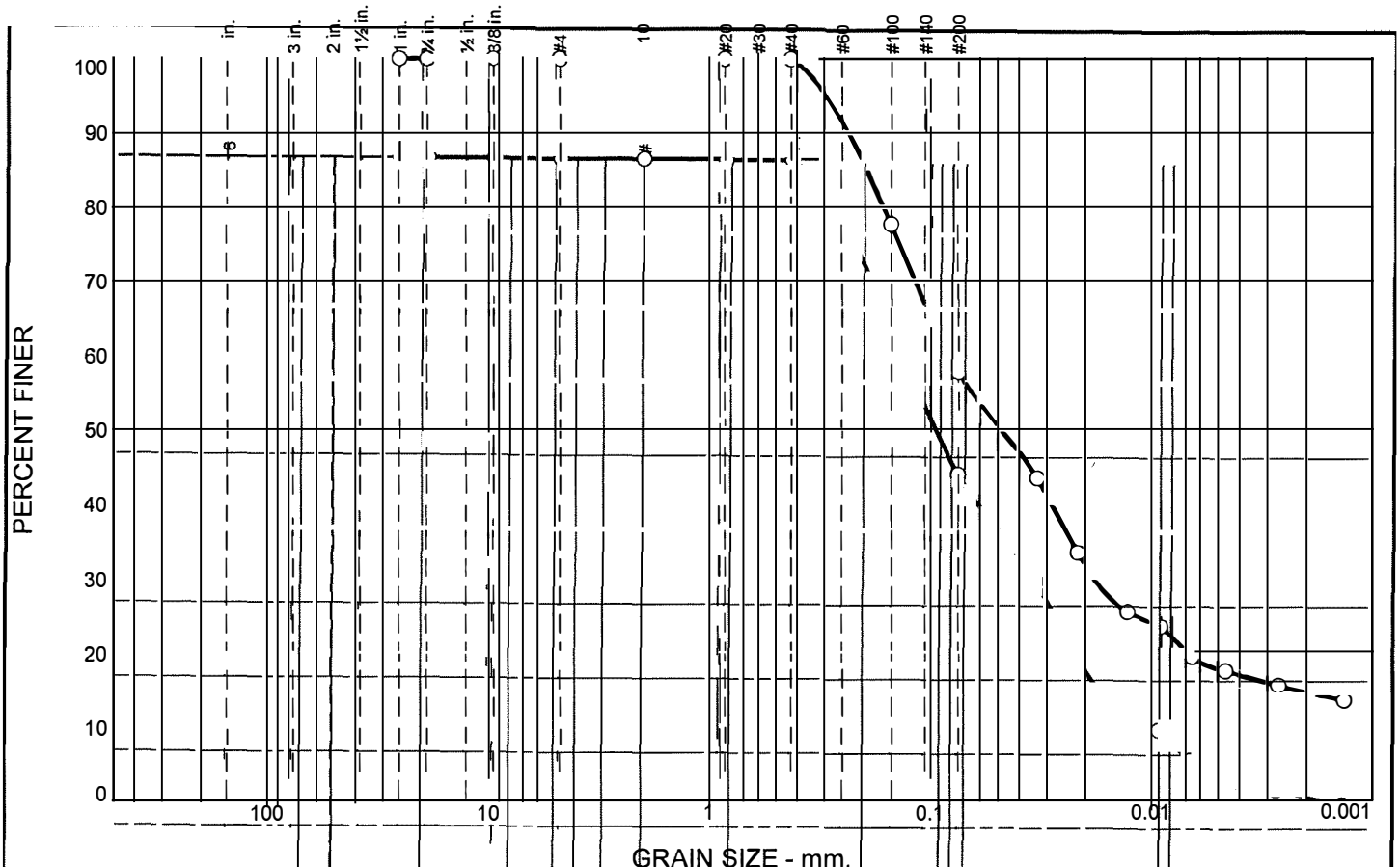
Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray LIMESTONE	
							End of Boring = 106 Feet	
								425.0
110								
								420.0
115								
								415.0
120								

Notes:

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	42.1	40.1	17.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.8		
#100	77.6		
#200	57.7		

* (no specification provided)

Material Description

SANDY SILTY CLAY
Brown, low plasticity

Atterberg Limits

PL= 19 LL= 26 PI= 7

Coefficients

D_{85}= 0.1931 D_{60}= 0.0826 D_{50}= 0.0487
D_{30}= 0.0183 D_{15}= 0.0024 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML ODOT=

Remarks

Location: L1-36.0' TO 38.0'
Sample Number: 418834-06

Date: 5/24/24

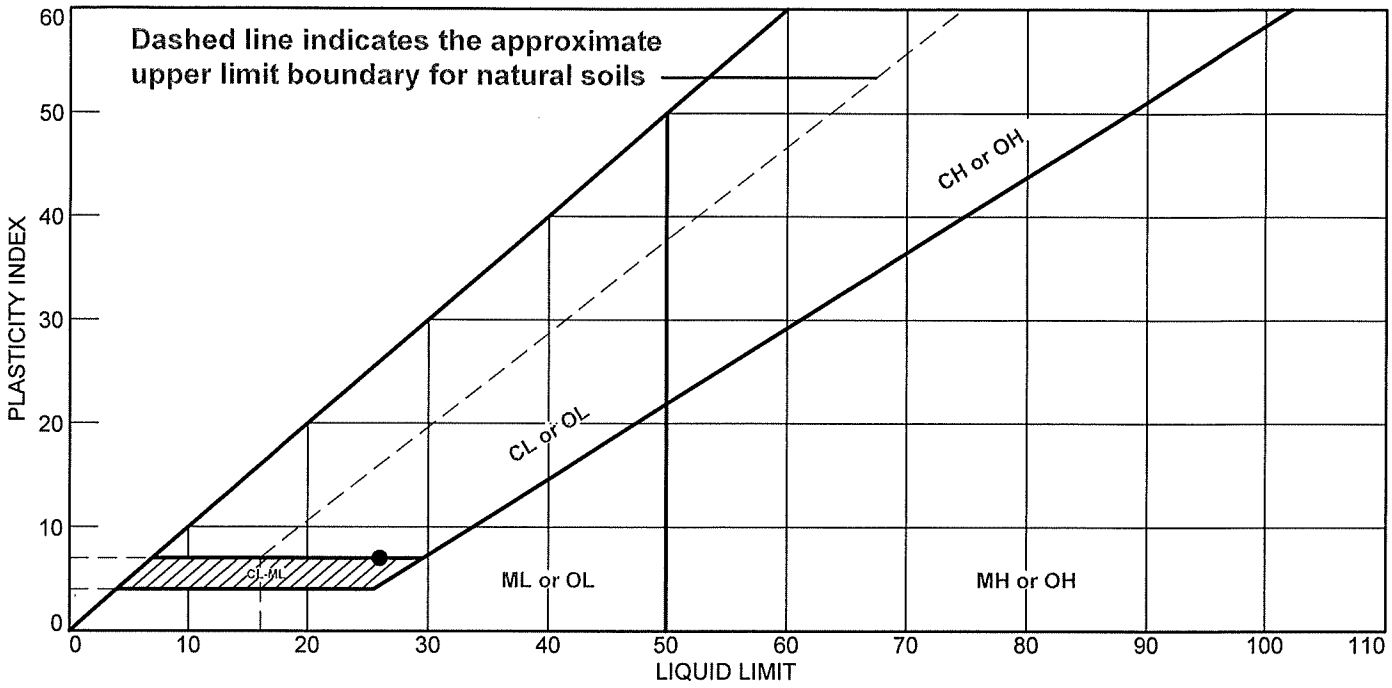
SKS ENGINEERS, LLC

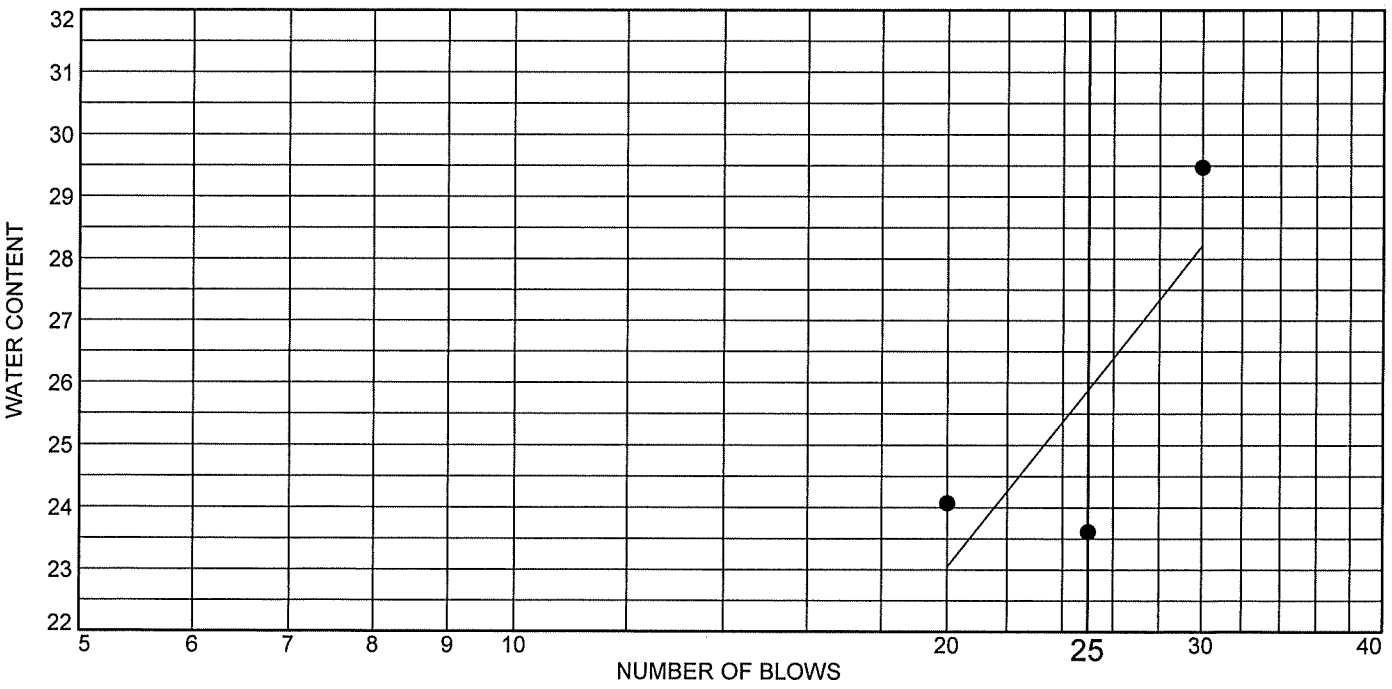
Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SANDY SILTY CLAY Brown, low plasticity	26	19	7	99.8	57.7	CL-ML

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L1-36.0' TO 38.0'

Sample Number: 418834-06

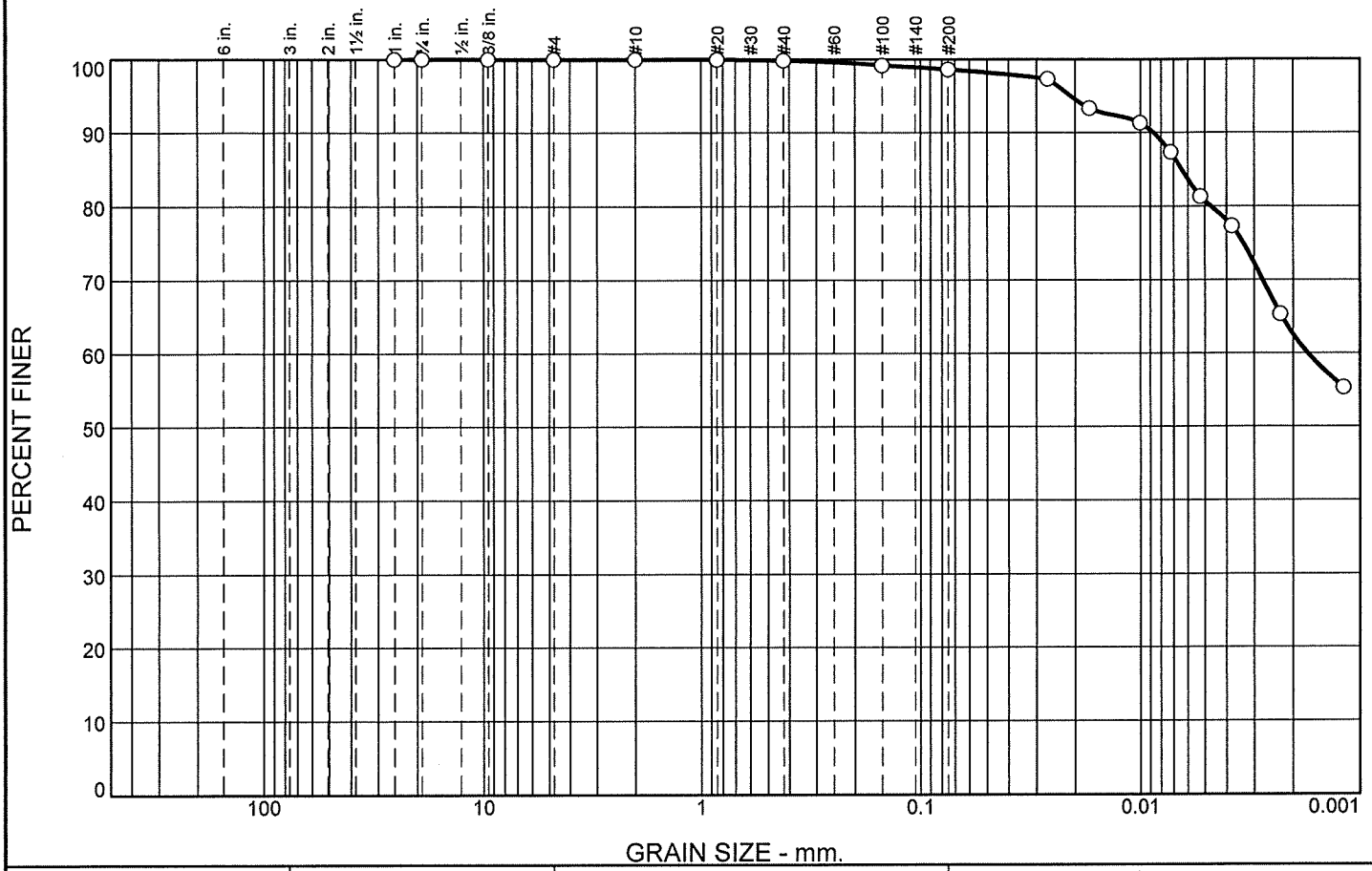
Remarks:

SIKS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	1.2	17.9	80.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.8		
#100	99.2		
#200	98.6		

* (no specification provided)

Material Description

LEAN CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 27 LL= 62 PI= 35

Coefficients

D_{85}= 0.0064 D_{60}= 0.0017 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH ODOT= A-7-6(20)

Remarks

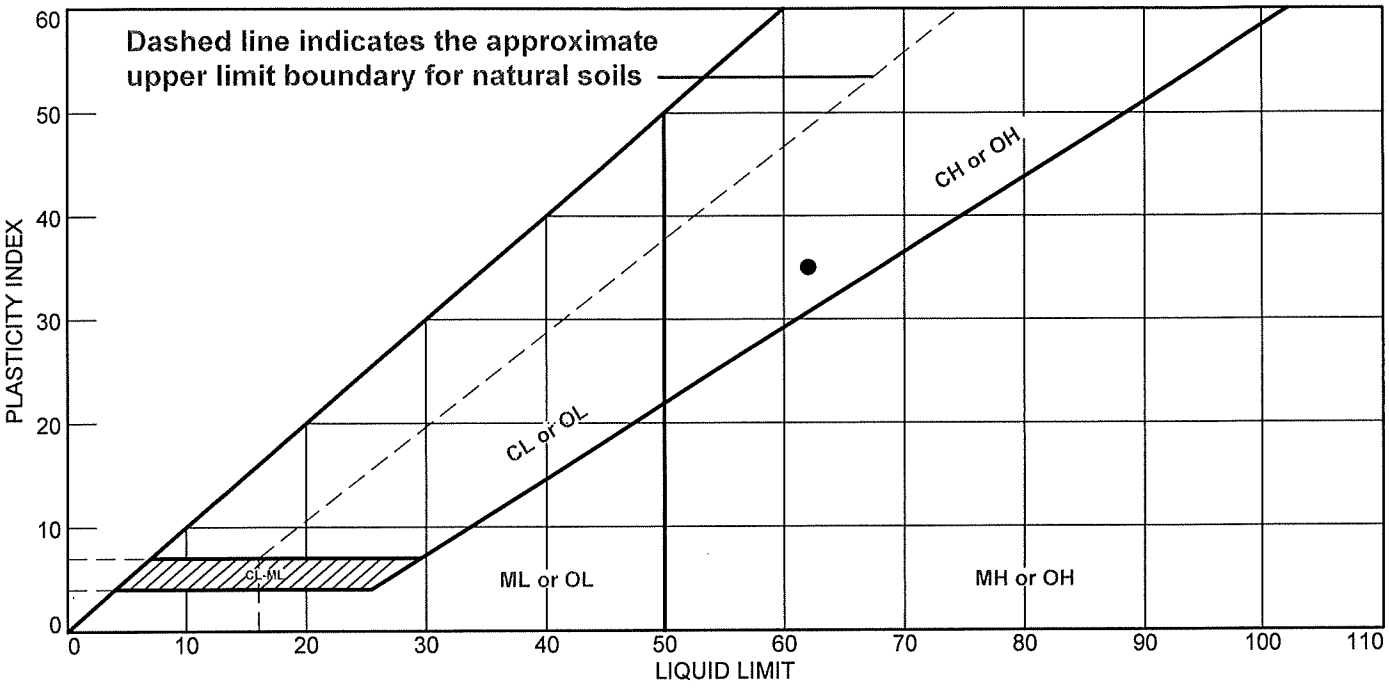
Location: L3-32.5' TO34.5'
Sample Number: 418834-07

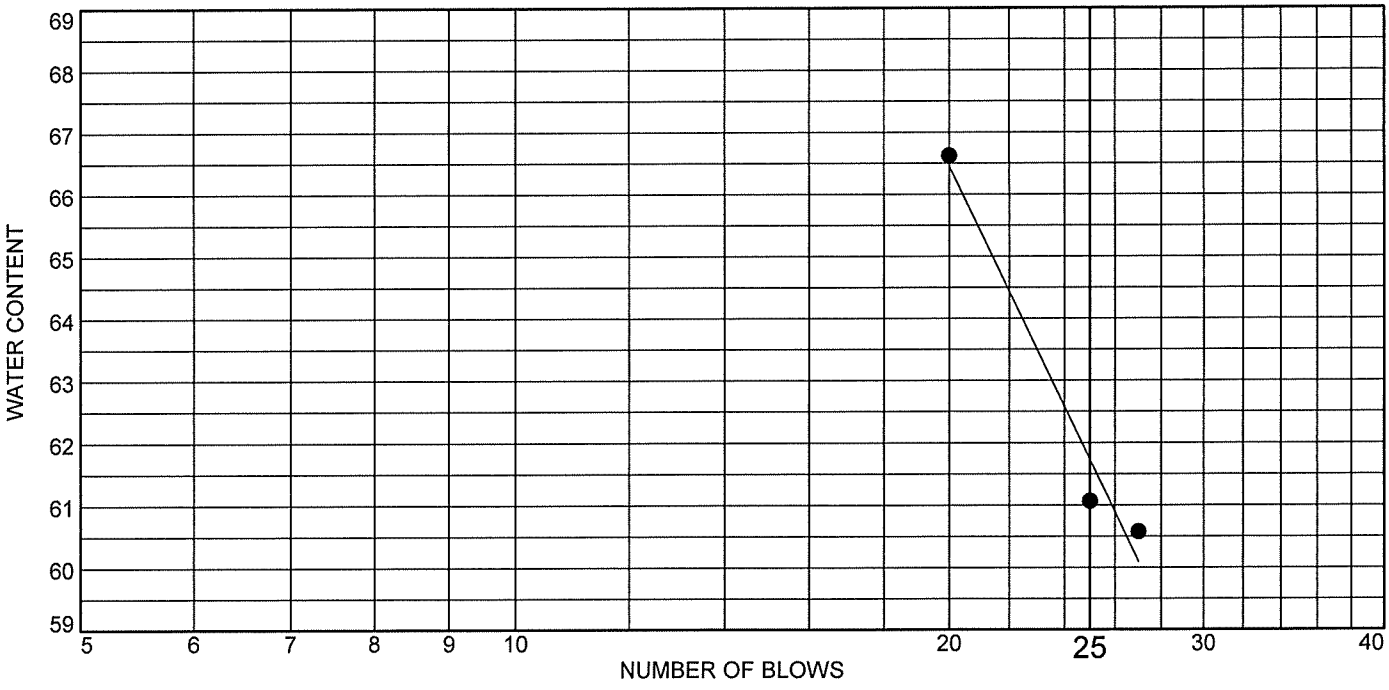
Date: 5/25/24

SIS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	LEAN CLAY Brown-Mottled-Gray, low plasticity, trace sand	62	27	35	99.8	98.6	CH

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L3-32.5' TO34.5'

Sample Number: 418834-07

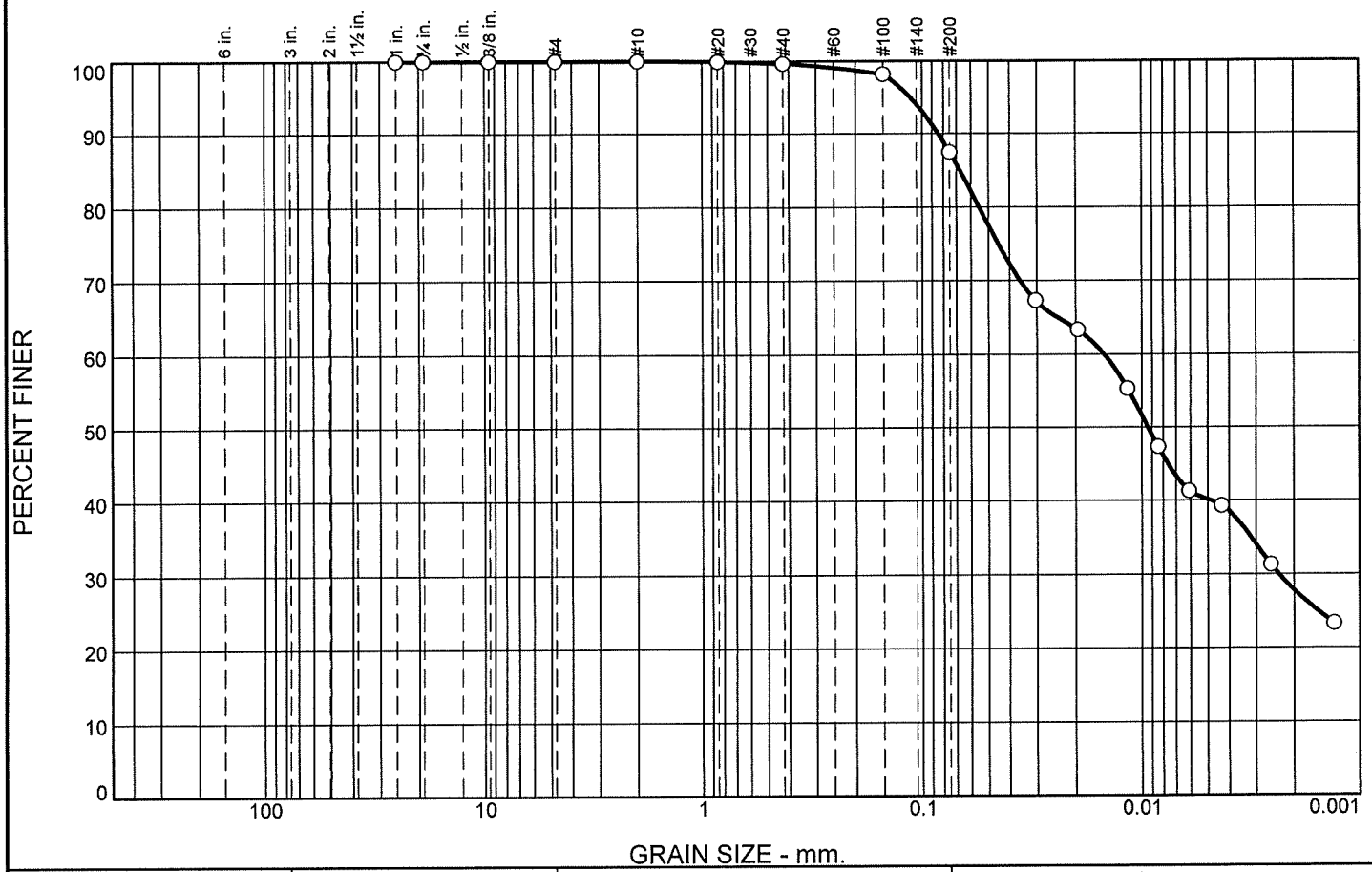
Remarks:

SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	12.2	47.4	40.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.7		
#100	98.2		
#200	87.5		

* (no specification provided)

Material Description

ORGANIC SILTY CLAY
Black, high plasticity, trace sand

Atterberg Limits

PL= 58 LL= 85 PI= 27

Coefficients

D_{85}= 0.0674 D_{60}= 0.0149 D_{50}= 0.0094
D_{30}= 0.0024 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH ODOT= A-7-5(19)

Remarks

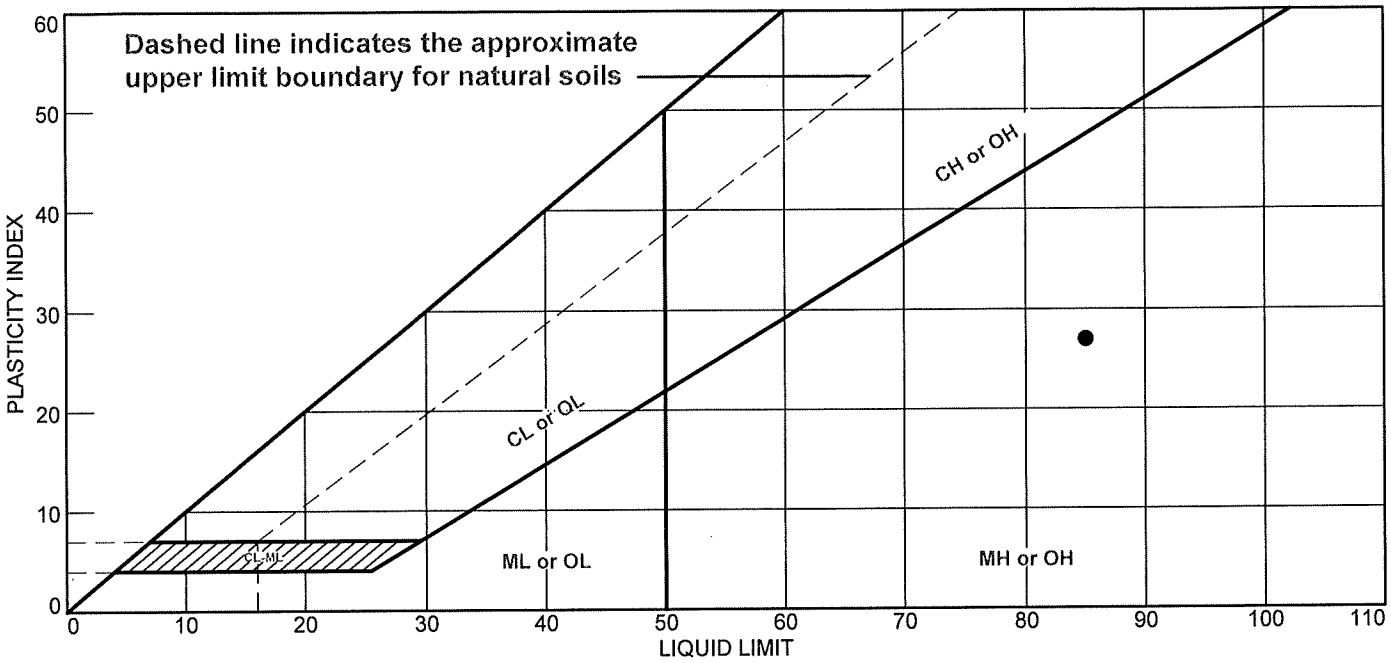
Location: L4-17.0' TO 19.0'
Sample Number: 418834-03

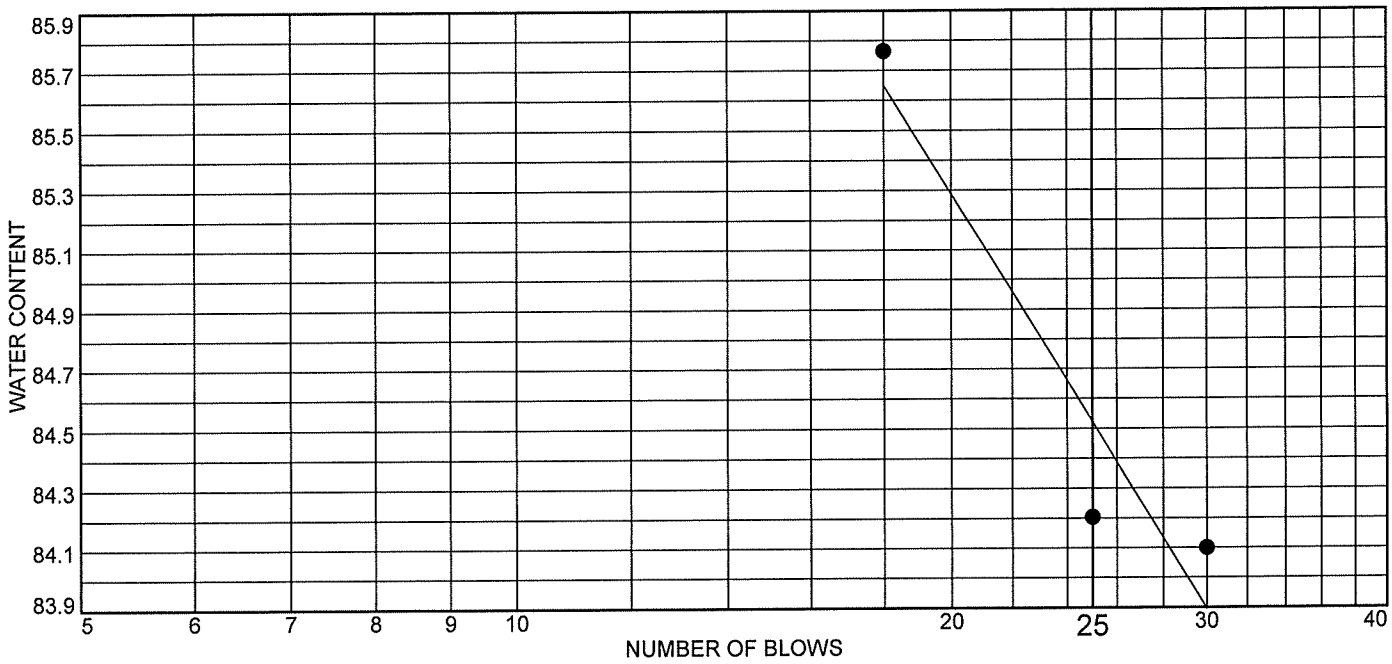
Date: 5/22/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	ORGANIC SILTY CLAY Black, high plasticity, trace sand	85	58	27	99.7	87.5	MH

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L4-17.0' TO 19.0'

Sample Number: 418834-03

Remarks:

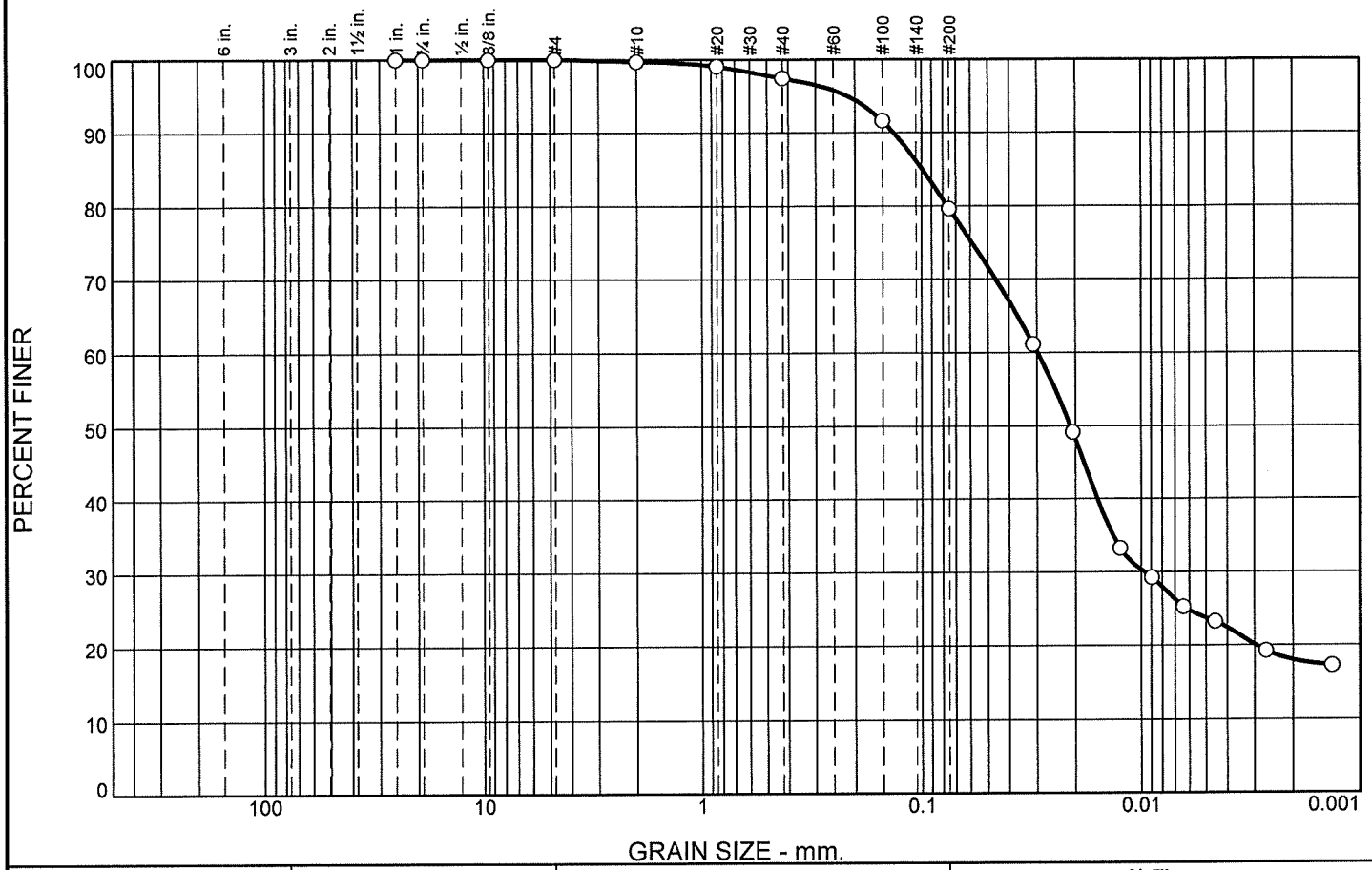
SKS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Tested By: 5/31/24

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	2.3	17.8	55.9	23.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.7		
#20	99.0		
#40	97.4		
#100	91.6		
#200	79.6		

* (no specification provided)

Material Description

SILTY CLAY
Mottle Brown, low plasticity, trace sand

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{85}= 0.0993 D_{60}= 0.0297 D_{50}= 0.0210
D_{30}= 0.0097 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-4b(8)

Remarks

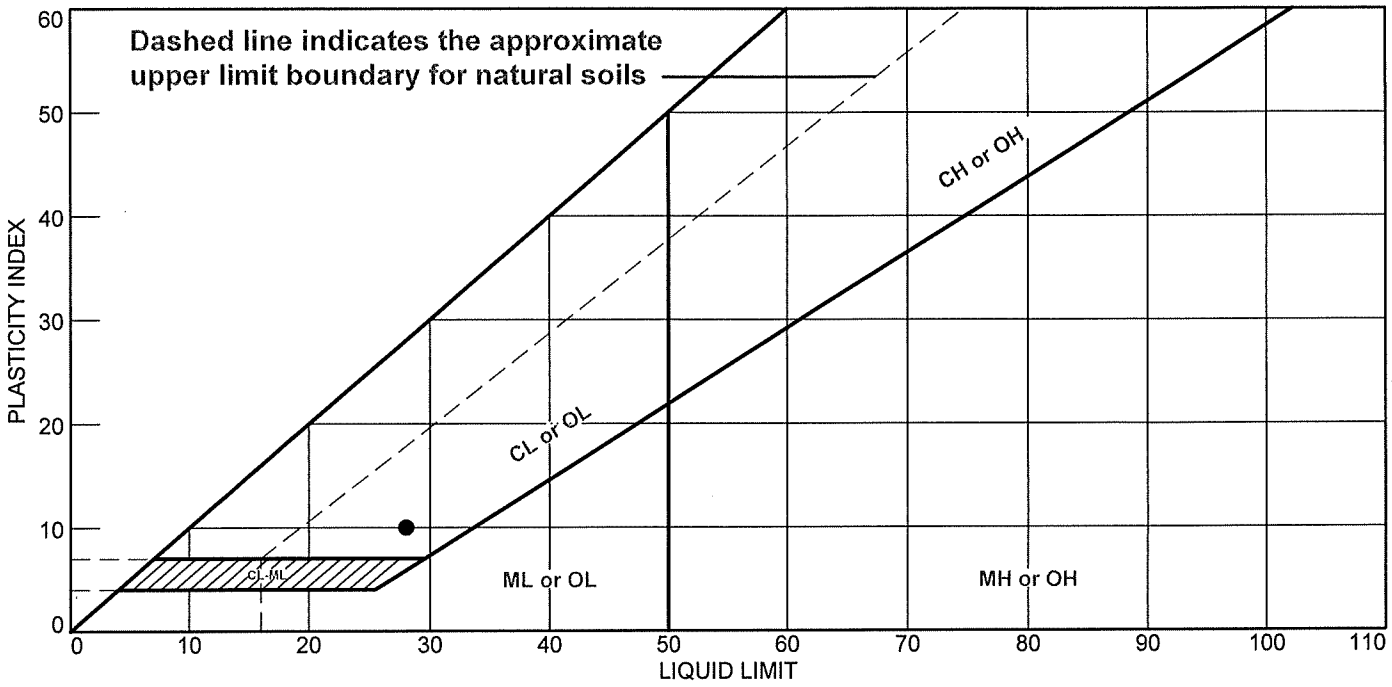
Location: L5-37.5' TO 39.5'
Sample Number: 418834-08

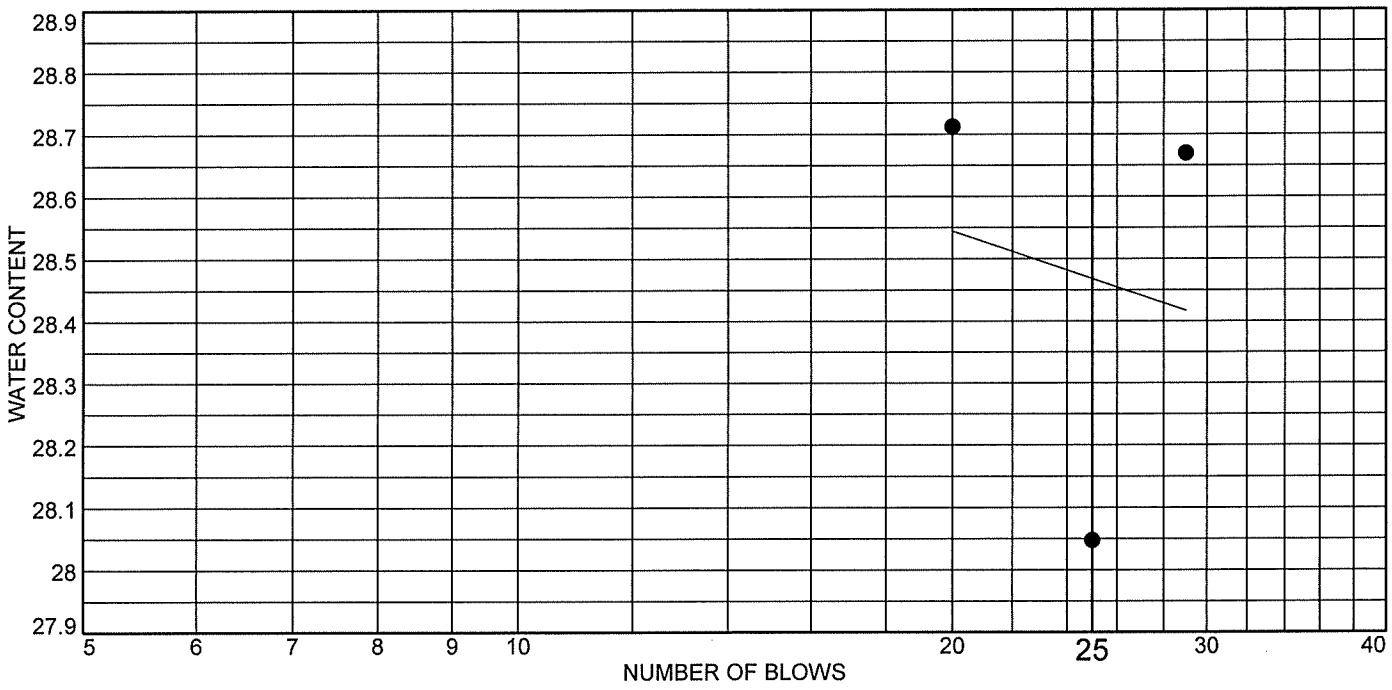
Date: 6/1/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Mottle Brown, low plasticity, trace sand	28	18	10	97.4	79.6	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L5-37.5' TO 39.5'

Sample Number: 418834-08

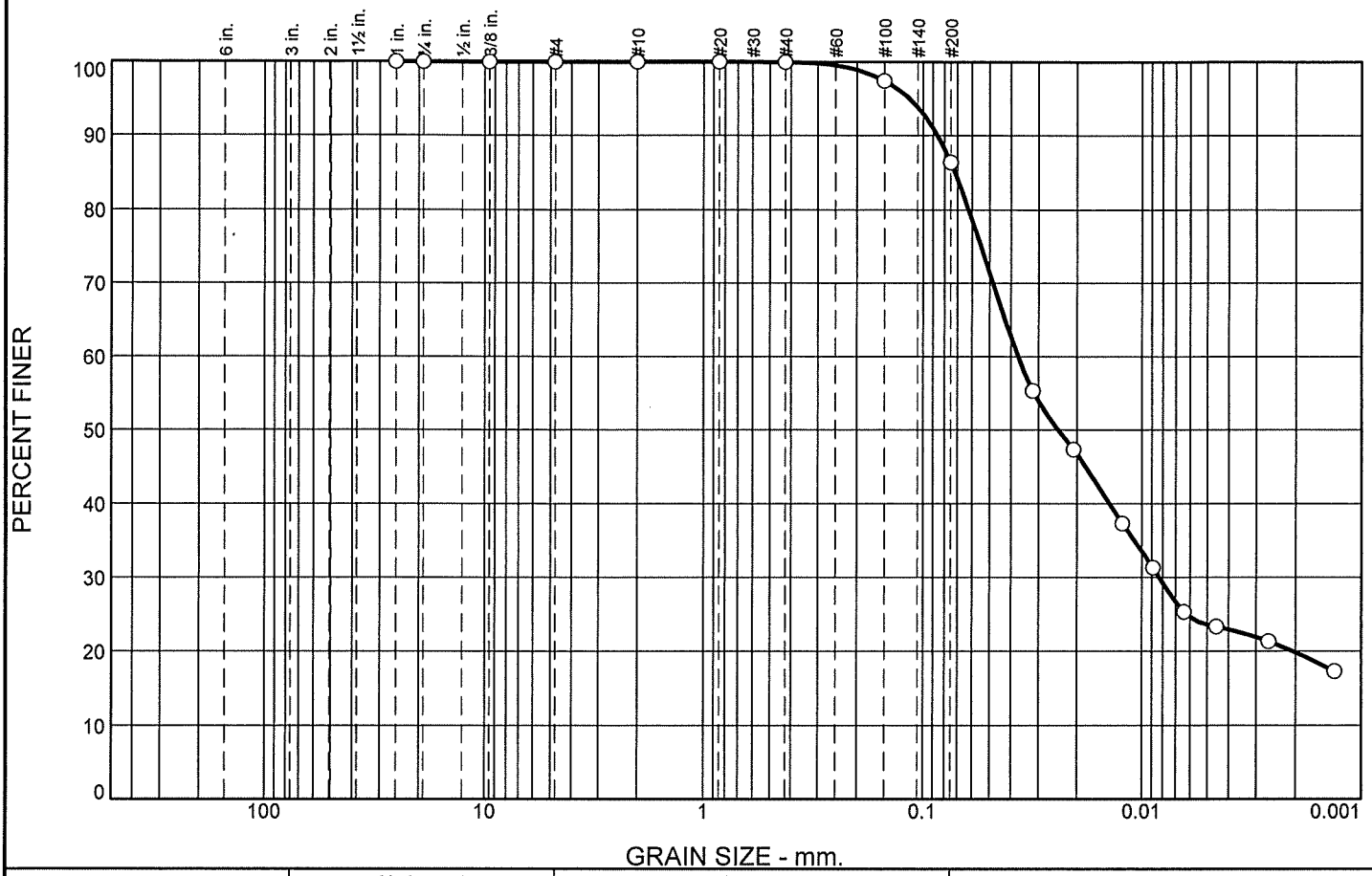
Remarks:

SLS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	13.5	62.8	23.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#100	97.4		
#200	86.4		

* (no specification provided)

Material Description

SILTY CLAY
Mottled Brown, low plasticity, trace sand

Atterberg Limits

PL= 20 LL= 31 PI= 11

Coefficients

D_{85}= 0.0717 D_{60}= 0.0371 D_{50}= 0.0244
D_{30}= 0.0083 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-6a(8)

Remarks

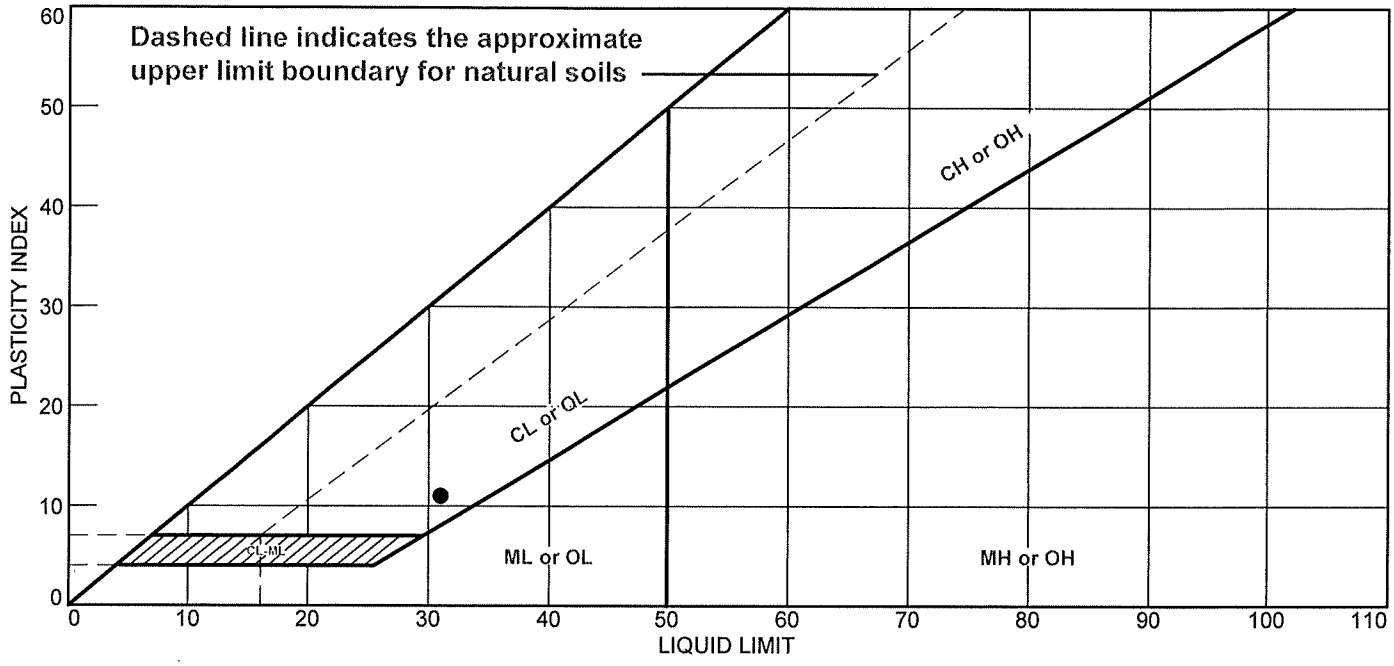
Location: D1-38.5'-40.5'
Sample Number: 418834-01

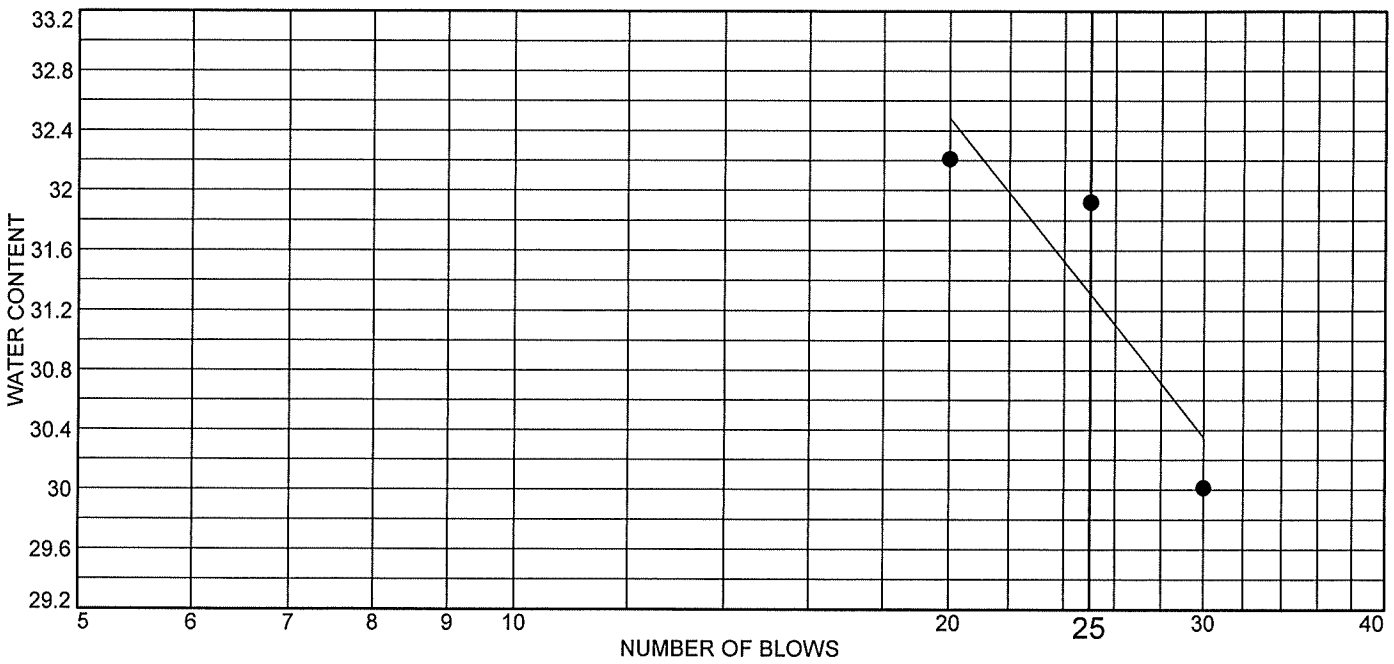
Date: 5/21/24

SIS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Mottled Brown, low plasticity, trace sand	31	20	11			

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D1-38.5-40.5

Sample Number: 418834-1

Remarks:

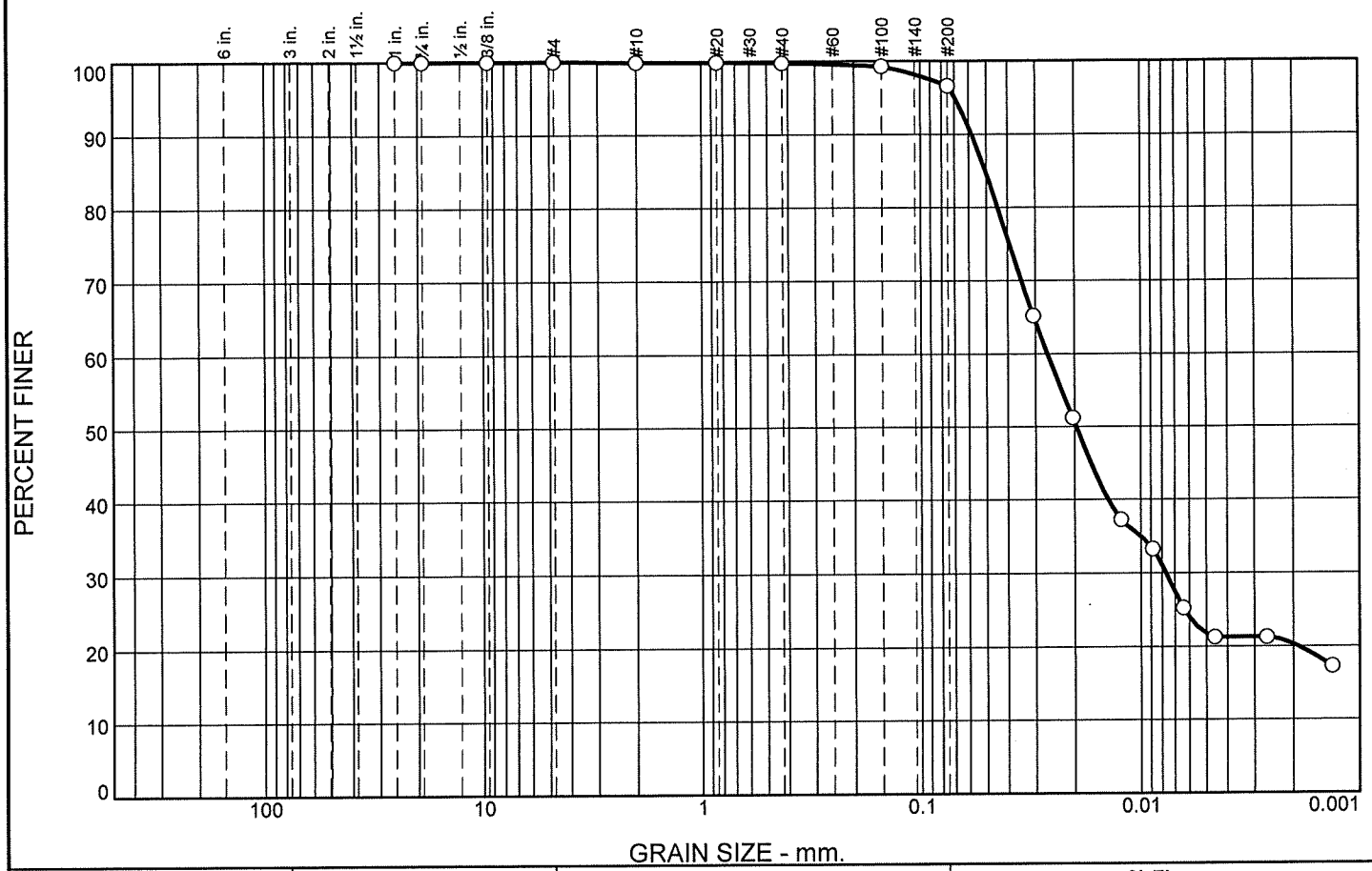
SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Tested By: 5/20/24

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.2	3.1	74.8	21.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.9		
#20	99.9		
#40	99.7		
#100	99.3		
#200	96.6		

* (no specification provided)

Material Description

SILTY CLAY
Gray-Mottled-Brown, low plasticity, trace sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.0505 D_{60}= 0.0265 D_{50}= 0.0196
D_{30}= 0.0077 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ODOT=

Remarks

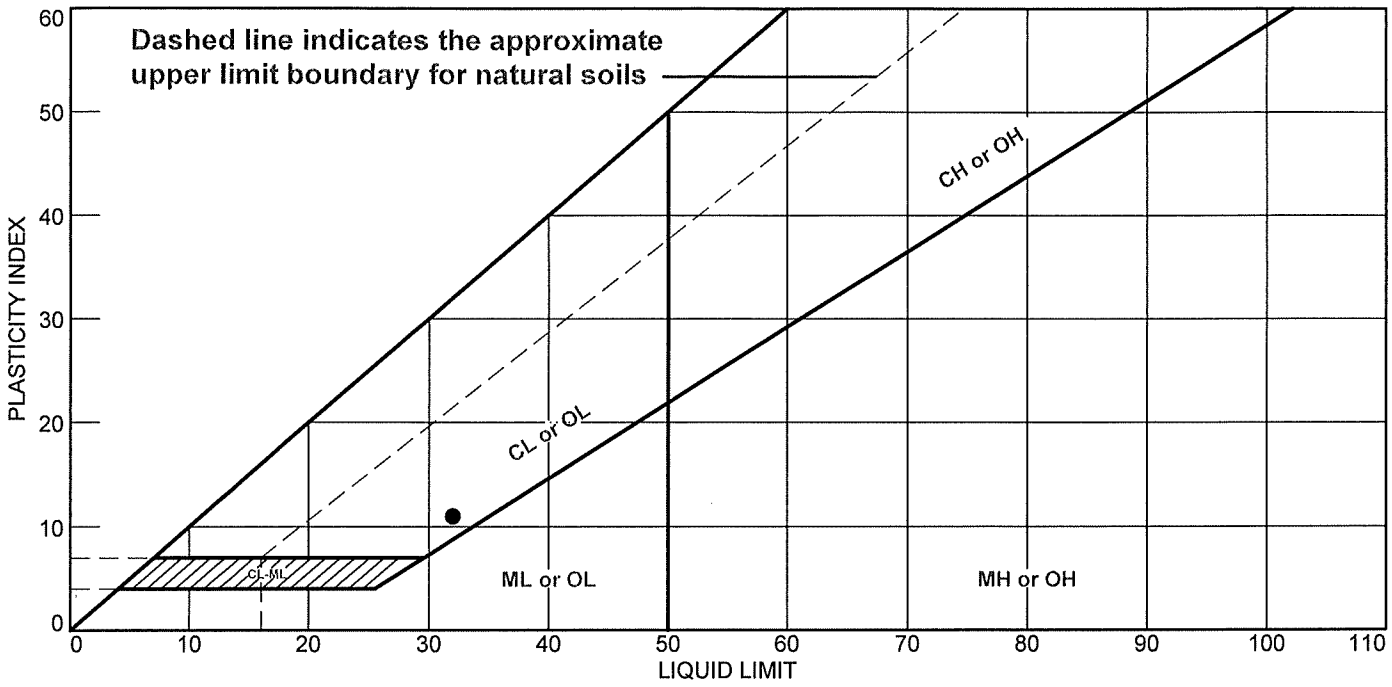
Location: D2-35.5' TO 37.5'
Sample Number: 418834-05

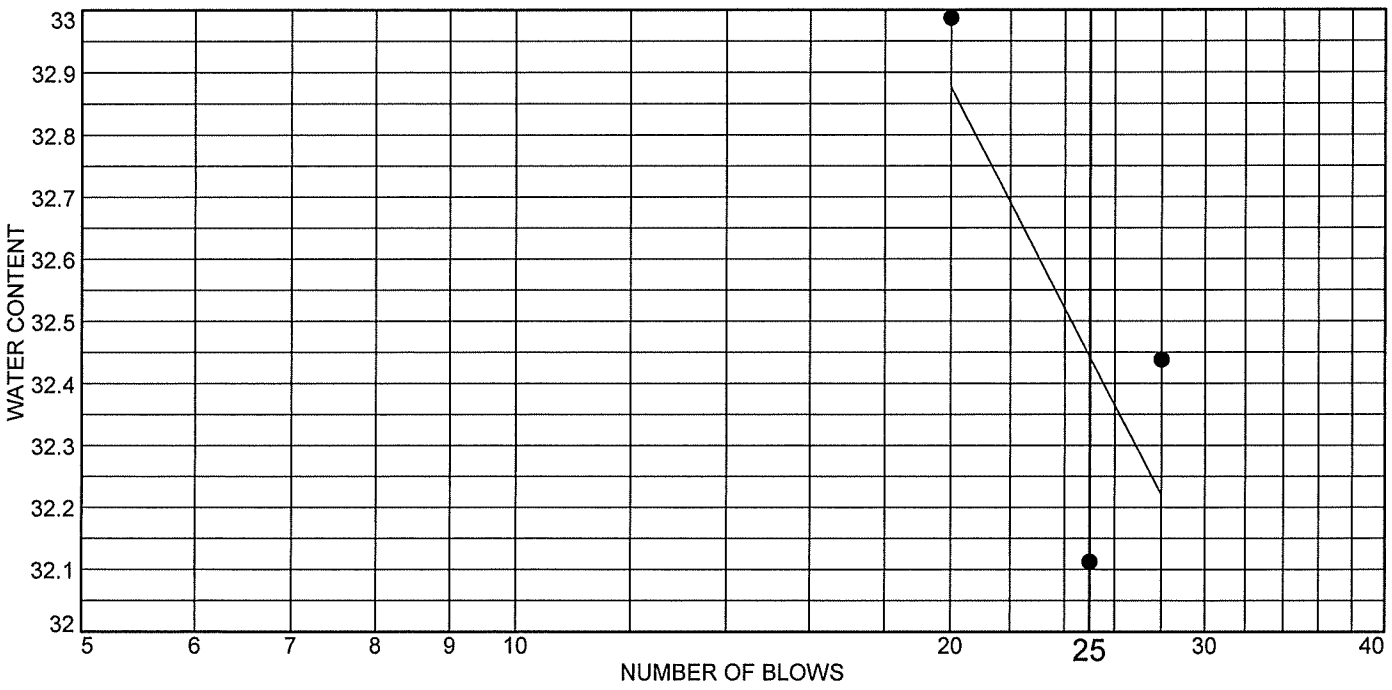
Date:

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Gray-Mottled-Brown, low plasticity, trace sand	32	21	11	99.7	96.6	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D2-35.5' TO 37.5'

Sample Number: 418834-05

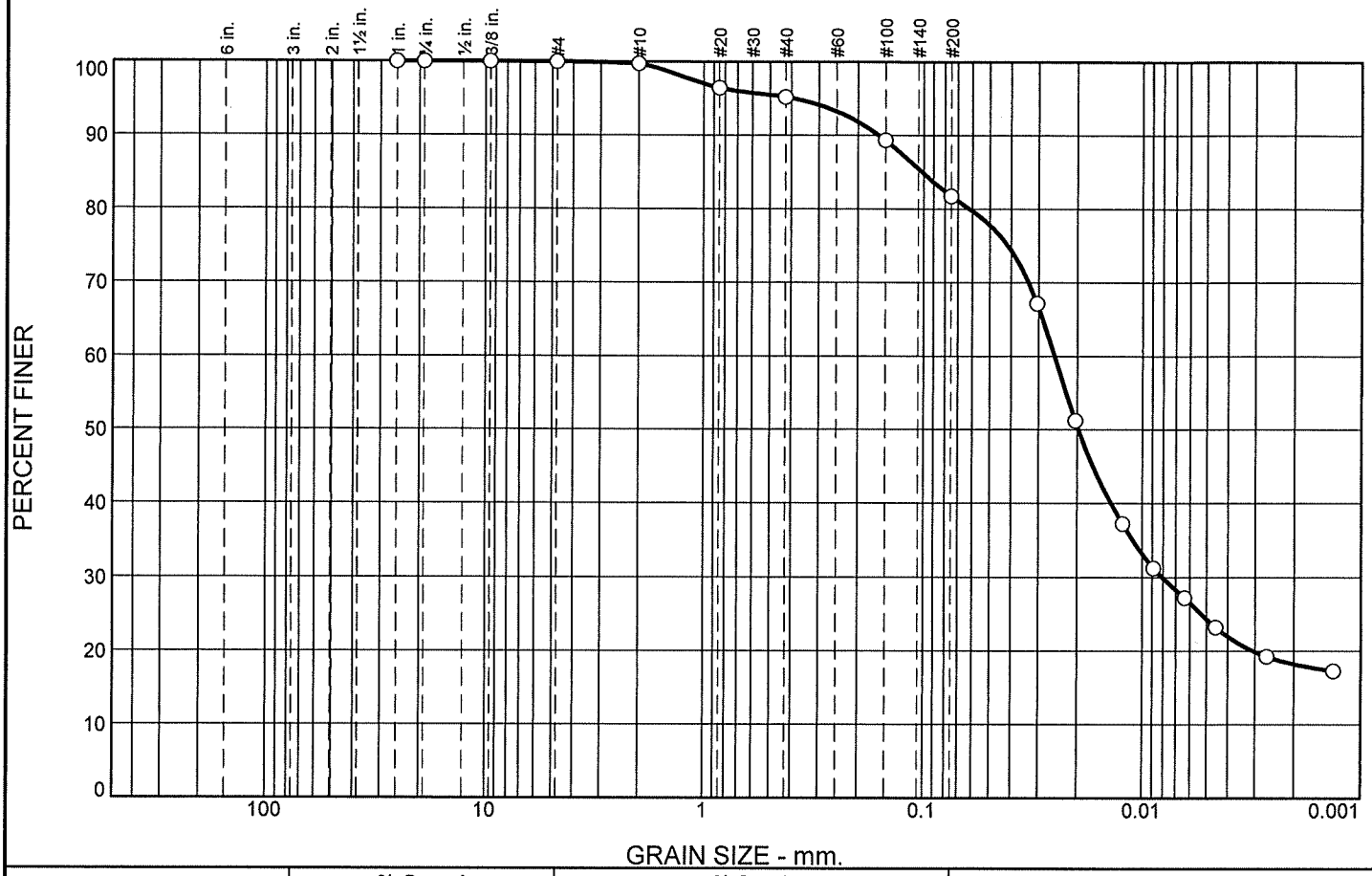
Remarks:

SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.6	13.5	57.3	24.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.8		
#20	96.5		
#40	95.2		
#100	89.3		
#200	81.7		

* (no specification provided)

Material Description

SILTY CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 19 LL= 23 PI= 4

Coefficients

D_{85}= 0.1017 D_{60}= 0.0253 D_{50}= 0.0197
D_{30}= 0.0081 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML ODOT= A-4b(8)

Remarks

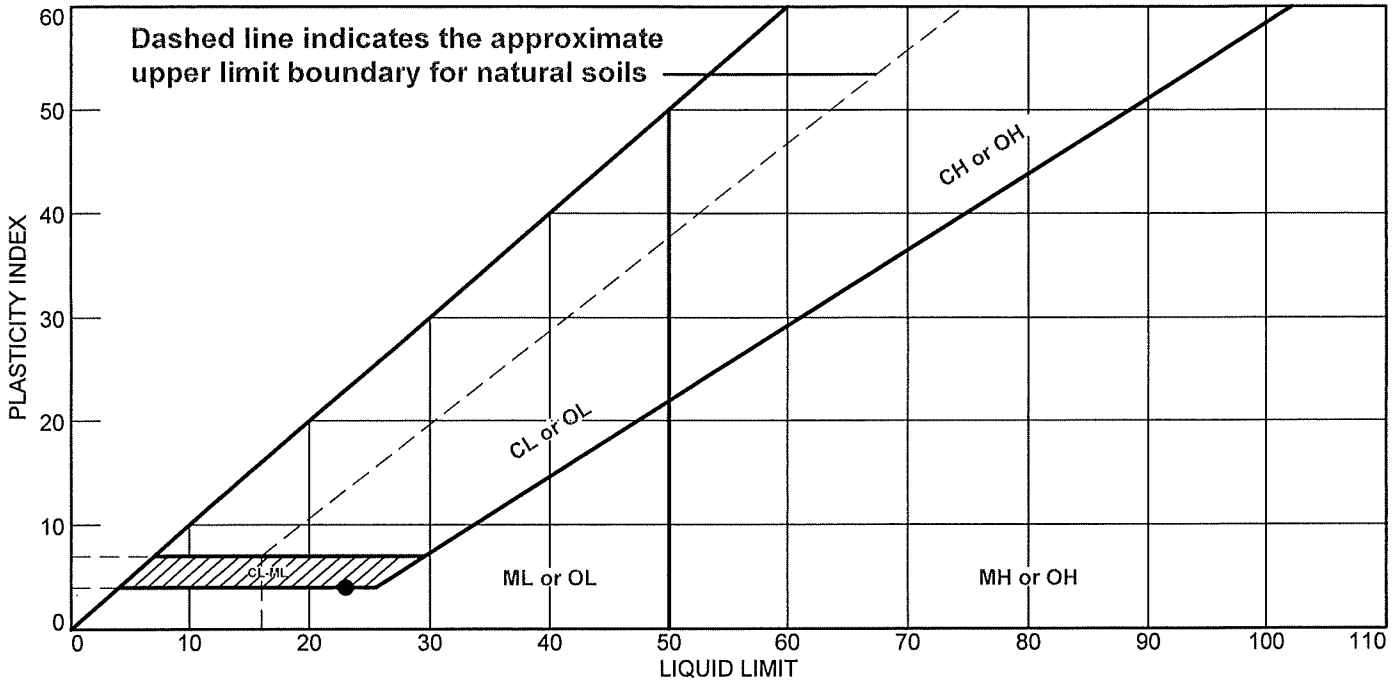
Location: D3-29.5'-31.5'
Sample Number: 418834-02

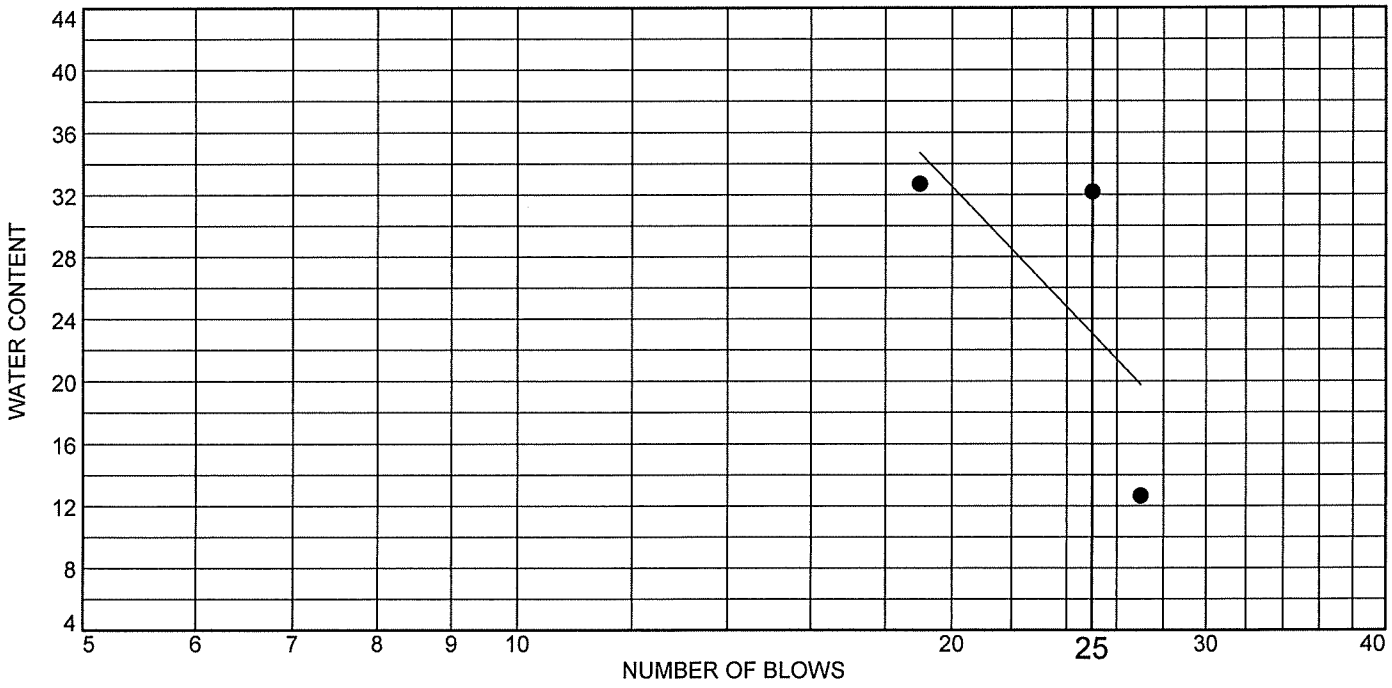
Date:

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Brown-Mottled-Gray, low plasticity, trace sand	23	19	4			

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D3-29.5'-31.5'

Sample Number: 418834-02

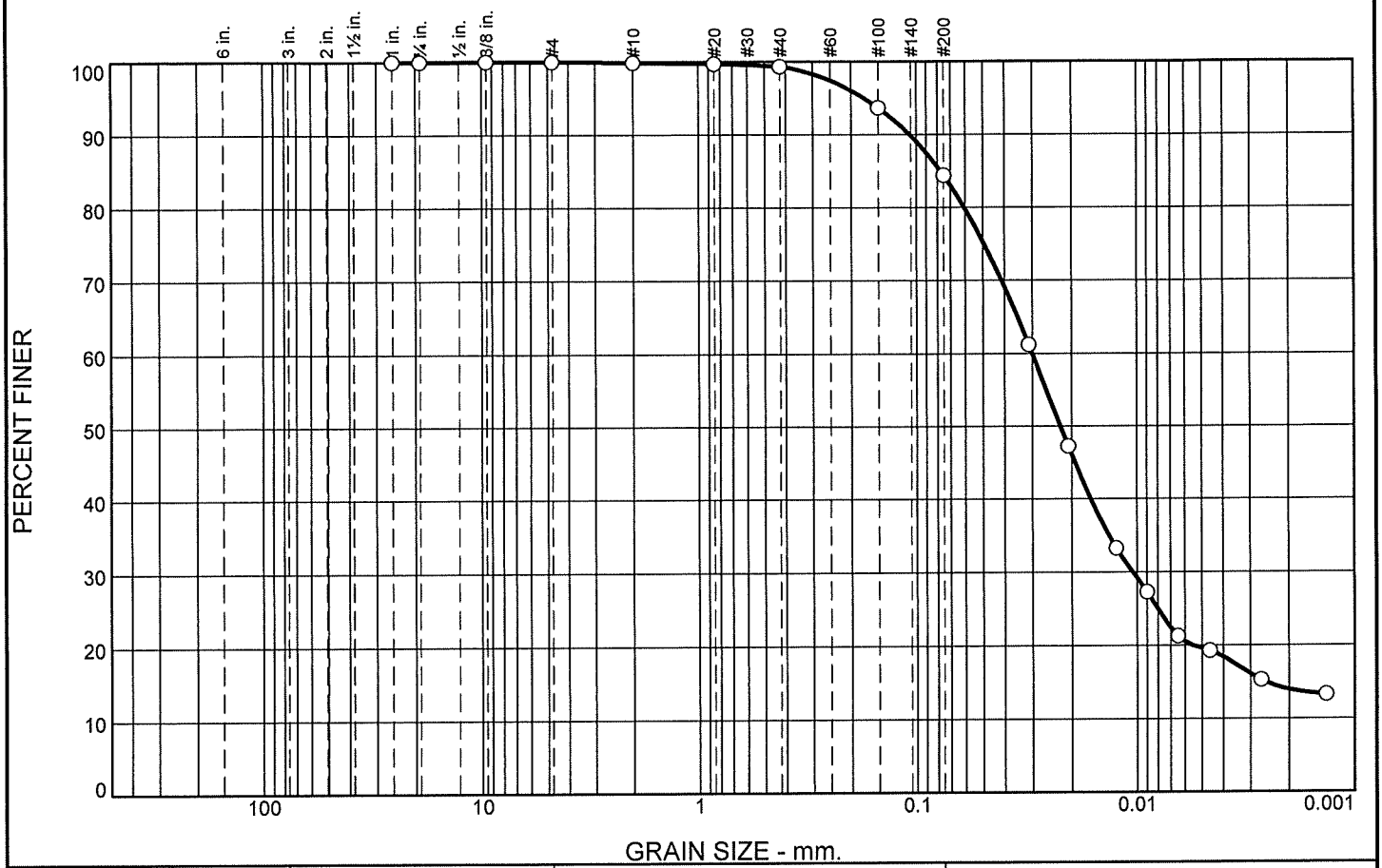
Remarks:

SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.6	14.9	64.8	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	99.3		
#100	93.7		
#200	84.4		

* (no specification provided)

Material Description

SILTY CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 20 LL= 44 PI= 24

Coefficients

D_{85}= 0.0776 D_{60}= 0.0300 D_{50}= 0.0224
D_{30}= 0.0105 D_{15}= 0.0026 D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-7-6(14)

Remarks

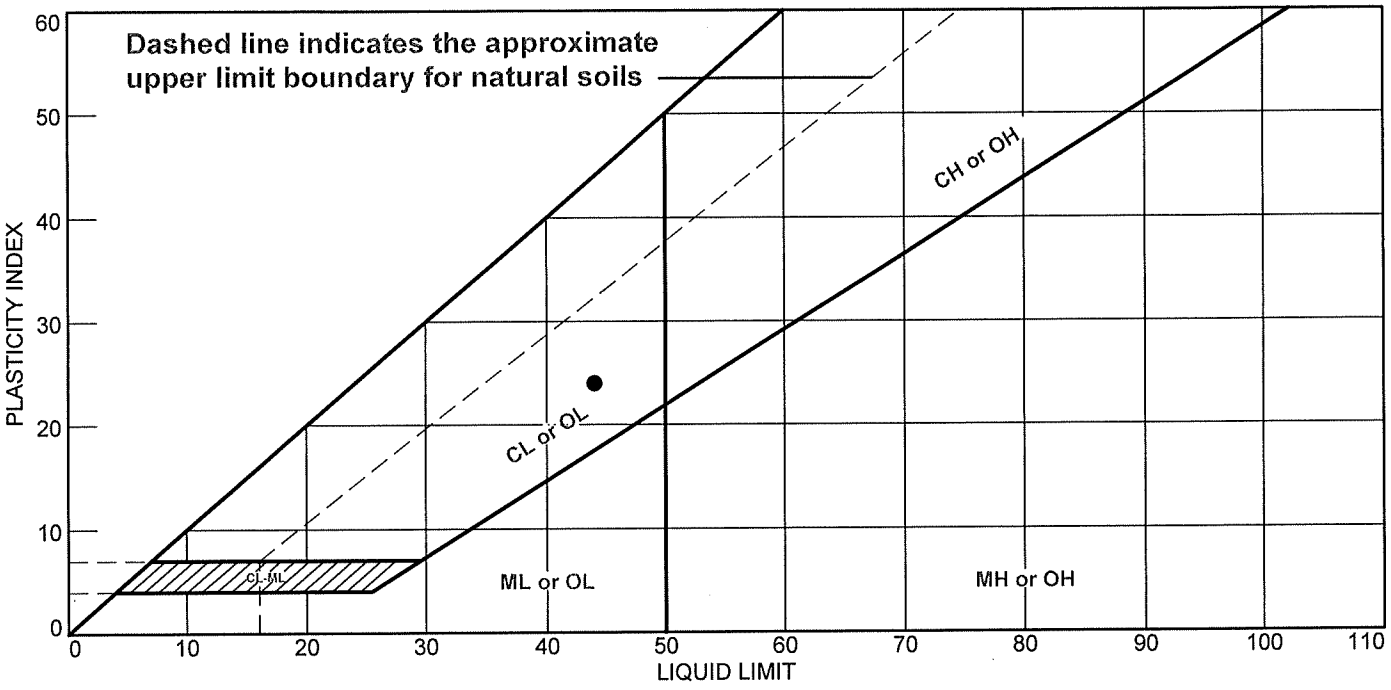
Location: D4-34.5' TO 36.5'
Sample Number: 418834-04

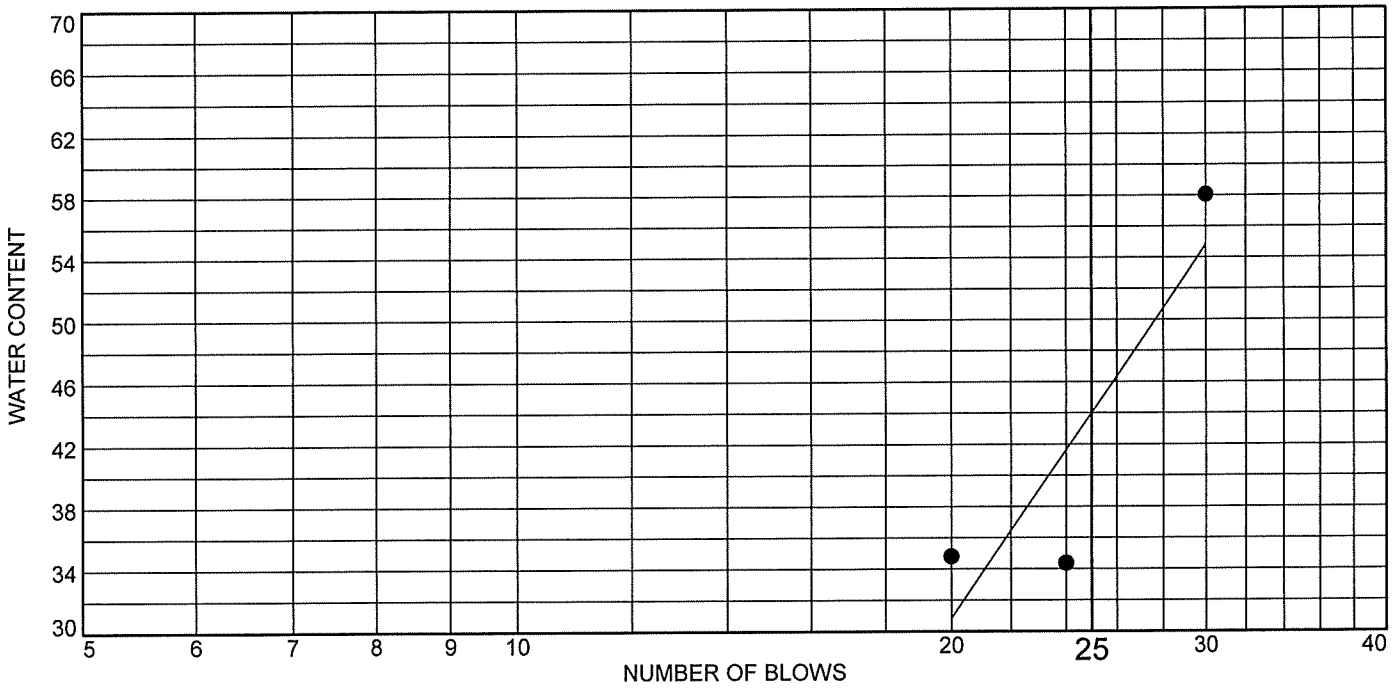
Date: 5/22/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Brown-Mottled-Gray, low plasticity, trace sand	44	20	24	99.3	84.4	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D4-34.5' TO 36.5'

Sample Number: 418834-04

Remarks:

SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

SKS ENGINEERS, LLC

CONSULTING ENGINEERS

2900 N. MARTIN LUTHER KING JR. DRIVE • DECATUR, ILLINOIS 62526

217-877-2100 • FAX 217-877-4816
www.sksengineers.com

Report of Lab Test

PROJECT:	CWLP	**PROJECT NO:**	418834
		DATE OF TEST	June 03, 2024
CLIENT:	Andrews Engineering	**REPORT NUMBER:**	418834-01
ATTN:	Mr. Brad Hunsberger	**PAGE NO.**	1/1

ITEM: **PERMEABILITY TEST RESULTS**

Sample	Moisture Content (%)		Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
	Before Test	After Test		
L4 (17'-19')	37.6	31.5	89.2	1.7 x 10-8
D3 (29.5'-31.5')	27.0	26.6	98.4	2.1 x 10-6
D1 (38.5'-40.5')	23.1	22.9	105.6	5.1 x 10-8
L5 (37.5'-39.5')	23.2	22.4	103.6	6.8 x 10-6
D2 (35.5'-37.5')	25.2	25.0	98.8	2.8 x 10-7
L3 (34.5'-36.5')	24.3	30.4	94.1	8.5 x 10-8
L1 (36'-38')	26.5	25.9	98.2	4.5 x 10-7
D4 (34.5'-36.5')	27.8	23.0	99.4	1.4 x 10-6

NOTES: Test ran according to ASTM D-5084

BY: Stephen Jacobs

GEOTECHNICS
Soil & Material Testing
A DIVISION OF KLINGNER
4510 Paris Gravel Road • Hannibal, MO 63401 • voice 573.221.7714 • fax 573.221.7762

February 27, 2024 23-1071

Andrews Engineering
101 East Walton
Warrenton, MO 63383

Attn: Mr. Karl Finke, P.E., R.G.

RE: Geotechnical Drilling Services: Andrews - Springfield Ash Ponds CPT Soundings

Dear Mr. Finke:

In accordance with your request, we have completed the geotechnical CPT Soundings for the Springfield Ash Ponds in Springfield, Illinois.

Scope of Services

The scope of our services for this phase of the project consisted of investigating the site's subsurface conditions by performing fourteen (14) CPT Soundings near the requested locations in Springfield, Illinois. The CPT Soundings were performed to depths of approximately 21½ to 47 feet below the existing ground surface. The locations of the soundings were determined by Andrews Engineering and staked in the field by Andrews. The scope of services consisted of exploratory CPT Soundings to help determine the subsurface material strengths and SPT N_{60} correlations in the vicinity of the proposed site.

Conclusions

The geotechnical investigation, including exploration and field testing has been completed for the exploratory geotechnical investigation CPT soundings for the Springfield Ash Pond project in Springfield, Illinois. These data are supplied for the benefit of the designers and owner and do not express or imply any warranty of the subsurface conditions. The scope of our services does not include environmental assessment of investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client. As always, if you have any questions do not hesitate to contact us.

Sincerely,

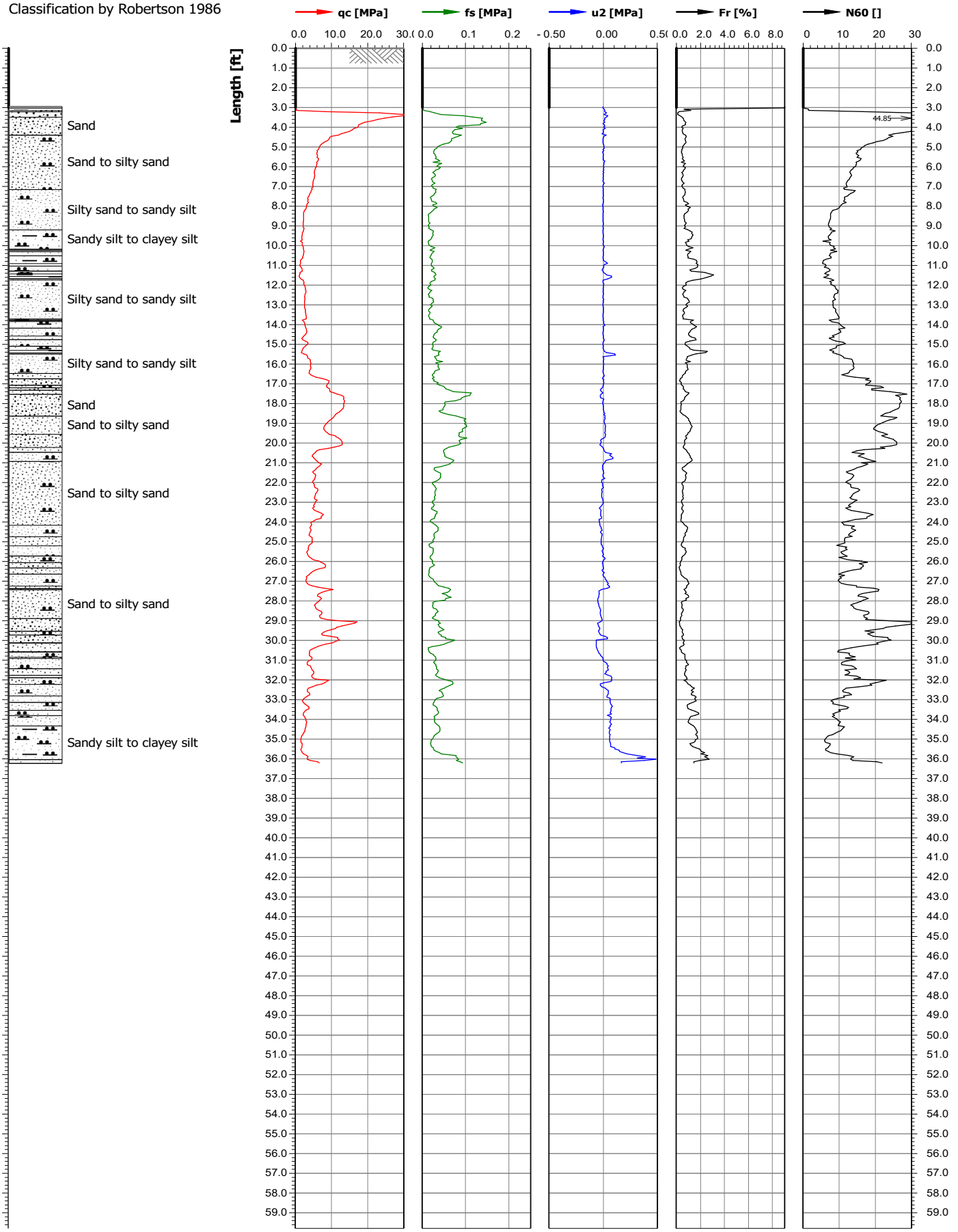
GEOTECHNICS, A DIVISION OF KLINGNER

Brian Joseph Sick, P.E.
Geotechnical Services Department Manager

Encl. CPT Sounding Logs

Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	568.21	CPT-1CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1120729, Easting 2441681		MAS		u2	

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	566.80	CPT-2CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121392, Easting 2441523		MAS		u2

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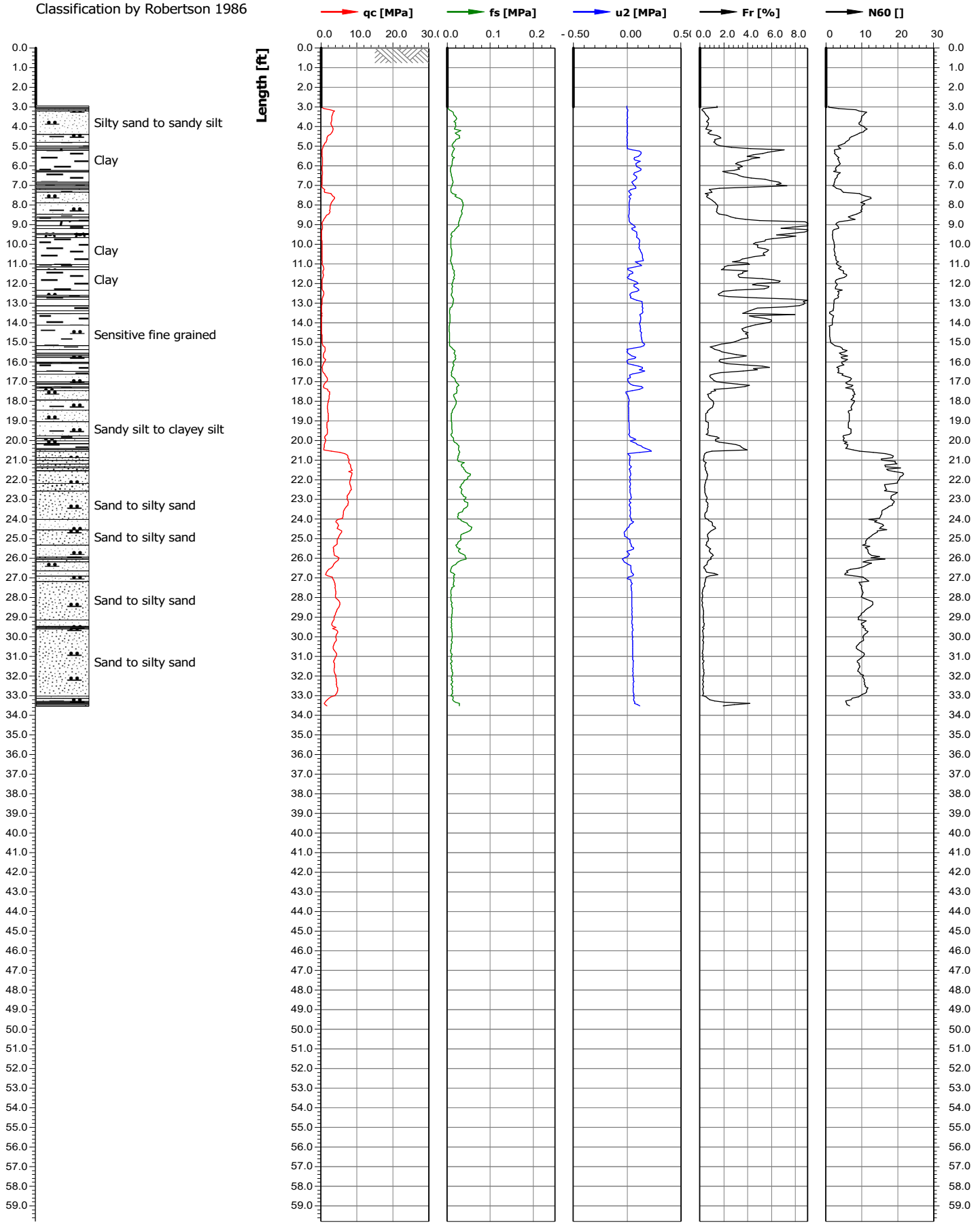
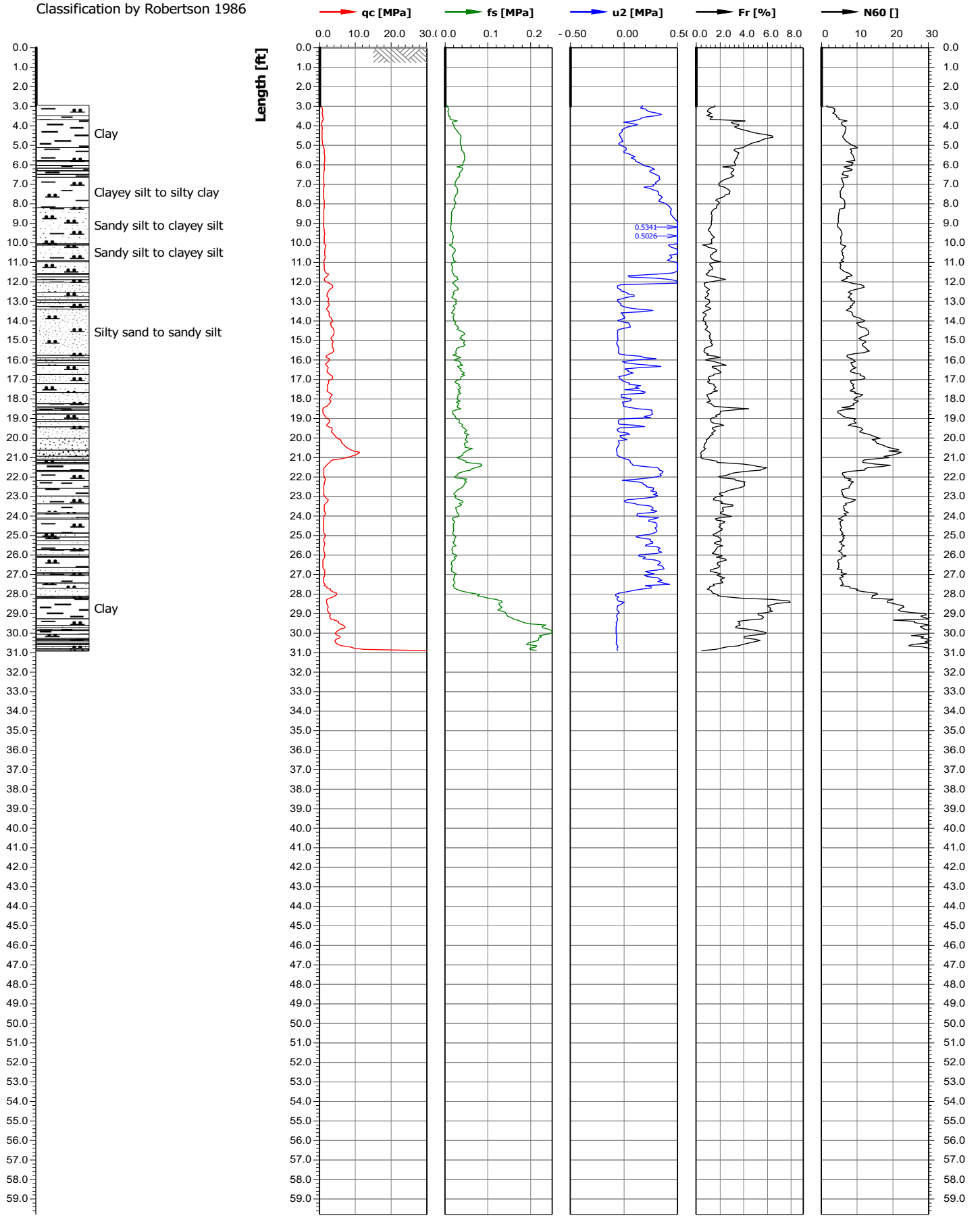
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	536.61	CPT-2L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121336, Easting 2441348		MAS		u2

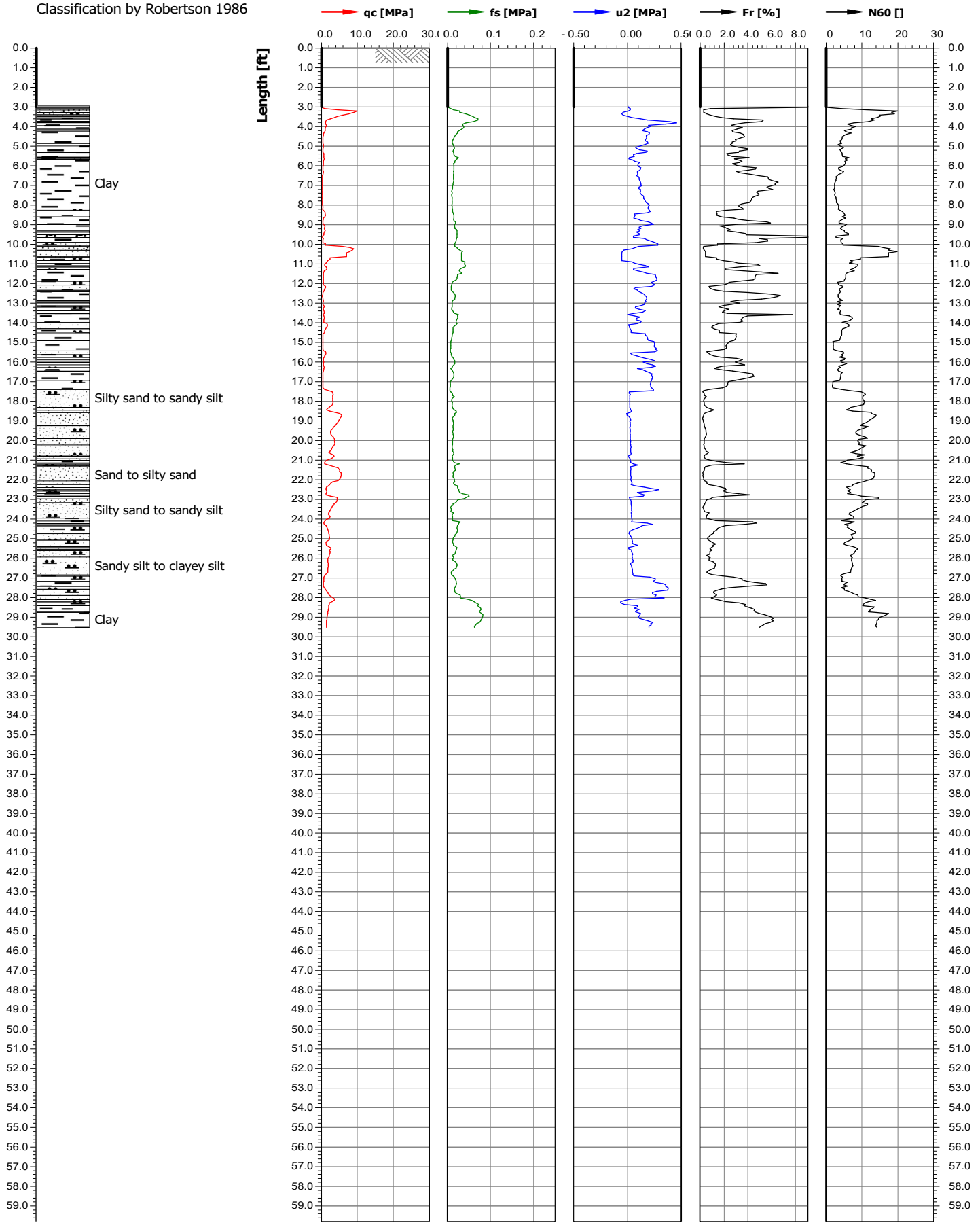
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



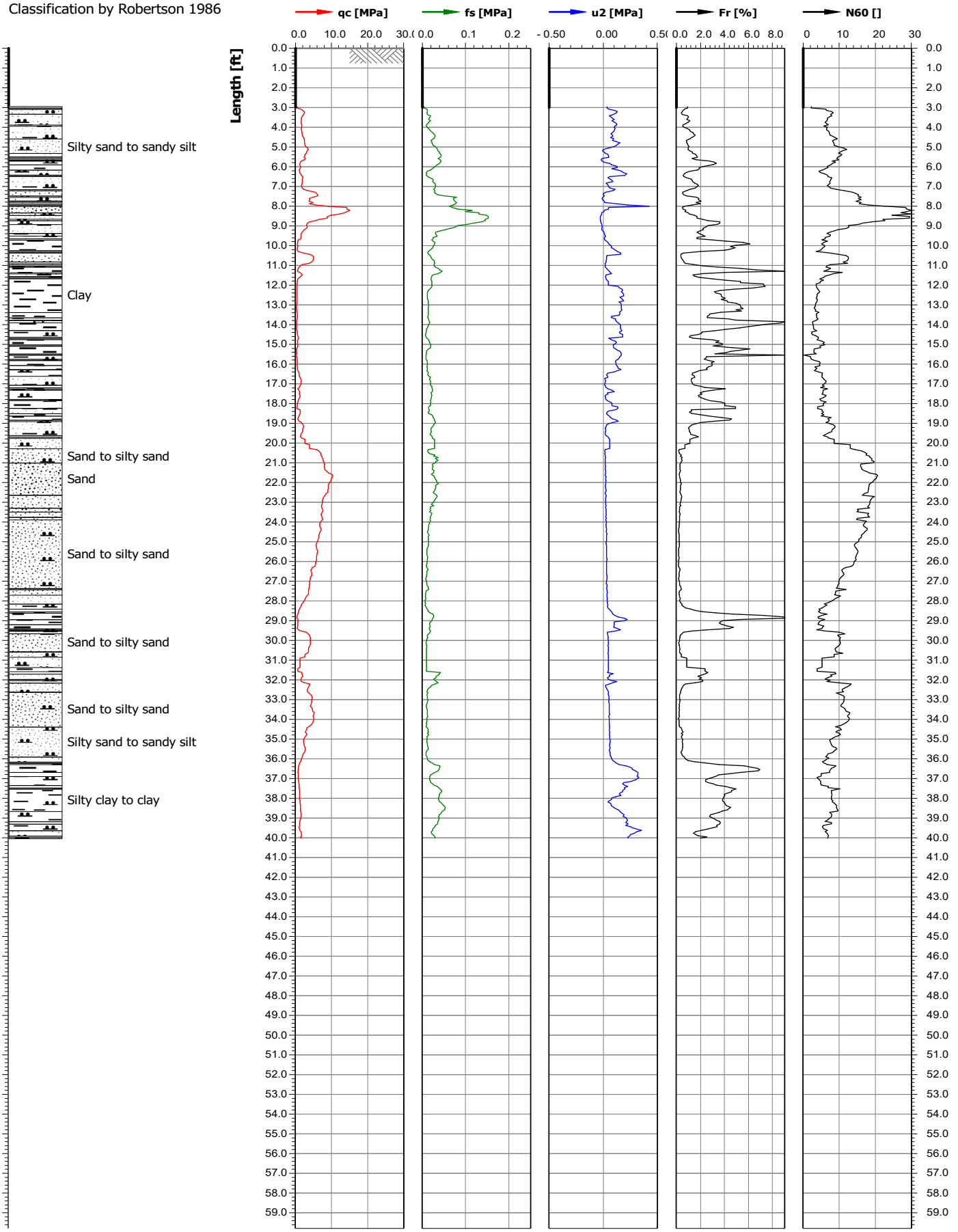
Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	564.30	CPT-3CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121521, Easting 2442246		MAS		u2	

Classification by Robertson 1986



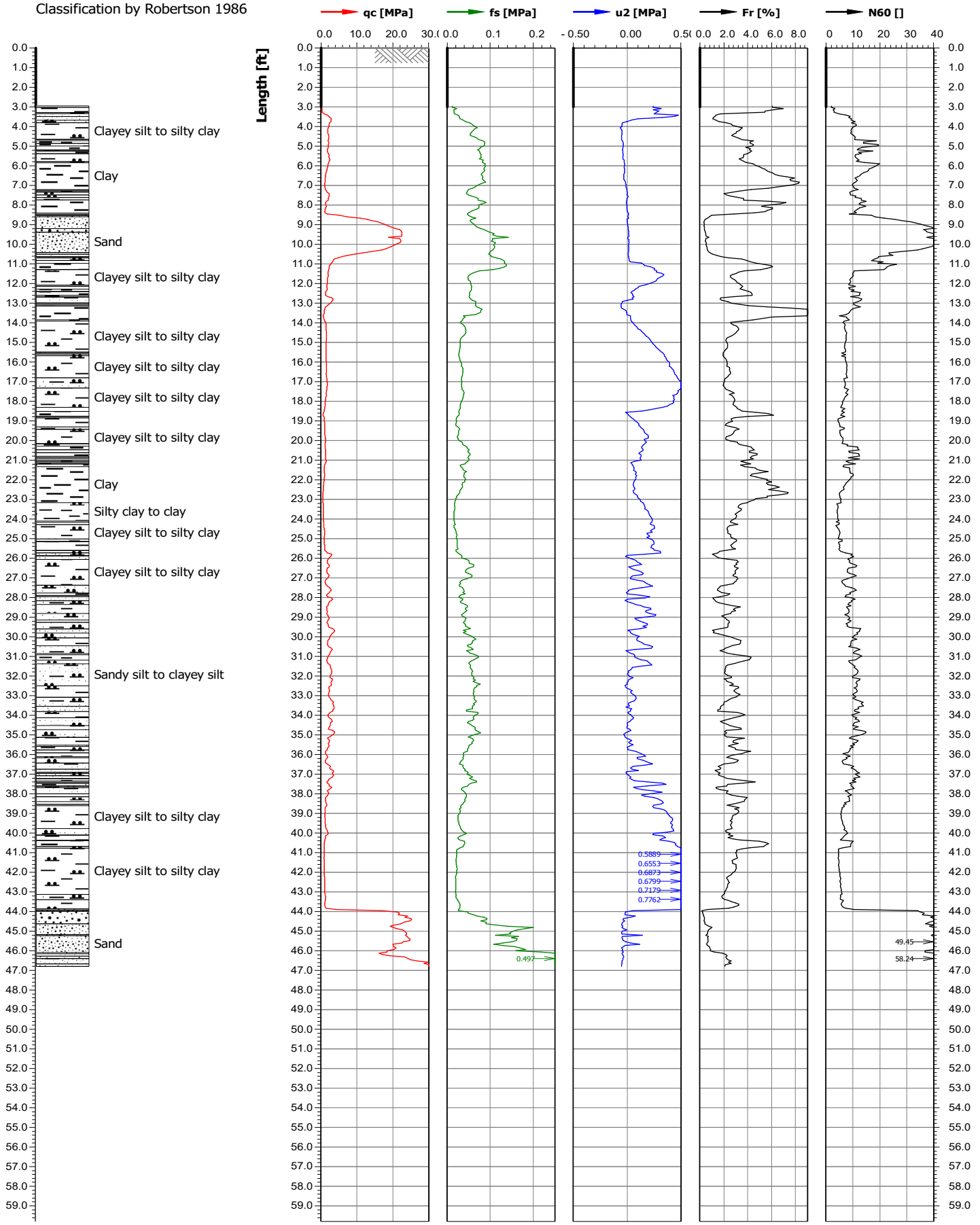
Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	568.50	CPT-4CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121297, Easting 2441920		MAS		u2	

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	541.01	CPT-4L	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1120958, Easting 2441425		MAS		u2	

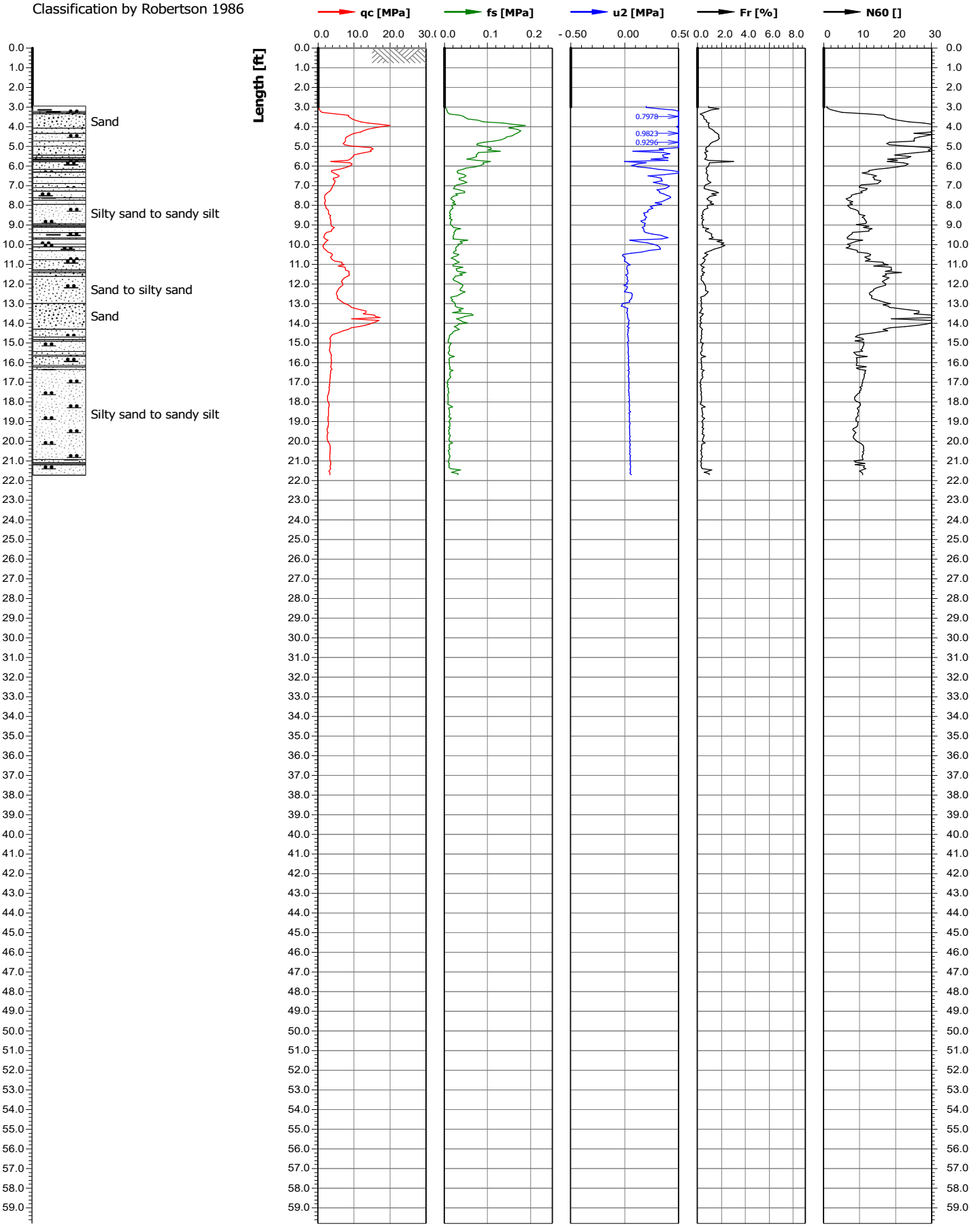
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.98	CPT- 5CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122667, Easting 2440793		MAS		u2

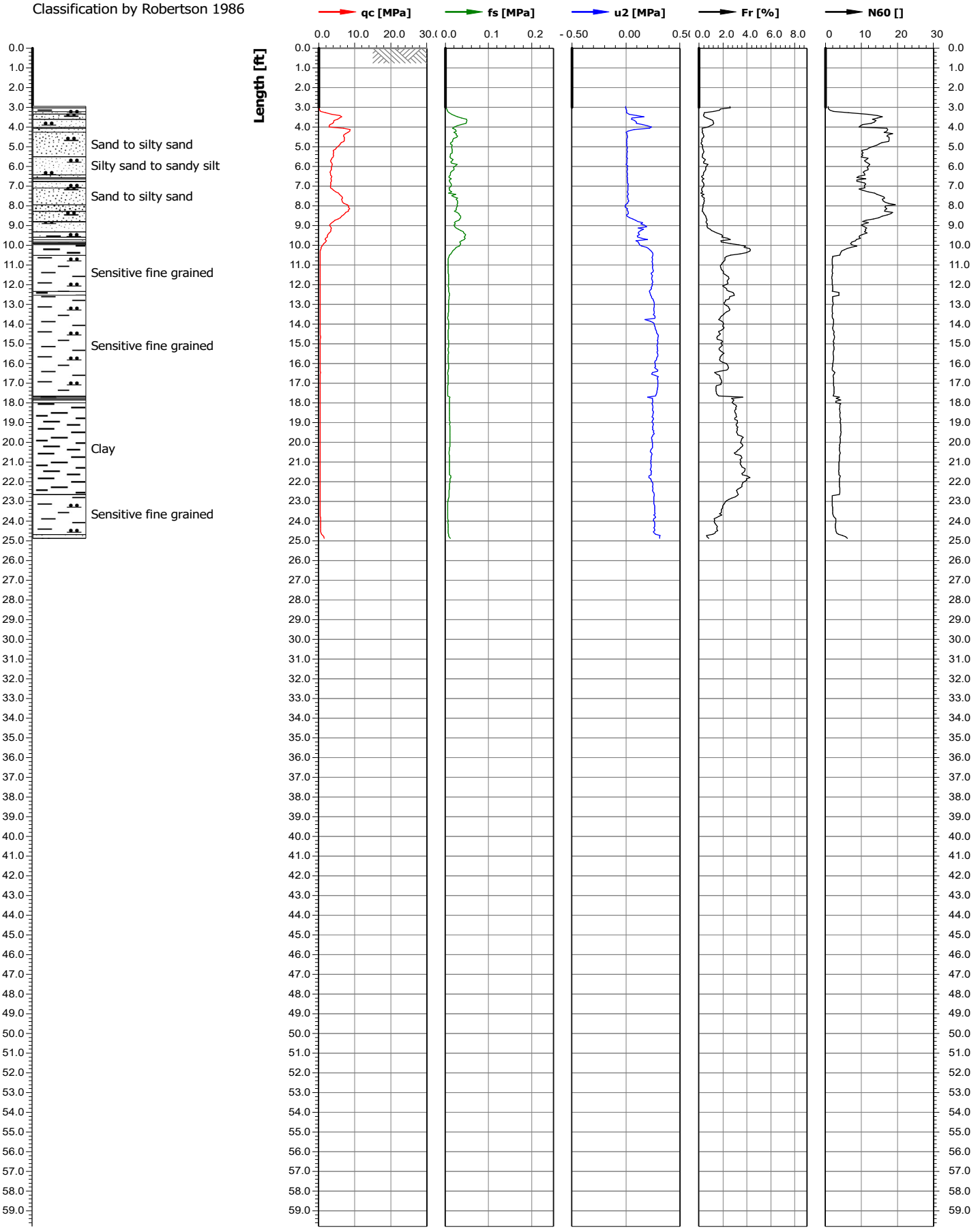
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	552.98	CPT-6CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1123387, Easting 2440830		MAS		u2	

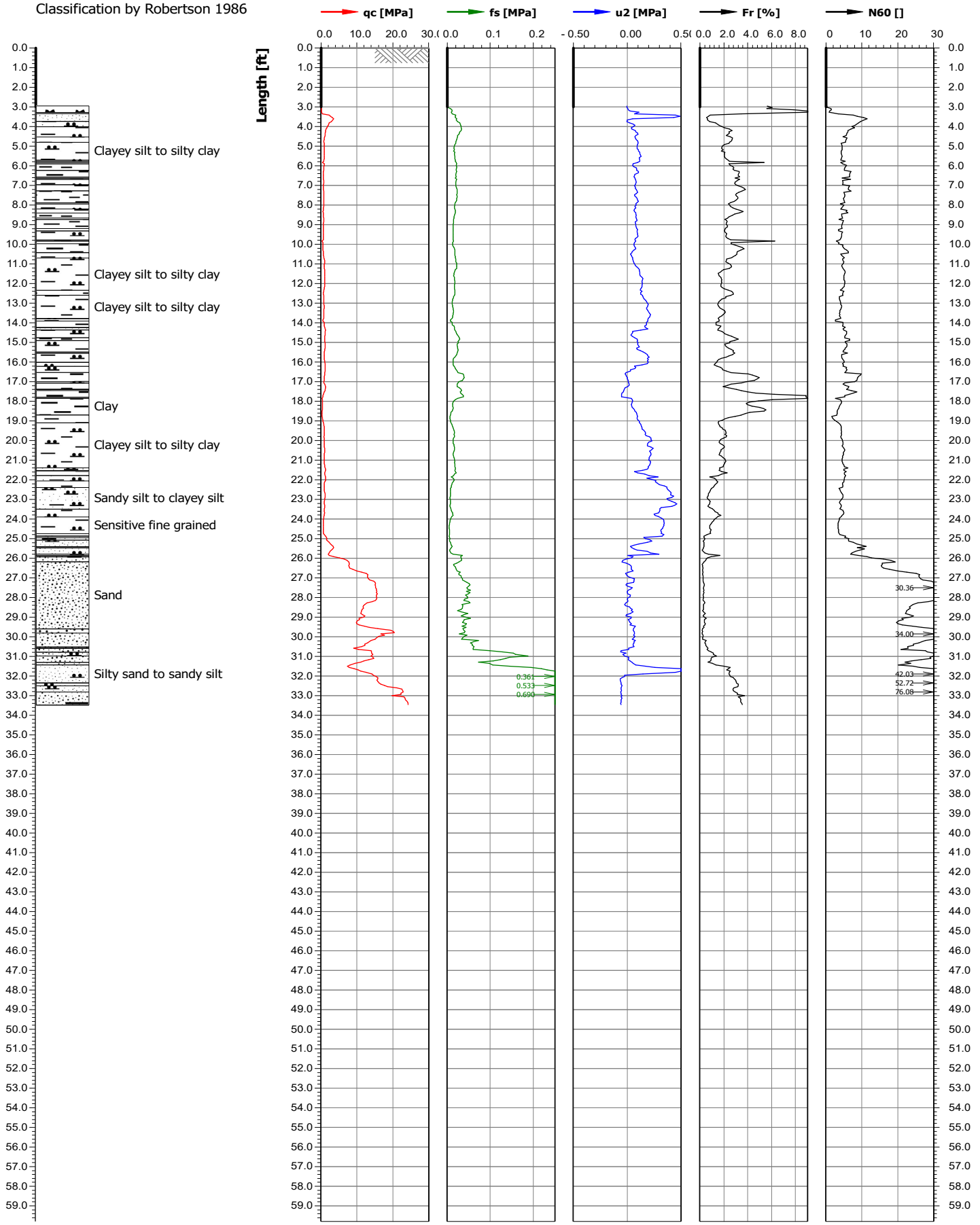
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	531.40	CPT-6L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123455, Easting 2440700		MAS		u2

GEOTECHNICS
Soil & Material Testing

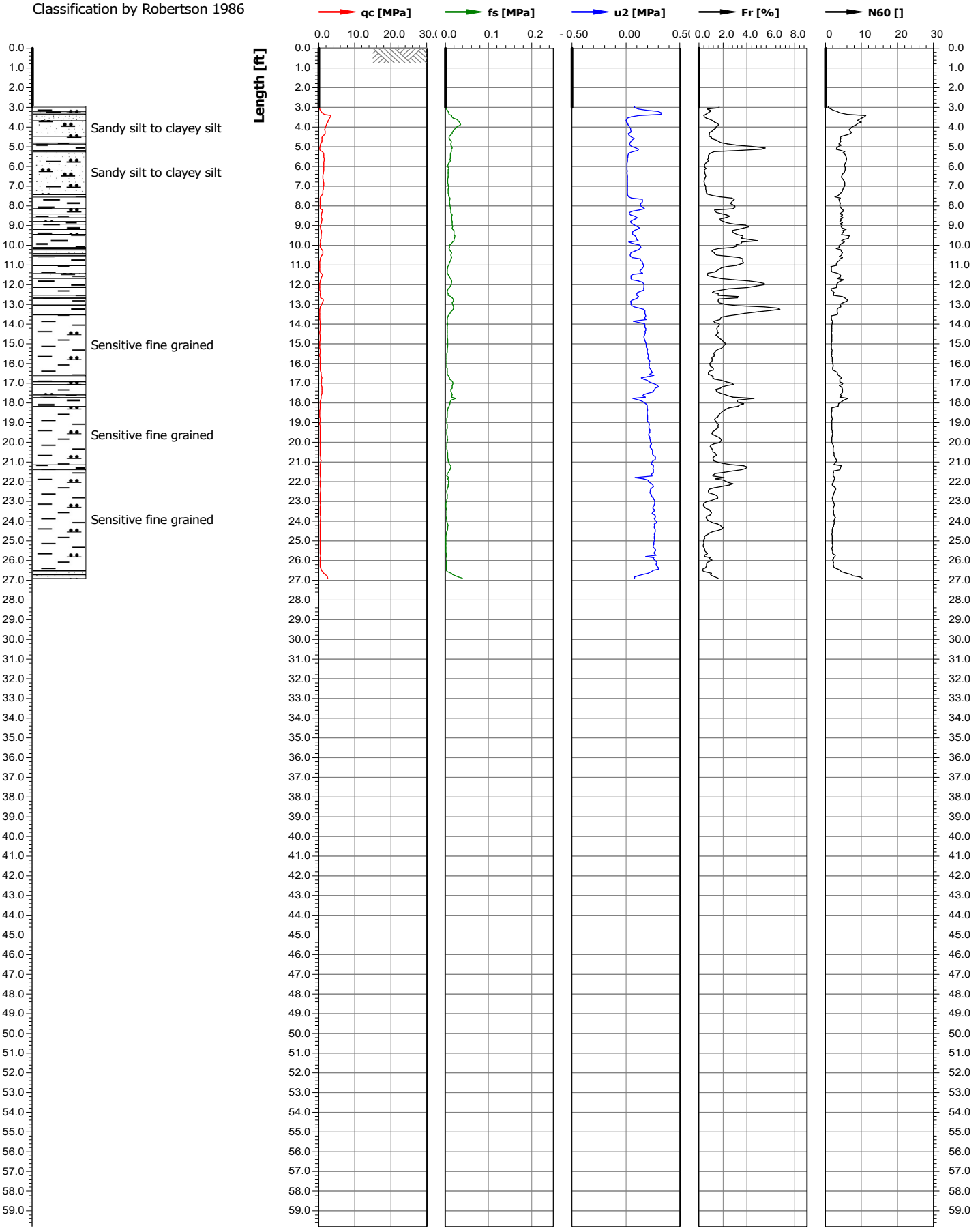
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.10	CPT- 7CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123637, Easting 2441397		MAS		u2

GEOTECHNICS
Soil & Material Testing

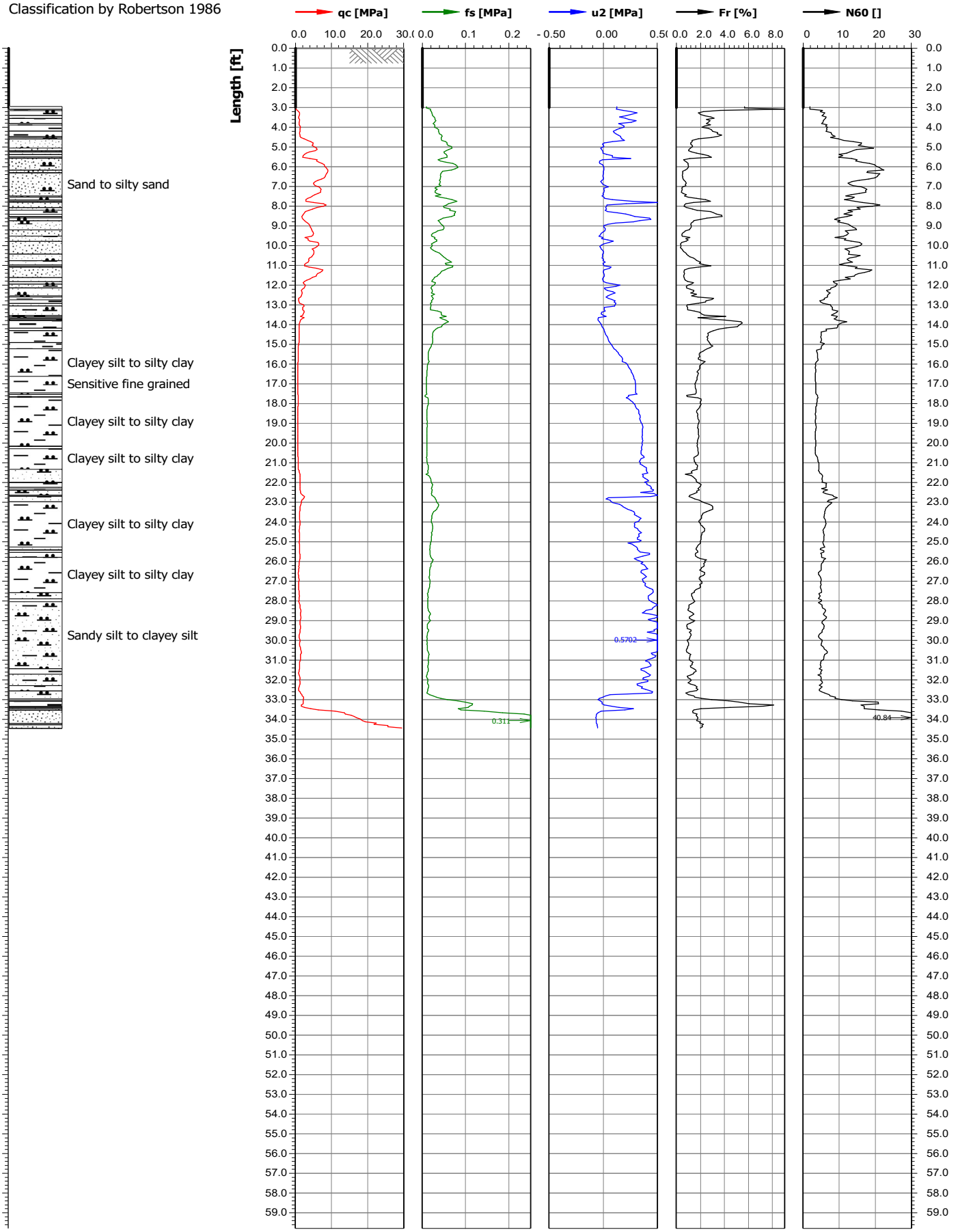
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	533.99	CPT-7L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123789, Easting 2441320		MAS		u2

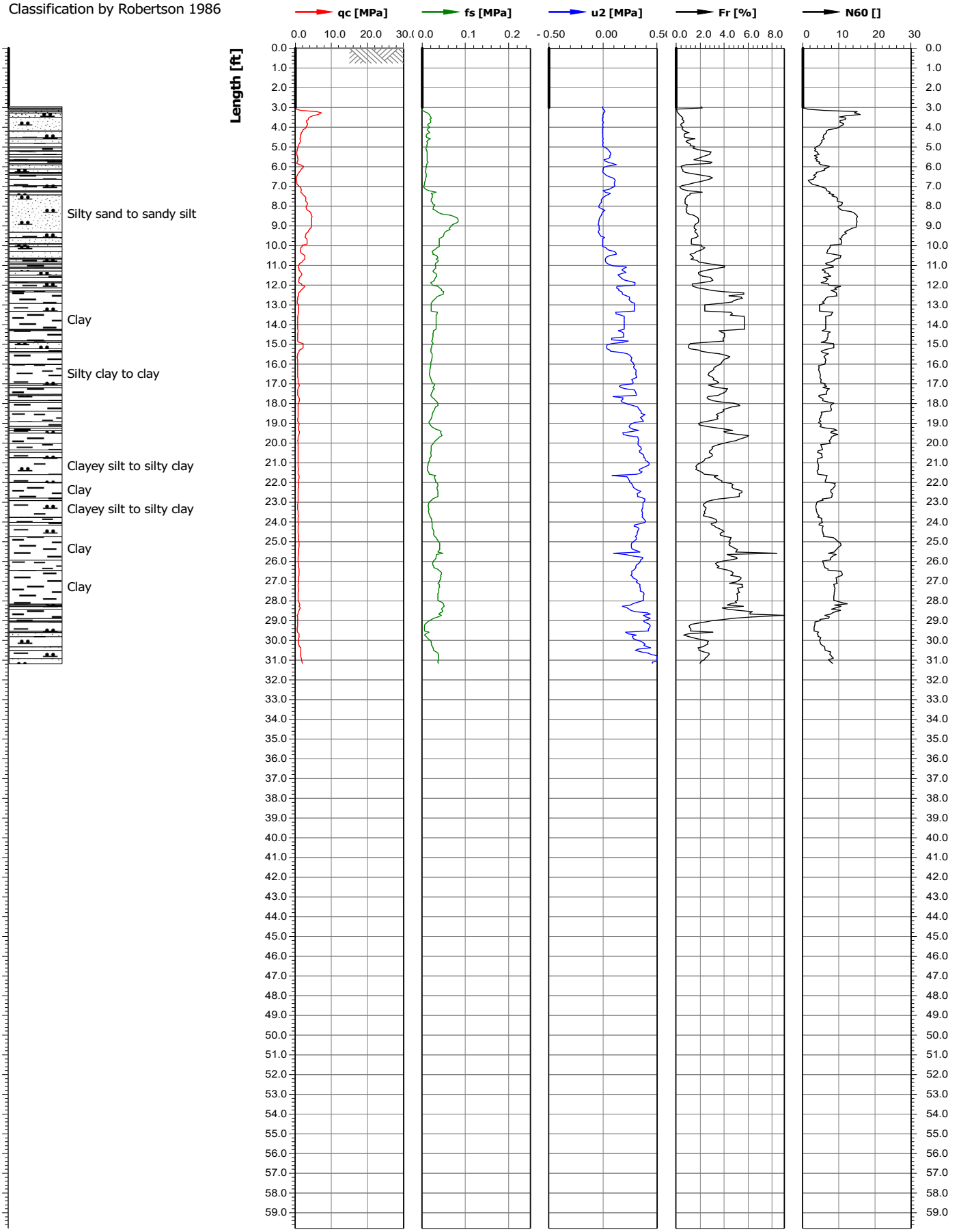
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	555.41	CPT- 10CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1122854, Easting 2441308		MAS		u2	

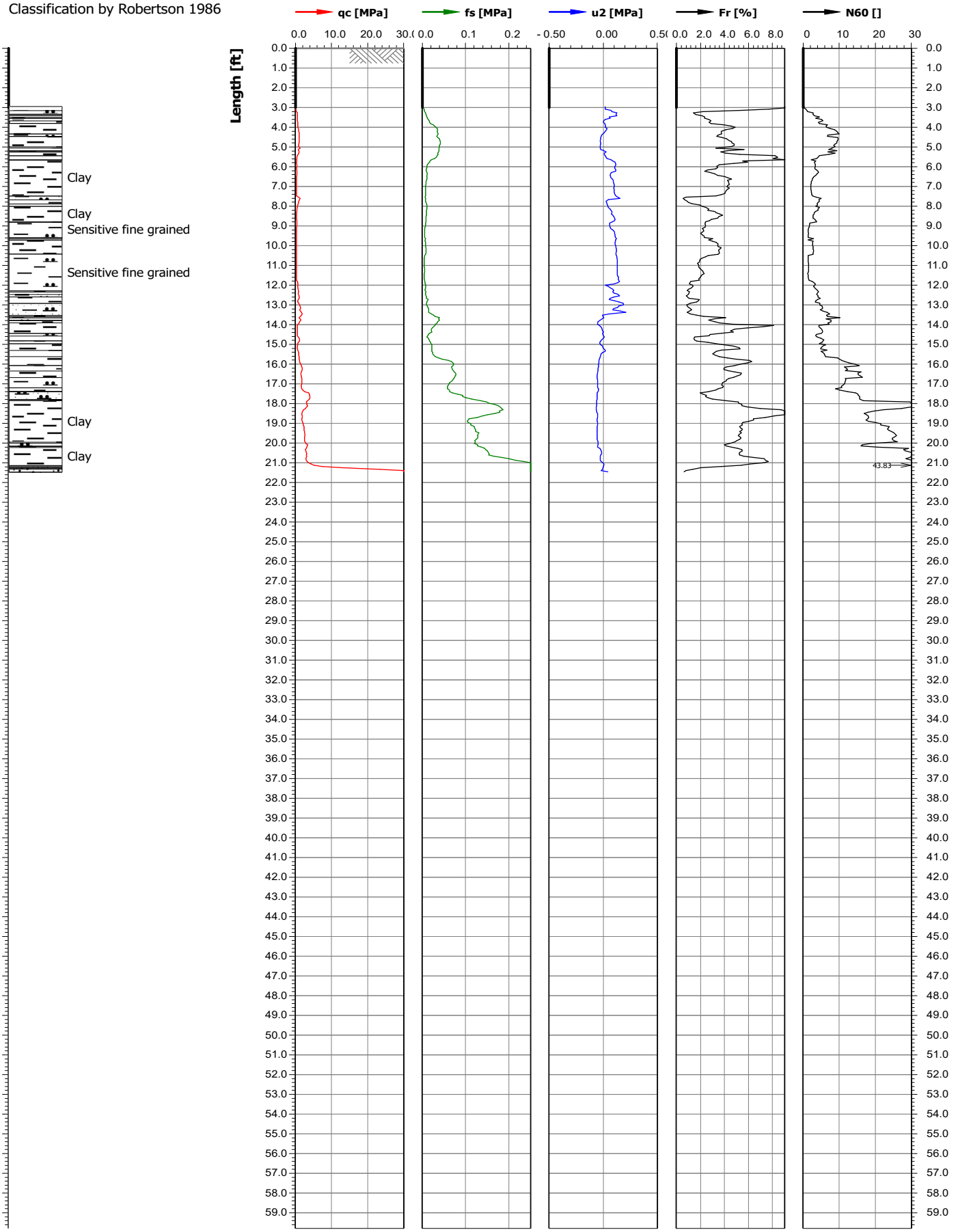
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	566.01	CPT- 14CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121321, Easting 2442579		MAS		u2

GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



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Springfield, IL CWLP	3.00	552.30	CPT- 15CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
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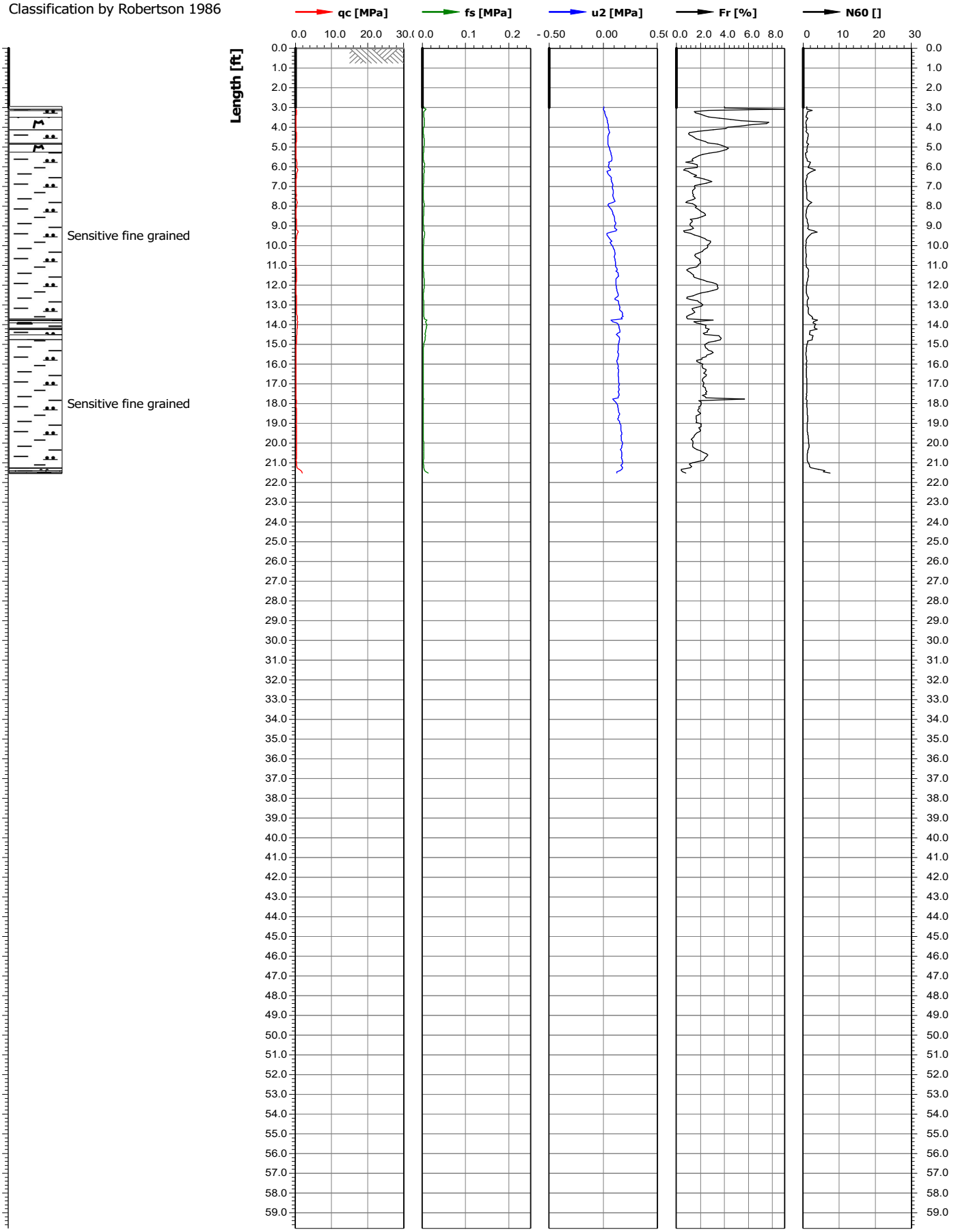
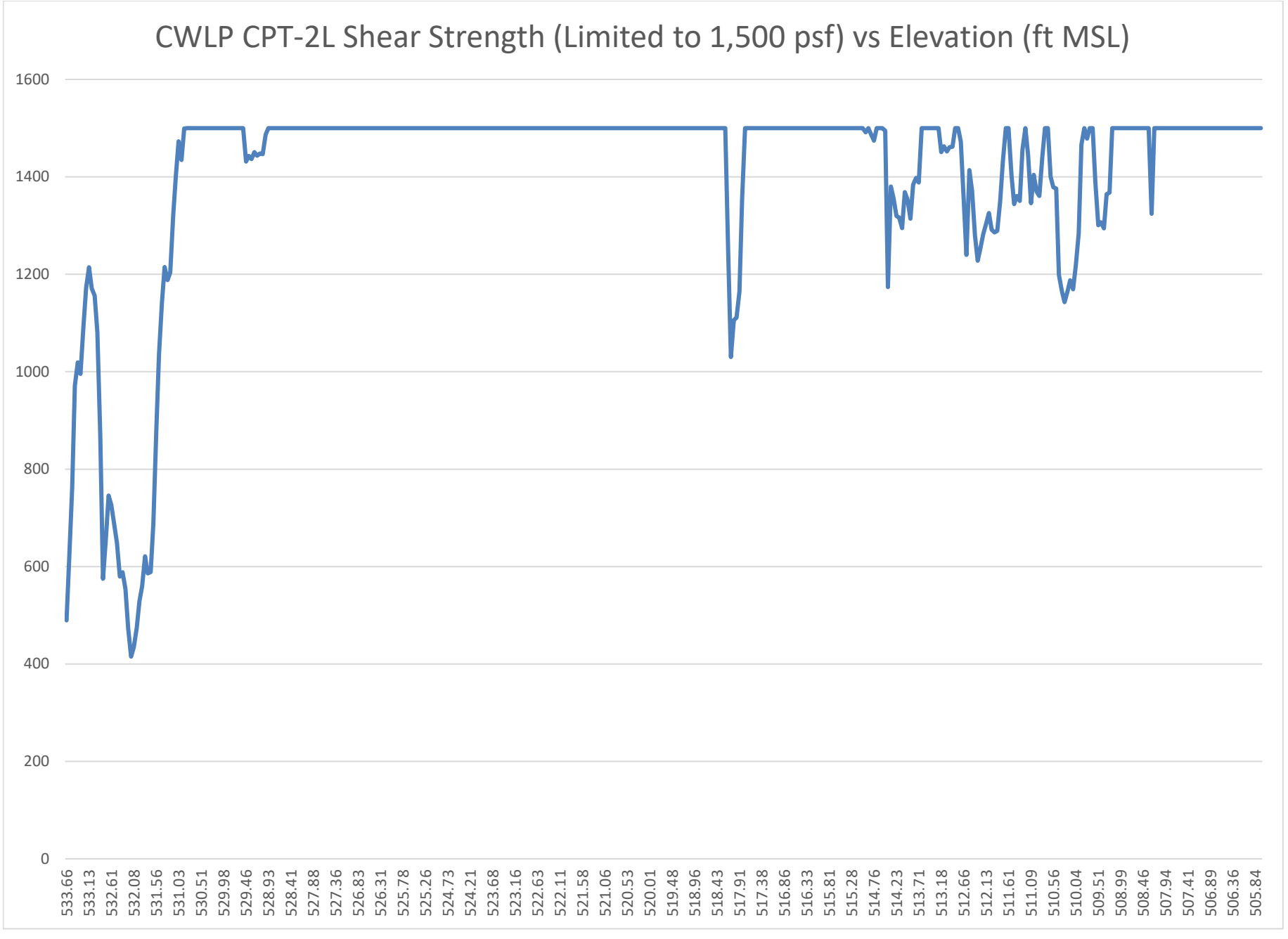
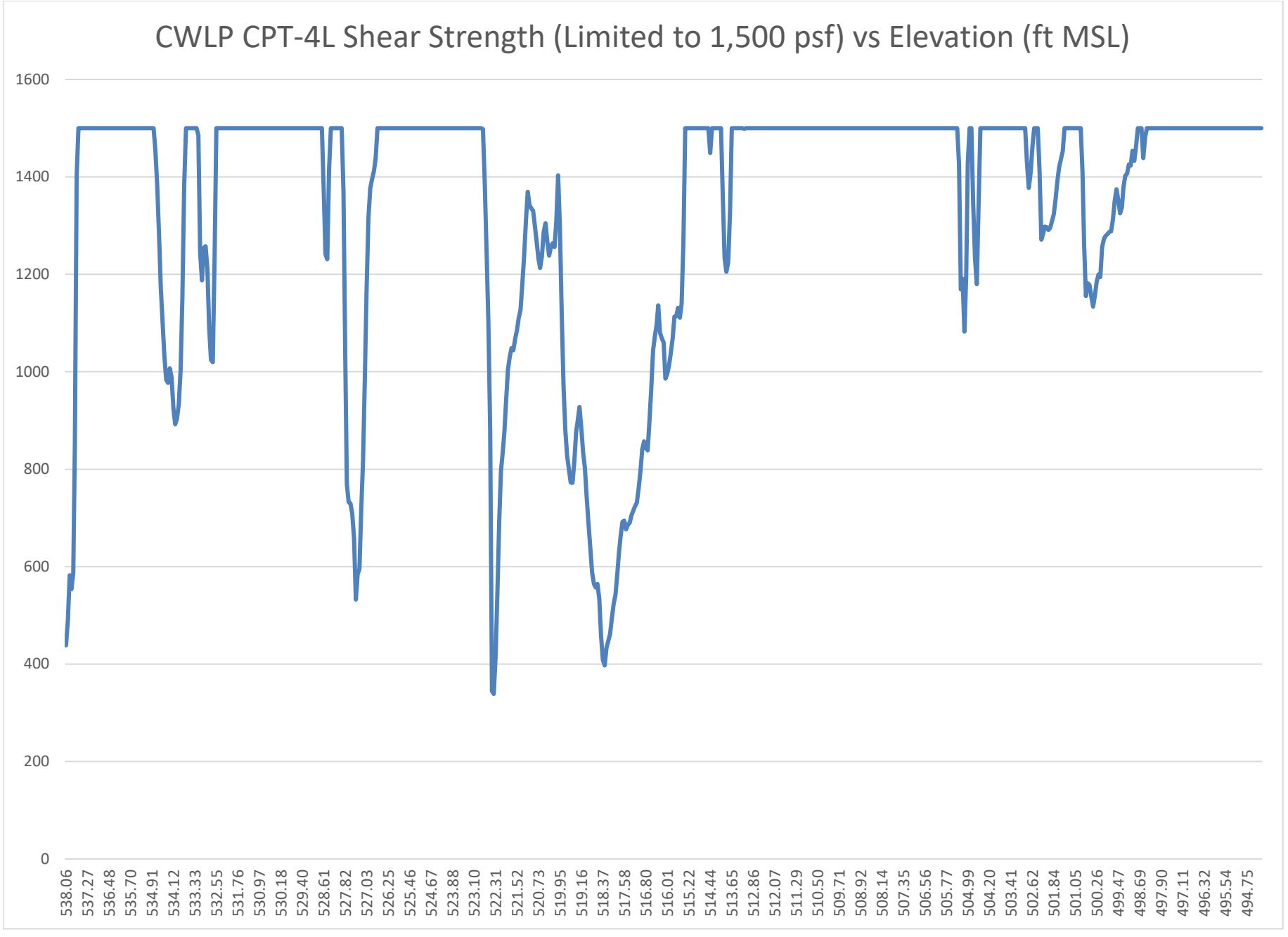
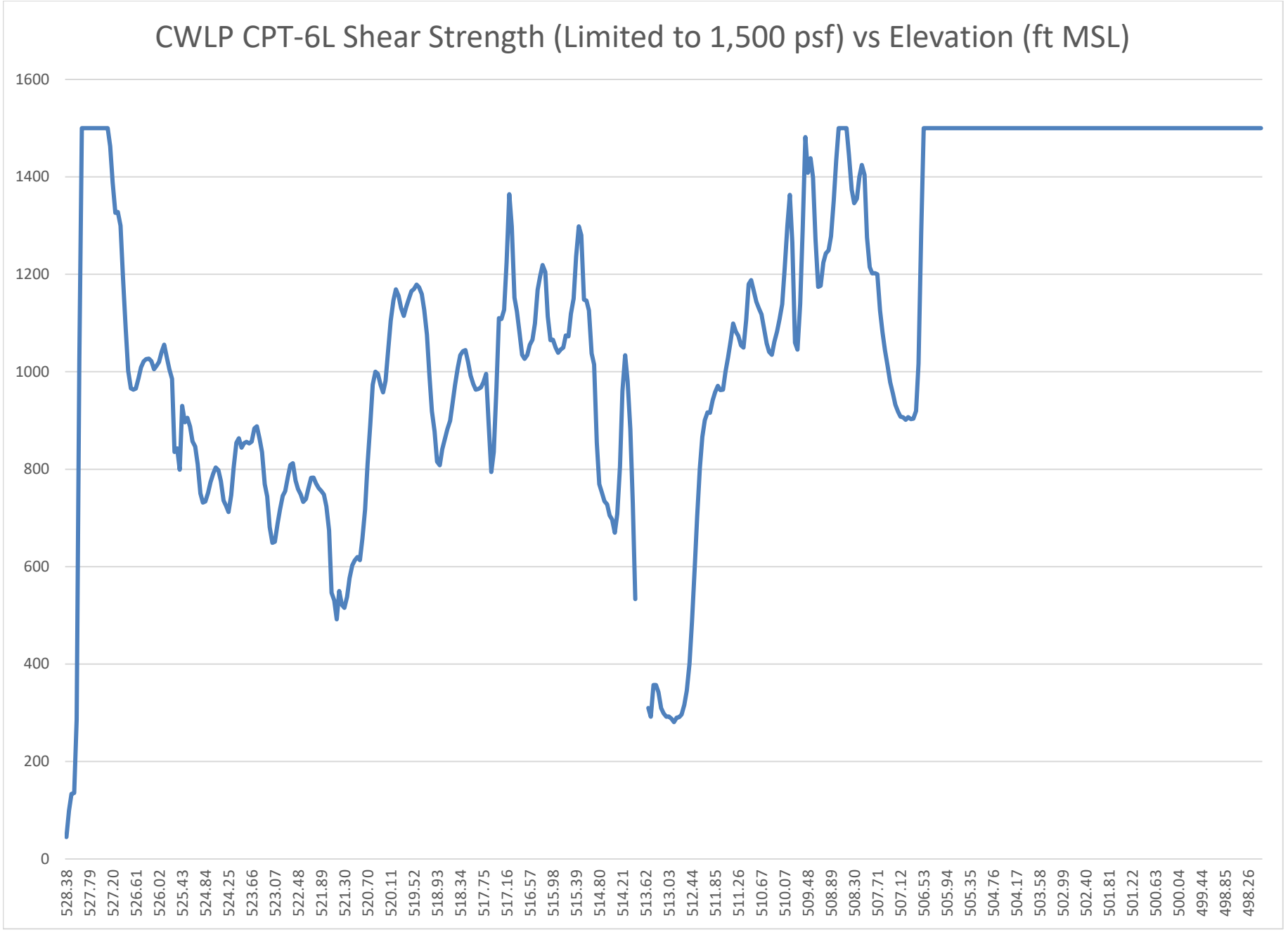
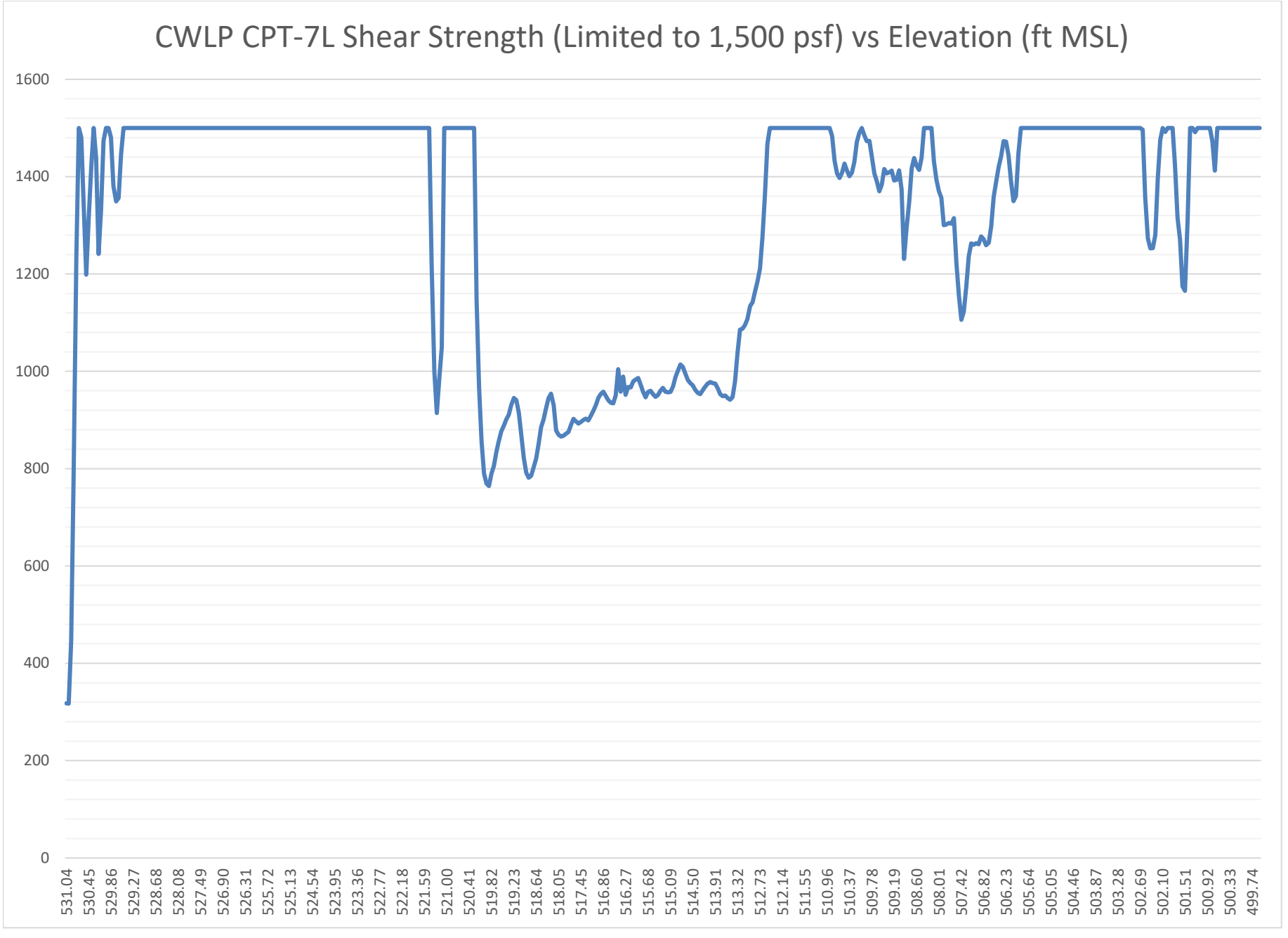
Classification by Robertson 1986




CWLP CPT-2L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
533.66
533.13
532.61
532.08
531.56
531.03
530.51
529.98
529.46
528.93
528.41
527.88
527.36
526.83
526.31
525.78
525.26
524.73
524.21
523.68
523.16
522.63
522.11
521.58
521.06
520.53
520.01
519.48
518.96
518.43
517.91
517.38
516.86
516.33
515.81
515.28
514.76
514.23
513.71
513.18
512.66
512.13
511.61
511.09
510.56
510.04
509.51
508.99
508.46
507.94
507.41
506.89
506.36
505.84


CWLP CPT-4L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
538.06
537.27
536.48
535.70
534.91
534.12
533.33
532.55
531.76
530.97
530.18
529.40
528.61
527.82
527.03
526.25
525.46
524.67
523.88
523.10
522.31
521.52
520.73
519.95
519.16
518.37
517.58
516.80
516.01
515.22
514.44
513.65
512.86
512.07
511.29
510.50
509.71
508.92
508.14
507.35
506.56
505.77
504.99
504.20
503.41
502.62
501.84
501.05
500.26
499.47
498.69
497.90
497.11
496.32
495.54
494.75


CWLP CPT-6L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
528.38
527.79
527.20
526.61
526.02
525.43
524.84
524.25
523.66
523.07
522.48
521.89
521.30
520.70
520.11
519.52
518.93
518.34
517.75
517.16
516.57
515.98
515.39
514.80
514.21
513.62
513.03
512.44
511.85
511.26
510.67
510.07
509.48
508.89
508.30
507.71
507.12
506.53
505.94
505.35
504.76
504.17
503.58
502.99
502.40
501.81
501.22
500.63
500.04
499.44
498.85
498.26


CWLP CPT-7L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
531.04
530.45
529.86
529.27
528.68
528.08
527.49
526.90
526.31
525.72
525.13
524.54
523.95
523.36
522.77
522.18
521.59
521.00
520.41
519.82
519.23
518.64
518.05
517.45
516.86
516.27
515.68
515.09
514.50
513.91
513.32
512.73
512.14
511.55
510.96
510.37
509.78
509.19
508.60
508.01
507.42
506.82
506.23
505.64
505.05
504.46
503.87
503.28
502.69
502.10
501.51
500.92
500.33
499.74

APPENDIX D:
Fly Ash Technical Paper

PDF_0279

Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples

Nicholas A. Lacour

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Master of Science
In
Civil Engineering

Adrián Rodriguez-Marek, Chair
Joseph Dove
James Martin

19 June, 2012
Blacksburg, Virginia

Keywords: coal combustion residuals, fly ash, bottom ash, surface impoundments

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Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples

Nicholas Alexander Lacour

ABSTRACT

Traditionally, coal combustion residuals (CCRs) were disposed of with little engineering consideration. Initially, common practice was to use a wet-scrubbing system to cut down on emissions of fly ash from the combustion facilities, where the ash materials were sluiced to the disposal facility and allowed to sediment out, forming deep deposits of meta-stable ash. As the life of the disposal facility progressed, new phases of the impoundment were constructed, often using the upstream method. One such facility experienced a massive slope stability failure on December 22, 2008 in Kingston, Tennessee, releasing millions of cubic yards of impounded ash material into the Watts Bar reservoir and damaging surrounding property. This failure led to the call for new federal regulations on CCR disposal areas and led coal burning facilities to seek out geotechnical consultants to review and help in the future design of their disposal facilities. CCRs are not a natural soil, nor a material that many geotechnical engineers deal with on a regular basis, so this thesis focuses on compiling engineering characteristics of CCRs determined by different researchers, while also reviewing current engineering practice when dealing with CCR disposal facilities. Since the majority of coal-burning facilities used the sluicing method to dispose of CCRs at one point, many times it is desirable to construct new "dry-disposal" phases above the retired ash impoundments; since in-situ sampling of CCRs is difficult and likely produces highly disturbed samples, a sample reconstitution technique is also presented for use in triaxial testing of surface impounded CCRs.

PDF_0281

Acknowledgments

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Chapter 1

Introduction and Background

Ever since the promulgation of the Resource Conservation and Recovery Act in 1976, there has been debate on the proper waste classification of coal combustion by-products. They have traditionally been disposed of in a fashion similar to that of mine tailings wastes. However, the failure of the Kingston Fossil Plant's main disposal cell on December 22, 2008 has once again led to discussions on how to properly regulate the disposal of these materials. From an engineering standpoint, geotechnical engineers have very little experience with coal combustion wastes, which have some unique engineering properties that set them apart from naturally occurring soils. A comprehensive literature review and compilation of engineering properties of coal combustion residual materials is consolidated and compared between researchers from different nations. Additionally, a triaxial sample reconstitution technique is proposed for surface impounded coal combustion residuals (different types of coal combustion residuals are addressed in section 1.1) which minimizes particle segregation and ensures constant density across the height of the sample. This chapter presents an introduction to the thesis and presents a brief summary of the December 22, 2008 slope stability failure at the Tennessee Valley Authority's (TVA's) Kingston power plant, which served as an inspiration for this thesis.

1.1 Introduction

Coal is the most commonly used fuel in generating electrical energy in the United States. In 2009, coal-powered steam turbines produced 45% of the almost 4 trillion kilowatt-hours of

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consumed energy in the US (Energy Information Administration 2010). With the burning of such large quantities of coal, there is naturally also a large amount of ash and other byproducts. The four main types of byproducts of burnt coal as described by the Environmental Protection Agency (EPA 2011) are:

Fly Ash: mostly spherical silt to clay-sized particles composed mostly of silica removed from plant exhaust gases through the use of electrostatic precipitators or bag-houses with secondary scrubber systems.

Bottom Ash: coarse, porous, angular fine sand to fine gravel-sized particles of agglomerated ash formed in pulverized ash furnaces.

Boiler Slag: molten bottom ash collected at the base of slag tap and cyclone type furnaces that is quenched with water, causing it to fracture, crystallize, and form pellets. It is composed of hard, black, angular particles that have a smooth, glassy appearance.

Flue Gas Desulfurization (FGD) Material: product of a process used for reducing SO_2 emissions from the gas system of a coal-fired boiler. Depending on the scrubbing process, the material is either predominantly calcium sulfite ($CaSO_3$), calcium sulfate ($CaSO_4$), or a mixture of the two. It consists of small, fine, particles. Calcium Sulfate FGD material can be used in place of gypsum ($CaSO_4 \cdot 2H_2O$) in wallboard manufacturing or in cement production, while calcium sulfite can be used as embankment and road base material.

There are beneficial reuses for each of these byproducts, though generation almost always outweighs demand. In order to avoid confusion, when referring to these byproducts, the definitions outlined by EPA (*Federal Register* 2010) will be used. When referring to burnt-coal byproducts being beneficially used, the term Coal Combustion Products (CCPs) will be used, while Coal Combustion Residuals (CCRs) will be used when referring to byproducts that are destined for disposal.

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Use of CCPs are unique to the application in which they are being utilized. Therefore, the focus of this thesis is on the geotechnical engineering properties and design and monitoring considerations for CCR landfills and surface impoundments.

Depending on the type of system used to remove fly ash from and/or to desulfurize the exhaust gases of boilers used in electricity generation, CCRs have traditionally been disposed of using either a dry (or, more accurately, a moisture conditioned) placement method or a hydraulic sluicing method . Again referring to EPA definitions (*Federal Register* 2010), any disposal area where CCRs are disposed of using a dry method will be referred to as a CCR landfill, while any area that CCRs are disposed of hydraulically will be referred to as a CCR surface impoundment. A CCR surface impoundment is a disposal area much akin to a mine tailings dam disposal area, or to a dredge spoil area. While CCR landfill wastes are placed using backhoes or other heavy equipment and compacted in a moist condition, CCR surface impoundment wastes are simply the result of a wet-scrubbing removal system for fly ashes; the effluent from these wet-scrubbing processes is then often mixed with bottom ashes and hydraulically placed in a disposal area contained by some sort of dike system.

As a result of the Kingston Fossil Plant failure, EPA found it necessary to reexamine regulatory policies regarding the disposal of CCRs:

With the promulgation of 42 U.S.C. §6901 (1976), commonly known as the Resource Conservation and Recovery Act (RCRA), CCRs were not initially specified as hazardous (subtitle C) or solid wastes (subtitle D). In 1980, the Solid Waste Disposal Act amendments to RCRA were enacted, one of which was the “Bevill Amendment”, 42 U.S.C. §6921 (b)(3)(A)(i). This amendment temporarily exempted CCRs from subtitle C regulation, classifying them as subtitle D, which is subject to state regulation. In 1988, EPA released a report entitled *Wastes from the Combustion of Coal by Electric Utility Power Plants* in which they concluded that the four above-mentioned CCRs did not exhibit hazardous characteristics according to RCRA regulations and would therefore not be regulated under Subtitle C. However, it was not until August 9, 1993 that EPA issued the final regulatory determination applicable to these CCRs (*Federal Register* 1993), stating that regulation of them as hazardous wastes was unwarranted (Dockter and Jagiella 2005).

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Most recently, on June 21, 2010, EPA announced their intent to regulate CCRs generated from the combustion of coal at electric utilities under the RCRA. The EPA announcement introduced two options:

- EPA would reverse the 1993 and 2000 exemptions of CCRs under the Bevill Amendment and list them as special wastes subject to regulation under subtitle C of RCRA when they are destined for disposal in landfills or surface impoundments.
- EPA would leave the Bevill determination in place while regulating the disposal of CCRs under subtitle D of RCRA by issuing national minimum criteria.

Regardless of the chosen alternative, EPA is also proposing to establish dam safety requirements in order to address the stability of CCR surface impoundments to prevent catastrophic releases like that at the TVA Kingston plant. EPA has suggested the adoption of the Hazard Potential Classification System for Dams, developed by the U.S. Army Corps of Engineers, since it would be relatively straightforward in its application to surface impoundments.

The main purpose of this thesis is to consolidate current published material on the properties of CCRs and to quantify the variability within the engineering properties of CCRs between countries, individual power plants, and CCR types. Furthermore, CCR impoundment areas are plentiful across the U.S. and power generating companies would prefer to begin dry disposal of CCRs directly over retired CCR surface impoundments. In order to do this, a geotechnical site investigation must be performed, in which the static and dynamic shear strengths of the surface impounded materials are analyzed. Since CCRs tend to be non-plastic in nature, undisturbed sampling is often difficult, time consuming, costly, and anything but "undisturbed." Therefore, a second objective of this thesis is to analyze a slurry deposition specimen reconstitution technique that is easier and less costly than undisturbed sampling, in order to determine if this specimen reconstitution technique forms samples of uniform relative density without particle segregation.

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1.2 Kingston Fossil Plant Failure

The Kingston Fossil Plant is a coal-fired electrical power plant constructed and operated by the Tennessee Valley Authority (TVA). Construction on the facility began in 1951 and the first coal-fired electrical unit began in 1954. Ash slurries were initially released into a slack water area created by a two dikes with a gap in-between to allow water from the Watts Bar Reservoir to enter. The ash slurries and the waters of the reservoir were then allowed to commingle until the two dikes were connected in 1958, separating the reservoir and the ash disposal area. This slack water area collected silt and clay sediments from the period of 1942 to 1954; after 1954, disposed ash was added to the silts and clays being deposited and with the construction of the closure dike, additional clay runoff sediment was deposited along with the runoff silts, reservoir clays, and disposed ash. This formed a slick, weak layer found by AECOM to be a major contribution to the ash disposal area's failure in December of 2008 (Walter and Butler 2009).

The AECOM Root Cause Analysis report attributed the failure as most likely due to creep in the aforementioned weak layer due to active loading in a dredge cell contained within the disposal area. This creep caused an initial failure of various disposal phase dikes founded on older disposed ash deposits, which, in turn, caused progressive failure of upstream ashes, leading to undrained loading and subsequent failure of the downstream ash material and disposal area perimeter dike. The upstream progressive failure stopped upon reaching a former divider dike within the disposal area. The estimated ash released in the failure was 5.4 million cubic yards. Figure 1 provides an aerial photograph of the disposal area before and after the slope failure.

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Figure 1: Aerial photographs comparing the Kingston Fossil Plant ash disposal area before and after the massive slope failure on December 22, 2008.

While this failure may have occurred because of a very unique site condition, AECOM did note in their Root Cause Analysis report that "extensive void ratio data in un-failed areas of the Dredge Cells showed a lack of significant consolidation of the wet ash with depth," which would indicate that strength would not increase significantly with depth in the disposed ash material. This property also raises the question of stability of these sort of disposal areas under dynamic loading. If surface-impounded coal ashes do not tend to increase in density with depth, this could leave a very deep, potentially liquefiable layer of CCRs at a given site, rather than just a single liquefaction-prone layer (which is usually the case in naturally-deposited soils).

The entire Root Cause Analysis report and other investigatory data for the Kingston Fossil Plant failure can be accessed on the TVA website at http://www.tva.gov/kingston/rca/.

1.3 Outline

This thesis is composed of eight chapters. The first chapter introduces the background as well as inspiration for the thesis topic. Chapters two and three provide consolidated research results on the static and dynamic engineering properties of CCRs, respectively. Chapter four discusses

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similarities between mine tailings disposal areas and CCR disposal areas and provides some guidance on how monitoring techniques developed for mine tailings disposal areas can be directly applied or slightly modified so that they can be applied to CCR disposal areas. Chapters five and six address how slope stability and settlement analyses can differ for CCR materials as opposed to naturally occurring soils. Chapter seven provides a review of common triaxial reconstitution techniques used on granular materials, while also analyzing a reconstitution technique to determine if it produces homogenous samples in terms of grain size distribution and relative density with height. Finally, chapter eight provides some final observations for each chapter, as well as a summary of topics that require further research in the future.

Chapter 2

Engineering Characterization of CCRs

Index and mechanical properties of soils provide the basic information required to design earth retaining structures, foundations, and earthen embankments and to perform slope stability analyses; determining the index properties and running field and laboratory tests to determine these properties is the first step in any geotechnical engineering application. In any given region, there is a large body of literature from past projects describing the local soils that engineers can use as a resource to accelerate this initial process. CCRs, however, are not a natural soil and have characteristics that make their behavior in certain situations markedly different than natural soils of similar grain size; additionally, coal ashes can vary considerably from one site to another based on differences in the coal source, coal preparation methods, type of power plant unit, and combustion temperatures (Yudbhir and Honjo 1991). This chapter outlines some of the major differences in the properties of CCRs as compared to other soils and compiles some CCR characteristics obtained from published technical literature. Additionally, test data from engineering reports for five specific coal combustion plants in the U.S. are included; however, information identifying the specific plants has been omitted at the request of the plant operators. These five plants are referred to as Site 1 through Site 5 consistently throughout this thesis.

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2.1 Specific Gravity

Perhaps one of the most unusual characteristics of CCRs is their wide range of specific gravities. While some CCRs may have specific gravities of around 2.7 or even 2.8, some have been reported to have specific gravities as low as 1.47. Table 1 provides some values of specific gravity (G_s) determined for CCRs by researchers in different countries.

Table 1: Reported specific gravities of CCRs from different countries

Reference	Type of CCR	Country	G_s
Martin et al. (1990)	Fly Ash	USA	2.03-2.49
Tu et al. (2007)		USA	2.10-2.40
Kim and Prezzi (2008)		USA	2.30-2.81
Site 3		USA	2.42-2.71
Site 4		USA	2.21-2.73
Sridharan et al. (1998)		India	1.95-2.31
Pandian and Balasubramonian (1999)		India	1.97-2.55
Prashanth et al. (1999)		India	2.03-2.67
Sridharan et al. (2001)		India	2.07-2.55
Trivedi and Sud (2004)		India	1.72-2.03
Pandian (2004)		India	1.95-2.55
Das and Yudhbir (2005)		India	2.14-2.62
Prakash and Sridharan (2006)		India	1.95-2.55
Prakash and Sridharan (2009)		India	1.66-2.55
Jakka et al. (2010)		India	2.18-2.27
Raymond (1961)		UK	2.05-2.26
Sherwood (1975)		UK	1.90-2.37
Indraratna and Nutalaya (1991)		Canada	1.90-2.90
		Thailand	2.27-2.45
Kolay and Kismoor (2009)		Malaysia	2.11-2.31
Muhardi et al. (2010)		Malaysia	2.50-2.70
Site 1	Surface Imp.	USA	2.13-2.30
Site 2		USA	2.16-2.26
Site 3		USA	2.55-2.62
Site 4		USA	2.20-2.47
Site 5		USA	2.29-2.61

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Reference	Type of CCR	Country	G_s
Sridharan et al. (1998)		India	1.91-2.15
Sridharan et al. (2001)		India	1.96-2.66
Trivedi and Sud (2002)		India	1.60-2.10
Trivedi and Sud (2004)		India	1.98-2.00
Pandian (2004)		India	1.91-2.50
Prakash and Sridharan (2006)		India	1.91-2.50
Bera et al. (2007)		India	2.16-2.23
Prakash and Sridharan (2009)		India	1.64-2.66
Skarzynska et al. (1989)		UK	2.10-2.24
		Poland	1.90-2.31
Seals et al. (1972)	Bottom Ash	USA	2.28-2.78
Sridharan et al. (1998)		India	1.82-2.15
Sridharan et al. (2001)		India	1.98-2.19
Pandian (2004)		India	1.82-2.15
Prakash and Sridharan (2006)		India	1.66-2.17
Prakash and Sridharan (2009)		India	1.47-2.19
Jakka et al. (2010)		India	2.50-2.59
Kolay and Kismoor (2009)		Malaysia	2.09-2.32

Despite the wide range of specific gravities observed for CCRs, most researchers recognize that they usually have a specific gravity lower than that of natural soils (Prakash and Sridharan 2009, Trivedi and Singh 2004b, Tu et al. 2007). It logically follows that since the unit weight of CCRs is less than that of natural soils, horizontal earth pressures in CCRs will be less than that of natural soils as well. Prakash and Sridharan (2009) cite this as a property that makes them ideal for use as backfill material for retaining structures or as a lightweight fill in other construction applications.

Many factors contribute to variability in the specific gravity of coal ashes, such as the parent coal and the combustion and cooling processes. Figure 1 compares variability of the specific gravity of different coal ashes from different countries. Additionally, some of the research studies done on ash from several different plants have a much higher variability than studies done on specific sites, indicating that variability in the specific gravity of CCRs within a given plant is lower than the specific gravity of CCRs within the country where that plant is in. Examining Figure 2, it is interesting to note the clear difference in the mean values of specific gravity between US coal ashes and Indian coal ashes; this may be due to higher iron contents in

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US coals. Table 2 provides percentages of major constituent oxides in CCRs from different countries by weight, which shows how much the mineralogy of CCRs can vary between countries, another factor that can account for high variability in the specific gravity of CCRs from different countries (Yudbhir and Honjo 1991). Loss on ignition (LOI) for the CCRs is also reported in Table 2, that is, the loss in mass of the samples upon strong heating.

Table 2: Percentages by weight of major oxide constituents of CCRs from different countries (after Yudbhir and Honjo 1991).

Constituents	USA	UK	Canada	India	Thailand	Japan	Hong Kong	China	Australia	S. Africa	Poland	Germany
SiO_2	28-59	37-54	37-59	13-64	27-34	50-62	38-77	44-55	44-73	40-53	43-52	48
Al_2O_3	7-38	17-33	12-24	14-31	19-28	22-30	14-46	20-32	16-33	24-35	19-34	25
Fe_2O_2	4-42	6-22	3-39	3-24	20-24	4-7	1-18	1-17	3-6	5-11	1-13	7
CaO	0-13	1-27	1-13	1-34	11-16	3-7	0-16	5-9	0-9	5-10	2-9	3
LOI	0-48	0-27	0-10	0-16	0-2	1-6	4-8	3-9	1-9	2-11	2-10	-
Glass Content	54-87	54-87	54-95	-	-	56-58	-	29-40	49-60	29-43	-	-

Note: LOI = loss on ignition

2.2 Consolidation Properties and Volume Stability

CCRs have historically been disposed of in two major ways: collected from boilers hydraulically and diverted to a surface impoundment or collected through electrostatic precipitators or flue gas desulfurization systems and dry-placed into CCR landfills. In either of these disposal alternatives, there is traditionally no defined level of compactive effort used and depending on future uses of the disposal sites, the consolidation characteristics of CCRs can be of interest to geotechnical engineers. Again, since CCRs are not naturally occurring soils, there has been little testing on their consolidation properties and volume stability. Table 3 provides compression and recompression indices and coefficients of consolidation determined by different researchers.

Few researchers report a value for the recompression index; in a disposal area, there would not necessarily be an unloading-reloading process during normal operations. Whenever recompression indices are reported, it is usually in reference to reuse of CCRs in construction applications. Furthermore, the recompression indices reported are extraordinarily low. The reported values of coefficient of consolidation, c_v, are highly variable, as might be expected for materials that have non-typical stress histories. Furthermore, it is important to note that values of

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c_v cannot be determined using the traditional Taylor or Casagrande methods, since the majority of deformation for laboratory consolidation tests is complete within one minute; therefore, it is necessary to take deformation readings at very small time intervals (Yudbhir & Honjo 1991). It is also important to note that reported values of c_v mean little independent of the vertical effective stress at which that value was recorded, since the coefficient of consolidation is dependent on both the compressibility of the material and the permeability of the material, based on Terzaghi's original one-dimensional consolidation equation:

$$c_v = \frac{1}{\gamma_w}\frac{k_v}{m_v} \tag{1}$$

where c_v = coefficient of consolidation
γ_w = unit weight of water
k_v = vertical coefficient of permeability
m_v = coefficient of compressibility

Since both k_v and m_v generally decrease with increasing overburden stress, but not necessarily at the same rate, it is hard to relate the coefficient of consolidation to the compression and recompression indices in a general manner. Consequently, the values of c_v reported in Table 3 should not be taken as "typical" values, because of how c_v is mathematically defined.

Some of the variability of compression and recompression indices and coefficient of consolidation of CCRs can be attributed to the type of CCR. For example, it is logical to assume that bottom ash would have a higher coefficient of consolidation, since it has a higher hydraulic conductivity and a lower compressibility than fly ash. For this reason, variability plots for fly ash and surface impounded ash have been presented separately from those for bottom ash. Figures 3 through 5 present variability plots for the compression and recompression indices for different types of CCRs. Since the recompression index of bottom ash is rarely determined by researchers, the variability plot for recompression index includes fly ash, surface impounded ash, and bottom ash. Figure 6 presents a variability plot for the coefficient of consolidation for CCRs at different placement conditions.

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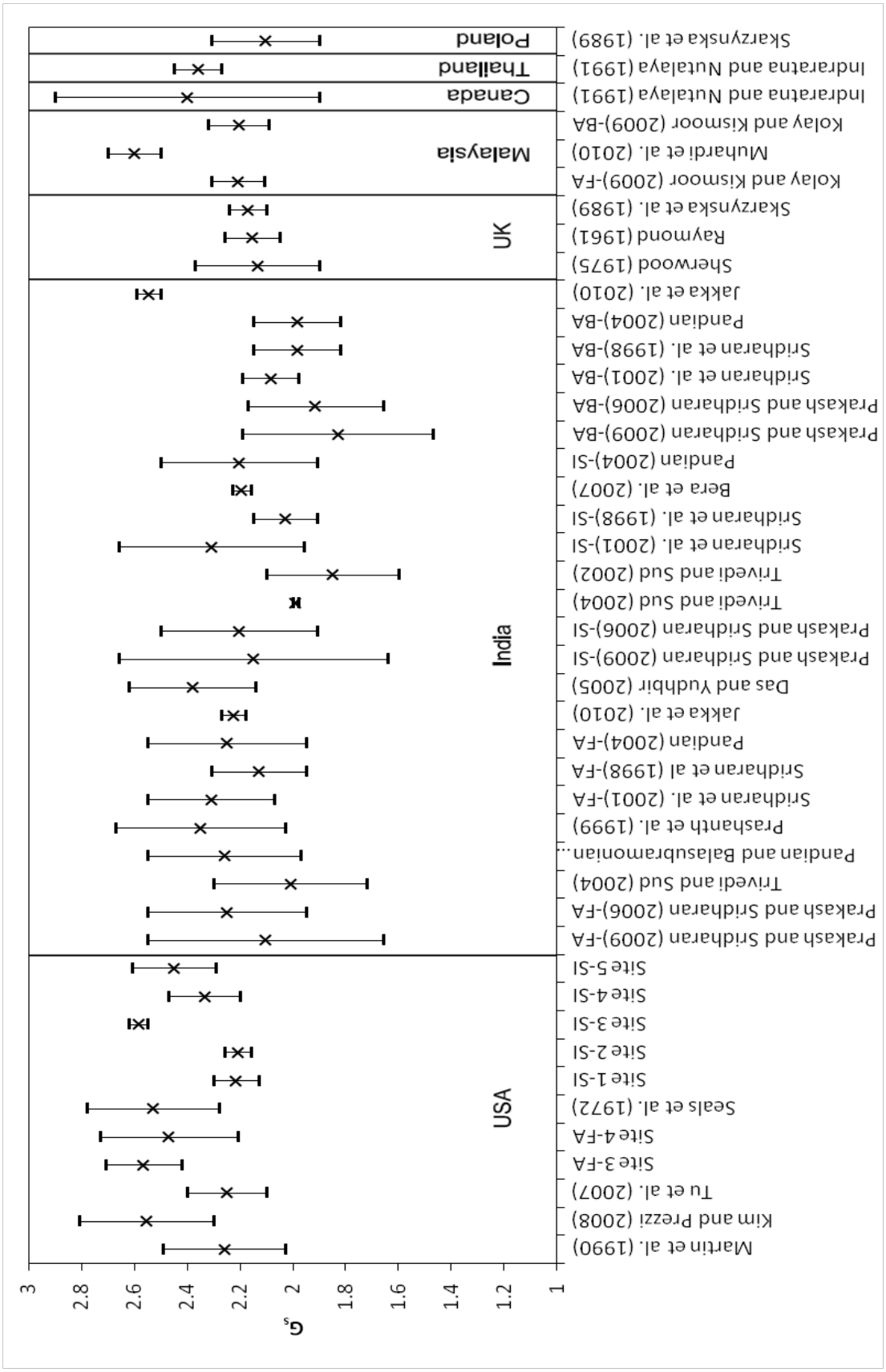

Figure 2: Variability plot for the specific gravities determined by studies performed in different countries.

PDF_0303

Table 3: Compression and recompression indices and coefficients of consolidation for CCRs reported by different researchers.

Reference	Type of CCR	Country	C_c	C_r	C_v (cm^2/s)	Vertical Stress (psi)
Tu et al. (2007)	FA Resed.	USA	0.0390-0.0640	0.0035-0.0072	2.00-70.0	0.203-150
Site 1	SI	USA	0.080-0.710	0.0100-0.0300	-	0.694-111
Pandian and Balasubramonian (1999)	FA	India	-	-	0.00200-0.0802	0.73-116
Trivedi and Sud (2002)	SI/MH	India	0.00600-0.0100	0.000300-0.00300	-	3.34-116
Kaniraj and Gayathri (2004)	FA Comp.	India	0.0410-0.0840	0.00800	0.080-2.00	1.42-182
Pandian (2004)	FA	India	0.0490-0.284	-	1.16×10^{-5}-1.27×10^{-4}	7.12-113
	SI	India	0.0520-0.300	-	2.93×10^{-7}-8.17×10^{-4}	0.00-56.9
	BA	India	0.0570-0.484	-	7.57×10^{-7}-3.35×10^{-5}	0.00-56.9
Madhyannapu et al. (2008)	FA Resed.	India	0.100-0.167	0.00400-0.00800	-	
Prakash and Sridharan (2009)	FA Comp.	India	-	-	0.140-3.25	-
	SI Comp.	India	-	-	0.960-10.0	-
	BA Comp.	India	-	-	1.43-10.15	-
Jakka et al. (2010)	FA Comp.	India	0.079-0.246	0.018-0.023	-	7.26-29.0
	BA Comp.	India	0.051-0.059	0.013-0.024	-	7.26-29.0
Kolay and Kismoor (2009)	FA Comp.	Malaysia	0.0490-0.0510	-	-	319-2467
	SI Comp.	Malaysia	0.0780	-	-	319-2468
	BA Comp.	Malaysia	0.103-0.113	-	-	319-2469
Muhardi et al. (2010)	FA Comp.	Malaysia	0.150	-	3.00×10^{-5}-1.53×10^{-4}	-
	BA Comp.	Malaysia	1.54	-	-	-
Yudhbir and Honjo (1991)	FA Comp.	-	0.0300-0.375	-	-	-
	FA SI	-	0.0650-0.610	-	-	-
	FA SID	-	0.610-0.885	-	-	-
CAPCO (1990)	FA Comp.	Hong Kong	-	-	9.51×10^{-3}-1.90^{-2}	-
Haws et al. (1985)	FA Comp.	UK	-	-	9.51×10^{-4}-6.34×10^{-3}	-
Koo (1991)	FA Comp.	Thailand	-	-	3.17×10^{-4}-7.61×10^{-3}	-

FA = fly ash
BA = bottom ash
SI = surface impoundment ash
SID = surface impoundment/loose dry dump ash
MH = mixed hopper ash
Comp. = compacted
Resed. = resedimented

PDF_0304

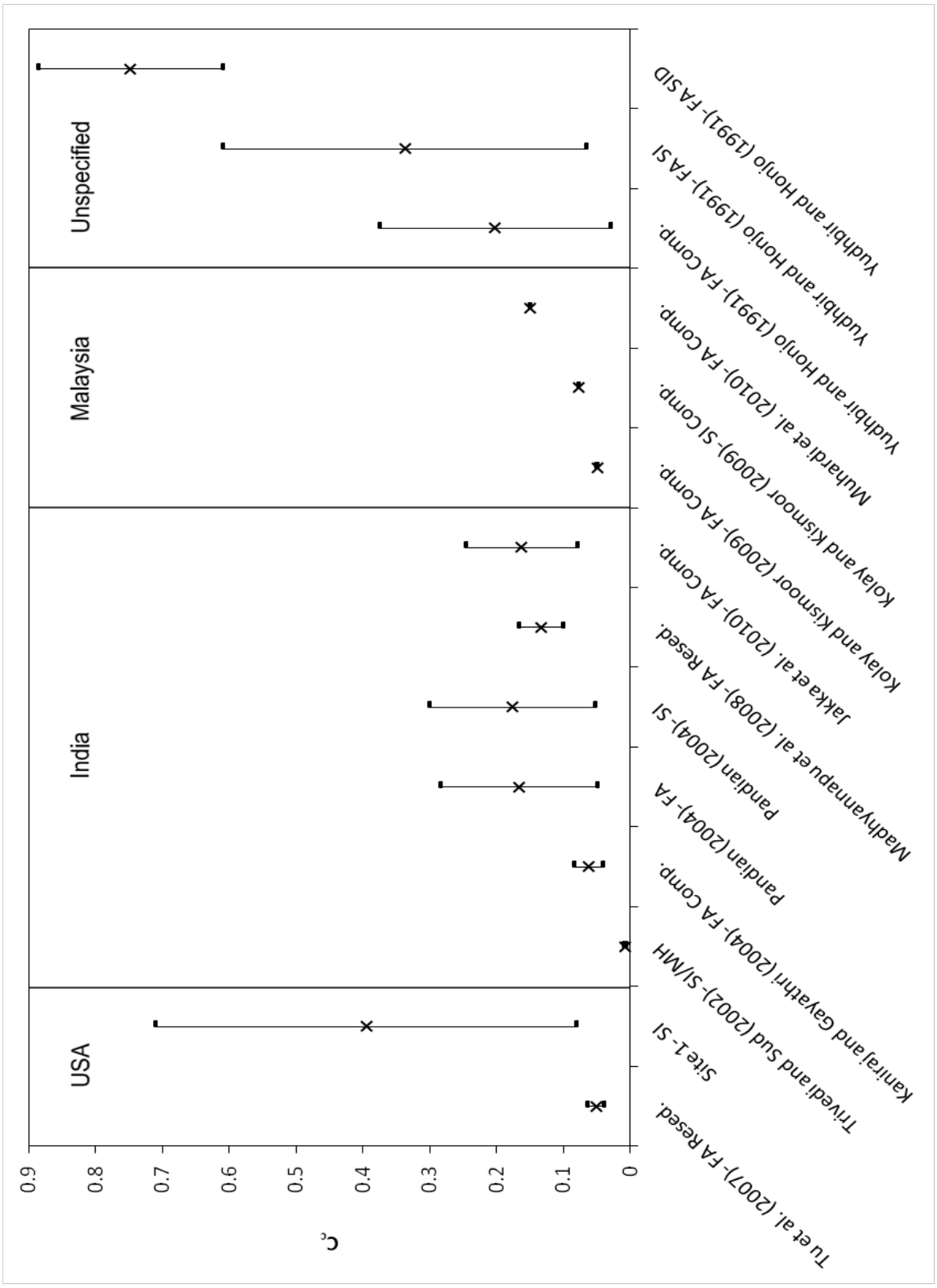

Figure 3: Variability plot for the compression indices of studies done on fly ashes and surface impounded ashes.

PDF_0305

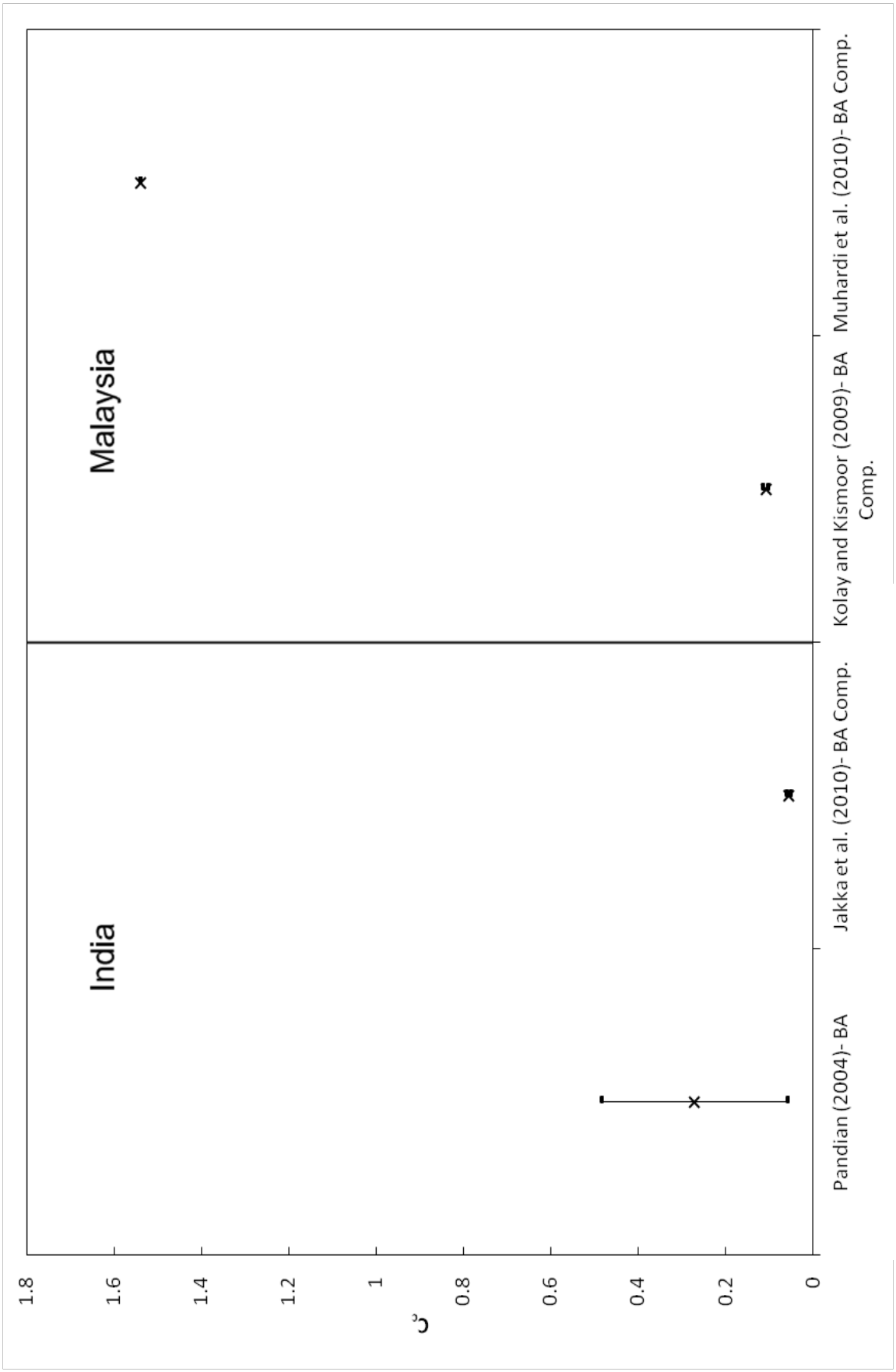

Figure 4: Variability plot of the compression indices for studies done on bottom ashes.

PDF_0306

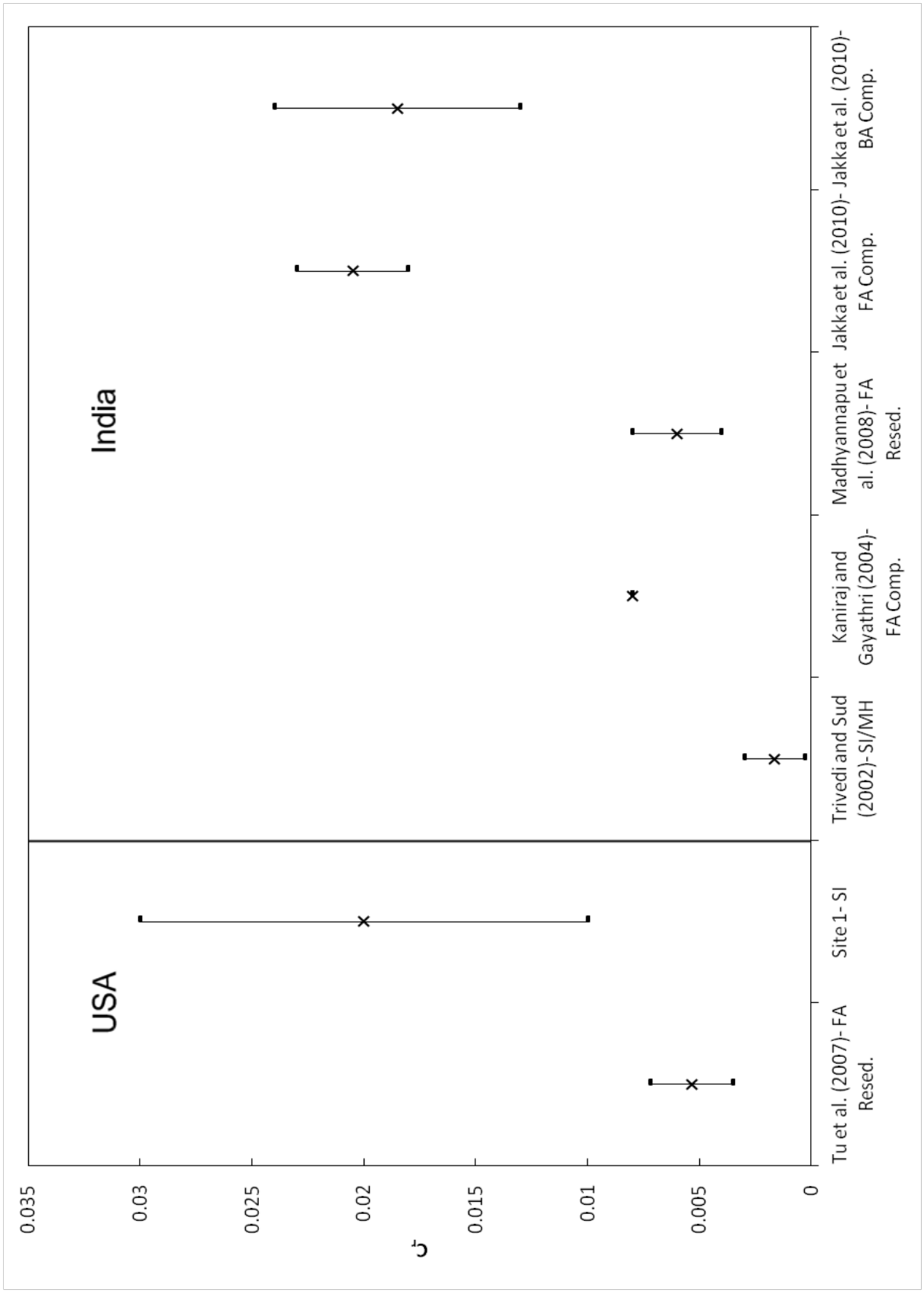

Figure 5: Variability plot of the recompression indices for studies done on fly ashes, bottom ashes, and surface impounded ashes

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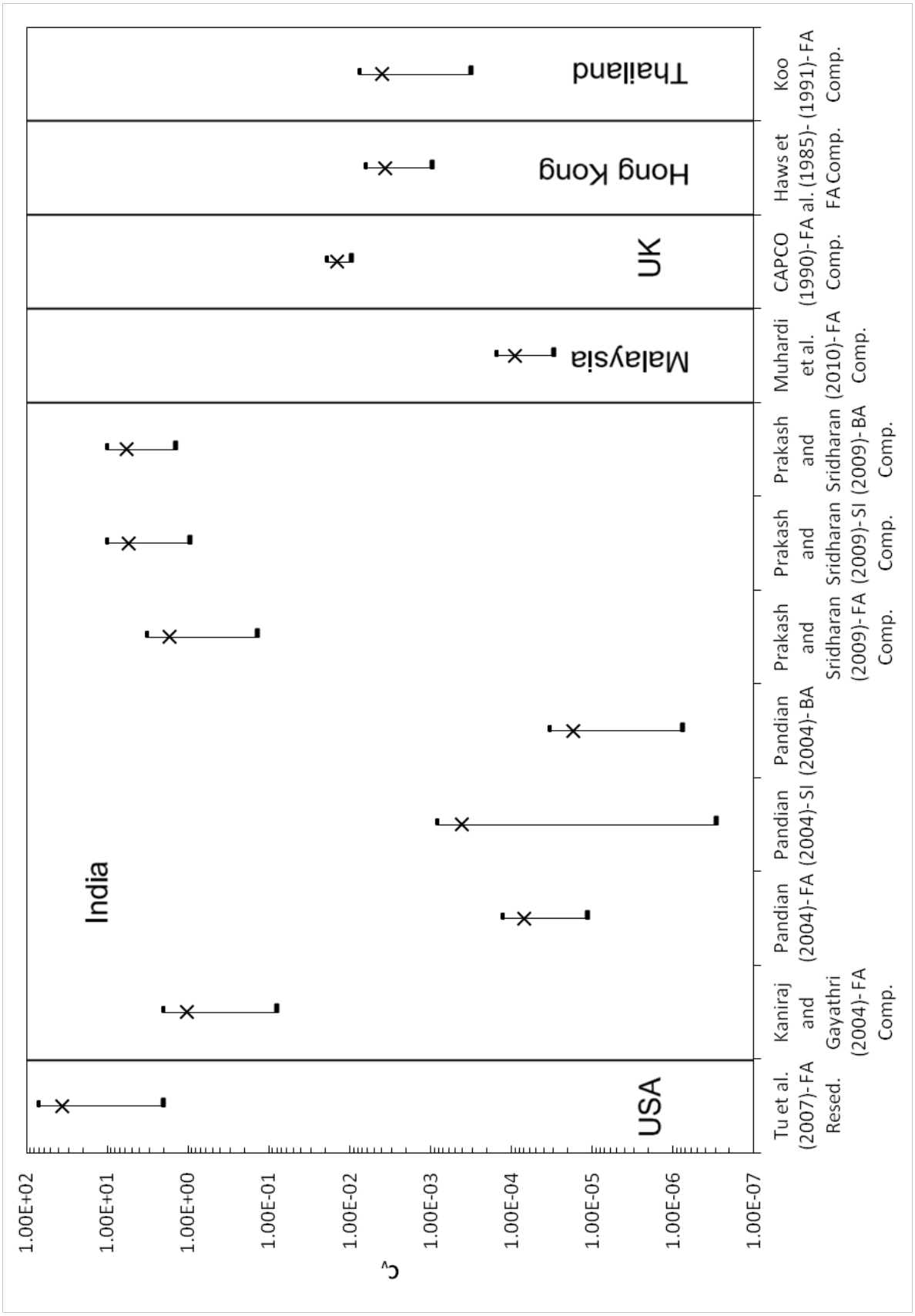

Figure 6: Variability plot for the coefficient of consolidation of studies done on fly ash, bottom ash, and surface impounded ash.

PDF_0308

If structures are to be built on former CCR disposal areas or dry-disposed ashes are to be placed on hydraulically-placed deposits, volume stability of CCRs can also be of engineering concern. Swell, shrink, and collapse potentials are the three main types of volume instability examined for soils.

According to Sridharan and Prakash (2009), the swell potential of a soil can be examined through the use of the free swell ratio (FSR) which is defined as

$$FSR = \frac{V_d}{V_k} \tag{2}$$

where V_d = sediment volume of 10 g of oven-dried soil that passes a 425 µm sieve placed in a 100 ml jar which is then filled with de-aired water.

V_k = a sample identical to V_d except the solute is carbon tetrachloride or kerosene.

Note: a fume hood is required if there are any hazardous materials associated with the samples being tested

The swell potential can be determined based on the ranges of FSR as outlined in Table 4:

Table 4: Classification of Soils based on FSR (adapted from Sridharan and Prakash 2000)

FSR	Soil Type	Swell Potential
≤1.0	Nonswelling	Negligible
1.0-1.5	Mixture of swelling and nonswelling	Low
1.5-2.0	Swelling	Moderate
2.0-4.0	Swelling	High
>4.0	Swelling	Very High

Additionally, ASTM D4829 (2003), "Standard Test Method for Expansion Index of Soils," provides a standardized method of determining the swell potential of soils based on the expansion index (EI_{50}). In order to determine the EI_{50} of a soil, a dried soil sample must first be mixed with distilled water to the approximate optimum moisture content and allowed to sit in an air-tight container for at least 16 hours. Then, the conditioned soil is compacted in a 4.01 inch diameter mold in two two-inch lifts using 15 well-distributed blows of a 5.5 lb, 2.00 inch diameter rammer dropped from a height of 12 inches. Once the sample degree of saturation (S) is measured to be within 40% to 60%, the sample is loaded into a consolidometer and consolidated

PDF_0309

for 10 minutes under a load of 1.0 psi before the initial reading on the dial indicator is taken. The specimen is then inundated with distilled water while periodic readings of the dial indicator are made in accordance with test D2435 (2003) for 24 hours or until the rate of expansion becomes less than 0.0002 inches per hour. The EI of a soil is then defined as

$$EI_{50} = EI_{meas} - (50 - S_{meas}) \cdot \frac{65 + EI_{meas}}{220 - S_{meas}} \tag{3}$$

where S_{meas} = the degree of saturation measured in the test

and

$$EI_{meas} = \frac{\Delta H}{H_1} \cdot 1000 \tag{4}$$

where ΔH = the change in height ($D_2 - D_1$) of the sample, mm
H_1 = initial height, mm
D_1 = initial dial reading, mm
D_2 = final dial reading, mm

The shrink potential of soils is usually assessed based on that soil's shrinkage limit, which is outlined in ASTM D4943 (2002) and calculated according to equation 5:

$$SL = w - \left[\frac{(V - V_d) \cdot \rho_w}{m_s}\right] \cdot 100 \tag{5}$$

where w = moisture content of the soil at the time it was placed in the dish (%)
V = the volume of the wet soil pat = volume of the dish
V_d = volume of the dry soil pat
ρ_w = density of water
m_s = mass of the dry soil pat

However, CCRs are generally non-plastic and ASTM D4943 is only applicable when the soil is cohesive in nature. Based on the fact that CCRs generally have a uniform gradation it can be assumed that they would have a high shrinkage limit (Prakash and Sridharan, 2009).

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The collapse potential of a soil is the percent change in volume of a specimen after inundation. It is usually determined using oedometer tests and, as a result, can either be expressed mathematically in terms of height or void ratio, according to equation 6.

$$C_p = \frac{\Delta h}{h_0} = \frac{\Delta e}{(1 + e_0)} \tag{6}$$

where Δh = change in height of the specimen upon inundation
h_0 = the height of the specimen prior to inundation
Δe = change in void ratio of the specimen upon inundation
e_0 = void ratio of the specimen prior to inundation

Since collapse potential can change given different applied stress levels and overconsolidation states, there are any number of typical collapse potential values for a given soil, depending on the in-situ stress and the preconsolidation pressure of the soil. Generally, if the collapse potential is below 1%, there is no danger of collapse of soil structure (Mudhyannapu et al. 2008, Trivedi and Sud 2004).

It is important to note that collapse potential increases dramatically for some dry-disposed coal ashes when tested in a moist condition as opposed to a dry condition; even soils that classify as non-collapsible in a dry condition can become collapsible in a moist condition. This is due to the presence of soluble substances not present in the coal ashes disposed of using wet disposal methods (Trivedi and Sud 2004).

2.3 Hydraulic Conductivity

An important soil property for seepage calculations for earthen embankments is hydraulic conductivity. This is an especially important property for CCR surface impoundments, since they tend to be deposited in a meta-stable structure. In addition, the CCRs are often used to construct embankments as the surface impoundments are raised. Hydraulic conductivity of CCRs deposited in surface impoundments can display anisotropy as a result of its cyclic, lacustrine-style deposition. For engineering purposes, the hydraulic conductivity of both the compacted embankment material and the disposed CCR material will be of interest, as these values are used in erosion analyses. Table 5

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presents hydraulic conductivities of different types of CCRs from different countries as determined by various researchers. Due to the fact that there are different disposal methods for CCRs and different types of CCRs that are often co-disposed of, there is a wide variety of placement conditions, each of which can potentially create a different soil fabric and therefore a different range of hydraulic conductivities.

The CCRs were divided into two groups in order to assess variability in hydraulic conductivity: fly ash and surface impounded ash/bottom ash. This was done because oftentimes surface impounded ash is made up of both fly ash and bottom ash; this fact, coupled with its loose placement condition ensures hydraulic conductivity will be at the material's naturally highest value. Figures 7 and 8 are variability plots hydraulic conductivity of fly ashes and surface impounded ash/bottom ash from different countries, as determined by different researchers. It is important to note that not all researchers specified whether it fly ash tested was class c or class f (class c exhibits self-cementing properties); this fact could be a further contributor to the variability in values of hydraulic conductivity of fly ashes.

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Table 5: Values of hydraulic conductivity for different CCRs for different countries as determined by different researchers (adapted from Prakash Sridharan 2009)

Reference	Country	CCR Type	Testing Condition	k (cm/s)
Seals et al. (1972)	USA	BA	Relative density = 50%	5.0×10^{-3} to 0.094
McLaren and DiGioia (1987)		Class F FA	$\gamma_{d\,max_SP}$, $\gamma_{d\,max_MP}$	1.3×10^{-5}
		Class F FA	SI or poorly compacted	1.8×10^{-5}
		Class C FA	$\gamma_{d\,max_SP}$, $\gamma_{d\,max_MP}$	1.1×10^{-5}
Martin et al. (1990)		FA	$\gamma_{d\,max_SP}$	1.8×10^{-5} to 1.2×10^{-4}
		BA	$\gamma_{d\,max_SP}$	1.2×10^{-3}
Yudbhir and Honjo (1991)		Class C FA	$\gamma_{d\,max}$	1.0×10^{-7} to 2.0×10^{-7}
		Class F FA	$\gamma_{d\,max}$	2.0×10^{-6} to 6.0×10^{-5}
Glogowski et al. (1992)		Eastern US FA	-	1.9×10^{-5}
		Western US FA	-	3.1×10^{-5}
Site 1		SI	Undisturbed	1.1×10^{-3} to 1.7×10^{-2}
Site 3		FA-SI	Undisturbed	7.0×10^{-7} to 6.5×10^{-7}
		BA	Bulk Recompacted	2.3×10^{-6}
Site 4		FA-Comp.	Undisturbed	1.3×10^{-7} to 8.2×10^{-5}
		SI	Undisturbed	1.6×10^{-5} to 6.3×10^{-5}
Site 5		FA-Comp.	Undisturbed	1.5×10^{-5} to 8.0×10^{-4}
		SI	Undisturbed	4.8×10^{-6} to 4.0×10^{-4}
Pandian and Balasubramonian (1999)	India	FA	Compacted to 0.95 $\gamma_{d\,max}$ and saturated	1.4×10^{-5} to 4.2×10^{-4}
Kaniraj and Gayathri (2004)		FA	$\gamma_{d\,max}$	4.7×10^{-6} to 6.0×10^{-6}
Prakash and Sridharan (2009)		FA	Compacted at $\gamma_{d\,max}$ and saturated	8.0×10^{-6} to 1.9×10^{-4}
		SI	-	5.0×10^{-5} to 9.6×10^{-4}
		BA	-	9.9×10^{-5} to 7.1×10^{-4}
Jakka et al. (2010)		FA	loose	7.0×10^{-7} to 2.1×10^{-6}
		FA	dense	3.5×10^{-7} to 9.4×10^{-7}
		BA	loose	6.0×10^{-6} to 1.3×10^{-5}
		BA	dense	1.4×10^{-6} to 3.7×10^{-6}
Indraratna et al. (1991)	Thailand	Class C FA	$\gamma_{d\,max_SP}$	4.0×10^{-7} to 7.0×10^{-7}
		Class C FA	$\gamma_{d\,max_SP}$, 2 weeks curing	$<10^{-7}$
Gray and Lin (1972)	UK	FA	$\gamma_{d\,max}$	5.0×10^{-7} to 8.0×10^{-5}
Porbaha et al. (2000)	Japan	FA	Slurry (e_i = 0.85 to 1.02)	10^{-5} to 10^{-4}
Skarzynska et al. (1989)	Poland	SI	-	1.5×10^{-5} to 5×10^{-5}
Chan et al. (1986)	Canada	FA	in situ	10^{-7} to 10^{-4}
		BA	-	4.8×10^{-4} to 3.4×10^{-3}
Gitari et al. (2009)	South Africa	FA	Air flush core samples, constant head	4.6×10^{-5} to 6.9×10^{-5}
		BA	Air flush core samples, constant head	8.1×10^{-5} to 4.9×10^{-4}
		FA/BA Dry Dump	Field Slug Tests	2.3×10^{-5} to 9.6×10^{-3}

Note: FA = fly ash; SI = surface impoundment ash; BA = bottom ash; OMC = optimum moisture content; e_i = initial void ratio; FA-SI = surface impounded fly ash; FA-DS = dry-stacked fly ash; FA Comp. = field-compacted fly ash

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Figure 7: Variability plot of the hydraulic conductivity of fly ashes from different countries, as determined by different researchers.

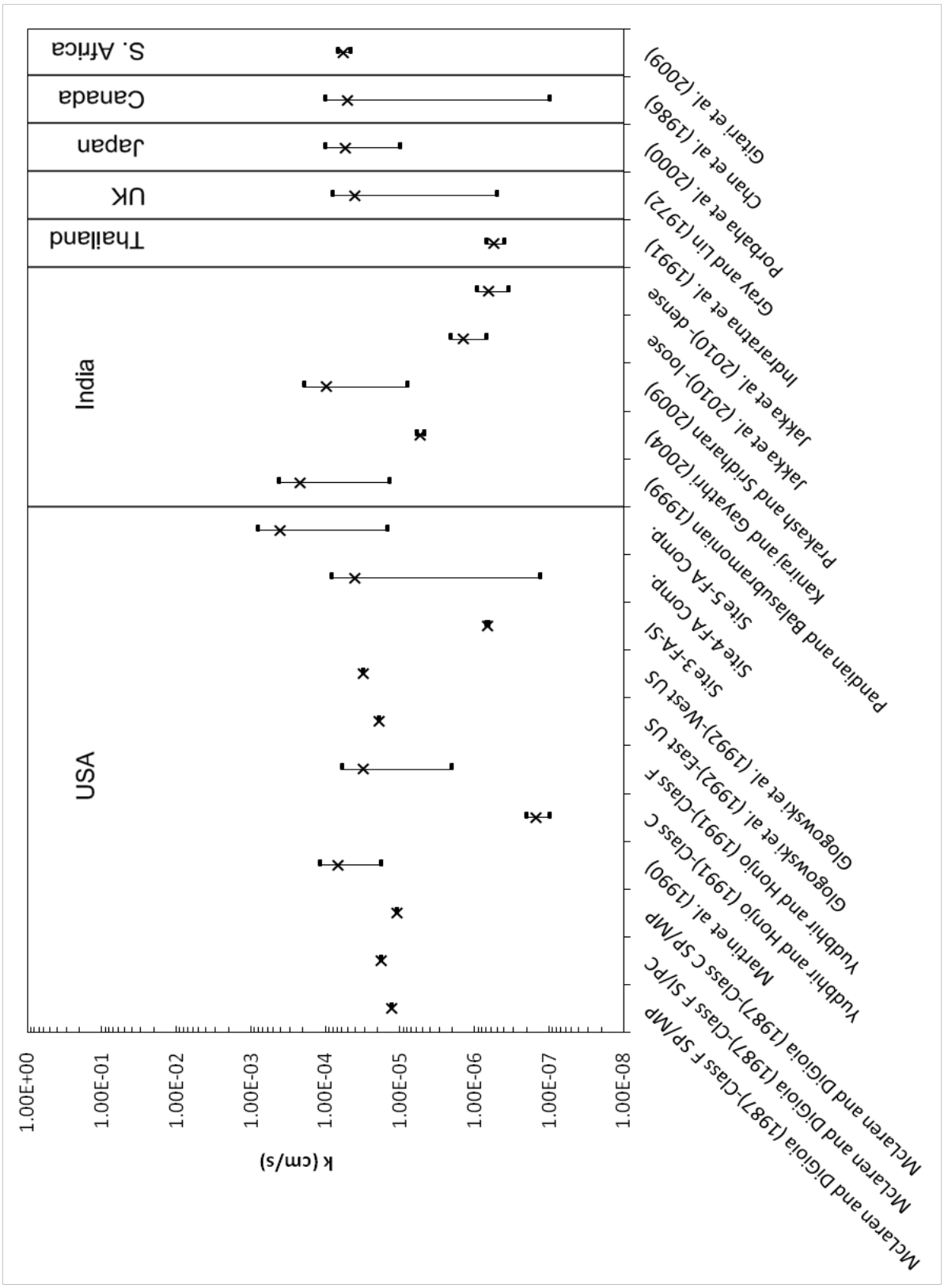

Figure 7: Variability plot of the hydraulic conductivity of fly ashes from different countries, as determined by different researchers.

PDF_0314

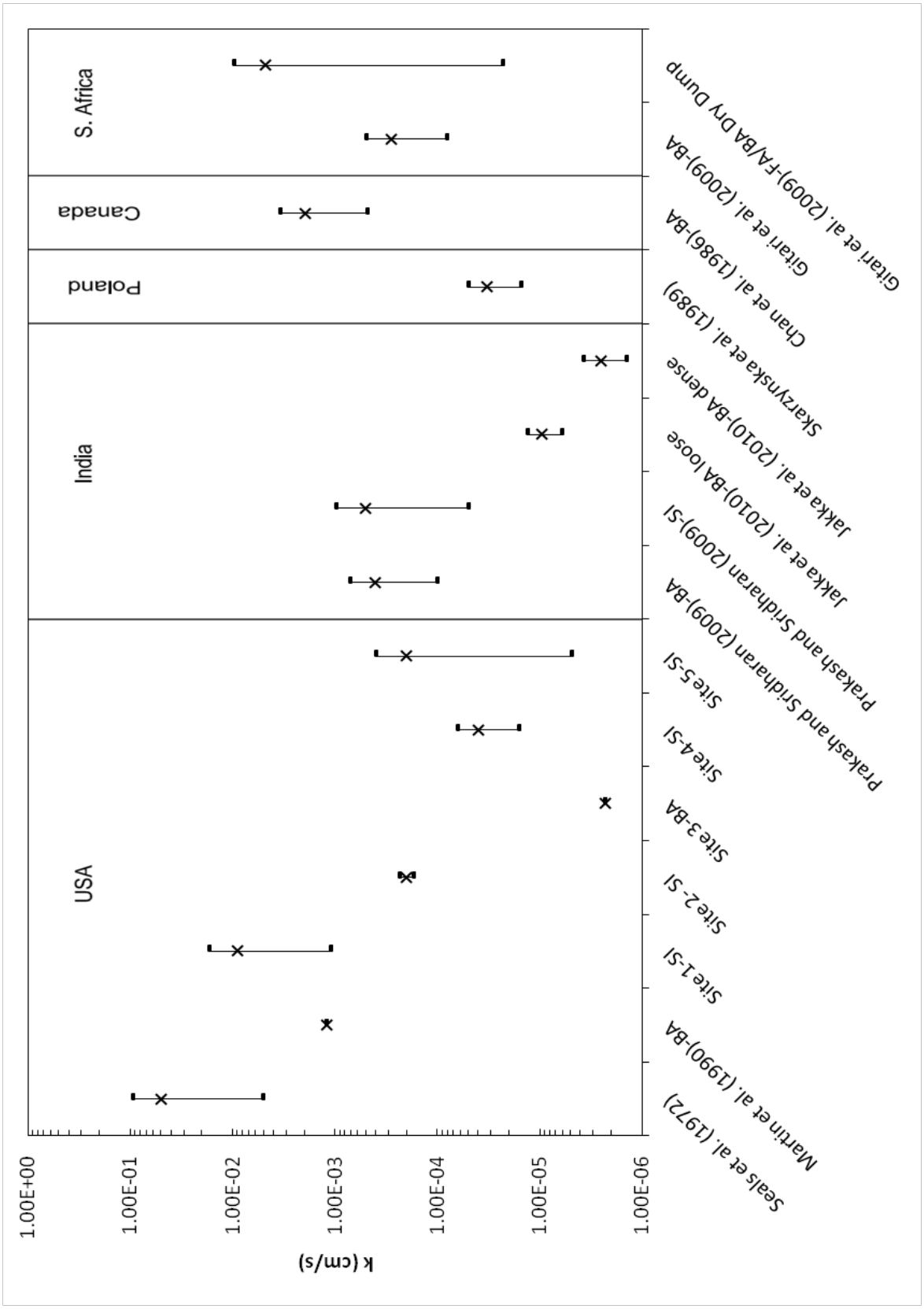

Figure 8: Variability plot of the hydraulic conductivity of surface impounded ashes and bottom ashes from different countries, as determined by different researchers.

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2.4 Shear Strength

X-ray diffraction studies indicate that CCRs do not contain any of the clay minerals responsible for the cohesive portion of shear strength in soils (Trivedi and Singh 2004a, Trivedi and Singh 2004b, Ward and French 2005), which means that CCRs must derive their strength entirely from the frictional interaction between ash particles. Through the use of a scanning electron microscope (SEM), it is possible to study the morphological characteristics of coal ash particles and get an idea of their angularity, which would in turn offer clues as to the source of their frictional strength. As shown in Figures 9 and 10, bottom ash is much more angular than fly ash. In general, this can be associated with higher friction angles than fly ash at low confining stresses, which is usually the case. At high confining stresses, the higher angularity could lead to more particle breakage for bottom ash, and consequently to a larger degradation of their frictional resistance.

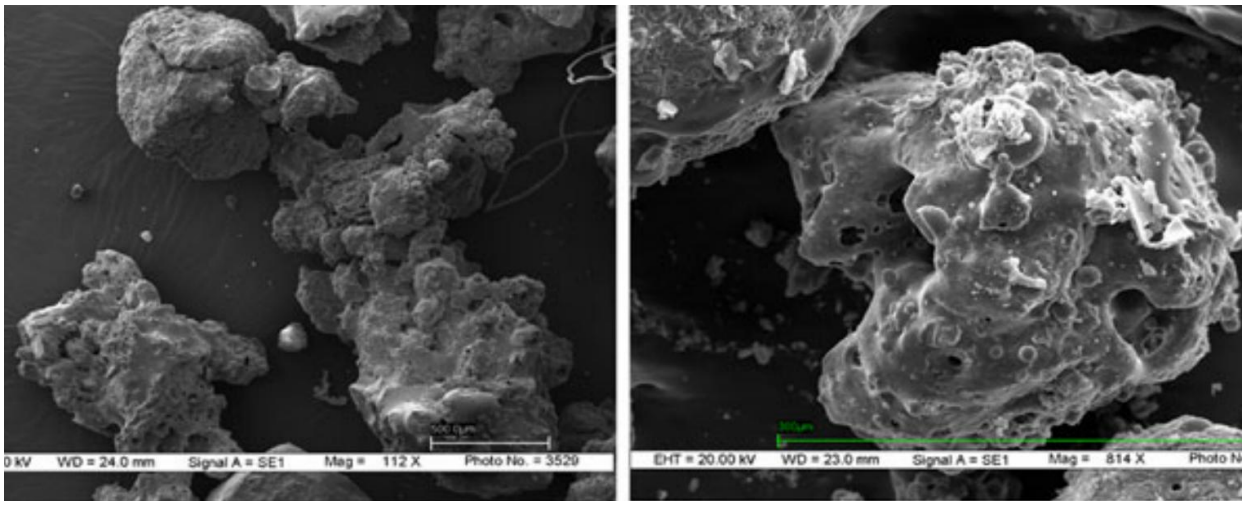

Figure 9: Micrographs of bottom ash particles magnified 112 and 373 times (Jakka et al. 2010)

PDF_0316

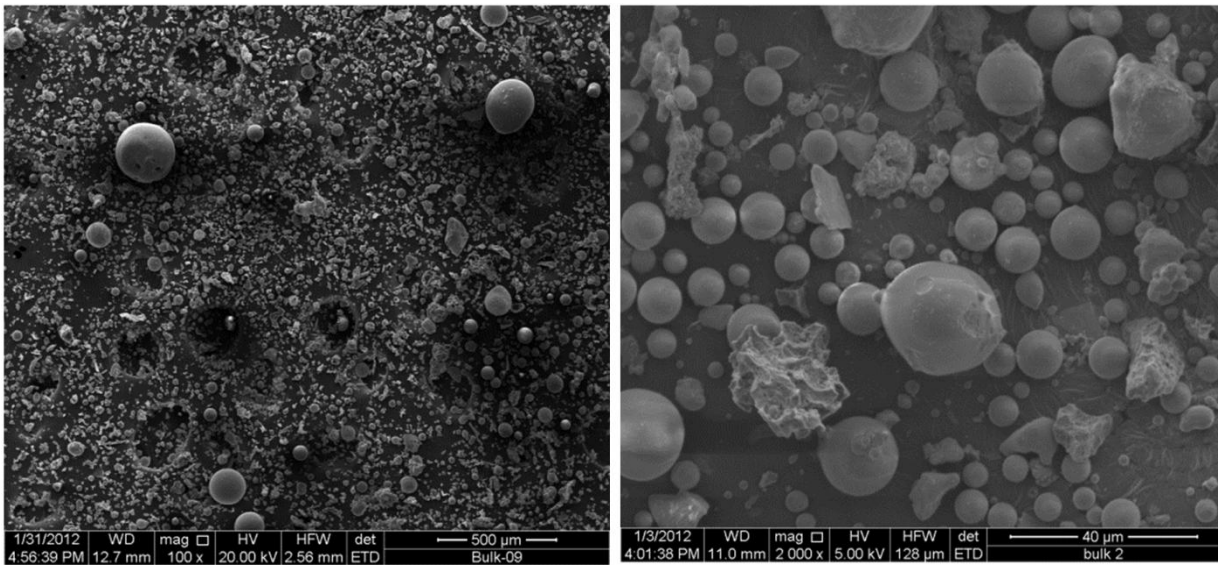

Figure 10: Micrographs of fly ash magnified 100 and 2,000 times (courtesy of Kevin Foster).

Shear strength parameters can be determined using several different laboratory test procedures. For CCRs, the most commonly performed tests are the direct shear test, consolidated drained triaxial test, and the consolidated undrained triaxial test. While the consolidated undrained triaxial test provides both effective and total stess strength parameters, most researchers only report effective strength parameters. This is undoubtedly because the rate of loading because of disposal is usually small enough that pore pressure dissipations are able to complete prior to the next disposal cycle; additionally, total strength parameters from CU tests can be misleading because of their dependence on the value of backpressure at which the specimen is sheared. Tables 6 through 8 report shear strength parameters of different CCRs from direct shear, consolidated drained, and consolidated undrained tests, respectively, reported in different studies. Figures 11 through 13 provide variability plots for the effective stress friction angles determined by various studies, compared on the basis of test type. Figures 14 through 16 provide variability plots on the basis of CCR type, while Figure 17 is a variability plot for the total stress parameters for all types of CCRs, since these parameters are not always reported. Variability plots were not made for values of cohesion since CCRs are usually reported to be non-plastic and the cohesions reported were either apparent cohesions of compacted, unsaturated samples or of samples that may have had self-cementing properties that would not be common to

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all disposed CCR materials. All acronymns used with the variability plots are consistent with those used in the Tables; for the Figures 14 through 16, DS, CD, and CU designate "direct shear test," "consolidated drained triaxial test," and "consolidated undrained triaxial test," respectively.

Table 6: Shear strength parameters determined by different researchers using the direct shear test.

Reference	Country	CCR Type	Condition	ϕ'_p (°)	c'_p (psf)
Kim & Prezzi (2008)	USA	FA	Comp. DoO	32.9-35.8	100-403
		FA	Comp. WoO	31.7-34.4	104-380
		FA	Comp. Sat.	30.2-34.5	58-276
Site 5		SI	Comp. Sat.	26.8-42.2	0
		SI	Undisturbed	23.4-35.4	0
Pandian (2004)	India	FA	Loose Dry	29.0-36.0	-
		SI	Loose Dry	29.0-34.0	-
		BA	Loose Dry	32.0-34.0	-
		FA	Loose Sat.	27.0-37.0	-
		SI	Loose Sat.	25.0-40.0	-
		BA	Loose Sat.	30.0-37.0	-
		FA	Comp.	28.0-42.0	205-819
		SI	Comp.	29.0-38.0	328-1024
		BA	Comp.	30.0-37.0	205-410
		FA	Comp. Sat.	28.0-41.0	-
		SI	Comp. Sat.	29.0-36.0	-
		BA	Comp. Sat.	30.0-37.0	-
Prakash &Sridharan (2009)		FA	Loose	29.0-33.0	-
		SI	Loose	30.0-33.0	-
		BA	Loose	31.0-34.0	-
		FA	Comp.	32.0-37.0	334-543
		SI	Comp.	30.0-33.0	272-334
		BA	Comp.	31.0-34.0	209-397
		FA	Comp. Sat.	32.0-35.0	0
		SI	Comp. Sat.	29.0-32.0	0
		BA	Comp. Sat.	30.0-33.0	0
Kolay & Kismoor (2009)	Malaysia	FA	Comp. Sat.	30.6-34.9	162-168
		SI	Comp. Sat.	26.2	70
		BA	Comp. Sat.	26.6	3.0-14
Muhardi et al. (2010)		FA	Comp.	23.0	251
		FA	Comp. Sat.	26.0	63
		BA	Comp.	32.0	79
		BA	Comp. Sat.	31.0	0

Note: ϕ'_p = peak effective friction angle; c'_p = peak effective cohesion; Comp. = compacted; Sat. = saturated; DoO = Dry of Optimum; WoO = Wet of Optimum

PDF_0318

Table 7: Shear strength parameters determined by different researchers using the consolidated drained triaxial test.

Reference	Country	CCR Type	Condition	RC (%)	ϕ' (°)	c' (psf)
Kim & Prezzi (2008)	USA	FA	Reconst.	95	33.5-47.1	0
		FA	Reconst.	90	27.9-37.9	0
Site 5		SI	Reconst.	-	27.1-31.0	0
Pandian (2004)	India	FA	Reconst.	100	33.0-37.0	418-1942
		FA	Reconst.	100	33.0-43.0	0
Prakash &Sridharan (2009)		FA	Reconst.	95	33.0-43.0	0
Jakka et al. (2010)		FA	Reconst.	-	32.9-37.0	0
		BA	Reconst.	-	33.7-41.7	0
Muhardi et al. (2010)	Malaysia	FA	Reconst.	-	41.0	522
		BA	Reconst.	-	46.0	0
Indraratna et al. (1991)	Thailand	FA	Reconst.	-	26.0	731
		FA	Reconst. Pozz.	-	36.0	37594

Note: Reconst. = reconstituted; Pozz. = pozzolanic curing allowed to occur

Table 8: Shear strength parameters determined by different researchers using the consolidated undrained triaxial test.

Reference	Country	CCR Type	Condition	RC (%)	ϕ (°)	c (psf)	ϕ' (°)	c' (psf)
Site 1	USA	SI	Undist.	-	11.1-19.5	0-950	25.2-33.0	90-190
Site 2		SI	Undist.	-	12.0-45.5	640-2580	31.8-32.1	0-140
Site 3		FA	Reconst.		-	-	36.0	14.3
		SI	Undist.	-	-	-	39.6	0
		BA	Reconst.		-	-	41.0-44.0	0-261
Site 4		FA	DS, Undist.	-	3.4-37.7	200-1900	28.7-36.7	0-400
		SI	Undist.	-	18.3-27.4	400-1600	29.5-38.6	0-740
Prakash &Sridharan (2009)	India	FA	Reconst.	95	20.0-41.0	0	26.0-39.0	334-2005
		SI	Reconst.	95	25.0-34.0	0-1170	28.0-36.0	585-2109
		BA	Reconst.	95	24.0-35.0	0-564	24.0-35.0	585-1149
Jakka et al. (2010)		FA	Reconst.	-	-	-	22.3-38.5	0
		BA	Reconst.	-	-	-	32.2-42.6	0
Muhardi et al. (2010)	Malaysia	FA	Reconst.	-	41.0	710	-	-
		BA	Reconst.	-	44.0	0	-	-
Indraratna et al. (1991)	Thailand	FA	Reconst.	-	20.0	0	26.0	0

Note: Undist. = undisturbed; Reconst. = reconstituted; DS = dry-stacked in field

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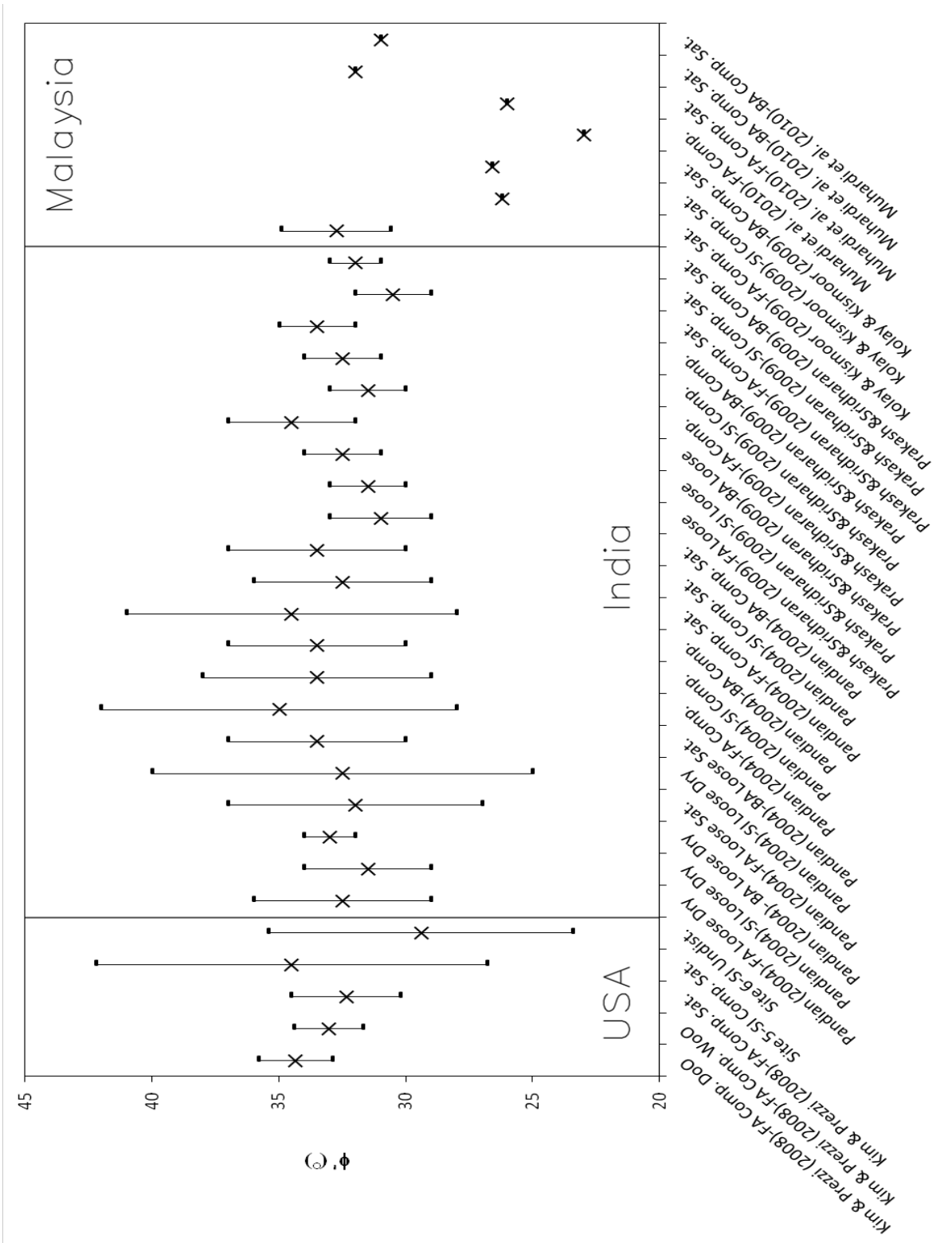

Figure 11: Variability plot of effective stress friction angle of various CCRs as determined by different researchers using the direct shear test.

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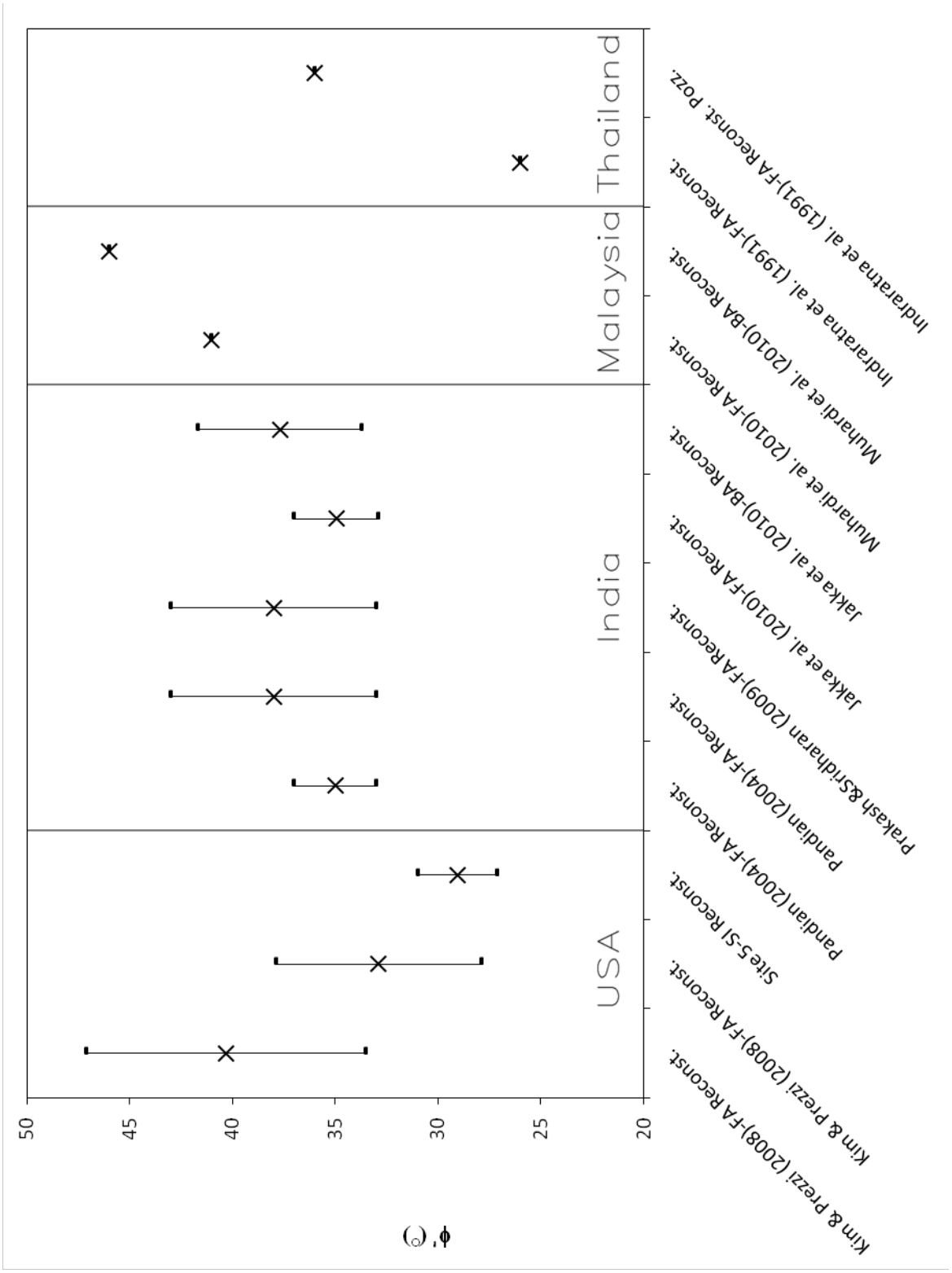

Figure 12: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated drained triaxial test.

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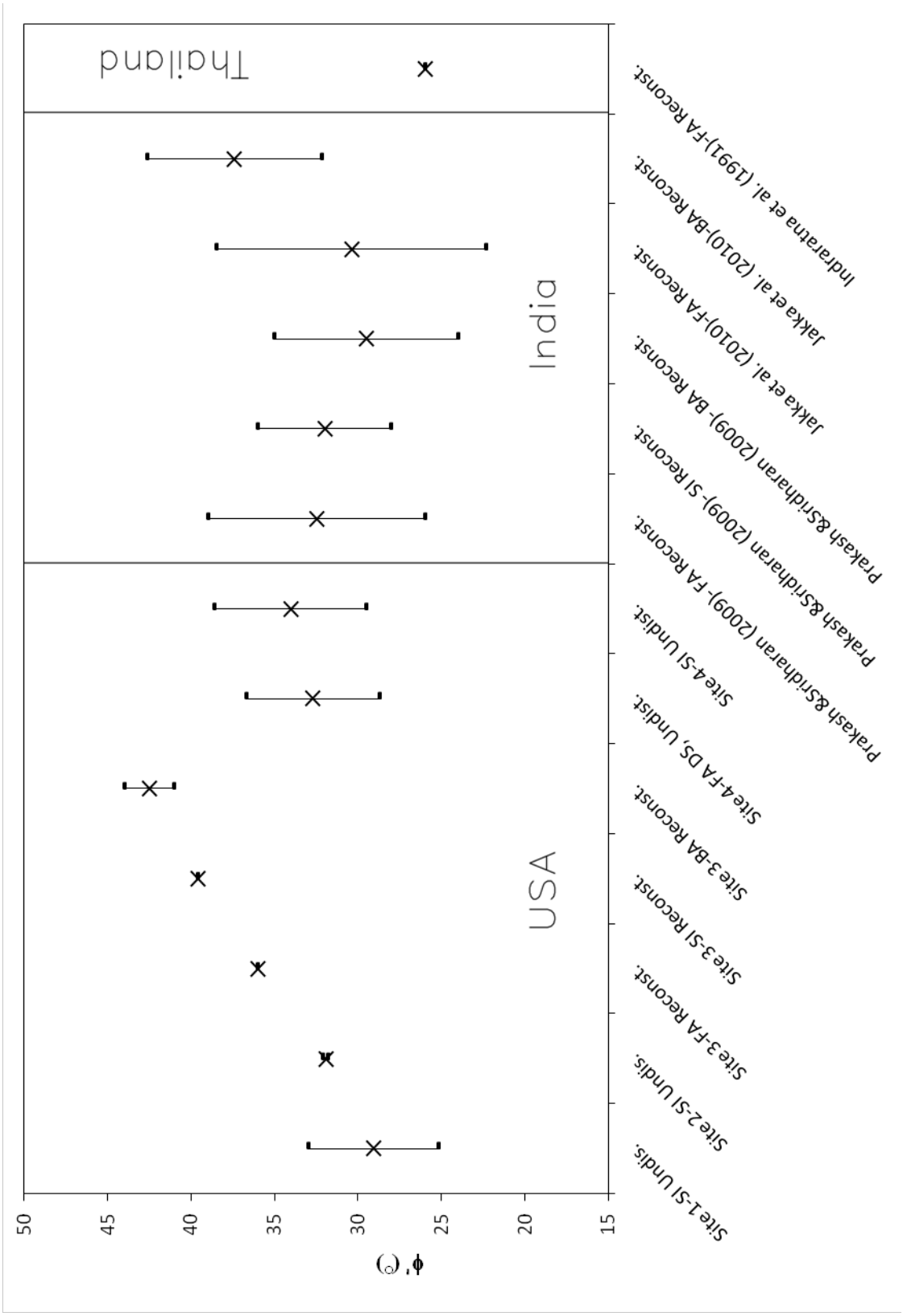

Figure 13: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated undrained triaxial test.

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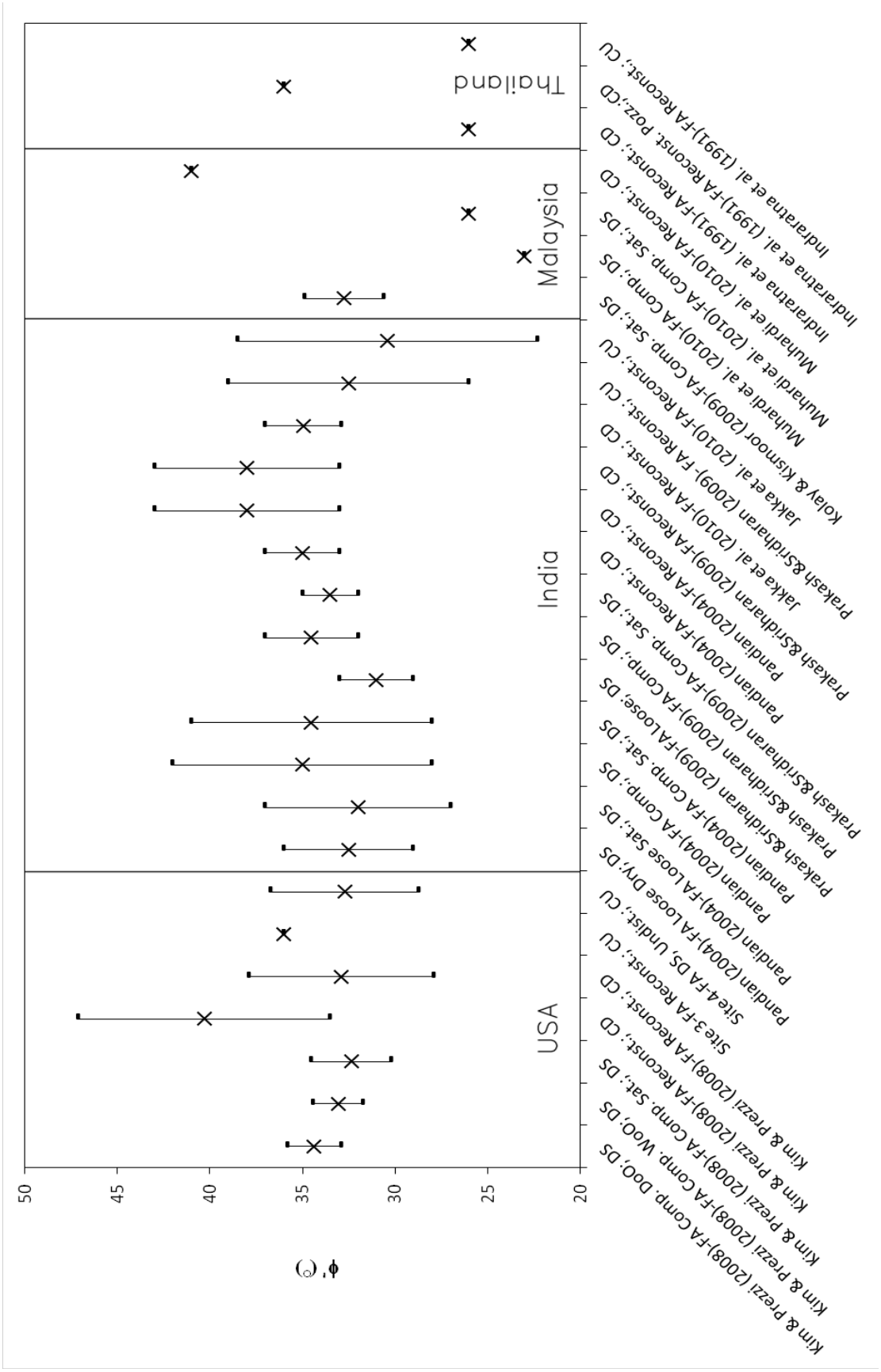

Figure 14: Variability plot of the effective stress friction angle of fly ashes for all shear strength tests performed by various researchers.

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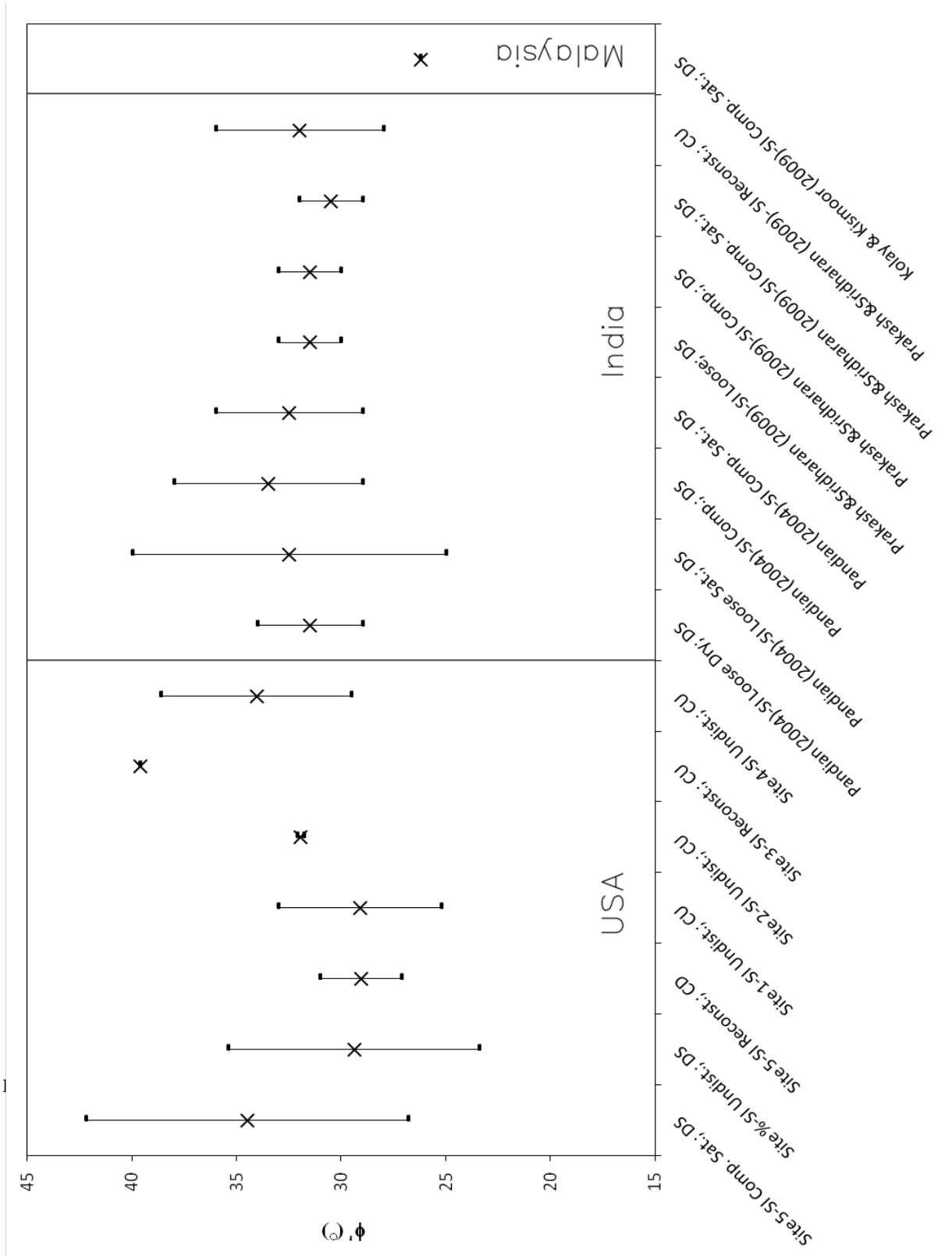

Figure 15: Variability plot of the effective stress friction angle of surface impounded ashes for all shear strength tests performed by various researchers.

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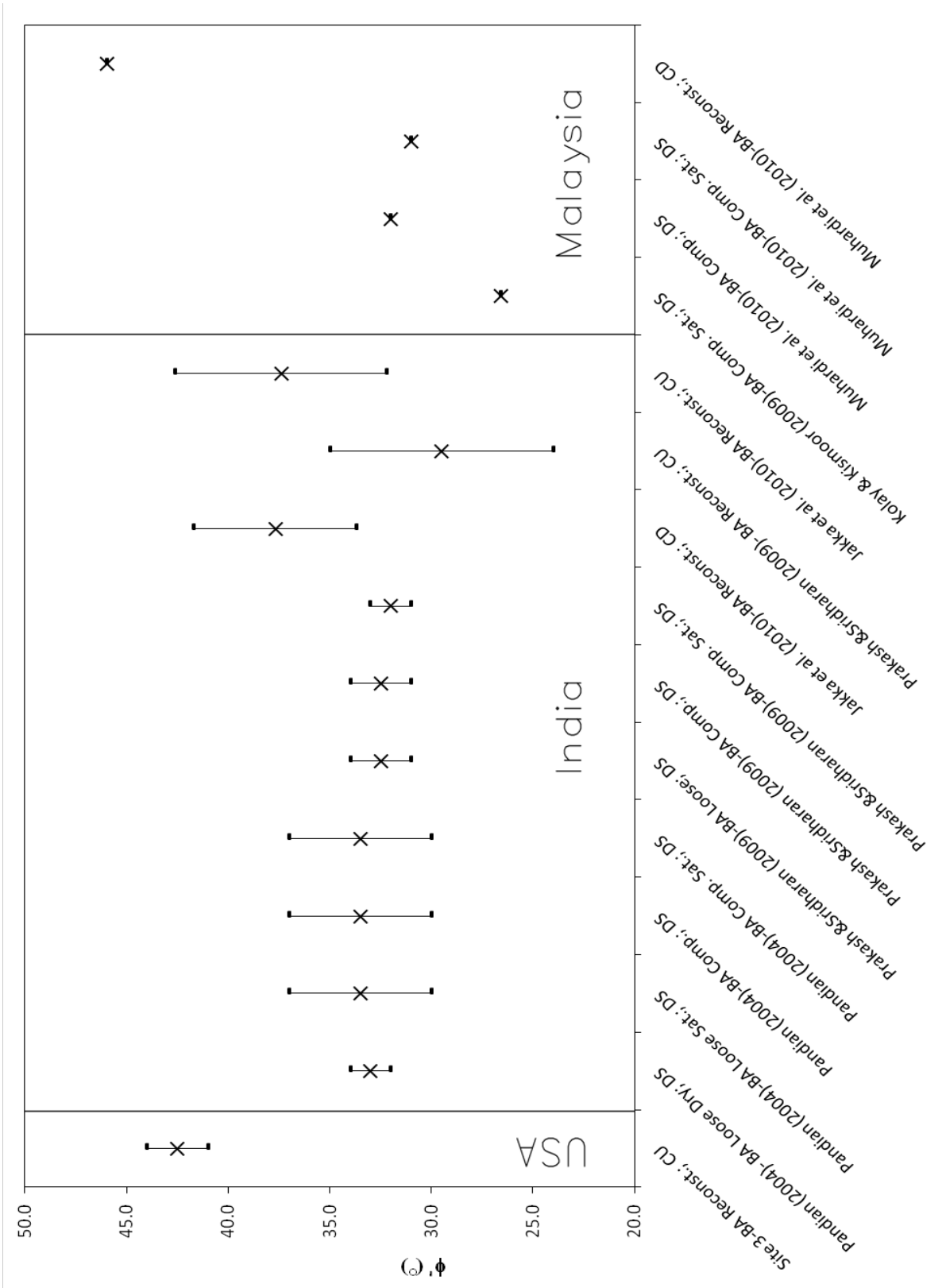

Figure 16: Variability plot of the effective stress friction angle of bottom ashes for all shear strength tests performed by various researchers.

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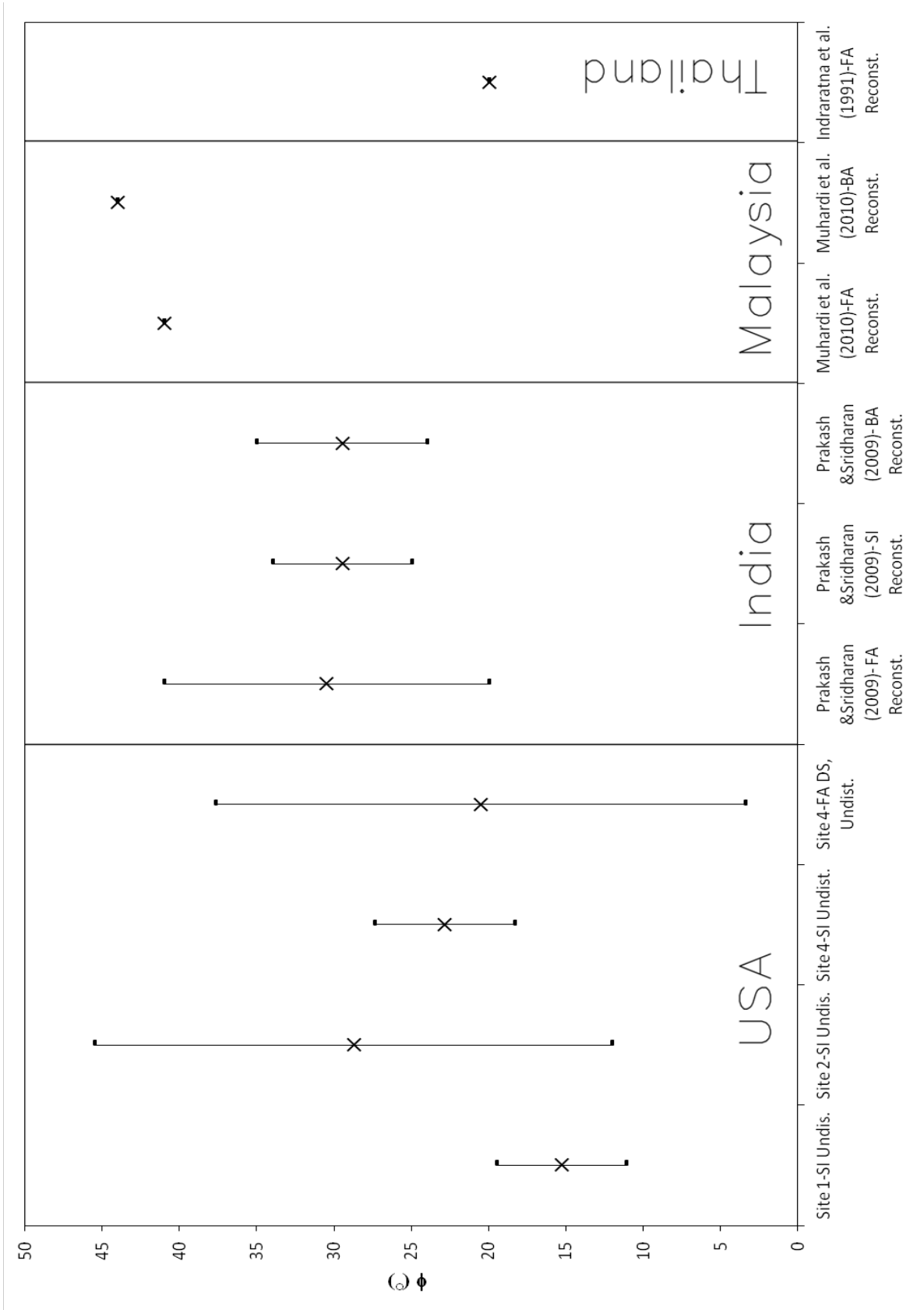

Figure 17: Variability plot of the total stress friction angle of all CCRs as determined by consolidated undrained triaxial tests performed by various researchers.

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2.5 Compaction Characteristics

Since CCRs are often used in the construction of embankments for CCR disposal areas, an understanding of their compaction characteristics is necessary to control stability and seepage of the CCR disposal areas. A unique consideration when studying the compaction characteristics of CCRs is their generally low specific gravity. Since CCRs tend to have lower specific gravities and higher air voids than natural soils, their maximum dry density tends to be lower and their optimum moisture content higher than most natural soils (Bera et al. 2007, Prashanth et al. 1999, Trivedi and Singh 2004a). Trivedi and Singh (2004a) associate the high optimum water content of CCRs with the porous nature of the particles; most of the water is absorbed by the particles at lower water contents such that the particles are not workable until higher moisture contents. The lower dry density and higher corresponding water contents of CCRs results in a compaction curve that appears "flatter" than those of most natural fine-grained soils, as shown in Figure 18. The "A-Z soils" included in the plots for comparison are for natural soils from Ohio, as published by J. G. Joslin in the proceedings of the 1958 ASTM Symposium on Soil Testing in Highway Design and Construction.

Bera et al. (2007) also developed empirical models to predict the maximum dry density and optimum moisture content of a specific surface impounded ash, as long as both of these values are known for the standard proctor test:

$$MDD_E = 1.60783 \cdot MDD_{proc} + 1.85727\left(\frac{E}{E_{proc}}\right) - 6.89047 \quad (7)$$

$$OMC_E = 1.73090 \cdot OMC_{proc} - 9.01750\left(\frac{E}{E_{proc}}\right) - 25.33520 \quad (8)$$

where MDD_E = maximum dry density at a given applied energy
MDD_E = maximum dry density for a proctor test
E = amount of energy input for given condition
E_{proc} = amount of energy input for a proctor test
OMC_E = optimum moisture content for a given applied energy
OMC_{proc} = optimum moisture content for a proctor test

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It should be noted, however, that these relationships were developed using test data from Indian CCRs. Therefore, before using these relationships, it should be verified that they apply to the specific CCRs in question.

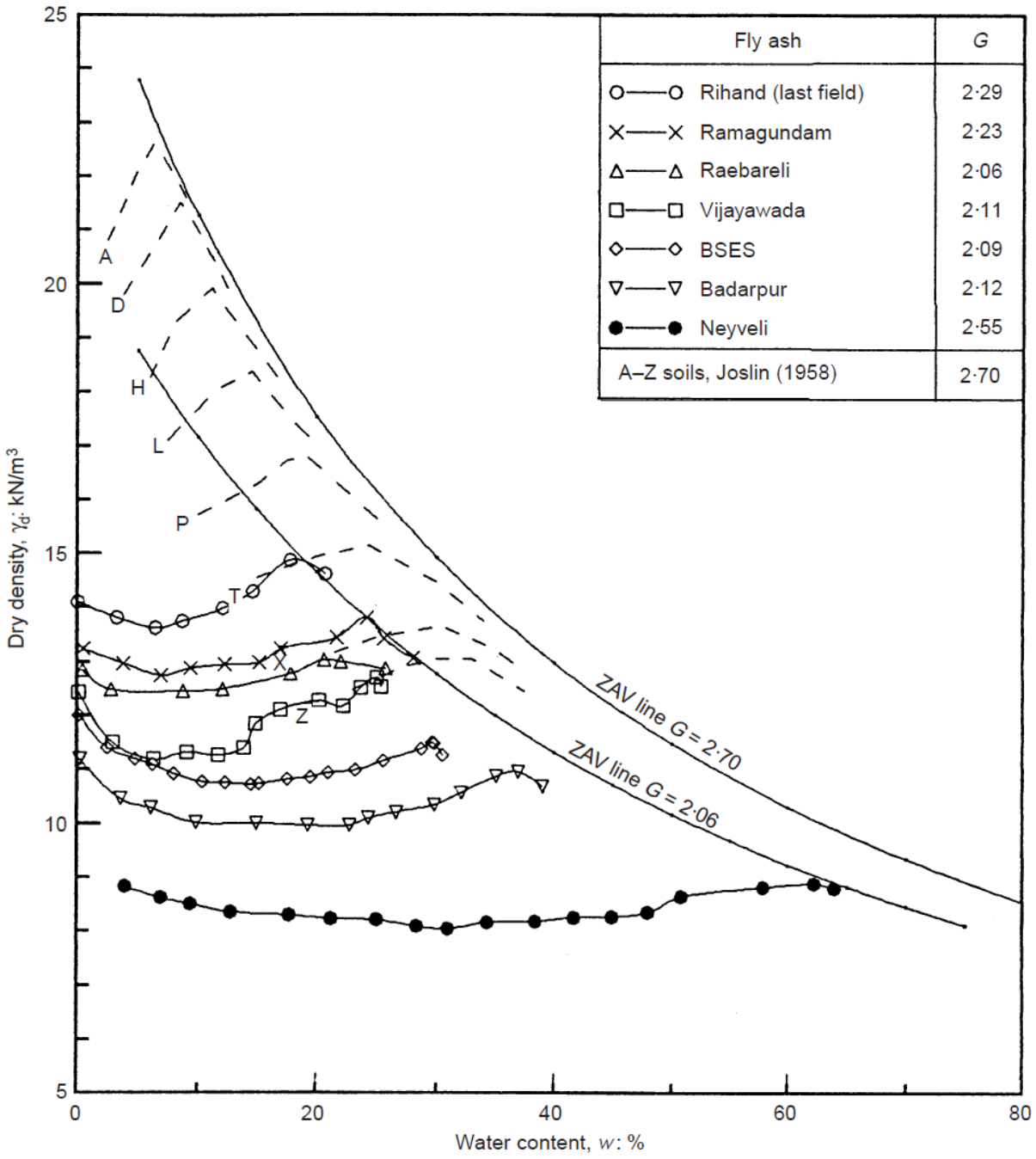

Figure 18(a): Compaction curves for different Indian fly ashes compared to those for several natural soils (Sridharan et al. 2001)

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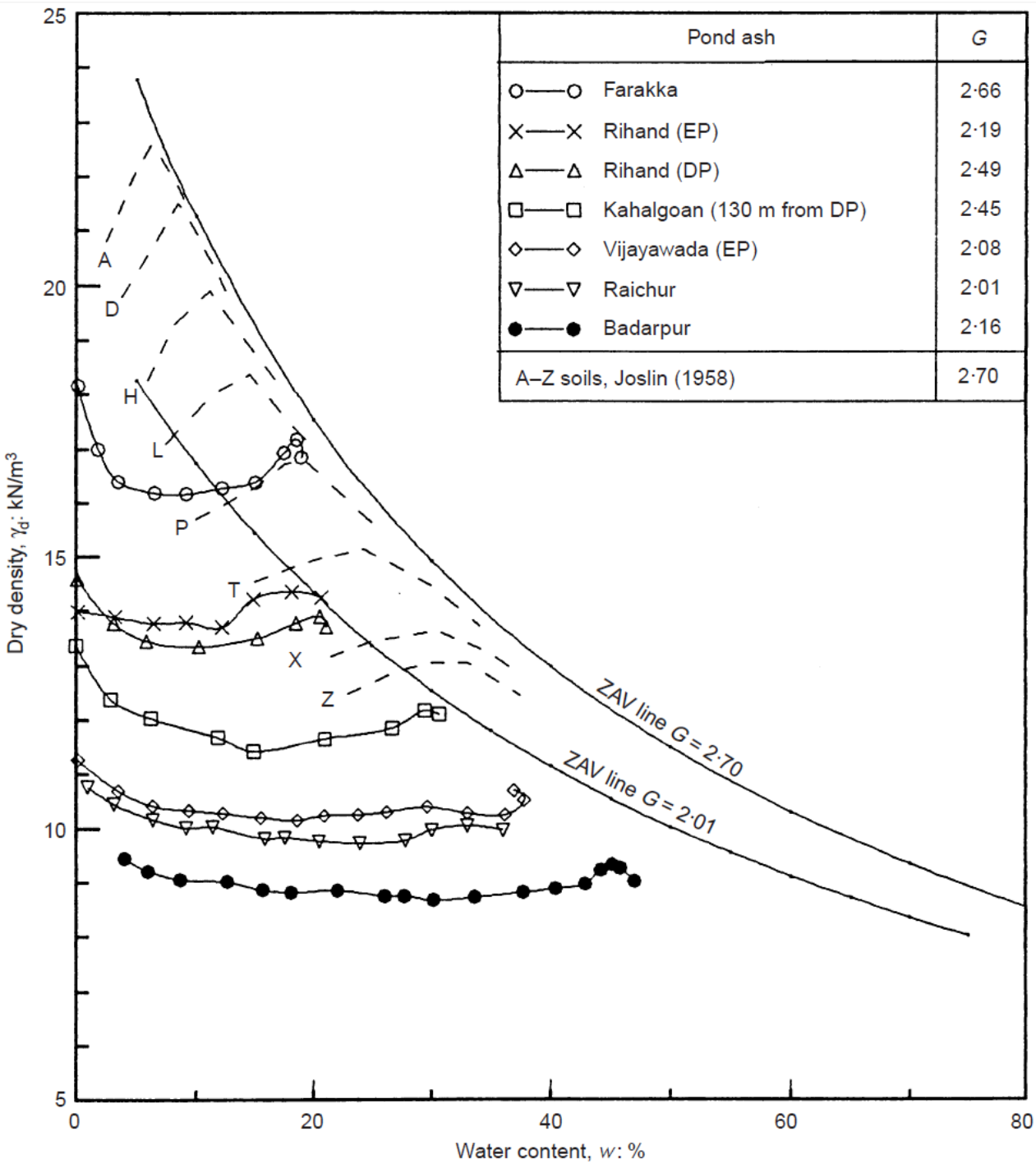

Figure 18(b): Compaction curves for different Indian surface impoundment ashes compared to those for several natural soils (Sridharan et al. 2001)

In Figures 17(a) and 17(b), the CCRs sometimes have a higher dry density at a dry condition (w = 0%). This is not a practical condition to use in construction or disposal situations, however, as there would be considerable dust pollution during placement (Sridharan et al. 2001).

Chapter 3

Dynamic Properties of CCRs

Regardless of the fact that CCRs are often composed of mostly fine-grained particles, they are still granular, non-plastic particles that exhibit no cohesion other than apparent cohesion in the moist state (Kaniraj and Gayathri 2004, Prakash and Sridharan 2009). Based on their grain-size, many CCRs could be classified as fine-grained soils, (which are commonly considered to have a lower liquefaction potential), but since these CCRs are also generally non-plastic, they have the potential of being liquefaction-prone. Liquefaction potential of CCRs is higher in the case of impounded CCRs, since these tend to exist at a saturated or nearly saturated state in-situ (and saturation is a necessary condition for liquefaction). In addition, the high moisture contents imply that impounded CCRs will have no negative pore pressures to help stabilize the soil mass under dynamic loading. Furthermore, the generally metastable structure of impounded CCRs makes their dynamic properties of great importance, even at low intensities of shaking. There have been a limited number of publications on the dynamic properties of CCRs; while this section presents and discusses currently published information on the dynamic properties of CCRs, there is still a need for further research in this area.

3.1 Cyclic Shear Strength Properties of CCRs

The most common laboratory test used to assess the dynamic properties of soils is the cyclic triaxial shear test. Cyclic triaxial testing apparatuses are expensive and provide very specific results, so very few commercial consultant firms own or even have access to them. Therefore,

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cyclic triaxial testing has traditionally been done at the academic level and has seen little use in commercial consulting. Given the specialized nature of the cyclic triaxial test, there is limited research published on the cyclic triaxial properties of CCRs. Since the cyclic shear strength properties of CCRs is a very specific topic, the research available on this topic is from academics of varied nationalities, all of whom have slightly different methods of analyzing the raw data; as a result, comparing results can be difficult.

Despite differences in how to analyze and present cyclic triaxial test results between researchers, it is useful to compare results using fundamental parameters of cyclic response, such as plots of excess pore pressure (usually excess pore pressure ratio) versus number of loading cycles, or plots of the cyclic stress ratio (CSR=$\sigma_d/2\sigma_{3c}$') versus number of loading cycles, which represents a measure of how the shear strength of the material in question degrades with cyclic loading. Figures 19 and 20 present some typical plots comparing excess pore pressures to the number of cycles to initial liquefaction, and Figures 21 through 23 present plots of CSR versus number of loading cycles to liquefaction (generally defined as 5% double-amplitude axial strain) for different surface impounded CCRs at different confining stresses and relative densities.

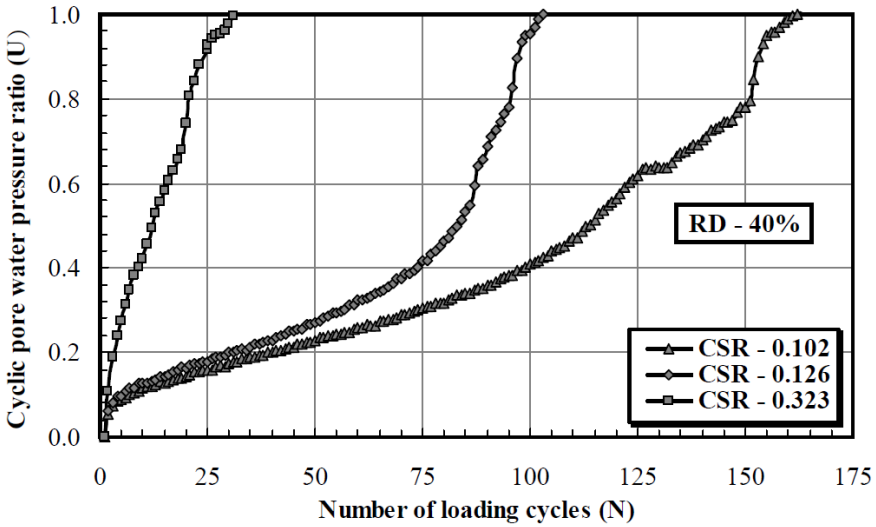

Figure 19: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at different cyclic stress ratios and 1 Hz loading frequency (Mohanty et al. 2010).

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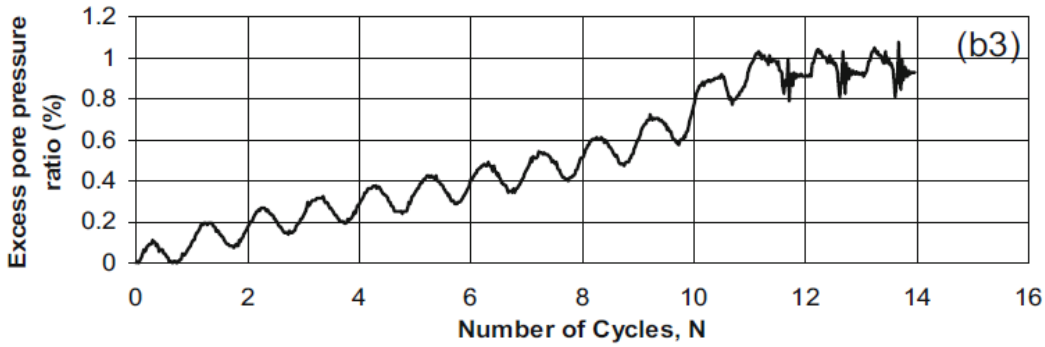

Figure 20: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at a cyclic stress ratio of 0.10 and confining pressure of 2214 psf and 0.1 Hz loading frequency (Jakka et al. 2010)

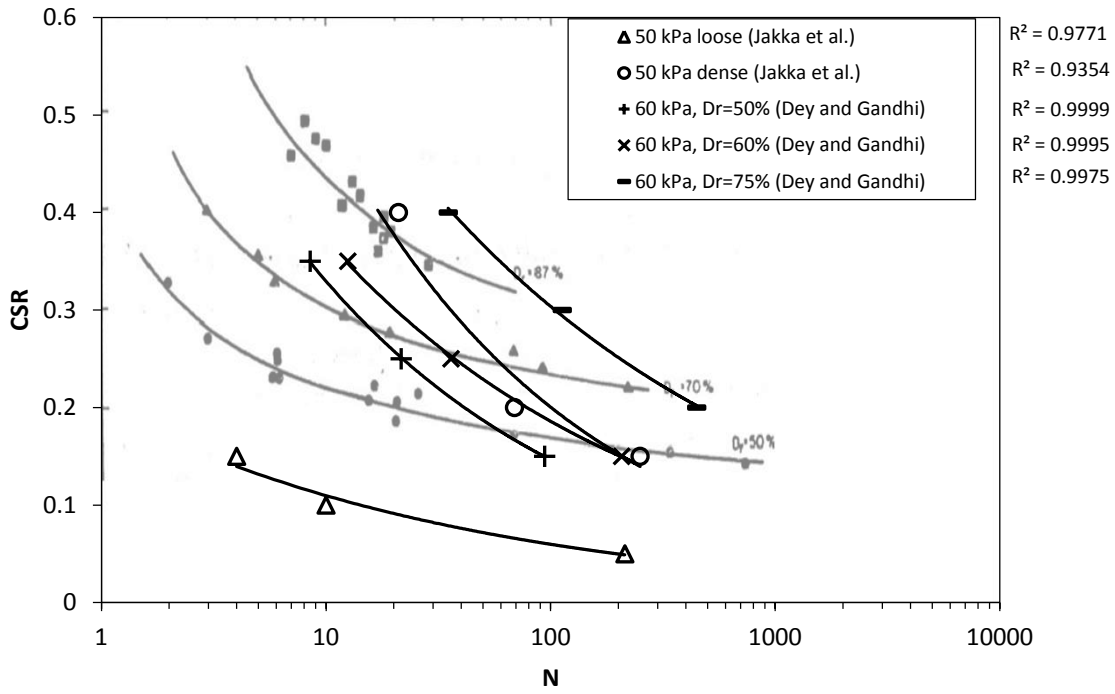

Figure 21: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at confining stresses close to 50 kPa. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Dey and Gandhi loaded specimens at 1 Hz. For comparison, curves for sands tested at the same confining pressure are superimposed (Mulilis et al 1976).

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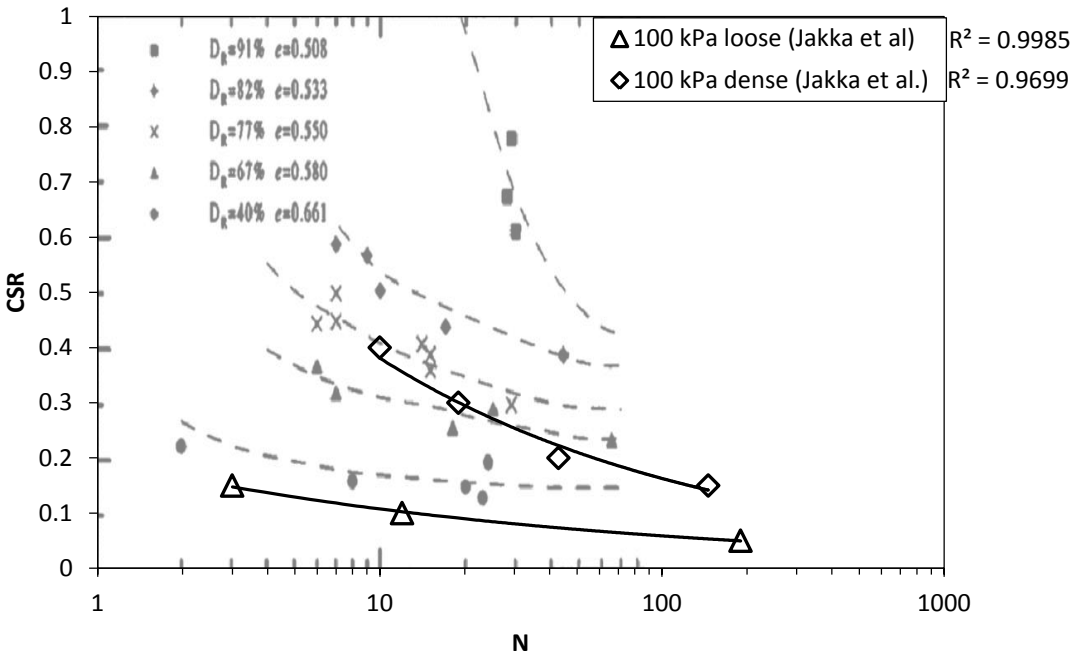

Figure 22: Plot of CSR versus number of loading cycles to liquefaction for surface impounded CCRs tested by Jakka et al (2010) at a confining pressure of 100 kPa. For comparison, curves for C778 sand at the same confining pressure are superimposed (Carraro et al 2003).

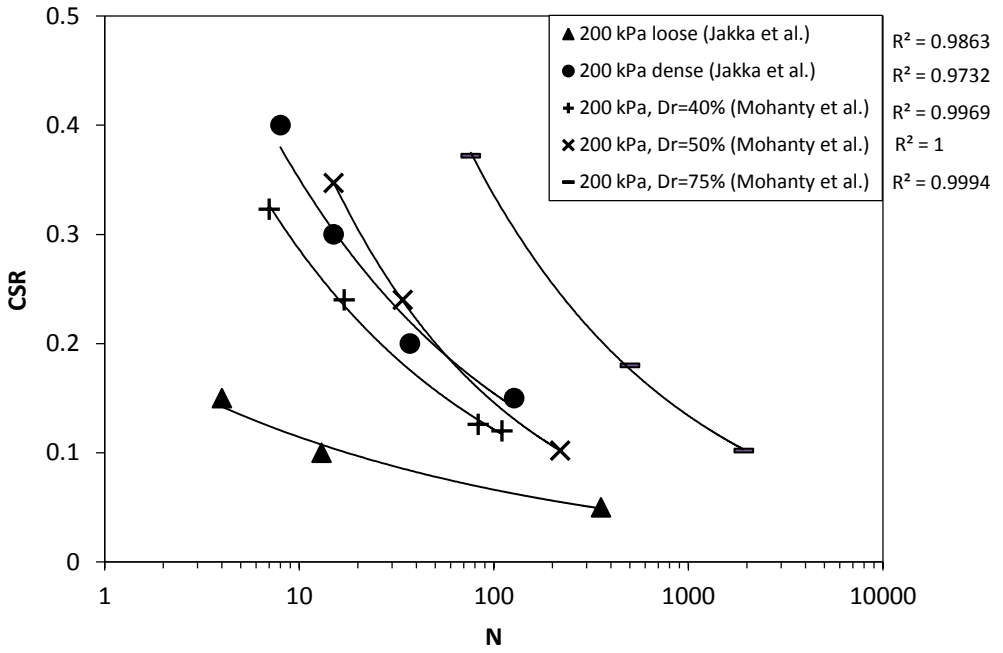

Figure 23: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at 200 kPa confining stress. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Mohanty et al. loaded specimens at 1 Hz.

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For the two plots of CSR versus number of cycles to initial liquefaction where results for surface impounded CCRs are compared to tests done on sands, it is apparent that the CCRs tested tend to be more resistant to liquefaction than natural sands at higher CSRs, but less resistant to liquefaction at lower CSRs. As more cyclic triaxial tests are run on surface impounded CCRs, it will be more apparent as to whether this is an actual trend, or just an apparent trend in these three studies.

Lastly, many researchers include a plot of the hysteresis loops for a cyclically-tested triaxial sample. This is simply a plot of the deviator stress versus the axial strain through a single load cycle, at which point the plot begins again, creating a nearly-symmetrical shape about the origin of the plot. The area contained within all of these loops represents the cumulative energy dissipated by the soil being tested (Yoshimoto et al. 2006). The cumulative dissipated energy method was used by Towhata and Ishihara (1985) in order to analyze cyclic shear behavior and liquefaction strength of soils. Figure 24 shows a diagram illustrating the dissipation energy contained within a hysteresis loop.

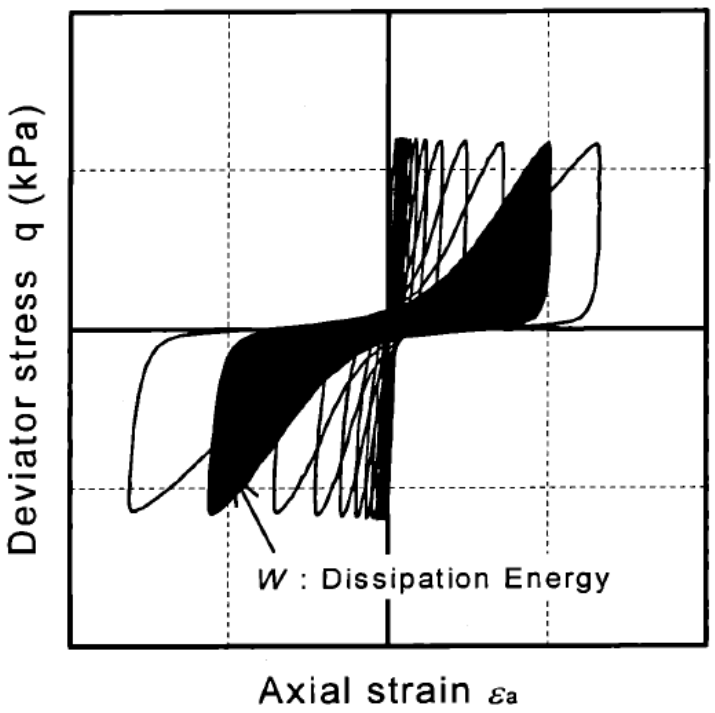

Figure 24: Example of how to determine the energy dissipated by a soil throughout a single loading cycle (Yoshimoto et al. 2006).

Chapter 4

CCR Failure Modes and Monitoring Practices

The critical failure mode for a CCR impoundment is not necessarily the same as for a CCR landfill, since differences in placement techniques for each have a significant effect on the fabric and shear strength properties of the CCRs. Determining the failure modes and developing monitoring practices for CCR impoundments can be done using the same methods as for mine tailings dams because of their similar structure. CCR landfills can be monitored much like any other earthen embankment (with material properties being the major difference), except that unlike most embankments, there is no end of construction until the landfill is retired.

4.1 Surface Impoundments

The observational method is a method of risk management outlined by Dr. Ralph Peck as the process of making design adjustments based on observed behavior in a given structure. The design can be adjusted to be either more or less conservative in order to optimize design (Martin and Davies 2000). This method of risk management is ideal for use with tailings dams since tailings dams are continuously constructed until they are retired; the same is true of CCR surface impoundments, which indicates that such methods could easily be applied to CCR surface impoundment monitoring programs. Figure 25 is a flow chart illustrating the risk management process utilizing the observational method, as applied to tailings dam design; however, the

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process is general enough that the same or a slightly modified flow chart could be used for surface impounding ash structures.

Another important consideration when developing a monitoring plan for surface impoundments is whether the dikes were constructed using the upstream or downstream methods, since use of the upstream method can lead to weaker dike foundations and an increased probability of sudden or catastrophic failure (Martin and Davies 2000). The upstream construction method consists of constructing the dike of a new phase of a disposal area partly on the top of the previous phase dike and partly on the upstream disposed material; contrarily, the downstream construction method consists of constructing the new phase dike partially on the previous phase dike and partially on land downstream of the disposal area. Figure 26 illustrates that the weaker foundations of mine tailings constructed using the upstream method is evident based on the prevalence of certain failure modes for upstream tailings dams as compared to other types of tailings dams (slope failure and earthquake failure constitute 59% of failure modes for upstream tailings dams, compared to 24% for other types of tailings dams).

Taking all of these factors into consideration, a sample surveillance plan schedule for a mine tailings impoundment is provided in Figure 27. As with the risk management chart presented in Figure 25, this flowchart is general enough that it could be used in its current form, or slightly modified in developing a surveillance plan for CCR surface impoundments.

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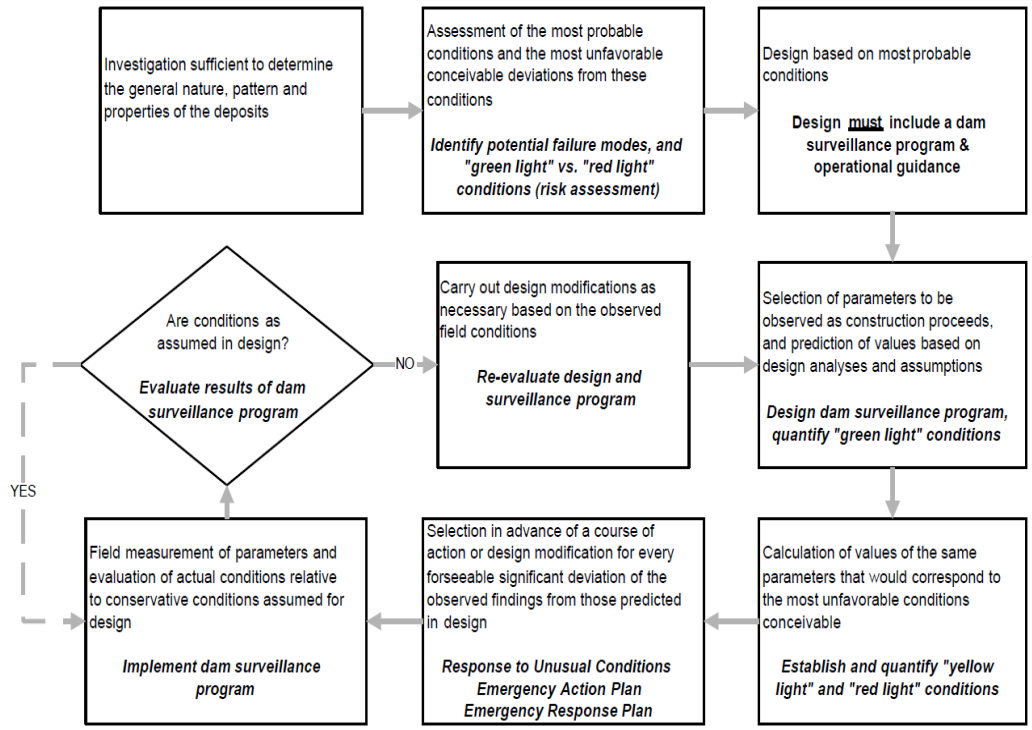

Figure 25: Flow chart illustrating risk management utilizing the observational method (after Martin and Davies 2000)

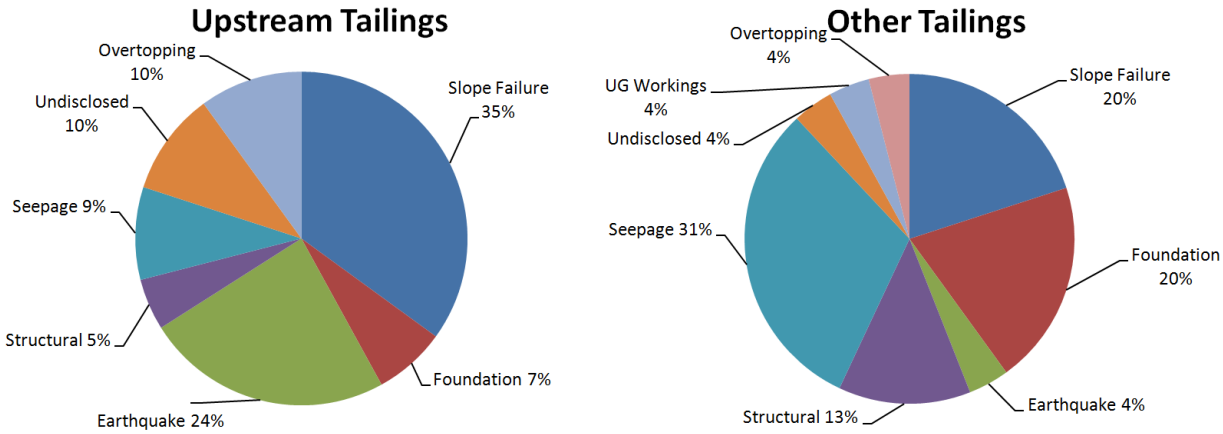

Figure 26: Comparison of failure modes of upstream mine tailings dams as compared to other types of mine tailings dams (modified from Martin and Davies 2000)

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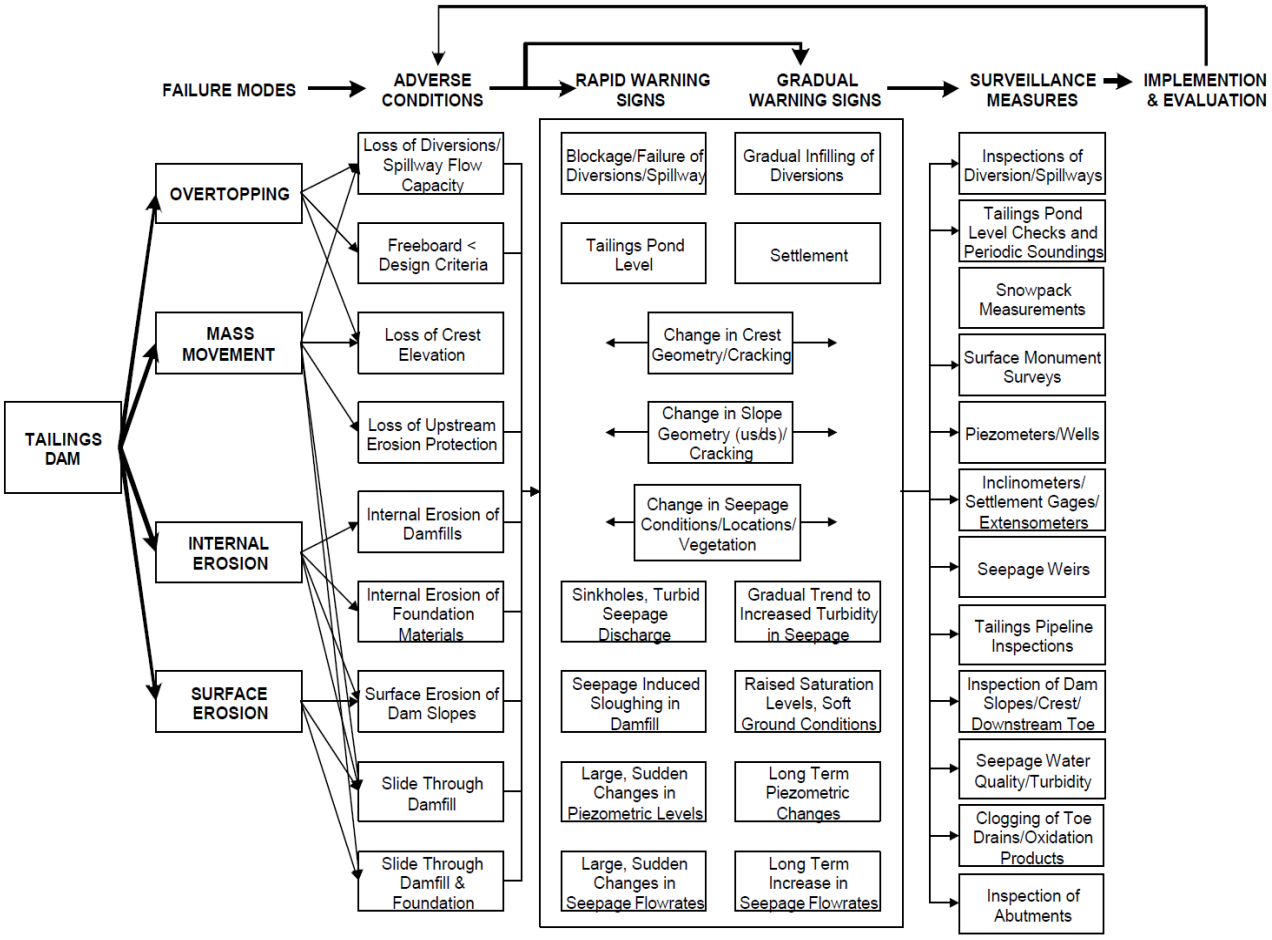

Figure 27: Sample surveillance plan schedule for a mine tailings impoundment (after Martin and Davies 2000)

Since CCR surface impoundments can have containment dikes constructed out of CCR material, natural soils, or a combination of both and these landfills have the potential to collect precipitation. An analysis procedure that can be used alongside the observational method is to treat them as earthen dams according to recommendations of the Bureau of Reclamation and the Army Corps of Engineers.

The Bureau of Reclamation's *Dam Safety Risk Analysis Best Practices Training Manual* (Scott et al. 2010) provides an overview in Chapter 1 of their recommended method for determining potential failure modes of dams for use in conducting risk analyses of dams. In Chapter 1, the authors identify determination of potential failure modes of dams as the basis for risk evaluations, making it one of the most important steps in risk analysis of a dam. They recommend a comprehensive and thorough review of all relevant background information such

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as, but not limited to, geology, design, analysis and construction documentation, flood and seismic loadings, operations, dam safety evaluations, and performance and monitoring documentation. Additionally, they recommend a site examination, including questioning of the operations personnel as to how unusual events are handled and what they consider to be the vulnerabilities of the structure. The data review process should include several qualified professionals from different disciplines to ensure a thorough investigation. Lastly, the authors outline three major parts in describing a potential failure mode:

- **The initiator**, or what causes the initiation or onset of the failure mode
- **Failure progression**, a step-by-step outline of mechanisms that lead to failure
- **The resulting impacts**, a description of the expected method and magnitude of a failure if it were to occur

For more in-depth guidance on determining failure modes and developing a risk analysis program for a specific structure, the U.S. Bureau of Reclamation's *Dam Safety Risk Analysis Best Practices Training Manual* can be accessed online at http://www.usbr.gov/ssle/damsafety/Risk/methodology.html, entitled "Complete Best Practices Document."

4.2 CCR Landfills

CCR landfills are generally placed at a moist state and compacted to some degree, being constructed in a similar manner to regular earthen embankments. As a result, they can be analyzed like any other earthen embankment, with special attention paid to the engineering properties and placement conditions of the CCR materials used in the embankment. The placement method for CCR materials in CCR landfills results in less uncertainty in their fabric and relative density, generally resulting in an overall more stable structure than with surface impoundments.

Ideally these compacted CCR embankments would remain well-drained, but depending on the geology of the site and variability in the hydraulic conductivity of the CCR materials, monitoring

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the groundwater table within these areas and how it is affected by rainfall patterns is good practice, unless it is clearly apparent that such monitoring is unnecessary. An additional consideration with CCR landfills is the need to continually condition the landfill surface with water in order to cut down on dust pollution and surface erosion. Ideally, slopes of CCR landfills should be seeded as soon as is feasible, in order to manage surface erosion and eliminate the need to continually condition the moisture of the slopes.

One unique case would be for sites where a CCR landfill is constructed over a retired surface impoundment. This is an appealing option to most CCR disposers, since land area can be reused, negating or delaying the need to purchase new land to construct a disposal area. Since the foundation material cannot be as well-characterized as the material being placed, a more rigorous design and monitoring procedure would be necessary, perhaps the same as or similar to those discussed in section 4.1.

4.3 Failure Modes

Failure modes for CCR surface impoundments and landfills include all of the usual failure modes for a dam or embankment. However, since disposal operations continue for years or decades, the need to continually monitor disposal areas for signs indicating the initiation of a particular failure mode is very important. Since surface impounded CCRs generally have a less stable structure than CCR landfills, they will generally tend to require more vigorous monitoring. Because of the differences in disposal methods between CCR surface impoundments and CCR landfills, the most likely failure modes will not be the same for each structure.

The most common failure modes for earthen dams and embankments include internal erosion or piping (of embankment or foundation materials), surface erosion leading to global instability, excessive seepage leading to an embankment breach, overtopping during a storm event, loss of freeboard due to excessive embankment settlements or subsidence, lateral movement of the embankment, and failure as a result of a seismic event (MSHA 2009; Martin and Davies 2000). Many of these failure modes are included in Figure 27, with common warning signs indicating the initiation of these failure modes.

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The majority of these failure modes can be recognized with good monitoring practices, with the exception of failures due to seismic events, for obvious reasons. There is little data on the performance of CCR disposal areas during seismic events and also very little data on the dynamic properties of CCR materials. As a result, dynamic properties of CCRs is an area where further research and laboratory testing is required.

The overall uncertainty in the engineering properties of CCR materials make it necessary to be more vigilant with monitoring practices in order to recognize when different failure modes are initiated so that remedial actions can be taken to prevent costly failures, both on an economic and life scale. Since surface impoundments often most closely resemble tailings dams in their design, a good reference for monitoring practices and identifying failure modes for surface impoundments is the MSHA 2009 "Engineering and Design Manual: Coal Refuse Facilities," which can be accessed at:

http://www.msha.gov/Impoundments/DesignManual/ImpoundmentDesignManual.asp.

Chapter 5

Slope Stability of CCRs

The basic principles of slope stability and methods of assessing slope stability of CCR surface impoundments and landfills are the same as for naturally occurring soils; however, the results of these analyses can be very different based on the unique properties of CCR materials. For example, while an ash might have a high percentage of clay-sized particles, they rarely have any cohesion at all and may be very prone to erosion; many naturally occurring soils with clay-sized particles have a cohesive component of strength and are usually considered erosion resistant. In most instances, CCR disposal areas will not be loaded enough to incur excess pore pressures that will not be fully dissipated by the next loading cycle (the next workday). For this reason, it is generally only necessary to perform effective-stress steady-state shear strength slope stability analyses for CCR disposal areas. Special analyses, such as rapid draw-down analyses may be necessary as dictated by site geometry and design rainfall events.

5.1 Limit Equilibrium and Finite Element Analyses

The majority of slope stability analyses today are performed using commercial software programs that utilize limiting equilibrium analyses and/or finite element analyses of slope stability and seepage through slopes. It is good practice and the recommendation of the United

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States Army Corps of Engineers (USACE) that some sort of check be done on the results of these software programs. In their Slope Stability Manual (EM 1110-2-1902), the USACE states that, "verification should be commensurate with the level of risk associated with the structure," and that one or more of the following methods should be used in verification of the initial analyses:

- Graphical (force polygon) method
- Spreadsheet calculations
- A second slope stability program
- Slope stability charts

The following example is of a slope stability analysis of a CCR surface impoundment using a limit equilibrium-based software program that also has a built-in finite element groundwater seepage option. The premise of this example is that a client wants to construct a dry-stacked CCR landfill on top of a retired surface impoundment. A thin layer with increased cohesion was included at the surface of all slopes in order to eliminate infinite slope failures that are solved with vegetation; this layer is not included in the table of strata properties, presented in Table 9.

Table 9: Summary of shear strength and hydraulic parameters used in CCR surface impoundment slope stability example.

Strata	γ (pcf)	N	σ_0' (tsf)	ϕ' (°)	c' (psf)	k (ft/s)	Sources
SI CCRs	92.0	N/A	N/A	25.2	0	2.55×10^{-6}	LT
Compacted CCRs	103.5	N/A	N/A	33.0	0	3.61×10^{-7}	Tables 6-8, Table 5
Embankment Fill	112.7	N/A	N/A	33.8	0	1.79×10^{-8}	LT
RR Embankment Fill	122.0	4.0	0.34	33.7	0	3.00×10^{-8}	Kulhawy and Mayne (1990)/LT
Alluvium	110.0	11.0	0.88	40.6	100	3.28×10^{-8}	Kulhawy and Mayne (1990)/LT
Saprolite	110.0	35.0	1.2	29.6	420	9.35×10^{-7}	LT
Partially Weathered Rock	120.0	N/A	N/A	30.0	500	3.28×10^{-9}	Assumed based on parent material
Bedrock	170.0	N/A	N/A	30.0	1.4×10^{5}	3.28×10^{-10}	Barton and Choubey (1977)

Note: LT = laboratory testing

Analyses were performed for six different conditions: three geometries, each with an in-situ water table and a hypothetical high water table. Figure 28 shows the in-situ subsurface conditions, while Figures 29 through 31 provide the output results with slip surfaces below specified factors of safety shown for the six geometries considered. All slip surfaces shown with a factor of safety value are the lowest factor of safety for that slope geometry.

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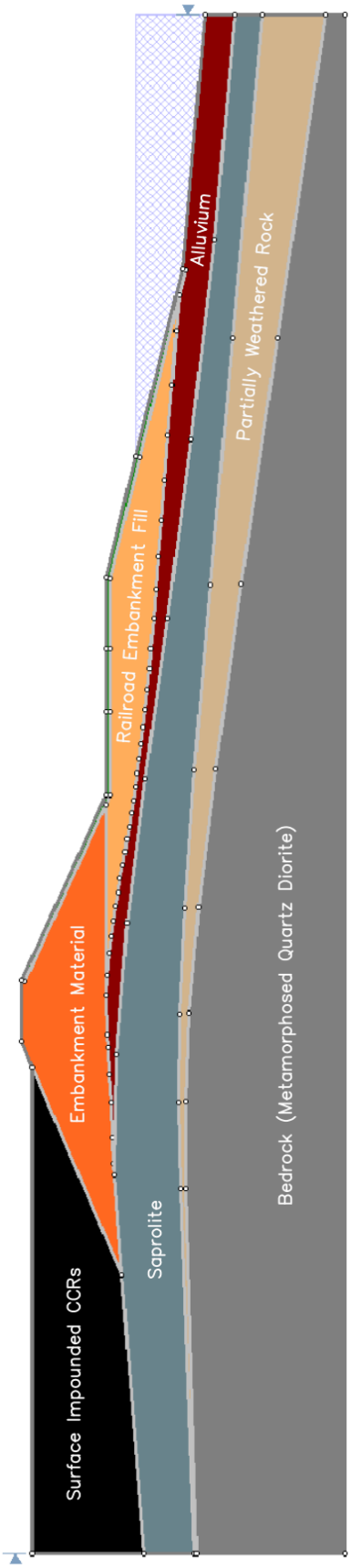

Figure 28: Subsurface profile of a slope stability example for an SI CCR embankment.

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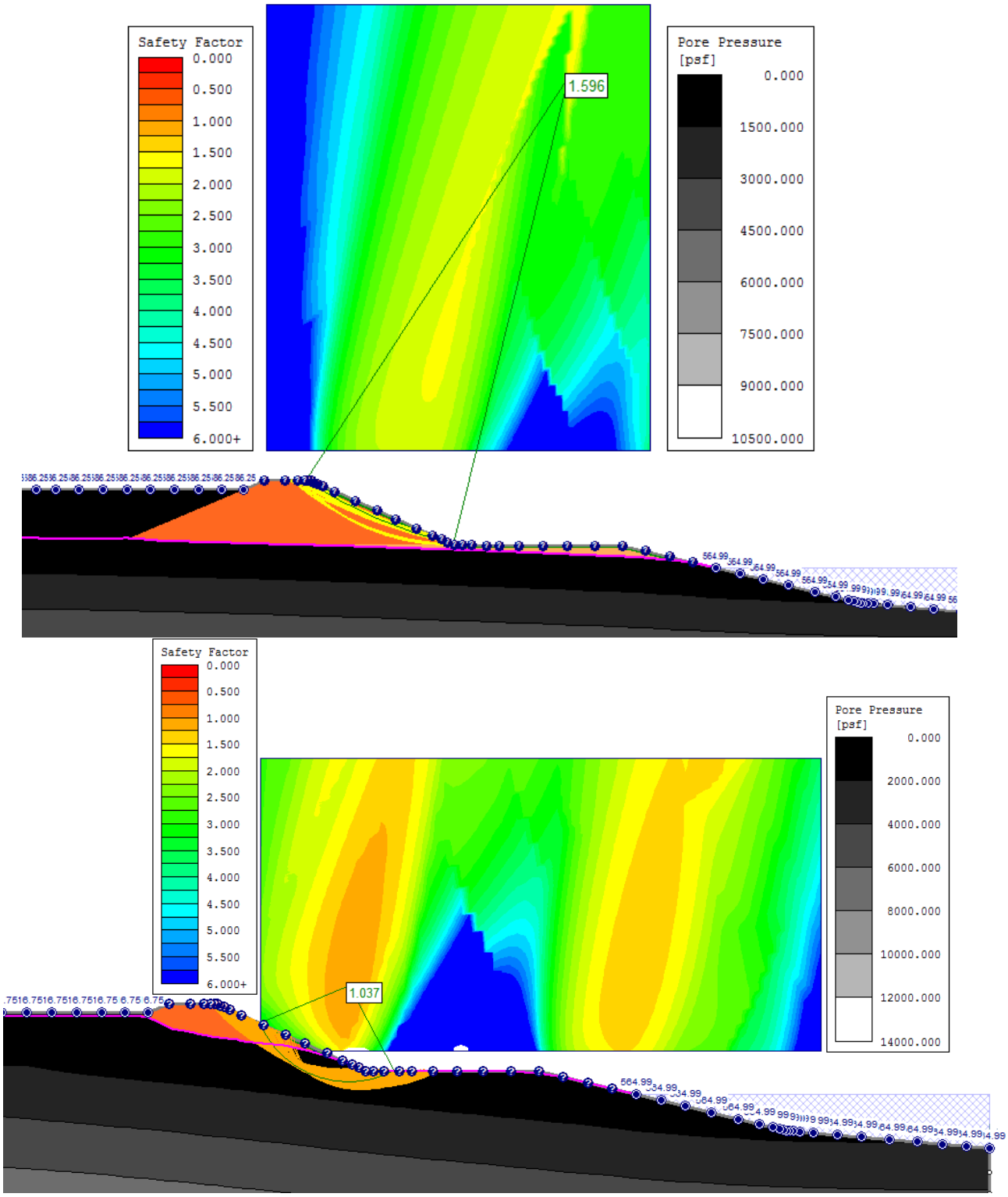

Figure 29: Analyses for the in-situ condition, first with the in-situ measured water table (above) and then with a hypothetical higher water table (below). Slip surfaces are shown for factors of safety below 1.7 for the above case and between 1.0 and 1.2 for the below case.

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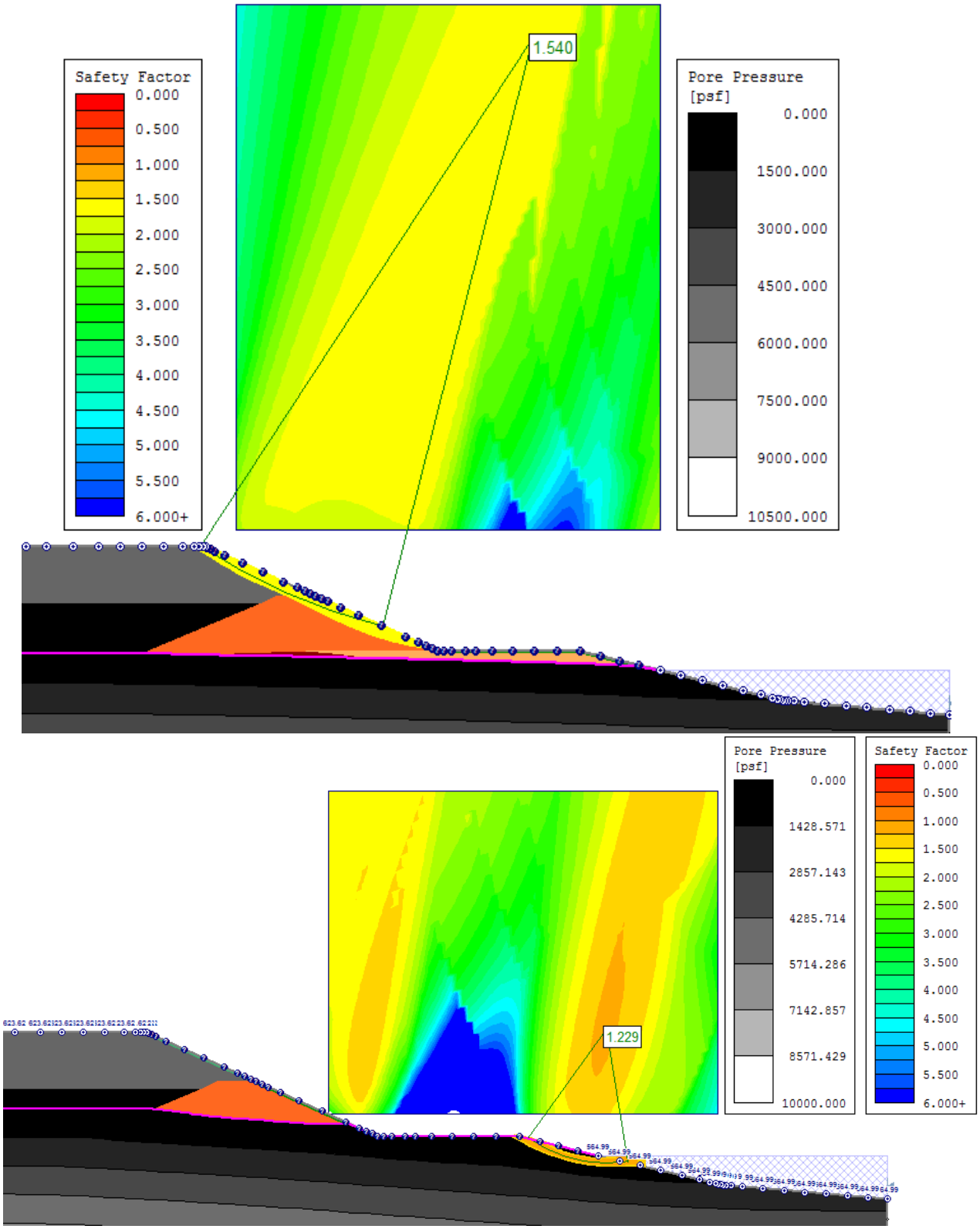

Figure 30: Analyses for an added upstream dry-disposed cell over the surface impoundment, for the in-situ water table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.6 are shown in the above case and between 1.2 and 1.3 for the below case.

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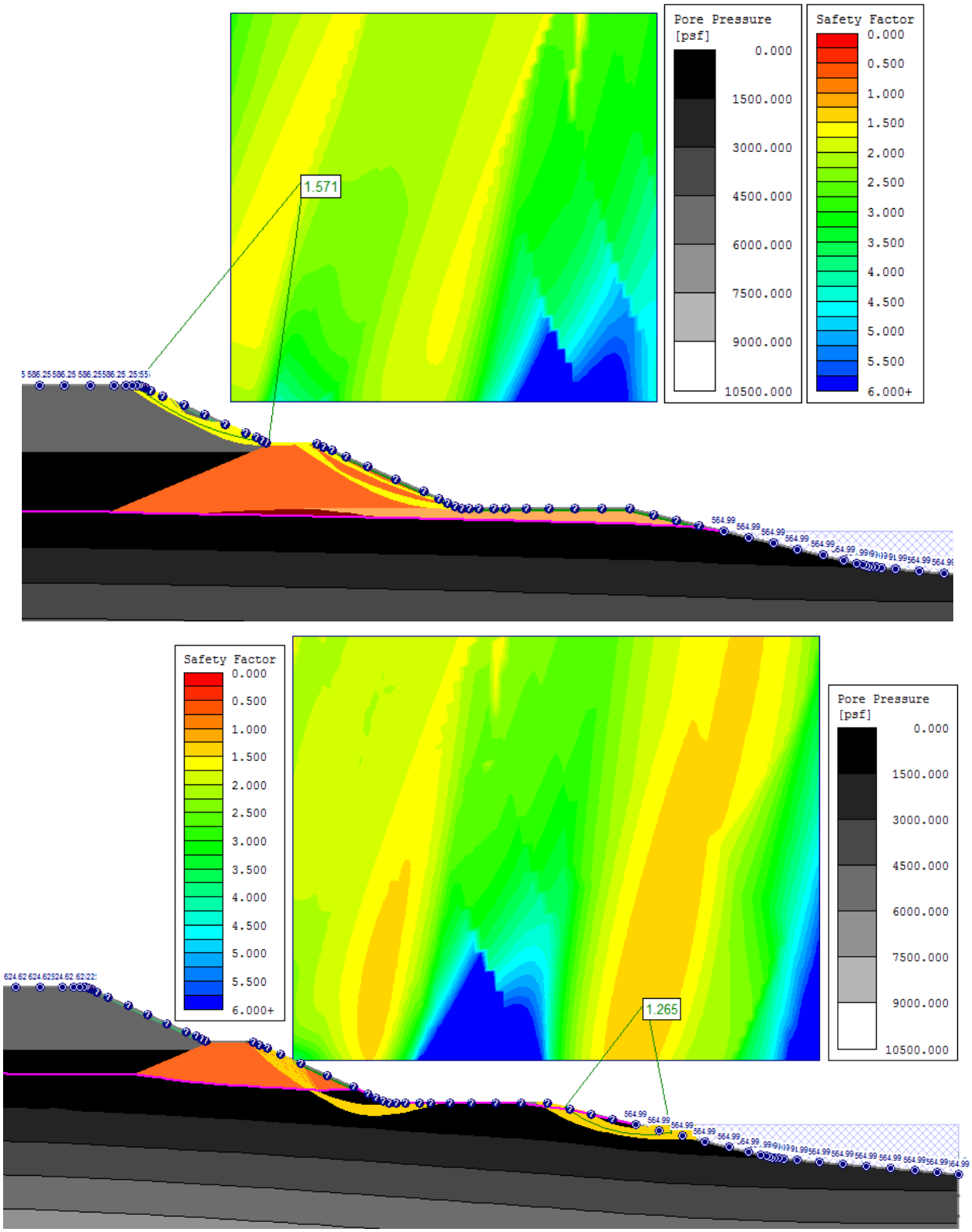

Figure 31: Analyses for an added upstream dry-disposed cell above the surface-impoundment for the in-situ groundwater table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.7 are shown for the above case and between 1.2 and 1.4 for the below case.

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In all of the geometries considered in these analyses, a thin layer with a low cohesion was included in order to eliminate infinite slope failures that are easily remediated by keeping the slopes moist or vegetated. In addition, all of the geometries analyzed for the in-situ phreatic surface resulted in acceptable factors of safety, since the in-situ water table is so low compared to the site geometry. However, with a slight rise in the water level (perhaps as the result of a 100-year storm event), the factors of safety drop dramatically. This is the result of the fact that the embankment is constructed out of nonplastic soils that completely derive their strength from the frictional component of shear strength. As the water table rises, buoyancy effects decrease the effective overburden pressures in the geometry, thereby decreasing the slope shear strength and decreasing the factors of safety of all surfaces considered. Furthermore, the very low permeability of the embankment material makes this water table condition a real possibility, if no form of drainage through the slope is provided.

Chapter 6

Settlement Calculations for CCRs

It is common to see consolidation data reported for CCRs in research publications. However, given that CCRs often tend to be fairly free-draining, it would seem odd to use these values to determine settlement of CCRs, given that a structure or embankment were constructed over previously disposed CCRs. However, any methods developed to calculate settlements in sands are not necessarily applicable to CCRs or to silt-sized materials either. In this chapter, a comparison of common methods of calculating settlements will be made for CCRs at a specific site where a test fill was performed and actual CCR settlements monitored.

6.1 Test Fill Results

The results of a test fill of compacted, dry-placed fly ash performed over an approximately uniform 50 ft deep deposit of surface impounded ash was provided by S&ME. The test fill was 20 ft high and had lateral dimensions of 250 ft by 250 ft. The side-slopes all-around were 3H to 1V, making the entire footprint of the fill about 370 ft by 370 ft, or 136,900 ft^2. For the purposes of these analyses and the sake of simplicity this load will be characterized as a constant 20 ft load over the 250 ft square footprint of the test fill. The recorded settlements at the center of the test fill area were between 18.0 and 19.5 inches.

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6.2 Settlement Calculation by Consolidation Theory

For increased accuracy, the surface impounded layer is divided into sub-layers and the settlements calculated for each layer and added together for the overall settlement. It is assumed that since the CCR material has not been loaded in the past that it is in the normally consolidated condition and that they unit weights of the surface impounded CCRs and dry-placed CCRs are 95 pcf and 100 pcf, respectively. Four sets of consolidation tests were performed on the impounded CCR material that made up the foundation for the test fill; the compression ratio for the test closest to the depth of the layer being considered is used in calculating the settlement in that layer. The water table is located 8 ft below the ground surface:

Table 10: Consolidation settlements calculated for test fill placed over a CCR surface impoundment.

Layer	T_L (ft)	D_{CL} (ft)	P_0 (psf)	ΔP (psf)	P_f (psf)	c_{ec}	S_i (in)
1	5	2.5	237.5	2000	2237.5	0.20225	11.82
2	10	10	587.7	2000	2587.7	0.20225	15.62
3	15	22.5	832.2	2000	2832.2	0.07299	6.99
4	20	40	1158.2	2000	3158.2	0.07299	7.63
						Σ	42.07

Note: T_L = layer thickness, D_{CL} = depth to center of layer, P_0 = initial stress condition, D_P = change in stress, P_f = final stress condition, and S_i = settlement for a specific layer

As displayed in Table 10, the settlements estimated using consolidation theory are just over twice the amount observed in the test fill. This is not really surprising since CCR materials do not tend to behave like soils where consolidation theory is used to calculate settlements; generally, plots of volumetric strain vs. normal stress from consolidation tests performed on CCRs do not have clearly log-linear portions corresponding to a recompression and compression ratio. As a result, depending on what values are assumed for $c_{\varepsilon c}$ and $c_{\varepsilon c}$, the settlement could either be greatly overestimated or underestimated, depending on different individuals' interpretations of the plot.

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6.3 Settlement Calculation by D'Appolonia Method

The D'Appolonia (D'Appolonia et al. 1970) method of calculating settlements in sand is based on elasticity theory and can be applied to this sort of example with some moderate assumptions. Equation 8 is the equation developed by D'Appalonia et al. (1970):

$$\rho = \mu_0 \mu_1 \frac{qB}{M} \tag{9}$$

where ρ = settlement
μ_0, μ_1 = geometry factors from Figure 36
q = applied bearing pressure
B = footing width
M = 1-dimensional compression modulus

Figure 32 provides plots used to determine the geometry factors, while the applied bearing pressure and footing width are the same as determined in section 6.2. From logs of CPT tests performed at the test fill location, the average M measured over the depth of the CCR deposit was about 45 tsf (based on CPT correlations).

Given the dimensions of the test fill given in section 6.1 and Figure 32, μ_0 is estimated as 1.0 (since the fill is at the ground surface) and μ_1 would likely be around 0.14. The settlement can now be calculated as:

$$\rho = 1.0 \cdot 0.14 \cdot \frac{1 \text{ tsf} \cdot 250 \text{ ft}}{45 \text{ tsf}} = 0.777 \text{ ft} = 9.33 \text{ in}$$

The most obvious problems with applying this method to placement of a fill is that it was developed for shallow foundations, which are a rigid structure and it was developed for sands, while CCRs are usually classified as silts according to the USCS. Tan and Duncan (1991) cite that this method tends to underestimate settlements around 50% of the time, as it certainly does in this case.

Since this method underestimates the settlements observed at this site by about 50 percent, it may be useful to determine what value of compressibility modulus actually give an accurate settlement:

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$$M = \mu_0 \mu_1 \frac{qB}{\rho} = 1.0 \cdot 0.14 \cdot \frac{1 \text{ tsf} \cdot 250 \text{ ft}}{1.5833 \text{ ft}} = 22.1 \text{ tsf}$$

This value for the compressibility modulus is equivalent to an average modulus calibrated to the observed settlements. While one data point is not sufficient to develop a correlation, if enough settlement tests were conducted for CCR materials, it would be possible to develop a CPT-*M* correlation that better predicts settlements than the one used in this investigation.

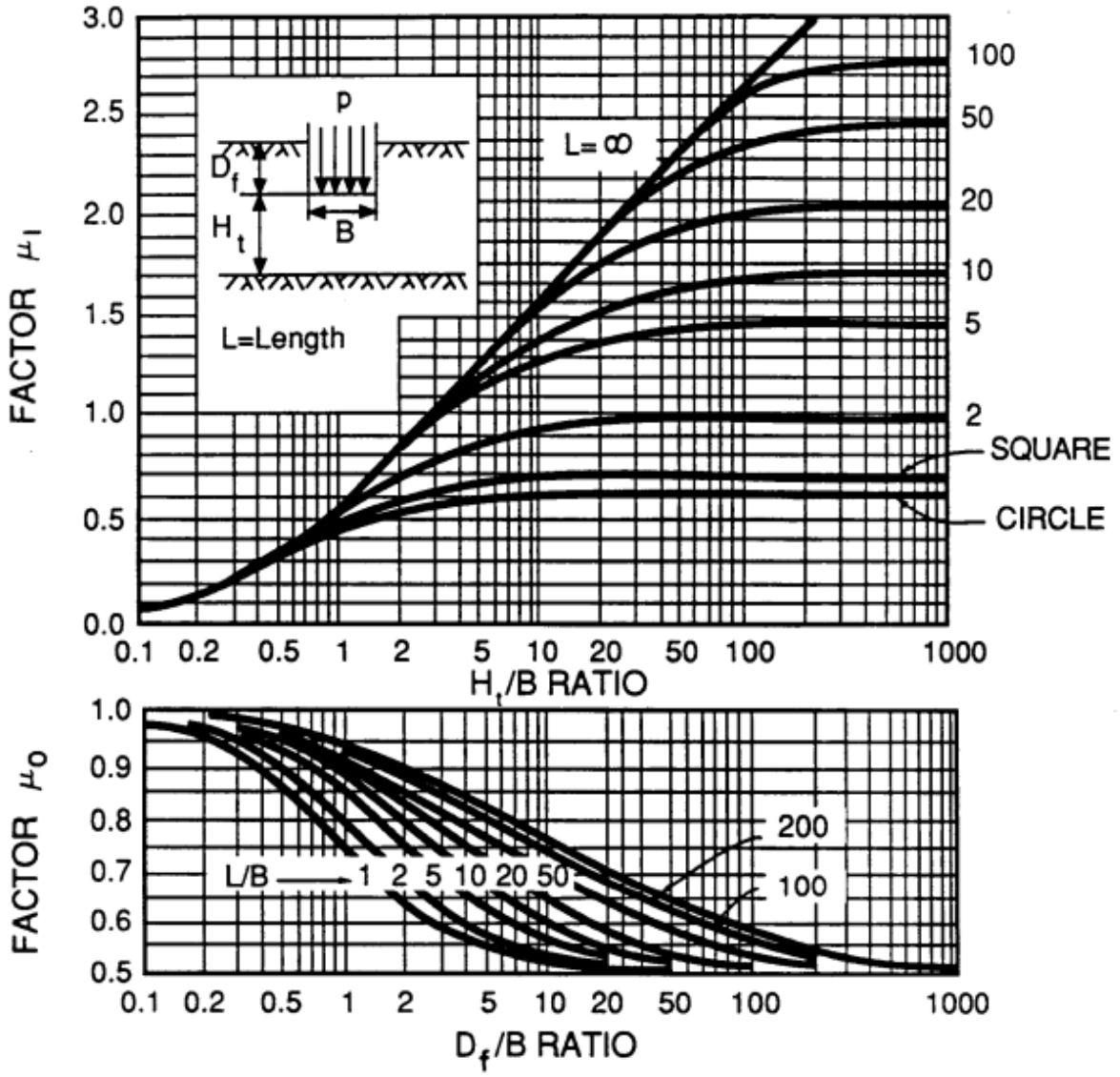

Figure 32: Plots published by D'Appolonia et al. (1970) to determine the values of the geometry factors to be used in footing settlement analyses.

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6.4 Other Observations

As an alternative to specific methods of settlement calculations, if it is assumed that the fill is of large lateral extent, a basic calculation of settlement can be made using *M*, the pressure applied by the fill, and the depth of the soil strata being filled:

$$S = \frac{PZ}{M} \tag{10}$$

where P = the pressure applied as a result of the fill
Z = the depth of the soil where settlements are being considered

Again using a value of M = 45 tsf, the settlement is calculated as 13.33 inches. This is still an under-estimate of settlement for this test fill, but given that a CPT correlation for *M* in CCR materials was developed, it may be possible to calculate more precise estimates of settlement. Reduction factors could then be applied to equation 10 in order to attain an acceptable level of reliability.

A comparison of Young's modulus of soil (E_s) can also be made using Hooke's Law and the observed settlement:

$$E_s = \frac{PZ}{S} \tag{10}$$

where P = the pressure applied as a result of the fill
Z = the depth of the soil where settlements are being considered
S = the observed settlements after fill placement

versus the correlation of CPT tip resistance (q_t) to E_s used in Schmertmann's CPT settlement calculation method:

$$E_s \approx 2.5 \cdot q_t \tag{11}$$

Using Hooke's Law with a settlement of 19 inches and an applied fill pressure of 1 tsf, the E_s calculated is 31.6 tsf. Using the CPT correlation given in equation 11, the average CPT tip resistance over the depth of the CCR deposit below the test fill was about 17 tsf, which would return an E_s value of 42.5 tsf.

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The accuracy of these values of E_s are questionable, however, Hooke's law assumes a linear-elastic stress-strain condition and the CPT correlation was developed for use with sandy soils. Ideally, CPT correlations should be developed specifically for CCR materials and E_s, which would require a large volume of CPT tests and data analysis.

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Chapter 7

Reconstitution Technique for Surface Impounded CCRs

Sample reconstitution techniques try to balance process simplicity with matching the in-situ fabric of the soil as closely as possible. Some reconstitution techniques commonly used on sand and non-plastic silt materials include moist tamping methods, air and water-pluviated methods, and slurry deposited methods. In this chapter, a brief overview of these various methods is given and a technique not yet applied to coal ash materials is analyzed when used with surface impounded CCR materials (will be referred to as SI CCRs throughout this chapter).

7.1 Moist Tamping

The first moist tamping method was proposed by Ladd (1978) in a paper entitled "Preparing Test Specimens Using Undercompaction." In this method, specimens are formed by hand-tamping of moist soil ($w\%$ = 20% to 70%) in equal lifts within a triaxial sample split mold, while increasing the dry mass of soil in each subsequent lift. The soil samples should be mixed with water at least 16 hours prior to use and the lift thickness should not exceed 1 inch for specimens with a diameter of less than 4 inches. Ladd provided an equation to calculate the percent under-compaction for each layer placed:

$$U_n = U_{ni} - \left[\frac{(U_{ni} - U_{nt})}{n_t - 1} \times (n - 1)\right] \tag{11}$$

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where U_{ni} = percent under-compaction selected for first layer
U_{nt} = percent under-compaction selected for final layer (normally zero)
n = number of layer being considered
n_i = first (initial) layer
n_t = total number of layers (final layer)

The U_{ni} of the first layer is usually between 0% for very dense specimens and 15% for very loose specimens. In order to determine the correct U_{ni}, a series of cyclic triaxial tests must be run with the same effective consolidation stresses and CSR, but with different values of U_{ni}. The specimen then observed during testing and the following observations indicate an inappropriate value of U_{ni}:

- Excessive necking or bulging in any part of the specimen during cyclic loading.
- Non-uniform vertical strains during unconsolidated-undrained loading.
- A honeycomb soil fabric structure at either end of the specimen.
- A non-uniform dry unit weight along the height of the specimen.

Other moist tamping techniques modify this method slightly, usually by either changing the method in which under-compaction is addressed or by defining a specific compaction energy to be used in compacting the sample. This method can be laborious if the correct value of U_{ni} must be determined, since a whole test regime must be completed. Additionally, with regards to hydraulically-placed soils, the fabric of the sample does not match in-situ conditions well.

7.2 Air/Water Pluviation

"Pluviation" or "raining" of soil is a technique first published by Kolbuszweski in 1948. In this technique, the soil is pluviated from a separate apparatus into the soil mold, either in a dry state, or in water. These apparatuses vary in complexity and have various opening sizes and diffuser designs. By controlling the flow rate of the soil through the diffuser and the fall height of the sand, it is possible to place the soil at varying relative densities (Rad and Tumay 1987).

While air-pluviated samples can provide relatively uniform specimens and is a good technique for modeling Aeolian deposits of poorly graded sands and silts, well-graded sands or sands with

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high fines content have a tendency to segregate. Furthermore, the fabric of the sample can be disturbed during the saturation phase of triaxial testing due to fines washing out of their original placement (Keurbis and Vaid 1988). Air-pluviation would not likely model the fabric of surface-impounded CCRs well, since these CCRs are deposited in a hydraulic environment. Furthermore, the high content of non-plastic fines in CCRs would make loss of soil due to dust very high.

Similarly, water-pluviated specimens form uniform samples of poorly graded soils, though usually at lower relative densities than air-pluviated specimens, since soils fall at a slower velocity through water than through air. However, with well-graded soils, or soils with high fines contents, particle segregation can be a problem with this technique (Keurbis and Vaid 1988). Particle segregation would also be an issue with surface impounded CCRs, since these tend to be a mixture of bottom ash and fly ash.

7.3 Slurry Deposition Techniques

Like the previous two methods, there are several different slurry deposition methods. The first slurry deposition method was first developed by Keurbis and Vaid (1988), which is the technique that is being assessed for use on surface impounded CCRs in this thesis, with some slight modifications. For the sake of avoiding any redundancy, the procedure for this technique will be outlined with specific reference to its use on SI CCRs, with departures from the original procedure of Keurbis and Vaid noted.

7.4 Slurry Deposition Technique Applied to SI CCRs

The basic premise of the slurry deposition technique is to form a lean (just enough water to allow for effective soil mixing), saturated slurry of soil that can then be deposited directly from a mixing tube into a triaxial split-mold, with minimal disturbance to the mixture. The slurry should be lean enough to avoid the development of sedimentation currents during the transfer from the mixing tube to the split-mold, but not so lean that mixing becomes difficult. In addition, the procedure ensures that the sample will be fully or very close to fully saturated upon completion. The samples are deposited very loosely initially and can be densified to higher relative densities

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by vibration. In their original slurry deposition method, Keurbis and Vaid recommend de-airing the soil-water mixture and then pluviating it into the mixing tube in order to better ensure saturation. However, CCRs can be fine enough that a considerable amount of the sample (of a specific grain-size) can be lost in the pluviation process. Therefore, the CCR samples prepared using this method are simply added to de-aired water directly into the mixing tube in order to minimize sample loss during the preparation process; if saturation ratios using this method are unacceptable, a soil-water mixture can de-aired under a vacuum or by boiling and then transferred directly to the mixing tube. The apparatus required for the CCR slurry deposition technique are as follows:

- Acrylic mixing tube, with an outer diameter slightly smaller than the target diameter of the sample being formed and a plug to seal off one end. The end opposite of the mixing tube will have rubber gasket seal glued around the rim. The other dimensions of this tube will be discussed later.

Figure 33: Acrylic mixing tube with a rubber stopper on one end and rubber gasket seal glued to the opposite end.

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- A thin metal disk approximately the same diameter as the bottom porous disk used in testing.

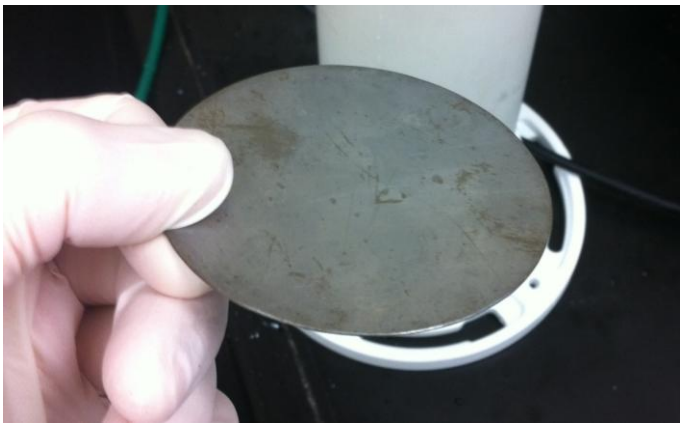

Figure 34: Thin metal disk approximately the same diameter of the bottom porous disk.

- A rubber or latex membrane with a smaller diameter than the mixing tube. Standard store-bought balloons can be cut to fit and are a cheap, readily available alternative.
- Water bath container for the acrylic mixing tube, large enough to completely submerge the mixing tube.

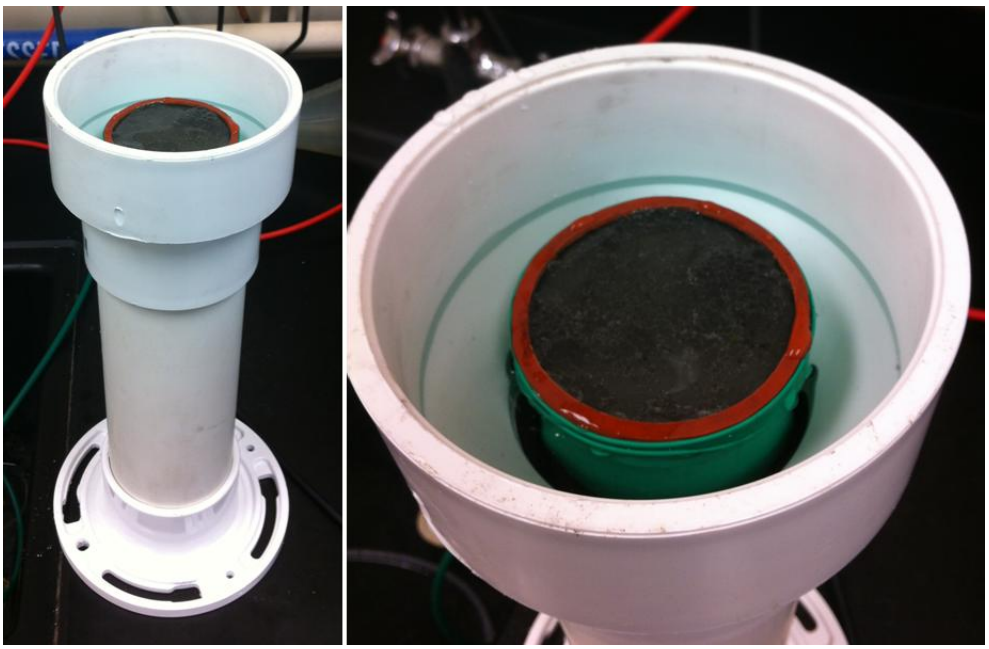

Figure 35: Water bath large enough to completely submerge the mixing tube and allow for easy placement of the porous disk and metal plate. The rubber membrane can also be seen rolled down around the mixing tube.

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- Water bath container for the triaxial cell base-platen that can at least submerge the bottom drainage line and the porous disk when the mixing tube is placed on it.

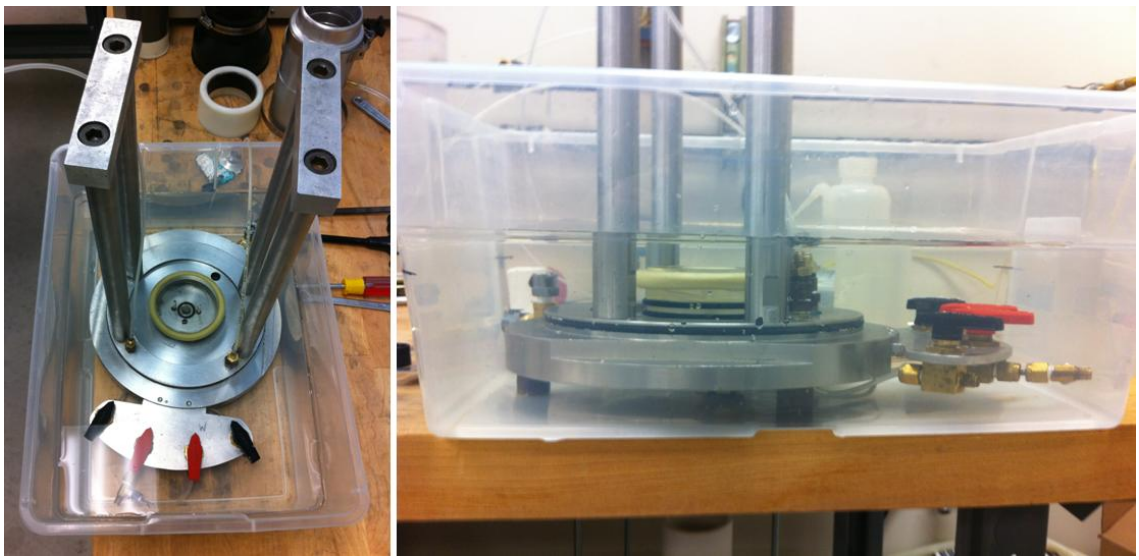

Figure 36: Water bath large enough to accommodate the bottom of the triaxial cell and submerge the bottom platen.

- A split-mold triaxial sample former.
- A collar that fits over the split-mold to accommodate the temporary increased volume of the sample when it is first placed.

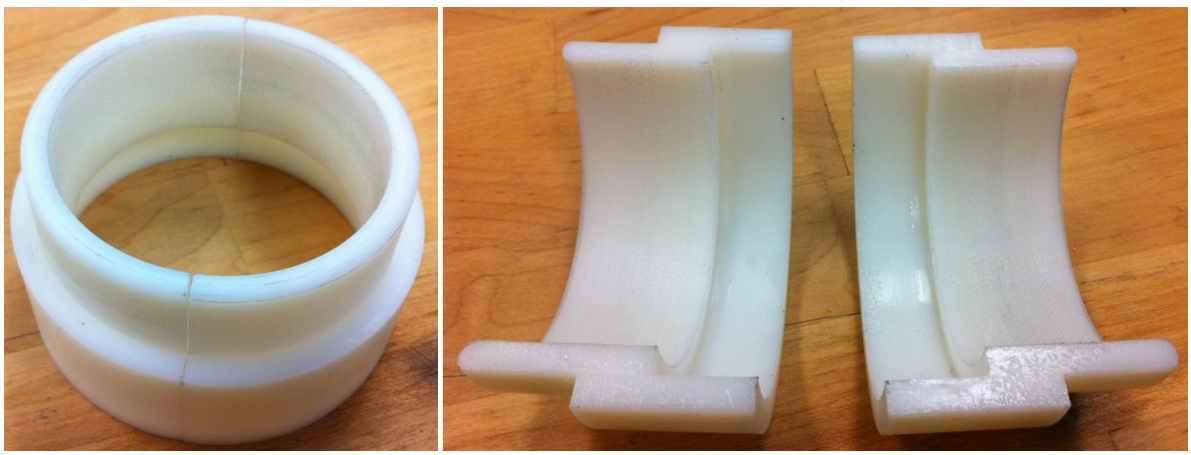

Figure 37: A custom-made split-collar to accommodate the additional volume of soil when the slurry is first placed in the specimen split-mold. This collar was machined out of nylon to fit the dimensions of the split-mold being used and the flexible collar used to accommodate the extra water volume when the slurry was placed.

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- A small mechanical shaker or mallet to densify the sample once it is placed. If a mallet is used, a heavier mallet is best, as it transfers more energy than a standard rubber mallet.

In their original slurry-deposition method, Keurbis and Vaid made their soil-water mixtures using dried soil; for SI CCRs, this would be impractical because of the dust that would be lost in handling it in a dry state. Thus, it is recommended that the SI CCRs be mixed at a target water content in order to make it more workable. Once the soil is well-mixed, several small samples should be oven-dried to verify that the moisture content of the soil is homogenous.

The mixing tube should have the thin rubber membrane rolled down over the end with the rubber gasket seal and the other end plugged with the stopper. The moist CCR specimen is placed in the mixing tube, which should then be filled with de-aired water (some water can be in the tube prior to adding the moist soil in order to help collapse the structure of the moist CCRs and decrease their volume during placement in the tube). The mixing tube is now placed into the de-aired-water bath. Once the mixing tube is in the water-bath, a saturated, de-aired porous disk with a filter paper attached is placed on the open end, such that it is completely submerged in the water bath; some fines will escape the mixing tube while it is submerged and before the porous disk is placed over the opening (see Figure 38), so these fines should be put into a container to be oven-dried and weighed in order to adjust the dry mass of the sample.

Figure 38: Placement of the porous disk and transferring of the fines lost in the water bath to a container to be oven-dried and weighed.

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At this point, the thin rubber membrane is rolled over the porous disk, such that a small portion of the center of the disk is exposed. The thin, metal disk is now placed over the porous disk and membrane and the mixing tube is withdrawn from the water bath, while keeping firm pressure on the metal disk. The securing of the porous disk with the thin rubber membrane and placement of the metal disk are shown in Figure 39.

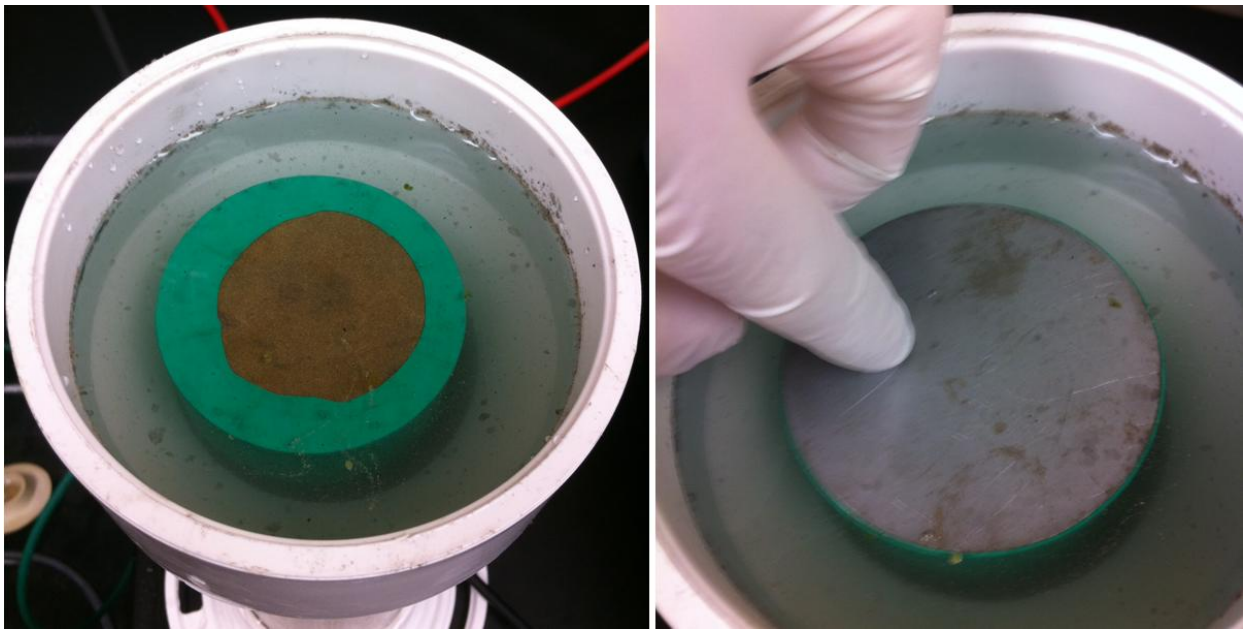

Figure 39: Securing of the porous disk with the thin rubber membrane and placement of the thin metal disk over the opening in the membrane.

Now the mixing tube is removed from the water bath while maintaining firm pressure on the thin metal disk and the soil slurry mixed vigorously, end-over-end for the next twenty minutes, to ensure homogeneity of the slurry. After twenty minutes has passed, the mixing tube is placed disk-end down and the mixture is allowed to settle to its loosest stable state. When the mixture has stabilized, the metal disk is removed (it should be held in place by suction when the mixing tube is lifted), the membrane rolled back to the edges of the porous stone, and the entire apparatus placed porous-disk-down onto the base platen, which is submerged in another de-aired water-bath. The rubber membrane around the mixing tube is now rolled up and off of the mixing tube. The sample membrane has been rolled down around and attached to the bottom platen with two o-rings prior to submerging the base platen in the de-aired water-bath and it is now rolled up and over the outside of the mixing tube. The entire bottom platen can now be removed from the water bath and the split mold formed around the mixing tube and sample membrane. Rolling of

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the membrane over the mixing tube and placement of the split mold and collars after removal of the triaxial cell base from the water bath is illustrated in Figure 40.

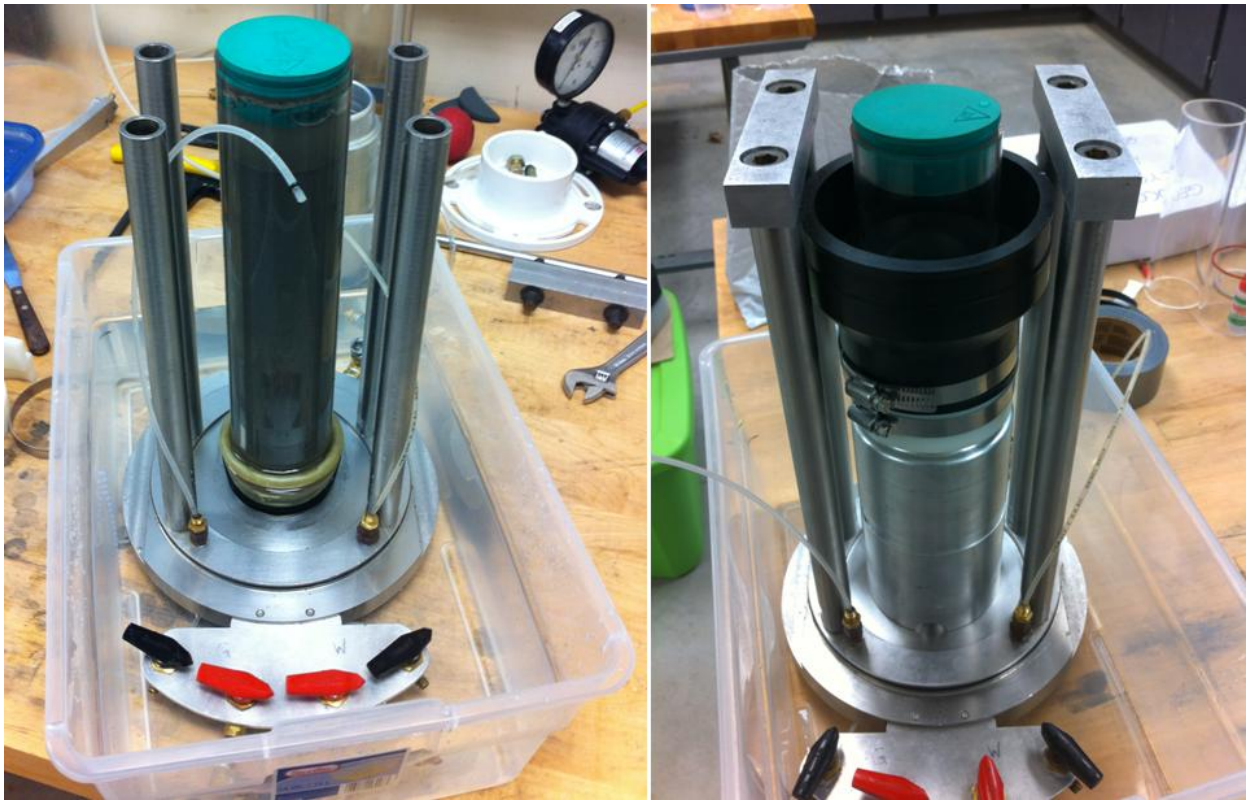

Figure 40: Rolling up the membrane around the mixing tube and placement of the specimen split-mold, the slurry extension collar, and the water extension collar after removal of the triaxial cell base from the water bath.

Once the extension collars for the split-mold is attached, a vacuum is applied between the split mold and the membrane; then, if additional volume is required to accommodate water volume, either a larger membrane can be secured using a hose clamp, or a flexible rubber PVC connection can be used (the flexible PVC connection was used in this experiment, as shown in the right-hand photograph in Figure 40). The last step before transferring the slurry to the split mold is to add a de-aired water bath to the split mold, outside of the mixing tube; this ensures minimal disturbance of the CCR material as it is transferred from the mixing tube to the split-mold. The rubber plug on the mixing tube can now be removed and the mixing tube slowly extruded, such that disturbance to the slurry is minimized as it is deposited in the split-mold. When the mixing tube has been fully extruded, the water level can be adjusted by allowing drainage through the drainage lines on the bottom platen (alternatively, some of the water and fines mixture at the top can be basted off and put into the same container as the fines from the

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mixing tube water bath and oven-dried and later weighed to save time). Once the water level has dropped enough to allow removal of the extra membrane or flexible PVC connection, the slurry can be densified by attaching the top platen (which also has a filter-paper applied), applying a small pressure, and vibrating the sample if necessary, while allowing excess pore pressures to dissipate through top and bottom drainage lines, as shown in Figure 41. This should be done such that the piezometric pressure is the same across the sample, which was postulated to form specimens of sand at uniform densities with height by Vaid and Negussey (1988).

Figure 41: Setup used to densify SI CCR slurry-deposition samples. Notice that the short-circuit between the top and bottom drainage is being used to drain the sample as it is densified with the top platen applied. The top platen fits snugly enough into the extension collar to keep a water-proof seal. The white piece on the top of the triaxial base is simply a part to keep the piston plumb as the slight pressure is applied to the top of the sample during densification.

This vibrating can be accomplished with either a mechanical shaker or by tapping the side of the split mold gently with a mallet. However compaction of specimens to high relative densities can take quite a long time using a mallet, so a mechanical shaker would be preferable for SI CCR specimens. Once the target sample height is reached (and thereby the target sample volume reached), the extension collar is removed, the membrane is secured to the top platen with two o-

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rings, and a small vacuum pressure is applied to the sample to allow removal of the split mold. The dimensions of the sample are then measured and the sample is placed into the triaxial testing apparatus.

The dimensions of the acrylic mixing tube are determined based on the minimum density of the largest volume of soil that will be used in making a sample. That is, the length of the tube is determined based on the amount of soil required in forming the densest sample to be tested, placed at a zero percent relative density. Keurbis and Vaid found that this volume, increased by five to ten percent is sufficient to allow for adequate slurry mixing, while avoiding large particle sedimentation distances. A sample calculation determining the appropriate length for a mixing tube is included in the appendix.

7.5 Analysis of Slurry Deposition Technique with SI CCRs

In order to assess the slurry deposition technique as applied to SI CCRs, relative density and gradation were determined for the top, middle, and bottom portions of the sample. Since CCRs tend to be non-plastic and negative pore water pressures in a moist sample are not high enough to ensure no disturbance of fabric during the verification process, a gelatin solidification technique developed by Emery et al. (1973) for use with sand specimens was modified for use in this experiment. Gelatin was chosen as the solidifying agent because it is easily dissolved using heat after the volume of each individual slice of the specimen is determined. Then, by adding bromelain, a proteolytic enzyme, the gelatin is broken down, leaving a brittle crystal that can then be avoided when selecting a sample to run a hydrometer test on, and that can be washed out when the gradation is analyzed above the #200 sieve.

SI CCRs have a wide range of hydraulic conductivities (a result of how they are generated and placed), sometimes being similar to sands and other times being more similar to silts. For this reason, the time required to permeate these samples with a gelatin solution is much longer than for clean sand samples. As a result, it was determined that a lower concentration should be used than recommended by Emery et al., such that the solution remains a liquid at room temperature, but is solidified by surrounding the sample in the split mold with an ice-bath; this is explained in more detail in the following paragraphs.

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Once the compaction of the slurry deposited sample was complete, height measurements were made at four locations (front, back, right, and left sides of the top platen) using the frame of the triaxial cell and a Mitutoyo micrometer. The height of the sample was determined by subtracting the thicknesses of all the component parts that are not soil from the heights measured from the bottom platen to the triaxial cell frame at four points (front, back, right, and left sides). This was done as a quality-control measure to ensure that the overall relative density across the sample was close to the target relative density. A 0.75% by-mass gelatin solution is then permeated through the specimen by applying an elevation head between the gelatin reservoir and bottom drainage lines of the specimen and allowing drainage through the top drainage lines (not more than 18 inches). About two specimen pore volumes were permeated through the specimen to ensure complete replacement of the pore fluid. After the gelatin flushing of the specimen was complete, the drainage lines were all closed and an ice-bath was packed around the specimen, as shown in Figure 42. For this experiment, the ice bath was maintained over the height of the sample for a period of four hours, which was found to be adequate to solidify the specimen.

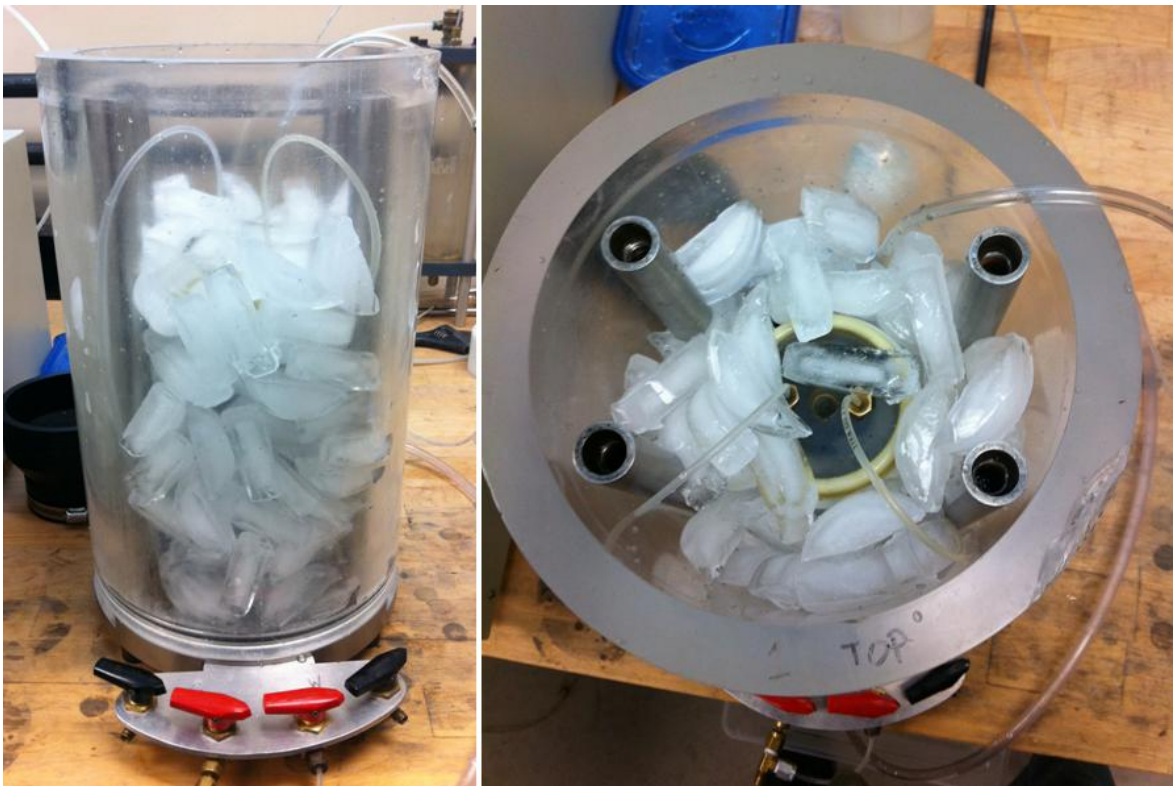

Figure 42: Ice bath placed around the compacted specimen for a period of four hours to set the gelatin.

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After the four hours, the ice bath was removed and the specimen was removed from the split mold and taken out of the membrane, as shown in Figure 43, and cut into three approximately even-sized portions.

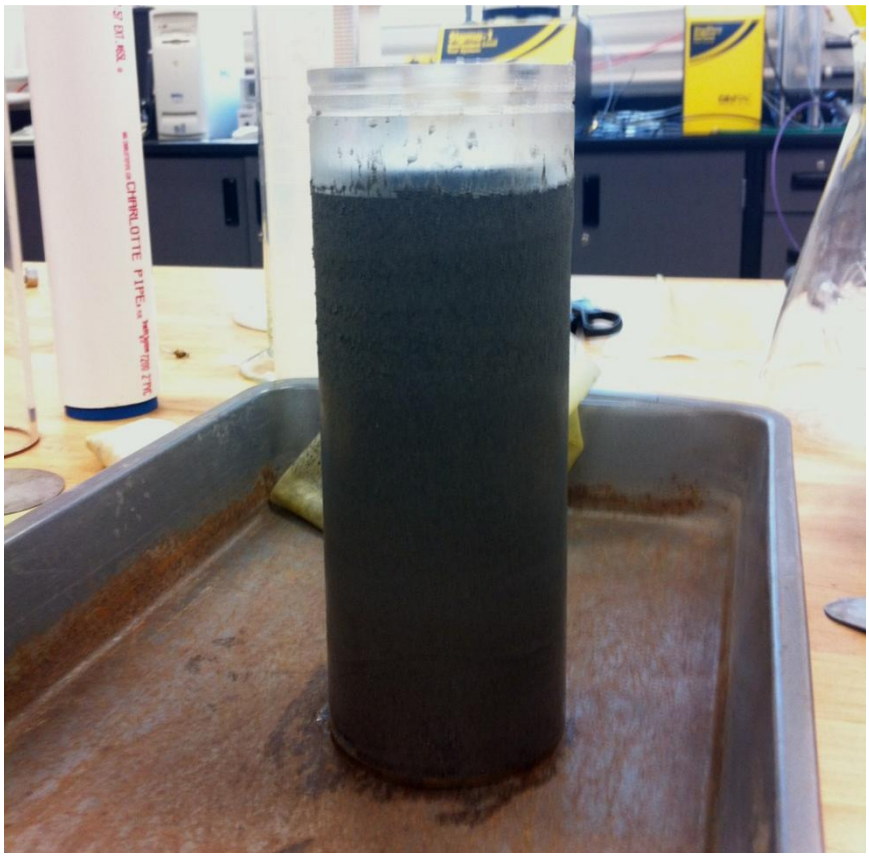

Figure 43: Specimen removed from the split mold and membrane following gelatin curing period.

The mass of these portions was taken and the volume determined using water displacement, as shown in Figure 44. These two measurements allow for the calculation of the density of each slice. It can be assumed that each of the slices is composed only of a mixture of gelatin and CCR material for the purposes of determining the relative density of each slice. The specific gravity of the gelatin solution was determined by permeating a portion of the solution through a piece of filter paper into a graduated cylinder and also placing this in an ice-bath for four hours, after which the mass and volume of the gelatin were measured and used to calculate the specific gravity at that temperature (ranged from 1.000 to 1.008). The specific gravity of the CCR material was determined according to ASTM D854, courtesy of Kevin Foster. Since the overall

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density of each slice is known, and the density of both component materials is known, it is possible to calculate the volume of each component according to equations 12 and 13.

$$V_{s_slice} = \frac{\rho_{slice} \cdot V_{Slice} \frac{G_G M_{slice}}{\rho_{slice}}}{G_S - G_G} \tag{12}$$

where V_{s_slice} = volume of solids of the specimen slice
ρ_{slice} = density of the specimen slice
V_{slice} = volume of the specimen slice
G_G = specific gravity of the gelatin solution after ice-bath
M_{slice} = mass of the specimen slice
G_S = specific gravity of the CCR material

$$V_{g_slice} = \frac{M_{slice}}{\rho_{slice}} - V_{s_slice} \tag{13}$$

where V_{g_slice} = volume of gelatin of the specimen slice

Since it is assumed that the gelatin completely permeated the pore space of the sample, the volume of the gelatin is equal to the volume of voids in the slice and the void ratio can be calculated, which can then be used to calculate the relative density.

Once the densities of the slices has been determined, each slice is placed in its own container and allowed to dissolve (which will occur at room temperature), after which the Bromelain is added (a mass ratio of 1:10 of Bromelain to gelatin was found to be sufficient) and allowed to sit for two hours before placing it in an oven maintained at 110° C until it dried completely. ASTM D422-63 was followed in the particle-size analyses performed on each of the three slices for each sample, except for a few changes based on the properties of the CCR materials:

- The soil was not separated at the #10 sieve, since the material retained on the #10 sieve represented such a small portion of the sample. Additionally, in separating the samples at this sieve, there was the potential to lose specific particle sizes due to dust losses. Each of the hydrometer tests were separated on the #10 sieve following the test and the mass was adjusted accordingly for the hydrometer analysis calculations. This also

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eliminates the need to perform the calculation given in section 16 of the ASTM specification.

- A dry sample was used in each hydrometer test, since there would have been considerable time delays waiting for the specimen to dry at room-temperature (especially considering the presence of gelatin and bromelain in the specimens.

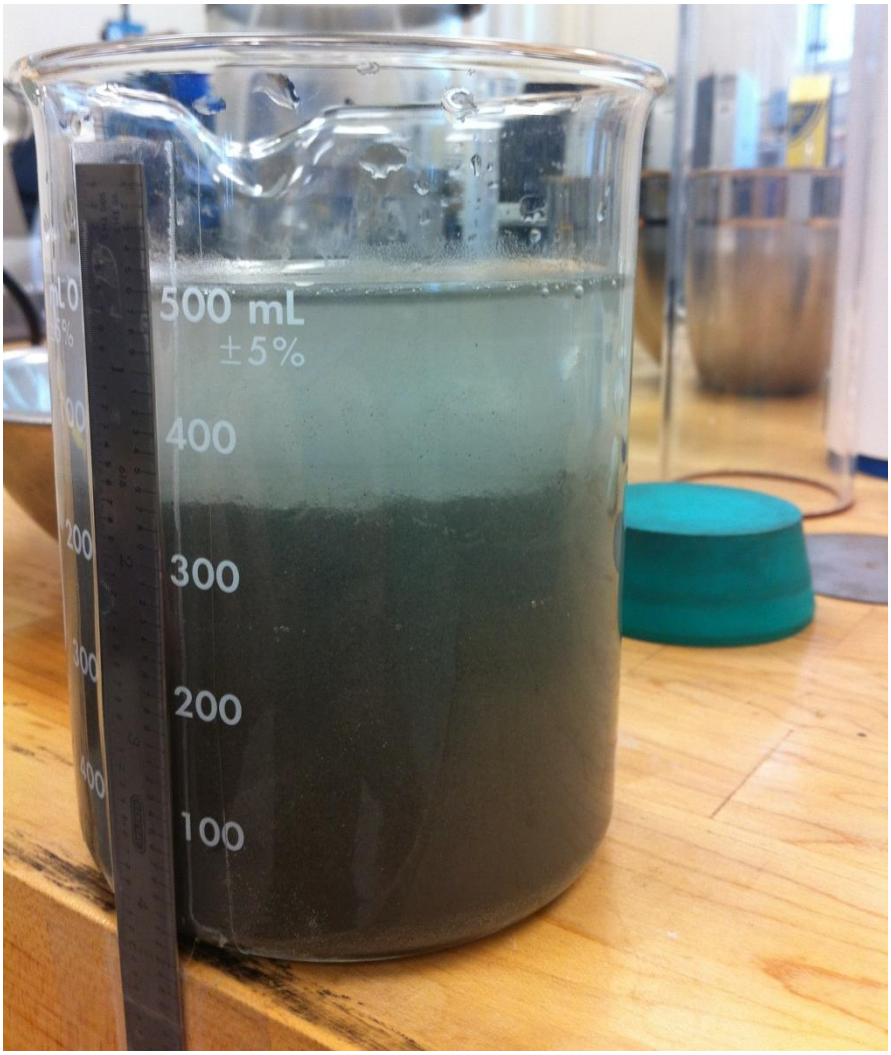

Figure 44: Each specimen slice volume was determined using water displacement. A 500 mL capacity beaker and a ruler incremented at 1/100" were used to do this. The vertical distance between a 100 mL addition of water to the beaker and the equation for the volume of a cylinder was used to calculate the diameter of the beaker; with the diameter known, it was determined that volumes could be measured accurately to ± 1.4 cm^3.

A dry sample of each of the slices could then be chosen to use in a hydrometer test (Bromelain-gelatin crystals were avoided in order to ensure they did not affect the results) to determine the

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grain size distribution for soil passing the #200 sieve. This soil was then added back to the rest of the dried specimen slice and washed on a #200 sieve to be included in a grain-size analysis for the particles with diameters greater than 75 μm.

Three different specimens were prepared, all at a target relative density of 70%. The first two specimens were deposited without a water bath within the split mold, while the last one was deposited with a water bath within the split mold. Table 11 makes a comparison of overall specimen slice densities and relative densities for the three specimens showing that, with or without a water bath inside the split mold, all three specimens had an increase in relative density down the height of the specimen. The top slice on the last specimen had not fully cured and as a result deformed some during the mass and volume measurements, undoubtedly resulting in the negative value of relative density. However, the bottom two slices of all three specimens are very consistent and the overall increase in relative density down the height of the specimen indicates that the densification technique that Vaid and Negussey (1988) cite as producing specimens of uniform density does not apply to SI CCR materials. Additionally, the very high values of relative density for all of the bottom slices indicate that the maximum and minimum void ratios determined for the material do not necessarily reflect the actual minimum and maximum void ratios; this could be the result of an inaccurate calculation of the specific gravity of the material, since that is a direct parameter for determining void ratio or an indication that the standards ASTM D4253 and D4254 are not appropriate methods for determining the minimum and maximum densities of CCR materials.

Table 11: Specimen relative density and density summary. The bottom two rows summarize relative density and density data for the entire specimen.

	Specimen 1		Specimen 2		Specimen 3	
	D_r	ρ (g/cm^3)	D_r	ρ (g/cm^3)	D_r	ρ (g/cm^3)
Top Slice	45%	1.63	27%	1.60	-13%	1.54
Middle Slice	93%	1.72	79%	1.69	76%	1.69
Bottom Slice	117%	1.78	113%	1.77	112%	1.77
Average	85%	1.71	73%	1.69	58%	1.67
From Dimensions	73%	-	70%	-	70%	-

The gradation curves presented for each specimen in Figures 45 through 47 show little segregation of particle size, with the most notable trend being that the bottom slice did tend to

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have a higher percentage of coarser particles within it; whether this phenomenon is solely the result of the placement method or the densification technique or whether both factors contribute is unclear and would require further study to determine. A comparison of the different slice gradations across specimens, presented in Figures 48 through 50, shows a very consistent gradation across the height of the sample between trials, indicating that this slight gradation difference is caused by a either the placement technique or the densification technique, though which of the one responsible cannot be stated with any certainty at this time. However, the effect of the placement technique and densification technique could be investigated easily through further testing. It is also interesting to note for specimen three, where a water-bath was used in the split-mold during slurry placement, that the gradations vary slightly more than for the two specimens, where a water-bath was not included. This may indicate that a water-bath allows sedimentation currents to form, while direct transfer without a water-bath minimizes the development of such currents. More reconstitutions would need to be made in order to perform meaningful statistical analyses on variation in gradation between samples made with and without water-baths to verify this claim. Lastly, Figure 51 plots all gradations on a single plot to make the extent of variation in the grain size distributions of the three specimens clear.

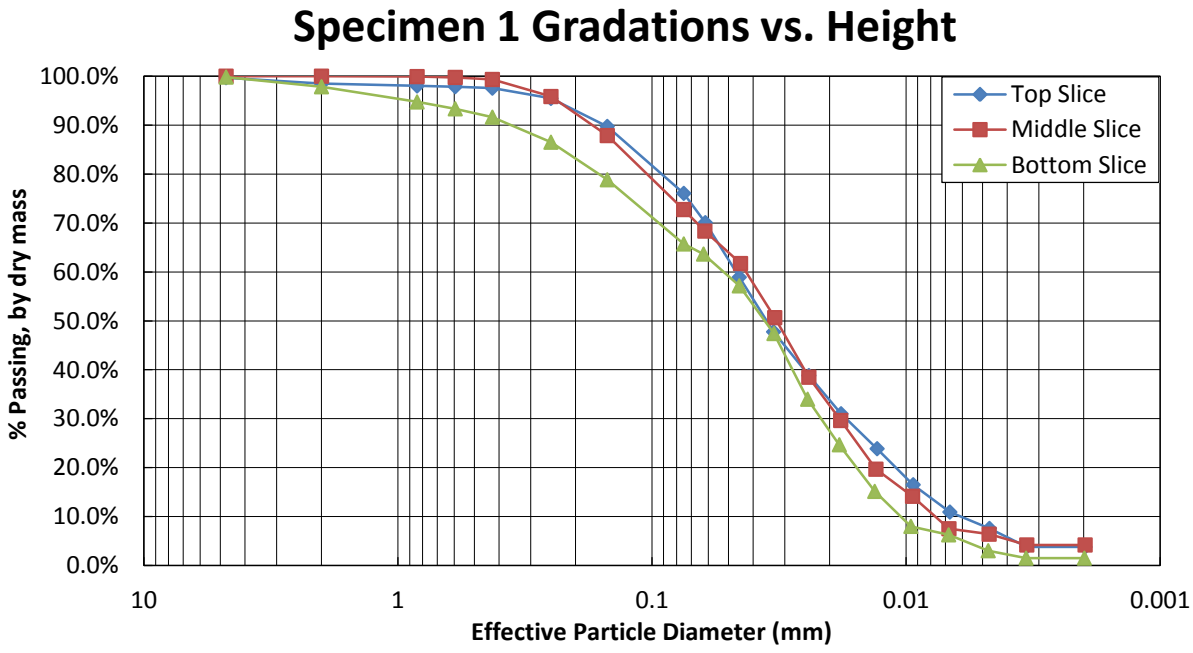

Figure 45: Plot comparing grain-size distributions across the height of specimen one.

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While the results of the three reconstitutions performed for this thesis provide some insight, a statement cannot be made about the suitability of the slurry deposition method for use with SI CCRs at this time. However, it can be said that the densification technique used in this investigation is unsuitable for SI CCR materials; if an alternative densification method could be developed, a simple investigation could be undertaken to determine if the slight particle segregation observed in this investigation was due to the vibratory compaction technique used, or if it was the result of the slurry deposition technique itself.

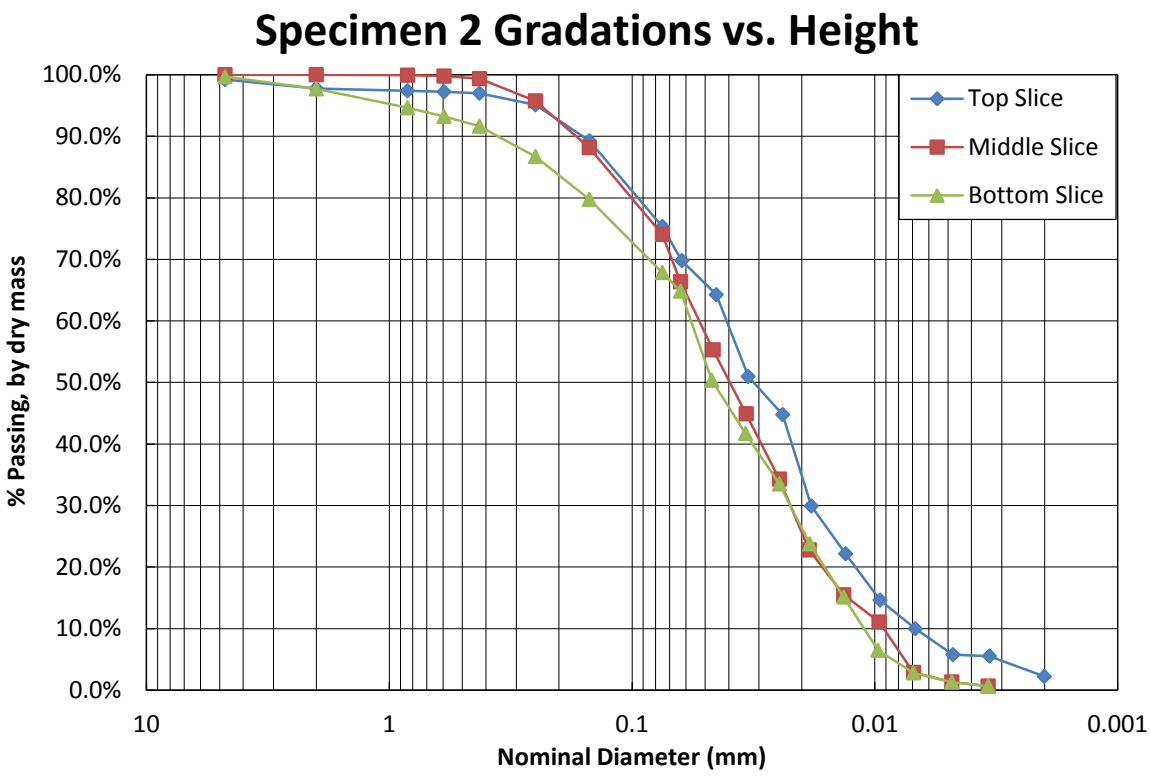

Figure 46: Plot comparing grain-size distribution across the height of specimen two.

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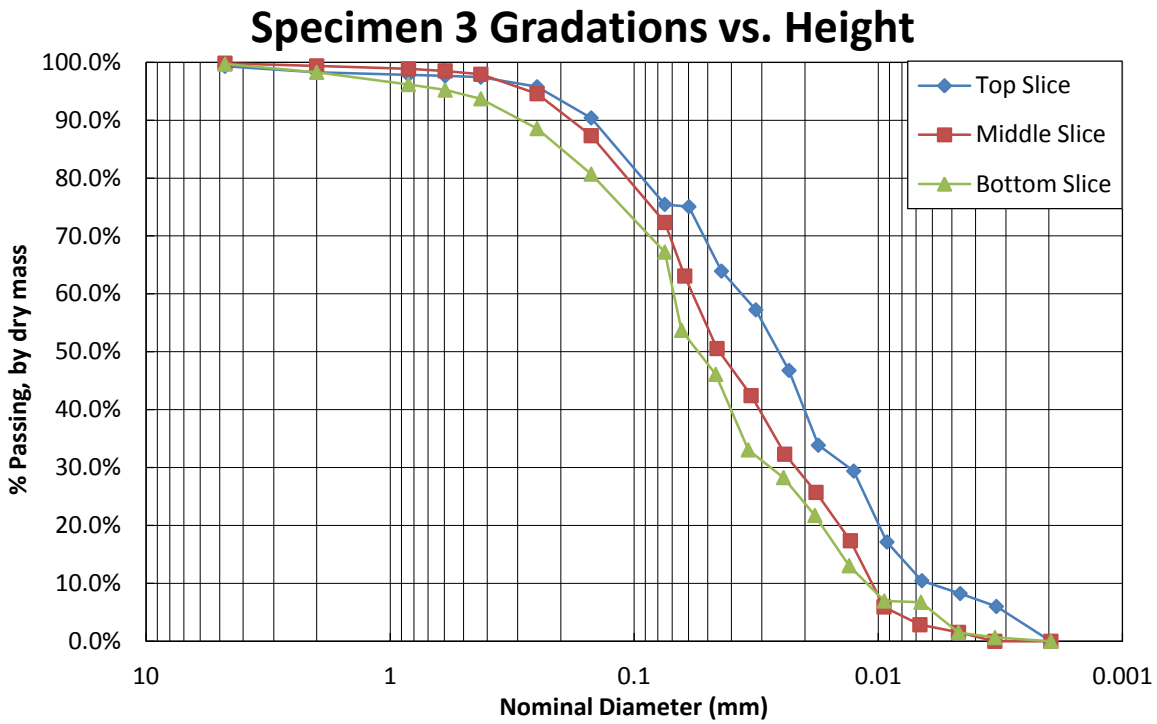

Figure 47: Plot comparing grain-size distribution across the height of specimen three.

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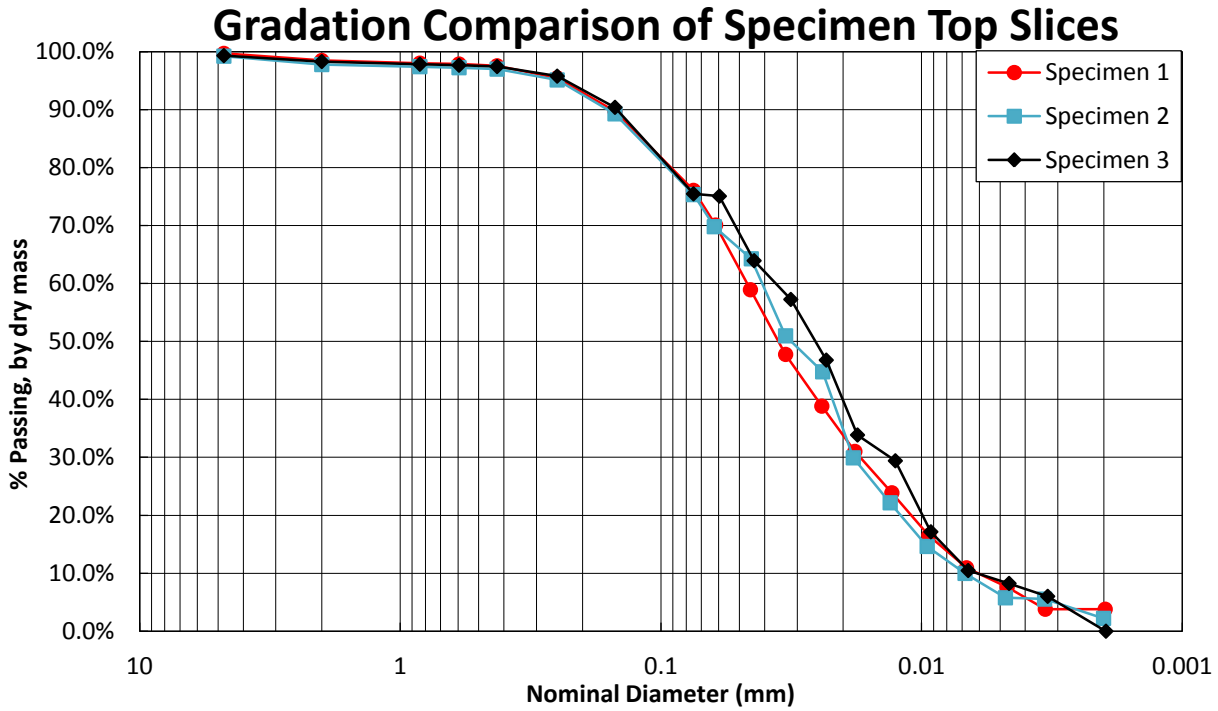

Figure 48: Plot comparing grain-size distributions of the top slices of all three specimens.

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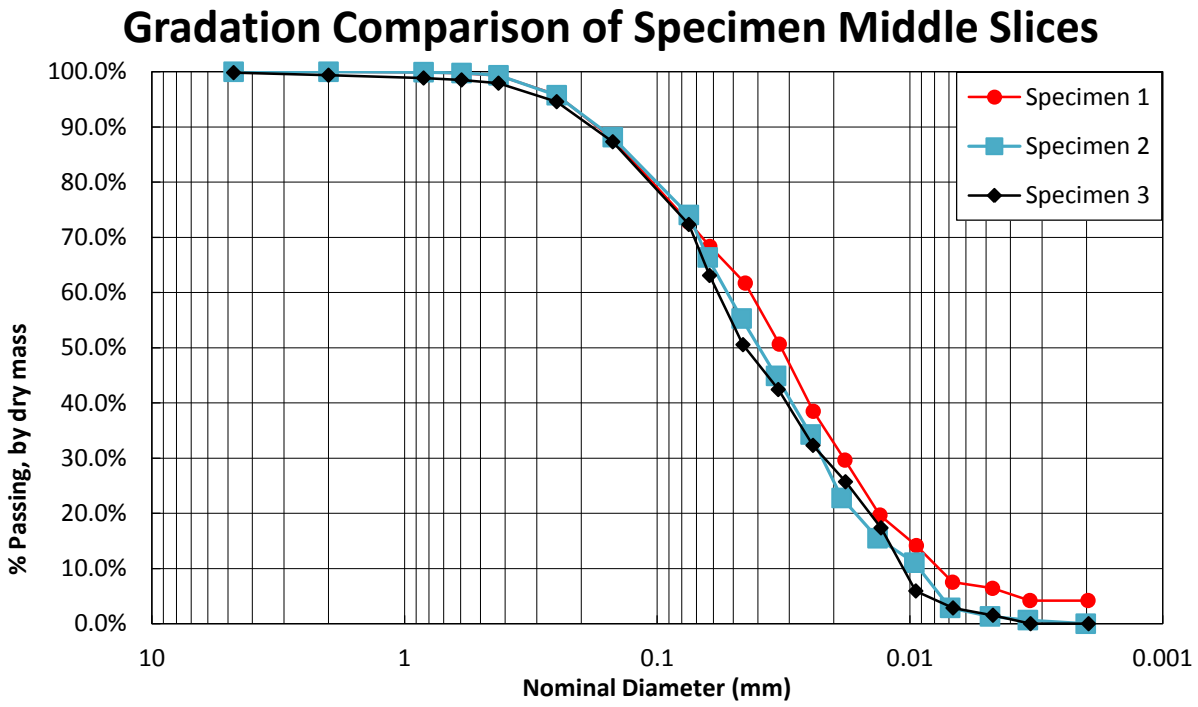

Figure 49: Plot comparing grain-size distribution of the middle slices of all three specimens.

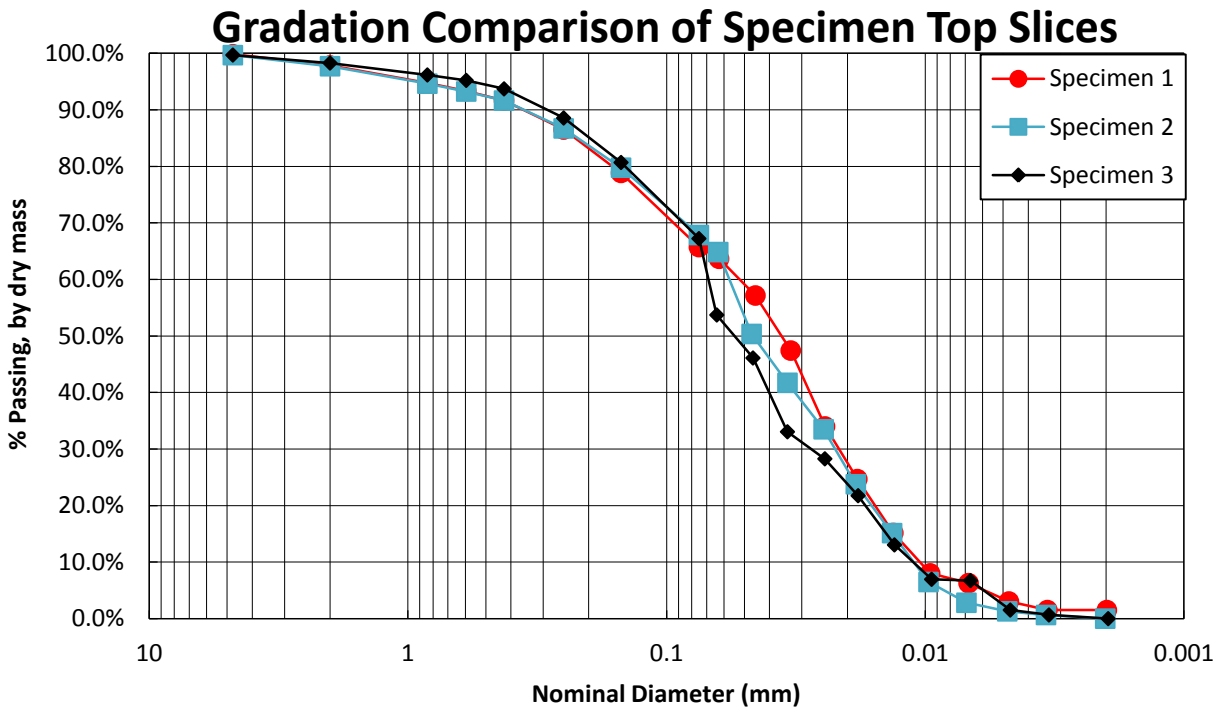

Figure 50: Plot comparing grain-size distribution for the bottom slices of all three specimens.

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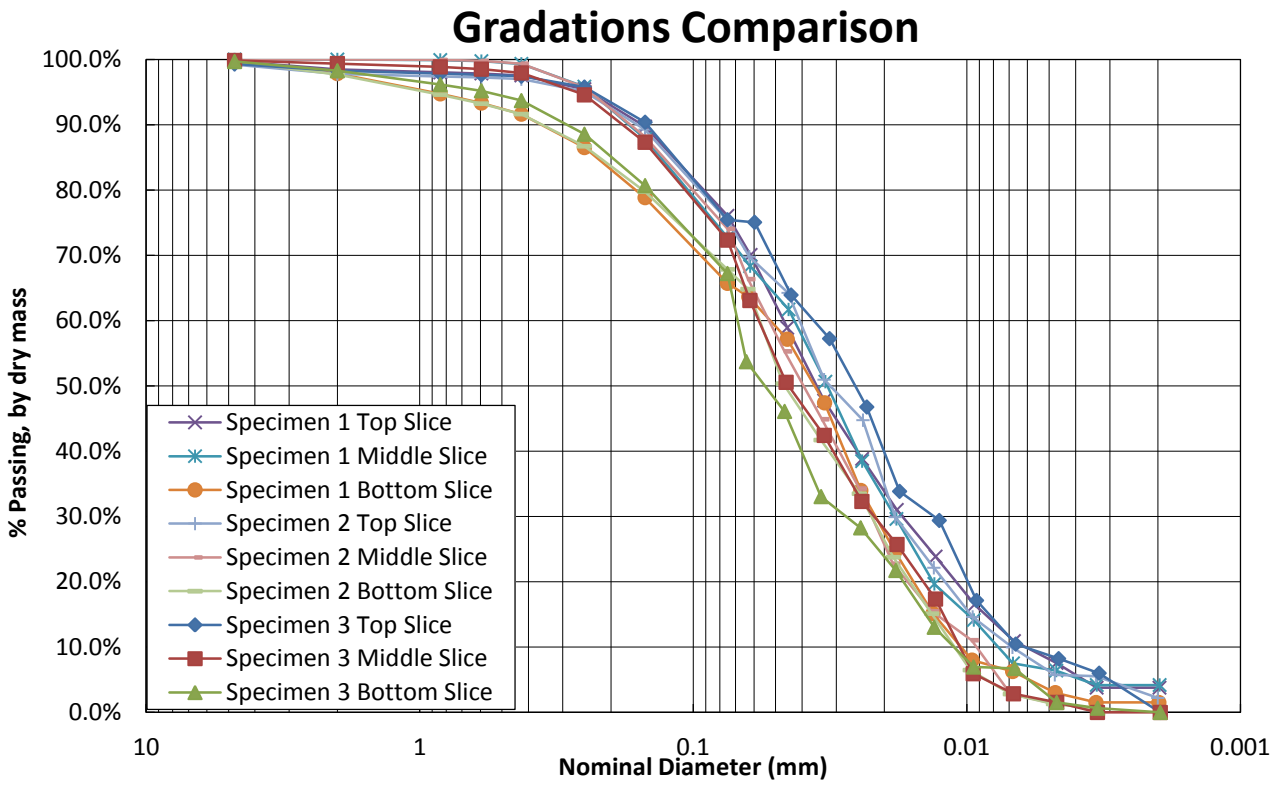

Figure 51: Comparison of all gradations for all three samples.

Examining Figure 51, it is obvious that a considerable amount of variability entered into gradation data with the portion of the graph that was determined using the hydrometer test. This may be the result of slight variations in temperature over the course of the test, regardless of the fact that the room temperature was thermostat-regulated. If temperature readings of the soil suspension had been take at each reading and used in calculating the values derived from Stokes' Law, this variability may have been reduced considerably. The maximum variability in the sieve analysis data for a given nominal diameter was about 10% by mass, while the maximum variability in the hydrometer analysis data for a given nominal diameter was about 25%.

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Chapter 8

Conclusions

8.1 Engineering Characterization of CCRs

Geotechnical designs and analyses when working with CCRs are similar to those for natural soils in many respects. The physical and engineering properties of CCRs are what differentiate them from natural soils of similar grain size. Consequently, the single most important aspect of working with CCRs is determining their physical and engineering characteristics. As a result of current and past CCR disposal methods, determining variability in their properties across a given site is also important. As evidenced by the variability plots of the different engineering properties of CCRs, variability can vary greatly to very little within a specific site. However, since the coal source for a given site will inevitable vary, so will the engineering properties of the resulting ash. Because of the differences in properties of CCRs between given sites and from that of natural soils of similar grain size, a more thorough site investigation and laboratory testing schedule will almost always be necessary than for natural soils.

8.2 Dynamic Properties of CCRs

Being a mostly granular and non-plastic material, the characterization of the dynamic properties of CCRs is important to ensure that current and future CCR disposal areas are designed in order to withstand seismic events. Currently there is very little data on the dynamic

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properties of CCRs and the data that is available is usually from different countries, whose CCRs may not be similar enough in makeup to merit comparison with CCRs in the U. S.; more dynamic laboratory testing is required before such a conclusion can be made.

8.3 CCR Failure Modes and Monitoring Practices

The two main types of CCR disposal areas, surface impoundments and landfills, are very different in their construction and therefore are prone to different failure modes. As a result, monitoring practices should be tailored to the type of disposal area it applies to. Despite the fact that there is a lack of literature and precedence regarding monitoring of CCR disposal areas, their design tends to be similar enough to mine tailings dams that monitoring practices for tailings dams could easily be adapted and applied to CCR disposal areas. The flowcharts developed by Martin and Davies (2000) provide an excellent template that could be adapted to develop a site monitoring program for CCR disposal areas, especially for surface impoundments.

8.4 Slope Stability of CCRs

Slope stability analyses with CCRs are basically the same as for natural soils, except that there is usually an inherently higher degree of uncertainty in the CCR material. For that reason, analyses involving CCRs should have a degree of conservatism built into every step, unless there is evidence to indicate that such a measure is unnecessary. If the dikes containing surface impounded CCRs are built CCR materials, or other non-plastic soils that have the potential to have low hydraulic conductivity, then a sudden rise in the water table has a deleterious effect on the impoundment's performance. For this reason, if such conditions do exist, it is good practice to install drainage (if not already installed) to ensure a steady-state water table can be maintained.

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8.5 Settlement Calculations for CCRs

Many researchers report compression and recompression indices for CCR materials. However, since CCRs generally do not have clearly log-linear values of compression and recompression indices, calculating settlements using consolidation theory can yield variable settlements, depending on different individuals' interpretation of standard consolidation tests.

The two methods for settlement of foundations in sand provide very similar results, underestimating settlement considerably. This is possibly the result of scale effects and differences in the mechanics of the materials (silt-sized particles that are the result of an industrial process rather than natural sands). In order to accurately say that none of these settlement calculation methods works well in CCR surface impounded materials, however, more test fills would need to be performed and analyzed in a similar fashion.

8.6 Slurry Deposition Technique Applied to SI CCRs

While it was not verified that the slurry deposition technique can be applied to SI CCR materials, the method shows promise based on the low variability of grain-size distribution across specimen height for the three specimens tested. However, a major drawback to this method is that the original densification method suggested by Keurbis and Vaid (1988), which was for sands and silty sands, does not appear to work for SI CCR material. Furthermore, more investigations would be required to determine whether the gradation differences observed in these three samples are due to particle migration during vibratory densification or to the actual deposition technique; if it is due to the former, a different densification method may make the slurry deposition method a very attractive reconstitution technique because it is relatively easy and has excellent repeatability, as evidenced in the results presented in Chapter 7. All spreadsheets used in specimen preparation and specimen analysis are provided in the appendix.

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8.7 Recommendations for Further Study

As discussed in Chapter two, since CCR materials are the result of an industrial process and not a naturally occurring soil, there is a variety of factors that can affect their engineering properties. Not being a naturally occurring soil, there is a comparatively small body of literature available that reports engineering properties of CCRs. Furthermore, these properties will not necessarily be comparable between different regions. It is therefore necessary to continue research in CCRs, especially with regards to the following:

- Effects of placement condition on the engineering properties of CCRs (i.e. surface impounded vs. moist-compacted).
- Variability in engineering properties of CCRs between disposal sites and within disposal sites (and how to best quantify variability for different properties).
- Dynamic properties of CCRs, to ensure that seismic design of CCR disposal areas is adequate and determine if some disposal areas are higher risk in the event of an earthquake.
- CPT correlations to determine engineering characteristics of CCR materials in-situ.
- The effect of time on the engineering properties of CCRs.
- Determining the most appropriate method to determine c_v of CCR materials, in order to determine if disposal loading rates may be cause for engineering concern.
- "Smarter" technologies that can be adapted to aid in monitoring CCR disposal areas that would better identify gradual changes that may not be readily apparent to daily inspectors.
- Further testing on slurry deposition reconstituted SI CCR samples to analyze soil fabric (a large enough body of tests to analyze statistically). The same method as used in this thesis could be used or methods to determine shear wave velocity across the height of the sample could be used.

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APPENDIX E:

USGS Earthquake Hazards Program
Dynamic: Conterminous U.S. 2014

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Please also see the new USGS Earthquake Hazard Toolbox for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

Input

Edition

Dynamic: Conterminous U.S. 2014…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

39.766

Time Horizon

Return period in years

2475

Longitude

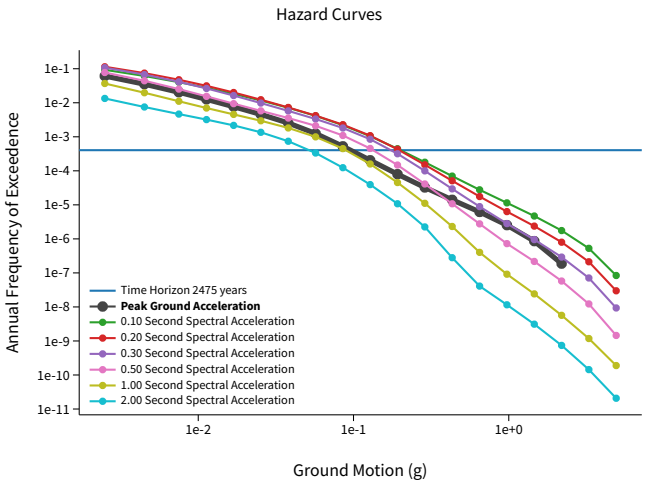
Decimal degrees, negative values for western longitu…

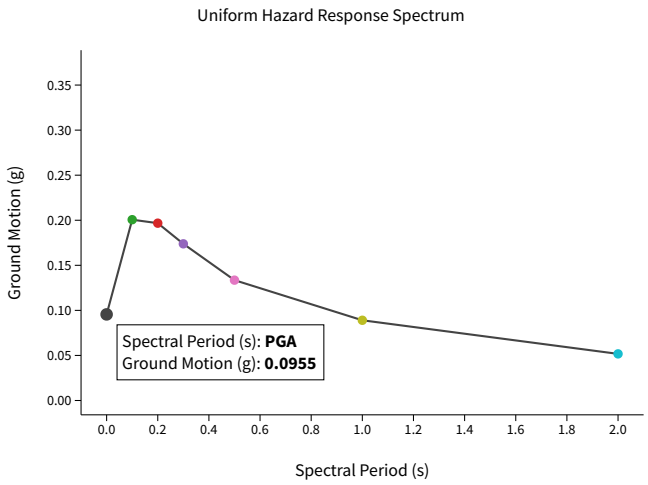
-89.596

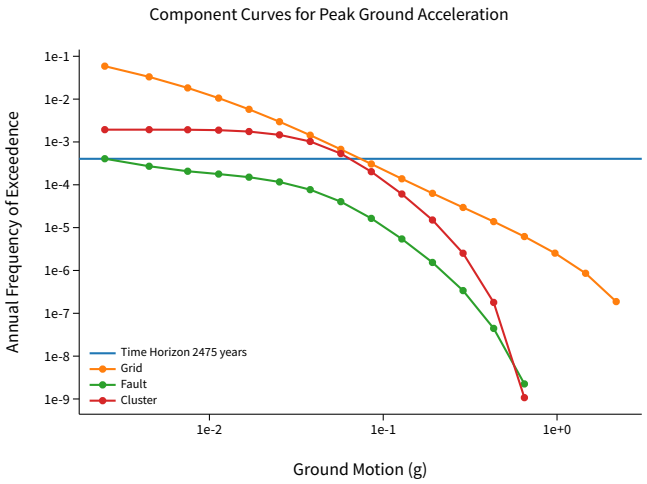
Site Class

760 m/s (B/C boundary)

Hazard Curve





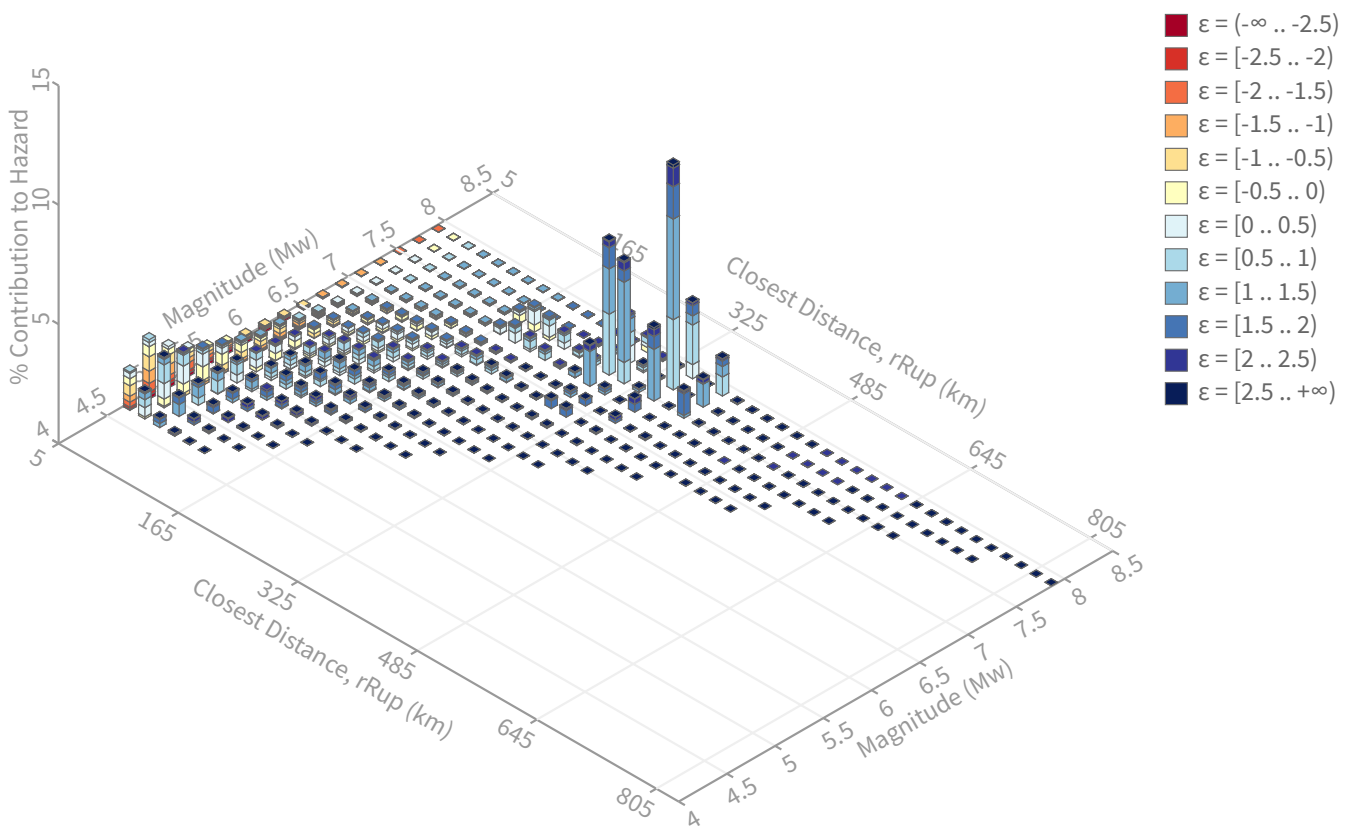


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.095534665 g

Recovered targets

Return period: 2519.0273 yrs
Exceedance rate: 0.00039697863 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 1.65 %

Mean (over all sources)

m: 6.62
r: 184 km
ε_0: 0.72 σ

Mode (largest m-r bin)

m: 7.77
r: 354.04 km
ε_0: 1.24 σ
Contribution: 9.42 %

Mode (largest m-r-ε_0 bin)

m: 7.76
r: 354.21 km
ε_0: 1.09 σ
Contribution: 4.21 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

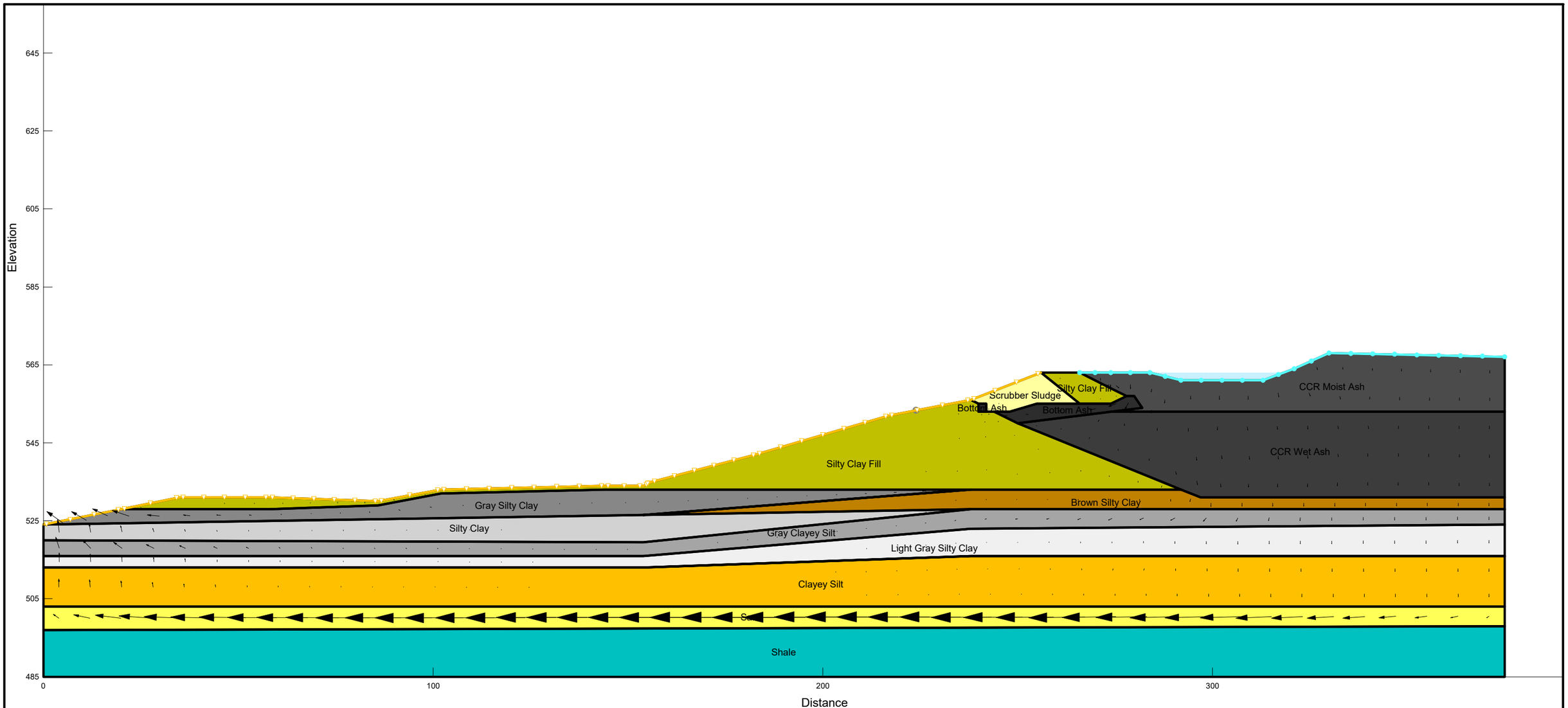
Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
SSCn New Madrid	Cluster							22.46
NMFS RLME 1		339.73	7.65	1.30	89.288°W	36.995°N	174.93	6.45
NMFS RLME 5		344.20	7.64	1.34	89.288°W	36.995°N	174.93	3.83
NMFS RLME 4		321.67	7.62	1.24	89.020°W	37.270°N	169.58	3.37
NMFS RLME 2		339.72	7.65	1.30	89.288°W	36.995°N	174.93	2.77
NMFS RLME 7		323.37	7.60	1.26	89.020°W	37.270°N	169.58	2.06
NMFS RLME 6		344.19	7.64	1.34	89.288°W	36.995°N	174.93	1.64
NMFS RLME 3		321.66	7.62	1.24	89.020°W	37.270°N	169.58	1.45
USGS Fixed Smoothing Zone 1 (opt)	Grid							19.12
PointSourceFinite: -89.596, 39.923		17.95	5.21	-0.76	89.596°W	39.923°N	0.00	1.55
PointSourceFinite: -89.596, 40.058		32.29	5.39	0.07	89.596°W	40.058°N	0.00	1.32
PointSourceFinite: -89.596, 40.013		27.49	5.33	-0.14	89.596°W	40.013°N	0.00	1.27
PointSourceFinite: -89.596, 40.148		41.86	5.52	0.38	89.596°W	40.148°N	0.00	1.06
PointSourceFinite: -89.596, 39.968		22.70	5.27	-0.41	89.596°W	39.968°N	0.00	1.00
SSCn Fixed Smoothing Zone 8 (opt)	Grid							14.87
PointSourceFinite: -89.596, 39.923		17.92	5.22	-0.78	89.596°W	39.923°N	0.00	1.11
USGS Adaptive Smoothing Zone 1 (opt)	Grid							7.44
USGS New Madrid 500-year	Cluster							6.61
NMSZ: Center Model		327.85	7.62	1.28	89.070°W	37.165°N	170.84	4.65
Wabash Valley	Grid							5.87
SSCn Adaptive Smoothing Zone 8 (opt)	Grid							5.39
SSCn Fixed Smoothing Zone 1 (opt)	Grid							5.03
USGS New Madrid 750-year	Cluster							4.41
NMSZ: Center Model		327.85	7.62	1.28	89.070°W	37.165°N	170.84	3.10
USGS New Madrid 500-year	Fault							2.93
New Madrid central		292.99	7.68	0.96	89.070°W	37.165°N	170.84	2.07
SSCn Adaptive Smoothing Zone 1 (opt)	Grid							2.43
USGS New Madrid 1500-year	Cluster							1.23

APPENDIX F:

Lakeside Ash Pond Profile D-D' Slope Stability Analysis

APPENDIX F-1:
Long-Term Static Slope Stability Analysis



Steady-State Seepage	
CWLP Long Term Alignment 4 rev.gsz	
06/26/2024	1:300

Steady-State Seepage

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 309
Date: 06/26/2024
Time: 01:49:52 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 4 rev.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 01:49:58 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d

Duration: 0 d
Ending Time: 0 d

Materials

Silty Clay Fill

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Shale

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.2
Compressibility: 0 /psf

Sand

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 0.00082 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Gray Silty Clay

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Gray Silty Clay
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Brown Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 3.13e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.29
Compressibility: 0 /psf

Gray Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Light Gray Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 3.13e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.28
Compressibility: 0 /psf

Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Bottom Ash

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 7.55e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3

Compressibility: 0 /psf

Scrubber Sludge

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Seepage Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

Slurry Impoundment Total Head

Category: Hydraulic
Kind: Water Total Head 563 ft
Review: No

Water K Functions

Gray Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure

Curve Fit to Data: 100 %
Segment Curvature: 100 %

Saturated Kx: 1.92e-07 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)

Data Point: (0, 1.92e-07)
Data Point: (0.20885434, 1.918151e-07)
Data Point: (0.3864664, 1.9165141e-07)
Data Point: (0.71512174, 1.9140211e-07)
Data Point: (1.3232692, 1.909973e-07)
Data Point: (2.4485922, 1.9033103e-07)
Data Point: (4.5309023, 1.8921279e-07)
Data Point: (8.384032, 1.8731629e-07)

Data Point: (15.513906, 1.8410371e-07)
Data Point: (28.707105, 1.7865085e-07)
Data Point: (53.119948, 1.6955726e-07)
Data Point: (98.293744, 1.5480397e-07)
Data Point: (181.88384, 1.3196468e-07)
Data Point: (336.55989, 9.9846978e-08)
Data Point: (622.77416, 6.1491766e-08)
Data Point: (1,152.3883, 2.7283629e-08)
Data Point: (2,132.3921, 7.8524436e-09)
Data Point: (3,945.8021, 1.5136188e-09)
Data Point: (7,301.3562, 2.3183481e-10)
Data Point: (13,510.511, 3.1888459e-11)
Data Point: (25,000, 2.4387227e-12)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Gray Silty Clay
Saturated Kx: 1.92e-07 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1391132e-09)
Data Point: (0.3864664, 2.1381836e-09)
Data Point: (0.71512174, 2.1365385e-09)
Data Point: (1.3232692, 2.1334315e-09)
Data Point: (2.4485922, 2.1275311e-09)
Data Point: (4.5309023, 2.1161863e-09)
Data Point: (8.384032, 2.0943424e-09)
Data Point: (15.513906, 2.0528423e-09)
Data Point: (28.707105, 1.97478e-09)
Data Point: (53.119948, 1.8332693e-09)
Data Point: (98.293744, 1.5909355e-09)
Data Point: (181.88384, 1.2148954e-09)
Data Point: (336.55989, 7.3430112e-10)
Data Point: (622.77416, 2.9955888e-10)
Data Point: (1,152.3883, 7.231009e-11)
Data Point: (2,132.3921, 1.1079366e-11)
Data Point: (3,945.8021, 1.3860485e-12)
Data Point: (7,301.3562, 1.7293141e-13)
Data Point: (13,510.511, 2.1839362e-14)
Data Point: (25,000, 1.4341527e-15)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function

Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Fly Ash (Silty Clay)

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2990469e-08)

Data Point: (0.3864664, 2.2980478e-08)
Data Point: (0.71512174, 2.2962797e-08)
Data Point: (1.3232692, 2.2929405e-08)
Data Point: (2.4485922, 2.286599e-08)
Data Point: (4.5309023, 2.274406e-08)
Data Point: (8.384032, 2.2509288e-08)
Data Point: (15.513906, 2.2063258e-08)
Data Point: (28.707105, 2.1224272e-08)
Data Point: (53.119948, 1.970336e-08)
Data Point: (98.293744, 1.7098838e-08)
Data Point: (181.88384, 1.3057285e-08)
Data Point: (336.55989, 7.8920198e-09)
Data Point: (622.77416, 3.2195574e-09)
Data Point: (1,152.3883, 7.7716449e-10)
Data Point: (2,132.3921, 1.190773e-10)
Data Point: (3,945.8021, 1.4896782e-11)
Data Point: (7,301.3562, 1.8586082e-12)
Data Point: (13,510.511, 2.3472209e-13)
Data Point: (25,000, 1.5413775e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash (Silty Clay)
Saturated Kx: 2.3e-08 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)

Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Gray Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.38
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.38
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.38)
Data Point: (0.20885434, 0.37999951)
Data Point: (0.38282598, 0.37999893)
Data Point: (0.70171264, 0.37999762)
Data Point: (1.2862257, 0.37999459)
Data Point: (2.357627, 0.37998751)
Data Point: (4.3214847, 0.37997074)
Data Point: (7.9211981, 0.3799307)
Data Point: (14.519403, 0.37983436)
Data Point: (26.613786, 0.3796014)
Data Point: (48.782557, 0.3790367)
Data Point: (89.417486, 0.37766994)
Data Point: (163.90053, 0.37439346)
Data Point: (300.42651, 0.36674903)
Data Point: (550.67599, 0.35003359)
Data Point: (1,009.3785, 0.31812636)
Data Point: (1,850.1713, 0.26993595)
Data Point: (3,391.3282, 0.2160985)
Data Point: (6,216.2392, 0.16993242)
Data Point: (11,394.247, 0.13554848)
Data Point: (20,885.434, 0.11049572)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.38
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)
Data Point: (0.20885434, 0.43999926)
Data Point: (0.38282598, 0.43999826)
Data Point: (0.70171264, 0.43999579)
Data Point: (1.2862257, 0.43998964)
Data Point: (2.357627, 0.43997408)
Data Point: (4.3214847, 0.43993431)
Data Point: (7.9211981, 0.43983201)
Data Point: (14.519403, 0.43956765)
Data Point: (26.613786, 0.43888316)
Data Point: (48.782557, 0.43711477)
Data Point: (89.417486, 0.43259479)
Data Point: (163.90053, 0.42139034)
Data Point: (300.42651, 0.39565596)
Data Point: (550.67599, 0.34560156)
Data Point: (1,009.3785, 0.27281832)
Data Point: (1,850.1713, 0.19931435)
Data Point: (3,391.3282, 0.14402614)
Data Point: (6,216.2392, 0.10758343)
Data Point: (11,394.247, 0.083628348)
Data Point: (20,885.434, 0.066976214)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	523 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	553 ft
Point 43	282 ft	554 ft
Point 44	280 ft	557 ft

Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	553 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	24	26	12 ft	90 °	
Line 2	26	27	375 ft	0 °	
Line 3	27	25	13 ft	90 °	
Line 4	25	24	375 ft	0.153 °	
Line 5	11	12	19.313 ft	21.3 °	Seepage Face
Line 6	11	10	21.378 ft	10.8 °	Seepage Face
Line 7	9	8	27.893 ft	14.5 °	Seepage Face
Line 8	35	13	8 ft	0 °	Slurry Impoundment Total Head
Line 9	13	14	10 ft	0 °	Slurry Impoundment Total Head
Line 10	14	15	8.2462 ft	-14 °	Slurry Impoundment Total Head
Line 11	15	16	21 ft	0 °	Slurry Impoundment Total Head
Line 12	17	18	45.011 ft	-1.27 °	Slurry Impoundment Total Head
Line 13	19	33	78 ft	0 °	
Line 14	8	7	2.2361 ft	26.6 °	Seepage Face
Line 15	38	36	4.4721 ft	26.6 °	
Line 16	36	37	4.4721 ft	-26.6 °	
Line 17	37	35	8.9443 ft	-26.6 °	
Line 18	42	43	8.0623 ft	7.13 °	
Line 19	43	44	3.6056 ft	-56.3 °	
Line 20	44	36	2 ft	0 °	

Line 21	40	39	7.2801 ft	15.9 °	
Line 22	39	34	4 ft	0 °	
Line 23	41	34	6.7082 ft	-26.6 °	
Line 24	34	48	2 ft	0 °	
Line 25	48	45	2 ft	0 °	
Line 26	45	46	2 ft	90 °	
Line 27	46	11	2.2361 ft	-26.6 °	
Line 28	48	47	2 ft	90 °	
Line 29	47	46	2 ft	0 °	
Line 30	16	49	8.544 ft	20.6 °	Slurry Impoundment Total Head
Line 31	49	17	9.8489 ft	24 °	Slurry Impoundment Total Head
Line 32	23	24	6 ft	90 °	
Line 33	25	21	5 ft	90 °	
Line 34	21	23	375 ft	0 °	
Line 35	7	6	10 ft	0 °	Seepage Face
Line 36	6	5	42.012 ft	1.36 °	Seepage Face
Line 37	5	4	16.279 ft	10.6 °	Seepage Face
Line 38	4	3	28.018 ft	-2.05 °	Seepage Face
Line 39	3	2	23 ft	0 °	Seepage Face
Line 40	56	55	23 ft	0 °	
Line 41	54	53	16.279 ft	10.6 °	
Line 42	53	52	42.012 ft	1.36 °	
Line 43	52	51	10 ft	0 °	
Line 44	2	58	15.297 ft	11.3 °	Seepage Face
Line 45	58	56	15 ft	0 °	
Line 46	1	58	20.396 ft	11.3 °	Seepage Face
Line 47	55	54	28.018 ft	2.05 °	
Line 48	50	1	154.02 ft	0.93 °	
Line 49	31	57	137 ft	0 °	
Line 50	57	19	3 ft	90 °	
Line 51	32	59	137 ft	0.418 °	
Line 52	28	22	154 ft	-0.186 °	
Line 53	1	22	4 ft	90 °	
Line 54	60	29	154 ft	0 °	
Line 55	61	60	3 ft	90 °	
Line 56	59	20	8 ft	90 °	
Line 57	20	63	137 ft	0 °	
Line 58	63	62	84.054 ft	2.05 °	
Line 59	62	61	154 ft	0 °	
Line 60	61	23	10 ft	90 °	
Line 61	21	20	13 ft	90 °	
Line 62	38	64	8 ft	0 °	
Line 63	64	40	11 ft	0 °	
Line 64	12	64	12.806 ft	-38.7 °	
Line 65	35	12	10 ft	0 °	
Line 66	65	30	54 ft	0 °	

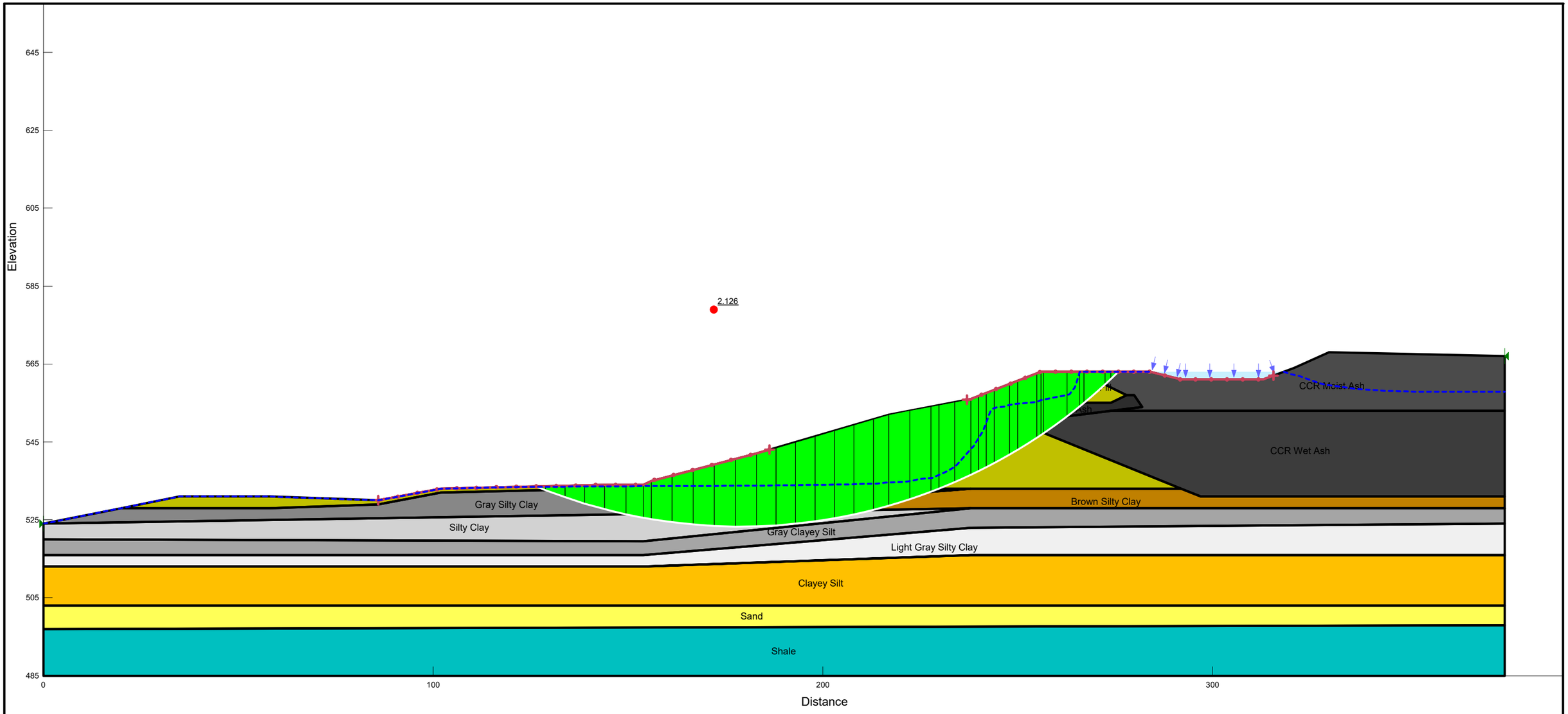
Line 67	65	33	5.3852 ft	-21.8 °	
Line 68	41	66	16.125 ft	7.13 °	
Line 69	66	42	8.0623 ft	7.13 °	
Line 70	18	67	14 ft	90 °	
Line 71	67	19	22 ft	90 °	
Line 72	42	67	101 ft	0 °	
Line 73	65	41	45.31 ft	-22 °	
Line 74	10	9	35.44 ft	16.4 °	Seepage Face
Line 75	29	32	84.291 ft	4.76 °	
Line 76	31	28	84.429 ft	5.78 °	
Line 77	31	50	84.013 ft	1.02 °	
Line 78	30	51	84 ft	0 °	
Line 79	30	50	84.251 ft	4.42 °	
Line 80	57	59	4 ft	90 °	
Line 81	60	22	4 ft	90 °	

Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Silty Clay Fill	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash	35,13,14,15,16,49,17,18,67,42,43,44,36,37	1,172.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	111 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Gray Silty Clay	50,1,58,56,55,54,53,52,51,30	949.5 ft²
Region 9	Brown Silty Clay	50,31,57,19,33,65,30	734 ft²
Region 10	Silty Clay	1,22,28,31,50	1,141 ft²
Region 11	Light Gray Silty Clay	61,60,29,32,59,20,63,62	1,909.5 ft²
Region 12	Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 13	Silty Clay Fill	12,64,38,36,37,35	96 ft²
Region 14	CCR Wet Ash	41,66,42,67,19,33,65	2,268 ft²
Region 15	Gray Clayey Silt	57,59,32,29,60,22,28,31	1,551 ft²

Mesh Properties

Global Element Size: 8 ft



Slope Stability	
CWLP Long Term Alignment 4 rev.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 309
Date: 06/26/2024
Time: 01:49:52 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 4 rev.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 01:50:06 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Silty Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Gray Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Brown Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 123 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °

Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Gray Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 126.5 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Light Gray Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

CCR Wet Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.40000002
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.4)
    Data Point: (0.20885434, 0.39999933)
    Data Point: (0.38282598, 0.39999841)
    Data Point: (0.70171264, 0.39999617)
    Data Point: (1.2862257, 0.39999058)
    Data Point: (2.357627, 0.39997643)
    Data Point: (4.3214847, 0.39994028)
    Data Point: (7.9211981, 0.39984728)
    Data Point: (14.519403, 0.39960695)
    Data Point: (26.613786, 0.39898469)
    Data Point: (48.782557, 0.39737707)
    Data Point: (89.417486, 0.39326799)
    Data Point: (163.90053, 0.38308212)
    Data Point: (300.42651, 0.35968724)
    Data Point: (550.67599, 0.31418324)
    Data Point: (1,009.3785, 0.24801666)
    Data Point: (1,850.1713, 0.18119486)
    Data Point: (3,391.3282, 0.13093286)
    Data Point: (6,216.2392, 0.09780312)
    Data Point: (11,394.247, 0.076025771)
    Data Point: (20,885.434, 0.060887467)
Estimation Properties
    Vol. WC Estimation Method: Sample functions

Saturated Water Content: 0.4
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft

Point 31	238 ft	528 ft
Point 32	238 ft	523 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	553 ft
Point 43	282 ft	554 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	553 ft

Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Silty Clay Fill	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash	35,13,14,15,16,49,17,18,67,42,43,44,36,37	1,172.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	111 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²

Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Gray Silty Clay	50,1,58,56,55,54,53,52,51,30	949.5 ft²
Region 9	Brown Silty Clay	50,31,57,19,33,65,30	734 ft²
Region 10	Silty Clay	1,22,28,31,50	1,141 ft²
Region 11	Light Gray Silty Clay	61,60,29,32,59,20,63,62	1,909.5 ft²
Region 12	Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 13	Silty Clay Fill	12,64,38,36,37,35	96 ft²
Region 14	CCR Wet Ash	41,66,42,67,19,33,65	2,268 ft²
Region 15	Gray Clayey Silt	57,59,32,29,60,22,28,31	1,551 ft²

Slip Results

Slip Surfaces Analysed: 8920 of 9261 converged

Current Slip Surface

Slip Surface: 3,746
Factor of Safety: 2.126
Volume: 2,239.293 ft³
Weight: 273,099.15 lbf
Resisting Moment: 17,087,592 lbf·ft
Activating Moment: 8,036,157.4 lbf·ft
Resisting Force: 116,085.11 lbf
Activating Force: 54,603.662 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (275.88151, 563) ft
Entry: (126.49962, 533.58332) ft
Radius: 138.24327 ft
Center: (178.89476, 661.5128) ft

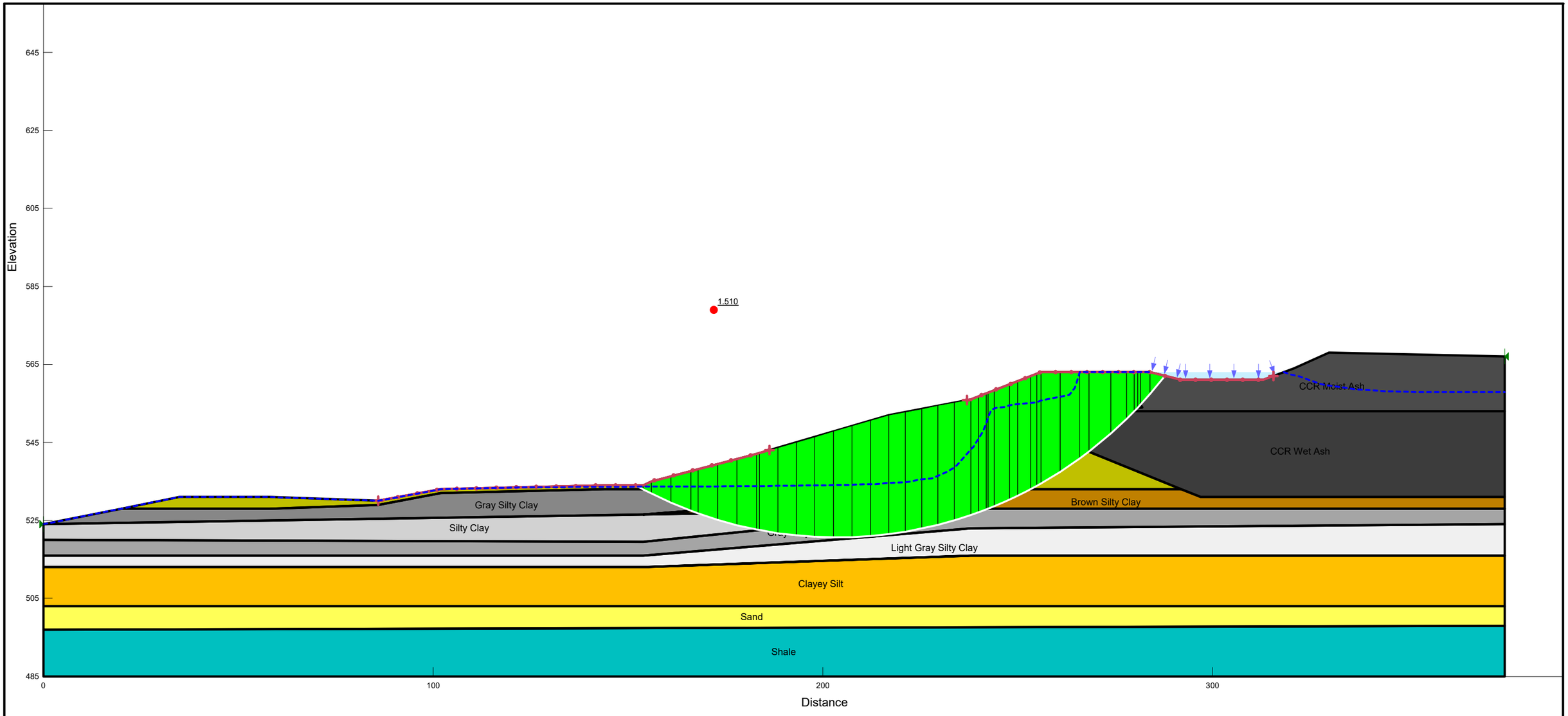
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.94076 ft	562.09118 ft	25.630046 psf	73.262226 psf	27.500452 psf	0 psf	0 psf	CCR Moist Ash
Column 2	273.23891 ft	560.47173 ft	111.71515 psf	211.25969 psf	57.47207 psf	0 psf	0 psf	CCR Moist Ash
Column 3	269.74939 ft	557.38054 ft	128.69974 psf	450.70255 psf	171.21193 psf	270 psf	0 psf	Silty Clay Fill
Column 4	266.51048 ft	554.58173 ft	134.66877 psf	812.85782 psf	474.87309 psf	0 psf	0 psf	Bottom Ash

Column 5	264.36538 ft	552.87741 ft	219.4224 psf	966.57315 psf	523.16058 psf	0 psf	0 psf	Bottom Ash
Column 6	259.73607 ft	549.43135 ft	386.33242 psf	1,361.4248 psf	261.27521 psf	0 psf	0 psf	CCR Wet Ash
Column 7	256.37068 ft	547.02051 ft	483.18677 psf	1,451.2774 psf	514.7429 psf	270 psf	0 psf	Silty Clay Fill
Column 8	255.50000 ft	546.43683 ft	460.71866 psf	1,496.3574 psf	550.65887 psf	270 psf	0 psf	Silty Clay Fill
Column 9	252.50000 ft	544.53098 ft	380.89865 psf	1,606.4528 psf	651.63869 psf	270 psf	0 psf	Silty Clay Fill
Column 10	249.00000 ft	542.36956 ft	285.12434 psf	1,739.501 psf	773.30581 psf	270 psf	0 psf	Silty Clay Fill
Column 11	246.00000 ft	540.67052 ft	232.12084 psf	1,837.7374 psf	853.72149 psf	270 psf	0 psf	Silty Clay Fill
Column 12	243.00000 ft	539.03649 ft	182.94555 psf	1,917.3544 psf	922.20156 psf	270 psf	0 psf	Silty Clay Fill
Column 13	241.00000 ft	538.01022 ft	154.14829 psf	1,909.945 psf	933.57367 psf	270 psf	0 psf	Silty Clay Fill
Column 14	239.00000 ft	537.02453 ft	128.37603 psf	1,983.379 psf	986.3226 psf	270 psf	0 psf	Silty Clay Fill
Column 15	235.96060 ft	535.61729 ft	110.2243 psf	2,071.2812 psf	1,042.7124 psf	270 psf	0 psf	Silty Clay Fill
Column 16	231.88180 ft	533.84644 ft	111.85945 psf	2,213.1912 psf	1,117.2979 psf	270 psf	0 psf	Silty Clay Fill
Column 17	228.82410 ft	532.60558 ft	145.21285 psf	2,332.8255 psf	1,163.1743 psf	0 psf	0 psf	Gray Silty Clay
Column 18	225.10434 ft	531.25283 ft	208.09082 psf	2,435.2099 psf	1,184.1802 psf	0 psf	0 psf	Brown Silty Clay
Column 19	219.70145 ft	529.45970 ft	294.22009 psf	2,572.6257 psf	1,211.4498 psf	0 psf	0 psf	Brown Silty Clay
Column 20	215.02332 ft	528.08965 ft	365.08937 psf	2,652.6425 psf	1,216.3136 psf	0 psf	0 psf	Brown Silty Clay
Column 21	210.54274 ft	526.96544 ft	429.42685 psf	2,679.549 psf	1,196.4111 psf	0 psf	0 psf	Silty Clay
Column 22	205.53497 ft	525.88467 ft	494.46772 psf	2,689.8 psf	1,167.2789 psf	0 psf	0 psf	Silty Clay
Column 23	200.52720 ft	524.99609 ft	548.03097 psf	2,675.6177 psf	1,131.2579 psf	0 psf	0 psf	Silty Clay
Column 24	195.51943 ft	524.29596 ft	590.30351 psf	2,635.0063 psf	1,087.1878 psf	0 psf	0 psf	Silty Clay
Column 25	190.51166 ft	523.78141 ft	621.2229 psf	2,565.8426 psf	1,033.9727 psf	0 psf	0 psf	Silty Clay
Column 26	185.50389 ft	523.45036 ft	640.93298 psf	2,466.0195 psf	970.41573 psf	0 psf	0 psf	Silty Clay
Column 27	180.30000 ft	523.30304 ft	649.32743 psf	2,339.5562 psf	898.71055 psf	0 psf	0 psf	Silty Clay
Column 28	174.90000 ft	523.35366 ft	645.41998 psf	2,182.2204 psf	817.13127 psf	0 psf	0 psf	Silty Clay

Column 29	169.50000 ft	523.61568 ft	628.36536 psf	1,984.54 psf	721.09085 psf	0 psf	0 psf	Silty Clay
Column 30	164.10000 ft	524.09030 ft	597.99051 psf	1,746.0821 psf	610.45111 psf	0 psf	0 psf	Silty Clay
Column 31	158.70000 ft	524.77976 ft	553.95987 psf	1,467.5047 psf	485.7404 psf	0 psf	0 psf	Silty Clay
Column 32	155.00000 ft	525.35403 ft	517.23462 psf	1,224.1144 psf	375.85464 psf	0 psf	0 psf	Silty Clay
Column 33	151.75821 ft	525.97837 ft	477.35363 psf	1,069.1099 psf	314.64237 psf	0 psf	0 psf	Silty Clay
Column 34	146.75821 ft	527.08661 ft	406.70234 psf	918.6605 psf	272.21298 psf	0 psf	0 psf	Gray Silty Clay
Column 35	141.47760 ft	528.45532 ft	319.54294 psf	726.37079 psf	216.31421 psf	0 psf	0 psf	Gray Silty Clay
Column 36	136.43281 ft	529.97893 ft	222.66307 psf	506.58061 psf	150.96164 psf	0 psf	0 psf	Gray Silty Clay
Column 37	131.38802 ft	531.71644 ft	111.89947 psf	262.68102 psf	80.171975 psf	0 psf	0 psf	Gray Silty Clay
Column 38	127.68262 ft	533.11149 ft	23.018743 psf	125.41491 psf	54.44501 psf	270 psf	0 psf	Silty Clay Fill

APPENDIX F-2:
Short-Term Static Slope Stability Analysis



Slope Stability	
CWLP Short Term Alignment 4.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 305
Date: 06/26/2024
Time: 01:44:56 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Alignment 4.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 01:45:10 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Silty Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Gray Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 1,000 psf

Brown Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 123 pcf
Total Cohesion: 1,000 psf

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 124 pcf
Total Cohesion: 800 psf

Gray Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 126.5 pcf
Total Cohesion: 500 psf

Light Gray Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 124 pcf
Total Cohesion: 840 psf

Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,400 psf

Bottom Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit
Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	523 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	553 ft

Point 43	282 ft	554 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	553 ft

Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Silty Clay Fill	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash	35,13,14,15,16,49,17,18,67,42,43,44,36,37	1,172.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	111 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Gray Silty Clay	50,1,58,56,55,54,53,52,51,30	949.5 ft²
Region 9	Brown Silty Clay	50,31,57,19,33,65,30	734 ft²
Region 10	Silty Clay	1,22,28,31,50	1,141 ft²
Region 11	Light Gray Silty Clay	61,60,29,32,59,20,63,62	1,909.5 ft²
Region 12	Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 13	Silty Clay Fill	12,64,38,36,37,35	96 ft²

Region 14	CCR Wet Ash	41,66,42,67,19,33,65	2,268 ft²
Region 15	Gray Clayey Silt	57,59,32,29,60,22,28,31	1,551 ft²

Slip Results

Slip Surfaces Analysed: 8845 of 9261 converged

Current Slip Surface

Slip Surface: 6,016
Factor of Safety: 1.510
Volume: 2,898.4855 ft³
Weight: 349,604.88 lbf
Resisting Moment: 10,328,737 lbf·ft
Activating Moment: 6,837,872.9 lbf·ft
Resisting Force: 89,030.079 lbf
Activating Force: 58,946.183 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (287.82753, 562.04312) ft
Entry: (151.98552, 534) ft
Radius: 106.40594 ft
Center: (203.59108, 627.05423) ft

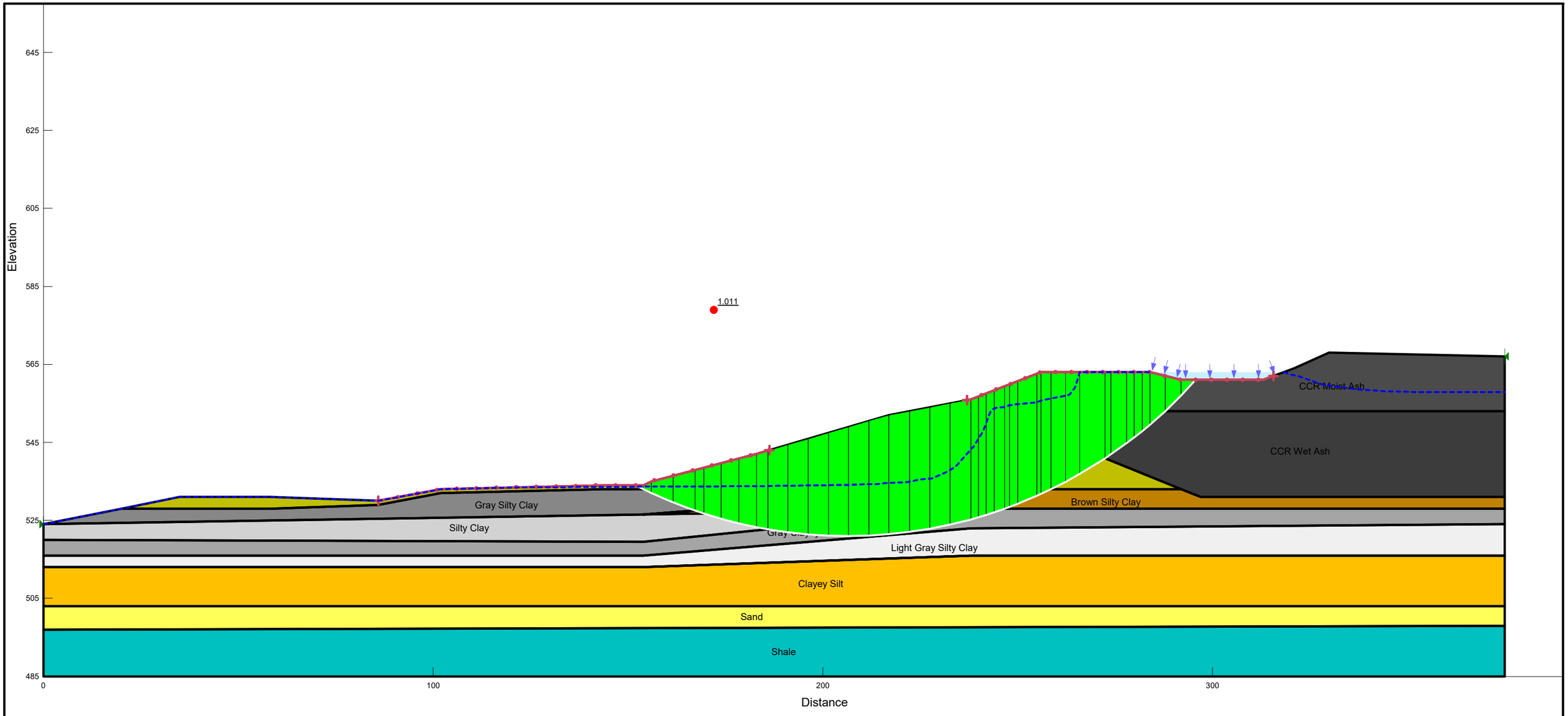
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	285.91376 ft	559.70391 ft	136.11554 psf	243.4317 psf	61.959014 psf	0 psf	0 psf	CCR Moist Ash
Column 2	282.78288 ft	556.00804 ft	261.28075 psf	532.61358 psf	156.65409 psf	0 psf	0 psf	CCR Moist Ash
Column 3	281.19076 ft	554.25167 ft	325.28775 psf	651.27827 psf	228.26102 psf	0 psf	0 psf	Bottom Ash
Column 4	280.40747 ft	553.42599 ft	355.63252 psf	739.87715 psf	221.84375 psf	0 psf	0 psf	CCR Moist Ash
Column 5	278.99958 ft	551.99576 ft	406.88763 psf	929.67563 psf	140.08062 psf	0 psf	0 psf	CCR Wet Ash
Column 6	276.00000 ft	549.13300 ft	519.14654 psf	1,220.3697 psf	187.89218 psf	0 psf	0 psf	CCR Wet Ash
Column 7	271.15317 ft	544.93239 ft	706.97863 psf	1,662.853 psf	256.12578 psf	0 psf	0 psf	CCR Wet Ash
Column 8	267.15317 ft	541.73122 ft	759.76993 psf	1,805.7 psf	556.1309 psf	270 psf	0 psf	Silty Clay Fill
Column 9	263.50000 ft	539.16799 ft	618.14536 psf	2,098.1119 psf	786.91215 psf	270 psf	0 psf	Silty Clay Fill

Column 10	258.50000 ft	535.95695 ft	486.77917 psf	2,488.6196 psf	1,064.3974 psf	270 psf	0 psf	Silty Clay Fill
Column 11	255.50000 ft	534.17065 ft	425.19914 psf	2,704.3773 psf	1,211.8605 psf	270 psf	0 psf	Silty Clay Fill
Column 12	254.17538 ft	533.44561 ft	403.59026 psf	2,756.6438 psf	1,251.1408 psf	270 psf	0 psf	Silty Clay Fill
Column 13	251.67538 ft	532.15114 ft	379.28515 psf	2,994.4195 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 14	249.00000 ft	530.83037 ft	369.19878 psf	3,098.204 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 15	246.00000 ft	529.48912 ft	371.24652 psf	3,191.51 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 16	243.22801 ft	528.30989 ft	384.03605 psf	3,257.8356 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 17	242.22801 ft	527.91114 ft	396.00351 psf	3,346.5498 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 18	241.00000 ft	527.44672 ft	423.28599 psf	3,308.6131 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 19	239.00000 ft	526.71826 ft	466.01778 psf	3,366.5189 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 20	235.90000 ft	525.69596 ft	526.15603 psf	3,424.6939 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 21	231.70000 ft	524.45125 ft	599.26563 psf	3,523.4008 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 22	227.50000 ft	523.39159 ft	661.59625 psf	3,604.5438 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 23	223.30000 ft	522.51134 ft	713.13734 psf	3,667.4557 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 24	219.10000 ft	521.80599 ft	754.51875 psf	3,711.1264 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 25	214.62600 ft	521.24895 ft	786.70418 psf	3,704.3049 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 26	209.87801 ft	520.86081 ft	808.86043 psf	3,641.4802 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 27	205.13001 ft	520.68592 ft	817.9878 psf	3,547.1171 psf	0 psf	500 psf	0 psf	Gray Clayey Silt

Column 28	200.38202 ft	520.72322 ft	814.15181 psf	3,418.9584 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 29	195.63402 ft	520.97293 ft	797.40421 psf	3,254.9659 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 30	190.88603 ft	521.43658 ft	767.42042 psf	3,053.483 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 31	186.13803 ft	522.11700 ft	724.10014 psf	2,813.3855 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 32	183.38202 ft	522.58574 ft	694.40418 psf	2,722.2697 psf	0 psf	800 psf	0 psf	Silty Clay
Column 33	180.51214 ft	523.21257 ft	654.99033 psf	2,555.792 psf	0 psf	800 psf	0 psf	Silty Clay
Column 34	175.53642 ft	524.44572 ft	577.48185 psf	2,243.8496 psf	0 psf	800 psf	0 psf	Silty Clay
Column 35	170.56069 ft	525.93862 ft	483.73372 psf	1,890.7935 psf	0 psf	800 psf	0 psf	Silty Clay
Column 36	167.12565 ft	527.09684 ft	411.34057 psf	1,685.1062 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 37	163.63385 ft	528.47378 ft	324.78673 psf	1,400.1269 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 38	158.54462 ft	530.69475 ft	184.69894 psf	964.06733 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 39	155.00000 ft	532.39766 ft	77.409688 psf	616.11644 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 40	153.91570 ft	532.95550 ft	42.278657 psf	488.58864 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 41	152.90846 ft	533.50000 ft	8.0072984 psf	197.51064 psf	100.76071 psf	270 psf	0 psf	Silty Clay Fill

APPENDIX F-3:
Seismic Slope Stability Analysis



Slope Stability	
CWLP Seismic Alignment 4.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 302
Date: 06/26/2024
Time: 01:44:04 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Alignment 4.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 01:44:16 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Silty Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Gray Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 1,000 psf

Brown Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 123 pcf
Total Cohesion: 1,000 psf

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 124 pcf
Total Cohesion: 800 psf

Gray Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 126.5 pcf
Total Cohesion: 500 psf

Light Gray Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 124 pcf
Total Cohesion: 840 psf

Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,400 psf

Bottom Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit
Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Seismic Coefficients

Horz Seismic Coef.: 0.1

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
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Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	523 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft

Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	553 ft
Point 43	282 ft	554 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	553 ft

Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Silty Clay Fill	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash	35,13,14,15,16,49,17,18,67,42,43,44,36,37	1,172.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	111 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Gray Silty Clay	50,1,58,56,55,54,53,52,51,30	949.5 ft²
Region 9	Brown Silty Clay	50,31,57,19,33,65,30	734 ft²
Region 10	Silty Clay	1,22,28,31,50	1,141 ft²
Region 11	Light Gray Silty Clay	61,60,29,32,59,20,63,62	1,909.5 ft²

Region 12	Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 13	Silty Clay Fill	12,64,38,36,37,35	96 ft²
Region 14	CCR Wet Ash	41,66,42,67,19,33,65	2,268 ft²
Region 15	Gray Clayey Silt	57,59,32,29,60,22,28,31	1,551 ft²

Slip Results

Slip Surfaces Analysed: 8856 of 9261 converged

Current Slip Surface

Slip Surface: 6,057
Factor of Safety: 1.011
Volume: 3,118.3581 ft³
Weight: 372,917.39 lbf
Resisting Moment: 11,605,554 lbf·ft
Activating Moment: 11,483,268 lbf·ft
Resisting Force: 90,364.416 lbf
Activating Force: 89,422.418 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (295.74165, 561) ft
Entry: (151.98552, 534) ft
Radius: 119.93848 ft
Center: (206.31629, 640.92711) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	293.87083 ft	559.00065 ft	195.46619 psf	265.97431 psf	40.707885 psf	0 psf	0 psf	CCR Moist Ash
Column 2	289.94436 ft	555.00065 ft	335.49556 psf	558.63564 psf	128.82999 psf	0 psf	0 psf	CCR Moist Ash
Column 3	285.94436 ft	551.27308 ft	465.13082 psf	924.96046 psf	123.21098 psf	0 psf	0 psf	CCR Wet Ash
Column 4	283.00000 ft	548.71455 ft	566.37001 psf	1,141.4619 psf	154.09541 psf	0 psf	0 psf	CCR Wet Ash
Column 5	281.00000 ft	547.08709 ft	633.54307 psf	1,276.8638 psf	172.37726 psf	0 psf	0 psf	CCR Wet Ash
Column 6	279.00000 ft	545.52933 ft	697.40778 psf	1,406.8769 psf	190.10167 psf	0 psf	0 psf	CCR Wet Ash
Column 7	276.00000 ft	543.33931 ft	798.27748 psf	1,624.8021 psf	221.46659 psf	0 psf	0 psf	CCR Wet Ash
Column 8	273.24555 ft	541.40382 ft	890.42271 psf	1,832.577 psf	252.44949 psf	0 psf	0 psf	CCR Wet Ash

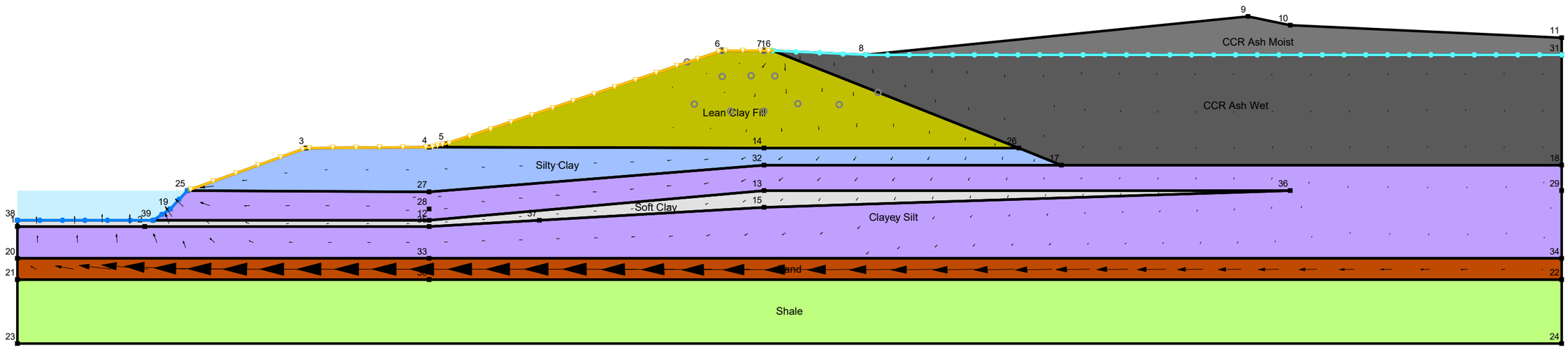
Column 9	269.24555 ft	538.89473 ft	756.48338 psf	1,911.3394 psf	614.04785 psf	270 psf	0 psf	Silty Clay Fill
Column 10	264.15811 ft	535.87883 ft	574.08934 psf	2,289.8388 psf	912.28016 psf	270 psf	0 psf	Silty Clay Fill
Column 11	260.47432 ft	533.93232 ft	486.13426 psf	2,548.8845 psf	1,096.7838 psf	270 psf	0 psf	Silty Clay Fill
Column 12	257.31621 ft	532.38158 ft	432.49361 psf	2,896.8886 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 13	255.50000 ft	531.53835 ft	412.72686 psf	3,009.485 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 14	252.50000 ft	530.27014 ft	393.83087 psf	3,104.1712 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 15	249.00000 ft	528.84591 ft	390.26306 psf	3,217.8523 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 16	247.36153 ft	528.23254 ft	393.98263 psf	3,265.0244 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 17	245.36153 ft	527.53119 ft	423.50607 psf	3,358.988 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 18	243.00000 ft	526.74112 ft	469.56783 psf	3,386.3748 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 19	241.00000 ft	526.11776 ft	505.77529 psf	3,348.6622 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 20	239.00000 ft	525.53242 ft	539.65312 psf	3,396.7324 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 21	235.37500 ft	524.59350 ft	594.11477 psf	3,454.0883 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 22	230.12500 ft	523.40600 ft	662.70255 psf	3,558.6779 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 23	224.87500 ft	522.46297 ft	717.34677 psf	3,643.2867 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 24	219.62500 ft	521.75857 ft	757.77136 psf	3,705.082 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 25	214.41171 ft	521.29027 ft	784.03984 psf	3,708.5072 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 26	209.23513 ft	521.05211 ft	796.66733 psf	3,648.5221 psf	0 psf	500 psf	0 psf	Gray Clayey Silt

Column 27	204.05854 ft	521.03783 ft	795.71503 psf	3,552.5359 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 28	198.88196 ft	521.24735 ft	781.07236 psf	3,416.2478 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 29	193.70538 ft	521.68186 ft	752.73275 psf	3,235.893 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 30	188.52879 ft	522.34383 ft	710.39913 psf	3,008.6061 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 31	184.47025 ft	523.00445 ft	668.4968 psf	2,908.2088 psf	0 psf	800 psf	0 psf	Silty Clay
Column 32	180.75106 ft	523.76756 ft	620.47613 psf	2,697.4817 psf	0 psf	800 psf	0 psf	Silty Clay
Column 33	176.25319 ft	524.84071 ft	552.98057 psf	2,418.7559 psf	0 psf	800 psf	0 psf	Silty Clay
Column 34	171.75532 ft	526.10001 ft	473.85964 psf	2,104.3233 psf	0 psf	800 psf	0 psf	Silty Clay
Column 35	168.38293 ft	527.15147 ft	408.22404 psf	1,934.9026 psf	0 psf	1,000 psf	0 psf	Brown Silty Clay
Column 36	164.44461 ft	528.57508 ft	318.71428 psf	1,612.4682 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 37	158.81487 ft	530.83871 ft	175.78718 psf	1,125.0451 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 38	155.00000 ft	532.52668 ft	69.354933 psf	749.33662 psf	0 psf	1,000 psf	0 psf	Gray Silty Clay
Column 39	152.99276 ft	533.50004 ft	8.0296661 psf	270.52216 psf	139.56973 psf	270 psf	0 psf	Silty Clay Fill

APPENDIX G:

Dallman Ash Pond Profile F-F' Slope Stability Analysis

APPENDIX G-1:
Long-Term Static Slope Stability Analysis



Steady-State Seepage	
CWLP Long Term Alignment 6.gsz	
06/26/2024	1:300

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 227
Date: 06/26/2024
Time: 08:35:40 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 6.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 08:35:52 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d

Duration: 0 d
Ending Time: 0 d

Materials

Lean Clay Fill

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Lean Clay Fill
K-Function: Lean Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Shale

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.12
Compressibility: 0 /psf

Sand

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3.3e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Silty Clay

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Clayey Silt

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 1.49e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.28
Compressibility: 0 /psf

CCR Ash Moist

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: CCR Ash Moist
K-Function: CCR Ash Moist
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Ash Wet

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 3.13e-10 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.232
Compressibility: 0 /psf

Soft Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Impoundment Head

Category: Hydraulic
Kind: Water Total Head 553 ft
Review: No

Sugar Creek Head

Category: Hydraulic
Kind: Water Total Head 521 ft
Review: No

Seepage Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

Water K Functions

Lean Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure

Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 1.39e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 1.39e-09)
Data Point: (0.20885434, 1.389424e-09)
Data Point: (0.38282598, 1.388832e-09)
Data Point: (0.70171264, 1.3877955e-09)
Data Point: (1.2862257, 1.3858575e-09)
Data Point: (2.357627, 1.3822169e-09)
Data Point: (4.3214847, 1.3752818e-09)
Data Point: (7.9211981, 1.3620755e-09)
Data Point: (14.519403, 1.3371853e-09)
Data Point: (26.613786, 1.2906884e-09)
Data Point: (48.782557, 1.2068695e-09)
Data Point: (89.417486, 1.0628305e-09)
Data Point: (163.90053, 8.3652779e-10)
Data Point: (300.42651, 5.3651004e-10)
Data Point: (550.67599, 2.4227552e-10)
Data Point: (1,009.3785, 6.6657191e-11)
Data Point: (1,850.1713, 1.1418962e-11)
Data Point: (3,391.3282, 1.509158e-12)
Data Point: (6,216.2392, 1.9337027e-13)
Data Point: (11,394.247, 2.4592833e-14)
Data Point: (20,885.434, 2.0028672e-15)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Lean Clay Fill
Saturated Kx: 1.39e-09 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 3.13e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.13e-10)
Data Point: (0.20885434, 3.13e-10)
Data Point: (0.38282598, 3.13e-10)
Data Point: (0.70171264, 3.13e-10)
Data Point: (1.2862257, 3.13e-10)
Data Point: (2.357627, 3.13e-10)
Data Point: (4.3214847, 3.13e-10)
Data Point: (7.9211981, 3.13e-10)
Data Point: (14.519403, 3.13e-10)
Data Point: (26.613786, 3.13e-10)
Data Point: (48.782557, 3.13e-10)

Data Point: (89.417486, 3.13e-10)
Data Point: (163.90053, 3.13e-10)
Data Point: (300.42651, 3.1299999e-10)
Data Point: (550.67599, 3.1300001e-10)
Data Point: (1,009.3785, 3.1300046e-10)
Data Point: (1,850.1713, 3.1300224e-10)
Data Point: (3,391.3282, 3.1297978e-10)
Data Point: (6,216.2392, 3.1272982e-10)
Data Point: (11,394.247, 3.1289947e-10)
Data Point: (20,885.434, 3.3121173e-10)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 3.13e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 1.71e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 1.71e-08)
Data Point: (0.20885434, 1.7092914e-08)
Data Point: (0.38282598, 1.7085632e-08)
Data Point: (0.70171264, 1.707288e-08)
Data Point: (1.2862257, 1.7049039e-08)
Data Point: (2.357627, 1.7004251e-08)
Data Point: (4.3214847, 1.6918935e-08)
Data Point: (7.9211981, 1.6756469e-08)
Data Point: (14.519403, 1.6450265e-08)
Data Point: (26.613786, 1.5878252e-08)
Data Point: (48.782557, 1.4847099e-08)
Data Point: (89.417486, 1.3075109e-08)
Data Point: (163.90053, 1.0291098e-08)
Data Point: (300.42651, 6.6002323e-09)
Data Point: (550.67599, 2.9805125e-09)
Data Point: (1,009.3785, 8.2002754e-10)
Data Point: (1,850.1713, 1.4047792e-10)
Data Point: (3,391.3282, 1.8565899e-11)
Data Point: (6,216.2392, 2.3788722e-12)
Data Point: (11,394.247, 3.0254511e-13)
Data Point: (20,885.434, 2.4639606e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 1.71e-08 ft/sec
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Lean Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.31000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.31000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.31)
Data Point: (0.20885434, 0.30999948)
Data Point: (0.38282598, 0.30999877)
Data Point: (0.70171264, 0.30999704)
Data Point: (1.2862257, 0.3099927)
Data Point: (2.357627, 0.30998174)
Data Point: (4.3214847, 0.30995372)
Data Point: (7.9211981, 0.30988165)
Data Point: (14.519403, 0.30969539)
Data Point: (26.613786, 0.30921314)
Data Point: (48.782557, 0.30796723)
Data Point: (89.417486, 0.30478269)
Data Point: (163.90053, 0.29688865)
Data Point: (300.42651, 0.27875761)
Data Point: (550.67599, 0.24349201)
Data Point: (1,009.3785, 0.19221291)
Data Point: (1,850.1713, 0.14042602)
Data Point: (3,391.3282, 0.10147297)
Data Point: (6,216.2392, 0.075797418)
Data Point: (11,394.247, 0.058919972)
Data Point: (20,885.434, 0.047187787)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.31
Sample Material: Silty Clay
Liquid Limit: 63 %
Diameter at 10% passing: 0.0001
Diameter at 60% passing: 0.0123
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure

Compressibility: 0 /psf
Saturated Water Content: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.41000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.41000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.41)
Data Point: (0.20885434, 0.40999931)
Data Point: (0.38282598, 0.40999837)
Data Point: (0.70171264, 0.40999608)

Data Point: (1.2862257, 0.40999035)
Data Point: (2.357627, 0.40997584)
Data Point: (4.3214847, 0.40993879)
Data Point: (7.9211981, 0.40984347)
Data Point: (14.519403, 0.40959713)
Data Point: (26.613786, 0.40895931)
Data Point: (48.782557, 0.40731149)
Data Point: (89.417486, 0.40309969)
Data Point: (163.90053, 0.39265918)
Data Point: (300.42651, 0.36867942)
Data Point: (550.67599, 0.32203782)
Data Point: (1,009.3785, 0.25421707)
Data Point: (1,850.1713, 0.18572474)
Data Point: (3,391.3282, 0.13420618)
Data Point: (6,216.2392, 0.1002482)
Data Point: (11,394.247, 0.077926415)
Data Point: (20,885.434, 0.062409654)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.41
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	512.5 ft
Point 2	30 ft	512.5 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft

Point 12	97 ft	514 ft
Point 13	176 ft	521 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	553 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft

Lines

	Start Point	End Point	Hydraulic Boundary	Length	Angle
Line 1	4	5	Seepage Face	4.0792 ft	11.3 °
Line 2	5	6	Seepage Face	68.622 ft	18.7 °
Line 3	6	7	Seepage Face	10 ft	0 °
Line 4	8	9		90.449 ft	5.71 °
Line 5	10	11		64.07 ft	-2.68 °
Line 6	18	17		118 ft	0 °
Line 7	21	23		15 ft	90 °
Line 8	23	24		364 ft	0 °
Line 9	24	22		15 ft	90 °
Line 10	14	4		79 ft	-0.145 °
Line 11	27	25		57.001 ft	-0.302 °
Line 12	22	30		267 ft	0 °
Line 13	30	21		97 ft	0 °
Line 14	14	26		60 ft	0 °
Line 15	26	17		10.77 ft	-21.8 °

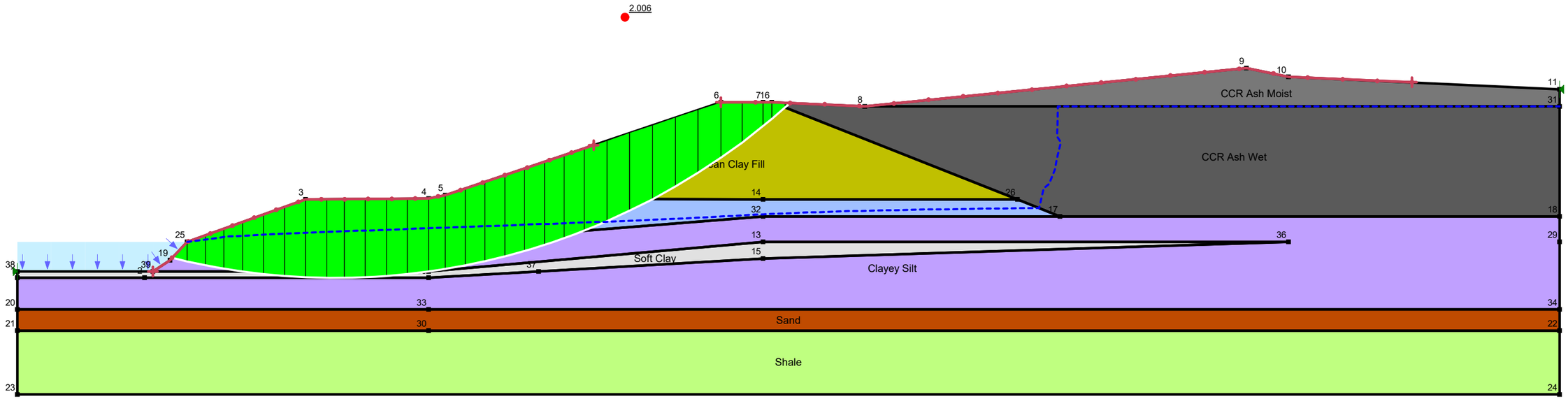
Line 16	4	3	Seepage Face	29.001 ft	0.395 °
Line 17	3	25	Seepage Face	29.732 ft	19.7 °
Line 18	8	16	Impoundment Head	22.023 ft	-2.6 °
Line 19	26	16		62.394 ft	-21.6 °
Line 20	16	7	Seepage Face	2 ft	0 °
Line 21	8	31	Impoundment Head	164 ft	0 °
Line 22	31	11		4 ft	90 °
Line 23	18	31		26 ft	90 °
Line 24	2	1		30 ft	0 °
Line 25	20	33		97 ft	0 °
Line 26	33	34		267 ft	0 °
Line 27	34	22		5 ft	90 °
Line 28	21	20		5 ft	90 °
Line 29	27	32		79.251 ft	4.56 °
Line 30	32	17		70 ft	0 °
Line 31	35	2		67 ft	0 °
Line 32	1	38		1.5 ft	90 °
Line 33	38	39	Sugar Creek Head	32 ft	0 °
Line 34	39	12		65 ft	0 °
Line 35	12	13		79.31 ft	5.06 °
Line 36	13	36		124 ft	0 °
Line 37	36	15		124.06 ft	1.85 °
Line 38	35	37		26.043 ft	3.3 °
Line 39	37	15		53.085 ft	3.24 °
Line 40	34	29		16 ft	90 °
Line 41	29	18		6 ft	90 °
Line 42	25	19	Sugar Creek Head	5.8728 ft	47.1 °
Line 43	19	39	Sugar Creek Head	4.826 ft	34 °
Line 44	1	20		7.5 ft	90 °
Line 45	10	9		10.198 ft	-11.3 °

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,14,26,16,7,6,5	1,717.5 ft²
Region 2	CCR Ash Moist	11,10,9,8,31	837 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,8,16	3,928 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Soft Clay	1,2,35,37,15,36,13,12,39,38	610 ft²
Region 8	Clayey Silt	20,33,34,29,18,17,32,27,25,19,39,12,13,36,15,37,35,2,1	6,303.4 ft²

Mesh Properties

Global Element Size: 9 ft



Slope Stability	
CWLP Long Term Alignment 6.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 227
Date: 06/26/2024
Time: 08:35:40 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 6.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 08:35:58 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft³
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 128 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °

Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Soft Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (32, 514) ft
Left-Zone Right Coordinate: (136, 543.84615) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (166, 554) ft
Right-Zone Right Coordinate: (329.09526, 558.63616) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)
    Data Point: (0.38282598, 0.22868775)
    Data Point: (0.70171264, 0.22868775)
    Data Point: (1.2862257, 0.22868775)

Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)

Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	512.5 ft
Point 2	30 ft	512.5 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 ft
Point 13	176 ft	521 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft

Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	553 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,14,26,16,7,6,5	1,717.5 ft²
Region 2	CCR Ash Moist	11,10,9,8,31	837 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,8,16	3,928 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Soft Clay	1,2,35,37,15,36,13,12,39,38	610 ft²
Region 8	Clayey Silt	20,33,34,29,18,17,32,27,25,19,39,12,13,36,15,37,35,2,1	6,303.4 ft²

Slip Results

Slip Surfaces Analysed: 4760 of 4851 converged

Current Slip Surface

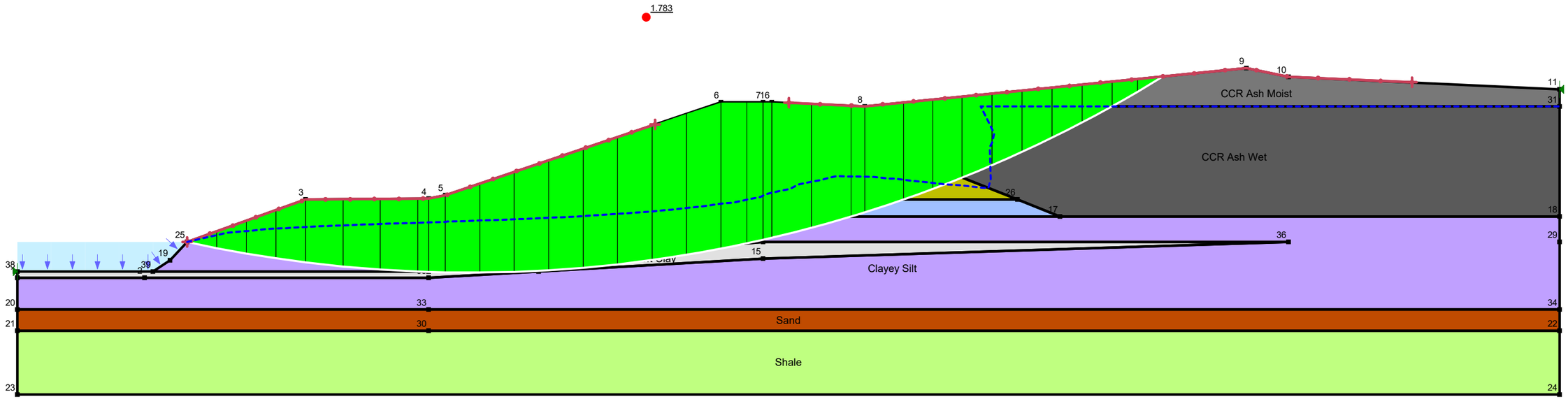
Slip Surface: 257
Factor of Safety: 2.006
Volume: 2,226.1411 ft³
Weight: 273,566.05 lbf
Resisting Moment: 19,334,521 lbf·ft
Activating Moment: 9,638,921.3 lbf·ft
Resisting Force: 111,952.02 lbf
Activating Force: 55,814.437 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (182.37517, 553.80113) ft
Entry: (36.474791, 517.2104) ft
Radius: 160.014 ft
Center: (75.067673, 672.50068) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	181.78049 ft	553.26889 ft	-87.815725 psf	46.126064 psf	21.508937 psf	0 psf	0 psf	CCR Ash Wet
Column 2	179.59291 ft	551.36220 ft	-146.8011 psf	160.58609 psf	85.385141 psf	270 psf	0 psf	Lean Clay Fill
Column 3	177.00000 ft	549.16131 ft	-244.80254 psf	414.33785 psf	220.30734 psf	270 psf	0 psf	Lean Clay Fill
Column 4	173.50000 ft	546.38367 ft	-359.76406 psf	708.17022 psf	376.54078 psf	270 psf	0 psf	Lean Clay Fill
Column 5	168.50000 ft	542.63384 ft	-479.44166 psf	1,107.0085 psf	588.60686 psf	270 psf	0 psf	Lean Clay Fill
Column 6	163.31762 ft	539.06123 ft	-548.07334 psf	1,396.8472 psf	742.71685 psf	270 psf	0 psf	Lean Clay Fill
Column 7	157.95285 ft	535.66248 ft	-481.78 psf	1,579.5488 psf	839.86102 psf	270 psf	0 psf	Lean Clay Fill
Column 8	152.58808 ft	532.55189 ft	-369.74566 psf	1,738.9917 psf	924.63828 psf	270 psf	0 psf	Lean Clay Fill
Column 9	147.21058 ft	529.70444 ft	-223.89808 psf	1,904.4239 psf	1,012.6002 psf	0 psf	0 psf	Silty Clay
Column 10	141.82034 ft	527.10547 ft	-76.438302 psf	1,996.1552 psf	1,061.3745 psf	0 psf	0 psf	Silty Clay
Column 11	136.43010 ft	524.74880 ft	57.050318 psf	2,073.3679 psf	1,072.0951 psf	0 psf	0 psf	Silty Clay
Column 12	131.39677 ft	522.74997 ft	169.43449 psf	2,119.9598 psf	1,218.8235 psf	0 psf	0 psf	Clayey Silt
Column 13	126.72034 ft	521.07288 ft	263.06347 psf	2,160.7963 psf	1,185.8351 psf	0 psf	0 psf	Clayey Silt
Column 14	122.04392 ft	519.55712 ft	346.76161 psf	2,184.7224 psf	1,148.4854 psf	0 psf	0 psf	Clayey Silt
Column 15	117.36749 ft	518.19796 ft	420.89523 psf	2,191.2388 psf	1,106.2334 psf	0 psf	0 psf	Clayey Silt
Column 16	112.69106 ft	516.99128 ft	485.5867 psf	2,179.5902 psf	1,058.5309 psf	0 psf	0 psf	Clayey Silt
Column 17	108.01464 ft	515.93354 ft	541.06446 psf	2,148.8332 psf	1,004.6454 psf	0 psf	0 psf	Clayey Silt
Column 18	103.33821 ft	515.02175 ft	587.48605 psf	2,097.906 psf	943.81512 psf	0 psf	0 psf	Clayey Silt
Column 19	99.00000 ft	514.29944 ft	622.87804 psf	2,067.4563 psf	902.67267 psf	0 psf	0 psf	Clayey Silt
Column 20	94.51658 ft	513.69274 ft	650.72935 psf	2,096.1586 psf	497.70122 psf	0 psf	0 psf	Soft Clay
Column 21	89.54974 ft	513.16288 ft	672.69734 psf	2,188.1029 psf	521.79598 psf	0 psf	0 psf	Soft Clay
Column 22	84.58290 ft	512.78921 ft	684.85526 psf	2,259.7408 psf	542.27658 psf	0 psf	0 psf	Soft Clay
Column 23	79.61606 ft	512.57063 ft	687.29911 psf	2,309.2023 psf	558.46607 psf	0 psf	0 psf	Soft Clay

Column 24	75.06767 ft	512.50000 ft	681.27644 psf	2,334.3545 psf	569.20043 psf	0 psf	0 psf	Soft Clay
Column 25	70.50135 ft	512.57142 ft	666.21838 psf	2,336.5443 psf	575.13932 psf	0 psf	0 psf	Soft Clay
Column 26	65.51880 ft	512.79119 ft	640.2116 psf	2,205.4373 psf	538.95044 psf	0 psf	0 psf	Soft Clay
Column 27	60.55640 ft	513.16551 ft	604.0351 psf	1,937.693 psf	459.21525 psf	0 psf	0 psf	Soft Clay
Column 28	55.59401 ft	513.69574 ft	555.01927 psf	1,643.8999 psf	374.93167 psf	0 psf	0 psf	Soft Clay
Column 29	50.92734 ft	514.33356 ft	499.05855 psf	1,374.6916 psf	547.15622 psf	0 psf	0 psf	Clayey Silt
Column 30	46.55640 ft	515.06289 ft	432.62803 psf	1,067.7262 psf	396.85339 psf	0 psf	0 psf	Clayey Silt
Column 31	42.18547 ft	515.91762 ft	354.10822 psf	746.78595 psf	245.37228 psf	0 psf	0 psf	Clayey Silt
Column 32	38.23740 ft	516.79348 ft	274.05657 psf	411.07237 psf	85.616976 psf	0 psf	0 psf	Clayey Silt

APPENDIX G-2:
Short-Term Static Slope Stability Analysis



Slope Stability	
CWLP Short Term Alignment 6.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 215
Date: 06/26/2024
Time: 04:51:28 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Alignment 6.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 04:51:42 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 700 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 900 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 300 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03559, 553.81656) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)
    Data Point: (0.38282598, 0.22868775)
    Data Point: (0.70171264, 0.22868775)
    Data Point: (1.2862257, 0.22868775)
    Data Point: (2.357627, 0.22868775)

Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)

Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	512.5 ft
Point 2	30 ft	512.5 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 ft
Point 13	176 ft	521 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft

Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	553 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,14,26,16,7,6,5	1,717.5 ft²
Region 2	CCR Ash Moist	11,10,9,8,31	837 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,8,16	3,928 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Soft Clay	1,2,35,37,15,36,13,12,39,38	610 ft²
Region 8	Clayey Silt	20,33,34,29,18,17,32,27,25,19,39,12,13,36,15,37,35,2,1	6,303.4 ft²

Slip Results

Slip Surfaces Analysed: 4523 of 4851 converged

Current Slip Surface

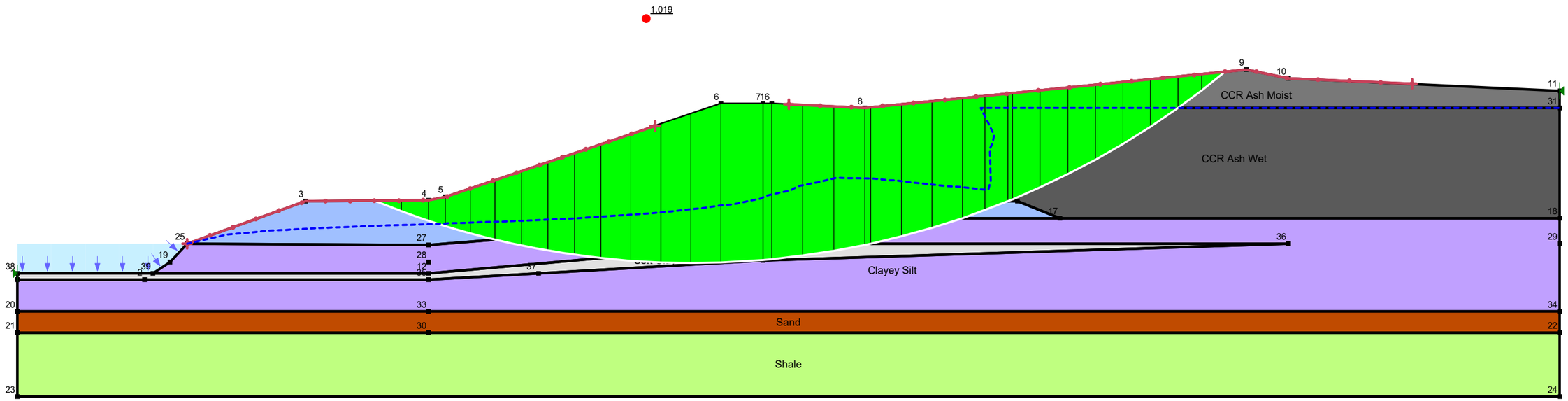
Slip Surface: 135
Factor of Safety: 1.783
Volume: 4,576.5073 ft³
Weight: 541,529.67 lbf
Resisting Moment: 45,353,107 lbf·ft
Activating Moment: 25,441,713 lbf·ft
Resisting Force: 140,570.87 lbf
Activating Force: 78,850.849 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (270.33745, 560.03374) ft
Entry: (40, 521) ft
Radius: 311.93798 ft
Center: (106.84194, 825.6924) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	267.33189 ft	558.23027 ft	-326.52671 psf	119.27022 psf	68.860693 psf	0 psf	0 psf	CCR Ash Moist
Column 2	261.32078 ft	554.71340 ft	-106.9677 psf	352.61904 psf	203.5847 psf	0 psf	0 psf	CCR Ash Moist
Column 3	254.77955 ft	551.09517 ft	11.143469 psf	650.02225 psf	171.18705 psf	0 psf	0 psf	CCR Ash Wet
Column 4	247.70819 ft	547.40065 ft	28.111409 psf	926.62485 psf	240.75595 psf	0 psf	0 psf	CCR Ash Wet
Column 5	240.63683 ft	543.93202 ft	29.872895 psf	1,182.4536 psf	308.83306 psf	0 psf	0 psf	CCR Ash Wet
Column 6	233.56547 ft	540.68104 ft	17.930609 psf	1,419.2927 psf	375.49383 psf	0 psf	0 psf	CCR Ash Wet
Column 7	226.49412 ft	537.64032 ft	-19.143279 psf	1,638.9658 psf	439.15956 psf	0 psf	0 psf	CCR Ash Wet
Column 8	219.49992 ft	534.83208 ft	-6.1845397 psf	1,687.8469 psf	0 psf	1,800 psf	0 psf	Lean Clay Fill
Column 9	212.58287 ft	532.24625 ft	63.452422 psf	2,035.8542 psf	0 psf	1,800 psf	0 psf	Lean Clay Fill
Column 10	204.56218 ft	529.49487 ft	122.62915 psf	2,545.4727 psf	0 psf	700 psf	0 psf	Silty Clay
Column 11	198.38805 ft	527.49487 ft	156.50173 psf	2,818.5445 psf	0 psf	700 psf	0 psf	Silty Clay
Column 12	192.08207 ft	525.66638 ft	238.06586 psf	3,112.8455 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 13	182.69402 ft	523.15588 ft	371.26447 psf	3,560.5359 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 14	177.00000 ft	521.74817 ft	442.27351 psf	3,807.2204 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 15	174.04035 ft	521.08503 ft	473.85988 psf	3,895.3729 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 16	169.04035 ft	520.03404 ft	517.84296 psf	4,064.9991 psf	0 psf	300 psf	0 psf	Soft Clay
Column 17	161.93750 ft	518.68630 ft	570.68582 psf	4,076.5879 psf	0 psf	300 psf	0 psf	Soft Clay
Column 18	153.81250 ft	517.33841 ft	625.38786 psf	3,926.1652 psf	0 psf	300 psf	0 psf	Soft Clay
Column 19	145.68750 ft	516.20967 ft	672.58188 psf	3,750.4571 psf	0 psf	300 psf	0 psf	Soft Clay
Column 20	137.56250 ft	515.29768 ft	710.83374 psf	3,548.3742 psf	0 psf	300 psf	0 psf	Soft Clay
Column 21	129.43750 ft	514.60053 ft	738.63069 psf	3,318.8804 psf	0 psf	300 psf	0 psf	Soft Clay
Column 22	121.31250 ft	514.11678 ft	754.75952 psf	3,061.0623 psf	0 psf	300 psf	0 psf	Soft Clay
Column 23	113.18750 ft	513.84544 ft	758.33953 psf	2,774.1932 psf	0 psf	300 psf	0 psf	Soft Clay

Column 24	105.06250 ft	513.78595 ft	748.68716 psf	2,457.7897 psf	0 psf	300 psf	0 psf	Soft Clay
Column 25	99.00000 ft	513.85942 ft	733.77379 psf	2,239.2441 psf	0 psf	300 psf	0 psf	Soft Clay
Column 26	95.73326 ft	513.95486 ft	721.9735 psf	2,181.4813 psf	0 psf	300 psf	0 psf	Soft Clay
Column 27	90.05543 ft	514.23774 ft	693.94651 psf	2,190.0587 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 28	81.23326 ft	514.83888 ft	639.09591 psf	2,116.7272 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 29	72.41109 ft	515.69220 ft	565.27241 psf	2,008.3228 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 30	64.50000 ft	516.66168 ft	480.43677 psf	1,730.2974 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 31	57.50000 ft	517.70196 ft	385.86158 psf	1,290.4231 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 32	50.50000 ft	518.90546 ft	268.97312 psf	831.11602 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 33	43.50000 ft	520.27412 ft	96.493826 psf	353.593 psf	0 psf	900 psf	0 psf	Clayey Silt

APPENDIX G-3:
Seismic Slope Stability Analysis



Slope Stability	
CWLP Seismic Alignment 6 rev.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 218
Date: 06/26/2024
Time: 04:52:19 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Alignment 6 rev.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 04:52:31 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 700 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 900 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 300 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03559, 553.81656) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.1

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)

Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)

Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	512.5 ft
Point 2	30 ft	512.5 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 ft
Point 13	176 ft	521 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft

Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	553 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,14,26,16,7,6,5	1,717.5 ft²
Region 2	CCR Ash Moist	11,10,9,8,31	837 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,8,16	3,928 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Soft Clay	1,2,35,37,15,36,13,12,39,38	610 ft²
Region 8	Clayey Silt	20,33,34,29,18,17,32,27,25,19,39,12,13,36,15,37,35,2,1	6,303.4 ft²

Slip Results

Slip Surfaces Analysed: 4706 of 4851 converged

Current Slip Surface

Slip Surface: 2,006
Factor of Safety: 1.019
Volume: 4,549.3703 ft³
Weight: 526,957.38 lbf
Resisting Moment: 22,087,722 lbf·ft
Activating Moment: 21,681,323 lbf·ft
Resisting Force: 106,166.71 lbf
Activating Force: 104,113.16 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (285.04264, 561.50426) ft
Entry: (84.264559, 531.11217) ft
Radius: 198.43755 ft
Center: (159.13618, 714.88295) ft

Slip Columns

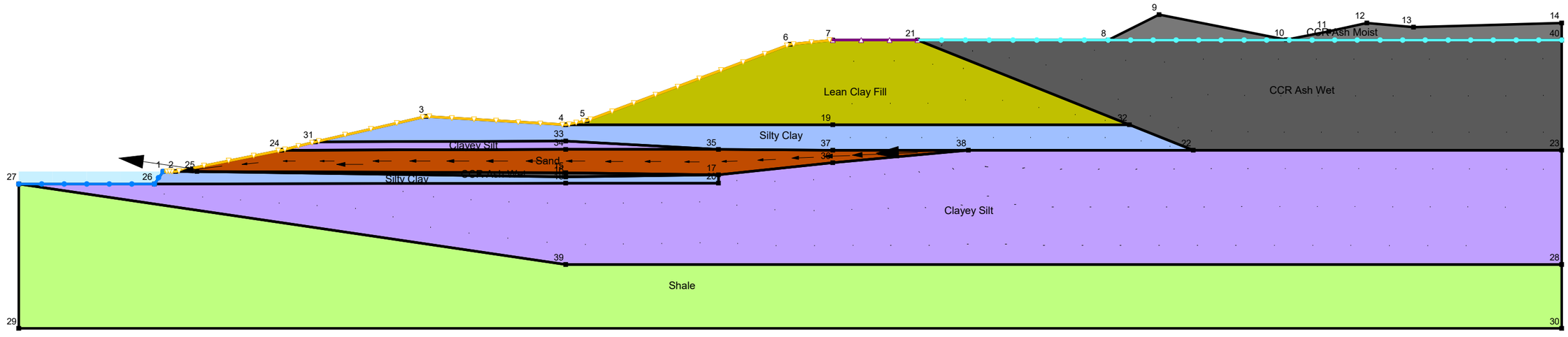
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	282.25767 ft	559.30036 ft	-393.33248 psf	125.61993 psf	72.5267 psf	0 psf	0 psf	CCR Ash Moist
Column 2	276.68773 ft	555.04822 ft	-127.87107 psf	372.83267 psf	215.25504 psf	0 psf	0 psf	CCR Ash Moist
Column 3	270.64821 ft	550.78834 ft	14.459079 psf	734.61243 psf	192.96451 psf	0 psf	0 psf	CCR Ash Wet
Column 4	264.13910 ft	546.54659 ft	41.259406 psf	1,034.899 psf	266.24492 psf	0 psf	0 psf	CCR Ash Wet
Column 5	257.63000 ft	542.65528 ft	63.061227 psf	1,308.4887 psf	333.71129 psf	0 psf	0 psf	CCR Ash Wet
Column 6	251.12089 ft	539.09109 ft	77.982671 psf	1,559.1436 psf	396.87587 psf	0 psf	0 psf	CCR Ash Wet
Column 7	244.61178 ft	535.83443 ft	85.482591 psf	1,790.1568 psf	456.76607 psf	0 psf	0 psf	CCR Ash Wet
Column 8	238.10268 ft	532.86876 ft	68.563873 psf	2,003.2019 psf	518.38469 psf	0 psf	0 psf	CCR Ash Wet
Column 9	234.29000 ft	531.22839 ft	56.491424 psf	1,860.4143 psf	0 psf	1,800 psf	0 psf	Lean Clay Fill
Column 10	231.04670 ft	529.95584 ft	95.651507 psf	2,266.561 psf	0 psf	700 psf	0 psf	Silty Clay
Column 11	225.67633 ft	527.95584 ft	150.99541 psf	2,523.3199 psf	0 psf	700 psf	0 psf	Silty Clay
Column 12	219.39386 ft	525.85328 ft	243.7008 psf	2,776.065 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 13	212.19930 ft	523.70809 ft	371.22482 psf	3,074.0378 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 14	205.00473 ft	521.85481 ft	478.90546 psf	3,346.0565 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 15	200.70373 ft	520.84924 ft	533.23272 psf	3,491.8844 psf	0 psf	300 psf	0 psf	Soft Clay
Column 16	196.33333 ft	519.99863 ft	564.48709 psf	3,663.6358 psf	0 psf	300 psf	0 psf	Soft Clay
Column 17	189.00000 ft	518.74051 ft	609.51986 psf	3,957.5793 psf	0 psf	300 psf	0 psf	Soft Clay
Column 18	181.66667 ft	517.76315 ft	643.31776 psf	4,230.9592 psf	0 psf	300 psf	0 psf	Soft Clay
Column 19	177.00000 ft	517.25366 ft	660.68809 psf	4,383.4558 psf	0 psf	300 psf	0 psf	Soft Clay
Column 20	171.00000 ft	516.86371 ft	673.0543 psf	4,490.9466 psf	0 psf	300 psf	0 psf	Soft Clay
Column 21	162.46269 ft	516.50483 ft	681.24343 psf	4,479.1354 psf	0 psf	300 psf	0 psf	Soft Clay
Column 22	155.38806 ft	516.51235 ft	671.38202 psf	4,258.481 psf	0 psf	300 psf	0 psf	Soft Clay
Column 23	148.31343 ft	516.77243 ft	646.07132 psf	3,997.5158 psf	0 psf	300 psf	0 psf	Soft Clay

Column 24	141.23880 ft	517.28607 ft	604.36741 psf	3,693.3893 psf	0 psf	300 psf	0 psf	Soft Clay
Column 25	134.57752 ft	517.99613 ft	547.64499 psf	3,537.1743 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 26	128.32957 ft	518.87680 ft	478.83965 psf	3,190.9035 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 27	122.08163 ft	519.96166 ft	398.01997 psf	2,806.2359 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 28	115.83369 ft	521.25417 ft	305.11028 psf	2,384.5391 psf	0 psf	900 psf	0 psf	Clayey Silt
Column 29	109.78229 ft	522.70460 ft	204.47498 psf	1,871.4175 psf	0 psf	700 psf	0 psf	Silty Clay
Column 30	103.92743 ft	524.30445 ft	94.969593 psf	1,409.4314 psf	0 psf	700 psf	0 psf	Silty Clay
Column 31	99.00000 ft	525.78854 ft	-7.0727041 psf	1,036.9555 psf	0 psf	700 psf	0 psf	Silty Clay
Column 32	93.81614 ft	527.53466 ft	-126.90991 psf	753.24819 psf	0 psf	700 psf	0 psf	Silty Clay
Column 33	87.44842 ft	529.87845 ft	-287.56458 psf	441.74489 psf	0 psf	700 psf	0 psf	Silty Clay

APPENDIX H:

Dallman Ash Pond Profile G-G' Slope Stability Analysis

APPENDIX H-1:
Long-Term Static Slope Stability Analysis



Steady-State Seepage	
CWLP Long Term Alignment 7 Rev.gsz	
06/26/2024	1:300

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 168
Date: 06/26/2024
Time: 08:45:00 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 7 Rev.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 08:45:04 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d

Duration: 0 d
Ending Time: 0 d

Materials

Lean Clay Fill

Hydraulic
- Hydraulic Material Model: Saturated / Unsaturated
- Vol. WC. Function: Fat Clay
- K-Function: Fat Clay
- Ky'/Kx' Ratio: 1
- Rotation: 0 °

Shale

Hydraulic
- Hydraulic Material Model: Saturated Only
- Sat Kx: 1e-11 ft/sec
- Ky'/Kx' Ratio: 1
- Rotation: 0 °
- Volumetric Water Content: 0.12
- Compressibility: 0 /psf

Sand

Hydraulic
- Hydraulic Material Model: Saturated / Unsaturated
- Vol. WC. Function: Silty Sand
- K-Function: Silty Sand
- Ky'/Kx' Ratio: 1
- Rotation: 0 °

Silty Clay

Hydraulic
- Hydraulic Material Model: Saturated / Unsaturated
- Vol. WC. Function: Silty Clay
- K-Function: Silty Clay
- Ky'/Kx' Ratio: 1
- Rotation: 0 °

Clayey Silt

Hydraulic
- Hydraulic Material Model: Saturated / Unsaturated
- Vol. WC. Function: Clayey Silt
- K-Function: Clayey Silt
- Ky'/Kx' Ratio: 1
- Rotation: 0 °

CCR Ash Moist

Hydraulic
- Hydraulic Material Model: Saturated / Unsaturated

Vol. WC. Function: CCR Ash Moist
K-Function: CCR Ash Moist
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Ash Wet

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3.13e-10 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.232
Compressibility: 0 /psf

Boundary Conditions

Drainage

Category: Hydraulic
Kind: Water Rate 0 ft^3/sec
Review: Yes

Impoundment Head

Category: Hydraulic
Kind: Water Total Head 553 ft
Review: No

Sugar Creek Head

Category: Hydraulic
Kind: Water Total Head 522 ft
Review: No

Seepage Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

Water K Functions

Fat Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 5.61e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 5.61e-10)
Data Point: (0.20885434, 5.61e-10)
Data Point: (0.38282598, 5.61e-10)

Data Point: (0.70171264, 5.61e-10)
Data Point: (1.2862257, 5.61e-10)
Data Point: (2.357627, 5.61e-10)
Data Point: (4.3214847, 5.61e-10)
Data Point: (7.9211981, 5.61e-10)
Data Point: (14.519403, 5.61e-10)
Data Point: (26.613786, 5.61e-10)
Data Point: (48.782557, 5.61e-10)
Data Point: (89.417486, 5.61e-10)
Data Point: (163.90053, 5.61e-10)
Data Point: (300.42651, 5.6099999e-10)
Data Point: (550.67599, 5.6100002e-10)
Data Point: (1,009.3785, 5.6100083e-10)
Data Point: (1,850.1713, 5.6100401e-10)
Data Point: (3,391.3282, 5.6096377e-10)
Data Point: (6,216.2392, 5.6051574e-10)
Data Point: (11,394.247, 5.6081982e-10)
Data Point: (20,885.434, 5.9364161e-10)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fat Clay
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 3.13e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.13e-10)
Data Point: (0.20885434, 3.13e-10)
Data Point: (0.38282598, 3.13e-10)
Data Point: (0.70171264, 3.13e-10)
Data Point: (1.2862257, 3.13e-10)
Data Point: (2.357627, 3.13e-10)
Data Point: (4.3214847, 3.13e-10)
Data Point: (7.9211981, 3.13e-10)
Data Point: (14.519403, 3.13e-10)
Data Point: (26.613786, 3.13e-10)
Data Point: (48.782557, 3.13e-10)
Data Point: (89.417486, 3.13e-10)
Data Point: (163.90053, 3.13e-10)
Data Point: (300.42651, 3.1299999e-10)
Data Point: (550.67599, 3.1300001e-10)
Data Point: (1,009.3785, 3.1300046e-10)
Data Point: (1,850.1713, 3.1300224e-10)
Data Point: (3,391.3282, 3.1297978e-10)

Data Point: (6,216.2392, 3.1272982e-10)
Data Point: (11,394.247, 3.1289947e-10)
Data Point: (20,885.434, 3.3121173e-10)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 3.13e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 5.61e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 5.61e-10)
Data Point: (0.20885434, 5.6076753e-10)
Data Point: (0.38282598, 5.605286e-10)
Data Point: (0.70171264, 5.6011026e-10)
Data Point: (1.2862257, 5.5932808e-10)
Data Point: (2.357627, 5.5785873e-10)
Data Point: (4.3214847, 5.5505975e-10)
Data Point: (7.9211981, 5.4972968e-10)
Data Point: (14.519403, 5.3968406e-10)
Data Point: (26.613786, 5.2091803e-10)
Data Point: (48.782557, 4.8708899e-10)
Data Point: (89.417486, 4.2895531e-10)
Data Point: (163.90053, 3.376202e-10)
Data Point: (300.42651, 2.1653392e-10)
Data Point: (550.67599, 9.7781716e-11)
Data Point: (1,009.3785, 2.6902652e-11)
Data Point: (1,850.1713, 4.6086599e-12)
Data Point: (3,391.3282, 6.0909155e-13)
Data Point: (6,216.2392, 7.8043666e-14)
Data Point: (11,394.247, 9.9255977e-15)
Data Point: (20,885.434, 8.0835113e-16)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Sand

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Saturated Kx: 5e-07 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 5e-07)
Data Point: (0.20885434, 4.9930906e-07)
Data Point: (0.38282598, 4.9850292e-07)
Data Point: (0.70171264, 4.9699288e-07)
Data Point: (1.2862257, 4.9404478e-07)
Data Point: (2.357627, 4.8840512e-07)
Data Point: (4.3214847, 4.7770451e-07)
Data Point: (7.9211981, 4.5788774e-07)
Data Point: (14.519403, 4.2261167e-07)
Data Point: (26.613786, 3.6313e-07)
Data Point: (48.782557, 2.733346e-07)
Data Point: (89.417486, 1.6154188e-07)
Data Point: (163.90053, 6.3311045e-08)
Data Point: (300.42651, 1.4171645e-08)
Data Point: (550.67599, 1.9057364e-09)
Data Point: (1,009.3785, 2.0038668e-10)
Data Point: (1,850.1713, 2.1273812e-11)
Data Point: (3,391.3282, 2.5299797e-12)
Data Point: (6,216.2392, 3.3810918e-13)
Data Point: (11,394.247, 4.5779315e-14)
Data Point: (20,885.434, 3.8147511e-15)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Sand
Saturated Kx: 5e-07 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 8.76e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 8.76e-09)
Data Point: (0.20885434, 8.7559203e-09)
Data Point: (0.38282598, 8.7511835e-09)
Data Point: (0.70171264, 8.7421645e-09)
Data Point: (1.2862257, 8.7240434e-09)
Data Point: (2.357627, 8.6879881e-09)
Data Point: (4.3214847, 8.616093e-09)
Data Point: (7.9211981, 8.4744247e-09)
Data Point: (14.519403, 8.2018097e-09)
Data Point: (26.613786, 7.6897688e-09)
Data Point: (48.782557, 6.7857765e-09)
Data Point: (89.417486, 5.3301095e-09)

Data Point: (163.90053, 3.3693059e-09)
Data Point: (300.42651, 1.4536272e-09)
Data Point: (550.67599, 3.6614783e-10)
Data Point: (1,009.3785, 5.5505228e-11)
Data Point: (1,850.1713, 6.4852651e-12)
Data Point: (3,391.3282, 7.5495247e-13)
Data Point: (6,216.2392, 9.6626135e-14)
Data Point: (11,394.247, 1.2682259e-14)
Data Point: (20,885.434, 1.0613104e-15)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Clayey Silt
Saturated Kx: 8.76e-09 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fat Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.25761403
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.25761403
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.258)
Data Point: (0.20885434, 0.25761403)
Data Point: (0.38282598, 0.25761403)
Data Point: (0.70171264, 0.25761403)
Data Point: (1.2862257, 0.25761403)
Data Point: (2.357627, 0.25761403)
Data Point: (4.3214847, 0.25761403)
Data Point: (7.9211981, 0.25761403)
Data Point: (14.519403, 0.25761403)
Data Point: (26.613786, 0.25761403)
Data Point: (48.782557, 0.25761403)
Data Point: (89.417486, 0.25761403)
Data Point: (163.90053, 0.25761403)
Data Point: (300.42651, 0.25761403)
Data Point: (550.67599, 0.25761403)
Data Point: (1,009.3785, 0.25761403)
Data Point: (1,850.1713, 0.25761403)
Data Point: (3,391.3282, 0.25761403)
Data Point: (6,216.2392, 0.25761403)
Data Point: (11,394.247, 0.25761403)
Data Point: (20,885.434, 0.25761403)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.258
Sample Material: Clay
Liquid Limit: 63 %
Diameter at 10% passing: 0.0001
Diameter at 60% passing: 0.0123
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.26000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.26000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999956)
Data Point: (0.38282598, 0.25999897)
Data Point: (0.70171264, 0.25999751)
Data Point: (1.2862257, 0.25999388)
Data Point: (2.357627, 0.25998468)
Data Point: (4.3214847, 0.25996118)
Data Point: (7.9211981, 0.25990074)
Data Point: (14.519403, 0.25974452)
Data Point: (26.613786, 0.25934005)
Data Point: (48.782557, 0.25829509)
Data Point: (89.417486, 0.25562419)
Data Point: (163.90053, 0.24900338)
Data Point: (300.42651, 0.23379671)
Data Point: (550.67599, 0.20421911)
Data Point: (1,009.3785, 0.16121083)
Data Point: (1,850.1713, 0.11777666)
Data Point: (3,391.3282, 0.085106358)
Data Point: (6,216.2392, 0.063572028)
Data Point: (11,394.247, 0.049416751)
Data Point: (20,885.434, 0.039576854)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.26
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.26000005
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.26000005
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999914)
Data Point: (0.38282598, 0.25999782)
Data Point: (0.70171264, 0.25999442)
Data Point: (1.2862257, 0.25998552)
Data Point: (2.357627, 0.25996214)
Data Point: (4.3214847, 0.25990038)
Data Point: (7.9211981, 0.25973694)
Data Point: (14.519403, 0.25930416)
Data Point: (26.613786, 0.25816211)
Data Point: (48.782557, 0.25518411)

Data Point: (89.417486, 0.24766912)
Data Point: (163.90053, 0.23019519)
Data Point: (300.42651, 0.19625882)
Data Point: (550.67599, 0.14821398)
Data Point: (1,009.3785, 0.10226739)
Data Point: (1,850.1713, 0.069975374)
Data Point: (3,391.3282, 0.050016484)
Data Point: (6,216.2392, 0.03761922)
Data Point: (11,394.247, 0.029447626)
Data Point: (20,885.434, 0.023658736)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.26
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	34 ft	522 ft
Point 2	37 ft	522 ft
Point 3	96 ft	535 ft
Point 4	129 ft	533 ft
Point 5	134 ft	534 ft
Point 6	182 ft	552 ft
Point 7	192 ft	553 ft
Point 8	257 ft	553 ft
Point 9	269 ft	559 ft
Point 10	299 ft	553.1 ft
Point 11	309 ft	555 ft
Point 12	318 ft	557 ft
Point 13	329 ft	556 ft
Point 14	364 ft	557 ft
Point 15	129 ft	521.7 ft
Point 16	129 ft	520.7 ft
Point 17	165 ft	521.2 ft

Point 18	129 ft	519.2 ft
Point 19	192 ft	533 ft
Point 20	165 ft	519.2 ft
Point 21	212 ft	553 ft
Point 22	277 ft	527 ft
Point 23	364 ft	527 ft
Point 24	62 ft	527 ft
Point 25	42 ft	522 ft
Point 26	32 ft	519 ft
Point 27	0 ft	519 ft
Point 28	364 ft	500 ft
Point 29	0 ft	485 ft
Point 30	364 ft	485 ft
Point 31	70 ft	529 ft
Point 32	262 ft	533 ft
Point 33	129 ft	529.2 ft
Point 34	129 ft	527.2 ft
Point 35	165 ft	527.2 ft
Point 36	192 ft	524 ft
Point 37	192 ft	527 ft
Point 38	224 ft	527 ft
Point 39	129 ft	500 ft
Point 40	364 ft	553 ft

Lines

	Start Point	End Point	Hydraulic Boundary	Length	Angle
Line 1	4	5	Seepage Face	5.099 ft	11.3 °
Line 2	5	6	Seepage Face	51.264 ft	20.6 °
Line 3	6	7	Seepage Face	10.05 ft	5.71 °
Line 4	8	9		13.416 ft	26.6 °
Line 5	9	10		30.575 ft	-11.1 °
Line 6	10	11		10.179 ft	10.8 °
Line 7	11	12		9.2195 ft	12.5 °
Line 8	12	13		11.045 ft	-5.19 °
Line 9	13	14		35.014 ft	1.64 °
Line 10	23	22		87 ft	0 °
Line 11	15	25		87.001 ft	-0.198 °
Line 12	2	25		5 ft	0 °
Line 13	2	1	Seepage Face	3 ft	0 °
Line 14	26	1	Sugar Creek Head	3.6056 ft	56.3 °
Line 15	27	29		34 ft	90 °
Line 16	29	30		364 ft	0 °
Line 17	30	28		15 ft	90 °
Line 18	20	18		36 ft	0 °
Line 19	16	17		36.003 ft	0.796 °
Line 20	17	20		2 ft	90 °

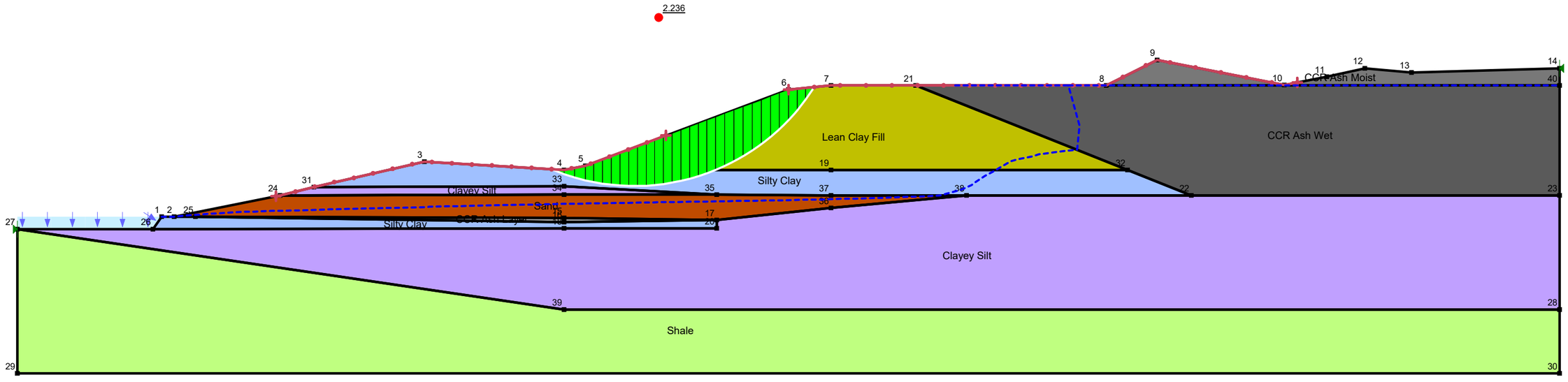
Line 21	19	4		63 ft	0 °
Line 22	35	33		36.056 ft	-3.18 °
Line 23	33	31		59 ft	0.194 °
Line 24	24	31	Seepage Face	8.2462 ft	14 °
Line 25	35	34		36 ft	0 °
Line 26	34	24		67 ft	0.171 °
Line 27	15	17		36.003 ft	-0.796 °
Line 28	37	35		27.001 ft	-0.424 °
Line 29	18	26		97 ft	0.118 °
Line 30	28	39		235 ft	0 °
Line 31	39	27		130.39 ft	-8.38 °
Line 32	17	36		27.145 ft	5.92 °
Line 33	36	38		32.14 ft	5.36 °
Line 34	38	37		32 ft	0 °
Line 35	19	32		70 ft	0 °
Line 36	32	22		16.155 ft	-21.8 °
Line 37	4	3	Seepage Face	33.061 ft	-3.47 °
Line 38	3	31	Seepage Face	26.683 ft	13 °
Line 39	38	22		53 ft	0 °
Line 40	26	27	Sugar Creek Head	32 ft	0 °
Line 41	28	23		27 ft	90 °
Line 42	25	16		87.01 ft	-0.856 °
Line 43	24	2	Seepage Face	25.495 ft	11.3 °
Line 44	8	21	Impoundment Head	45 ft	0 °
Line 45	32	21		53.852 ft	-21.8 °
Line 46	21	7	Drainage	20 ft	0 °
Line 47	8	40	Impoundment Head	107 ft	0 °
Line 48	40	14		4 ft	90 °
Line 49	23	40		26 ft	90 °

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,19,32,21,7,6,5	1,577.5 ft²
Region 2	CCR Ash Moist	14,13,12,11,10,9,8,40	326 ft²
Region 3	CCR Ash Wet	16,25,15,17	61.5 ft²
Region 4	Silty Clay	20,18,26,1,2,25,16,17	284.75 ft²
Region 5	Shale	27,29,30,28,39	6,685.5 ft²
Region 6	Clayey Silt	24,31,33,35,34	161.2 ft²
Region 7	Sand	24,2,25,15,17,36,38,37,35,34	793.75 ft²
Region 8	Silty Clay	31,33,35,37,38,22,32,19,4,3	1,034.2 ft²
Region 9	Clayey Silt	26,27,39,28,23,22,38,36,17,20,18	7,132.6 ft²
Region 10	CCR Ash Wet	32,22,23,40,8,21	3,107 ft²

Mesh Properties

Global Element Size: 9 ft



Slope Stability	
CWLP Long Term Alignment 7 Rev.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 168
Date: 06/26/2024
Time: 08:45:00 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term Alignment 7 Rev.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 08:45:14 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Silty Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

CCR Ash Layer

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (61, 526.8) ft
Left-Zone Right Coordinate: (153, 541.125) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182, 552) ft
Right-Zone Right Coordinate: (302, 553.67) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 519) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)
    Data Point: (0.38282598, 0.22868775)
    Data Point: (0.70171264, 0.22868775)
    Data Point: (1.2862257, 0.22868775)
    Data Point: (2.357627, 0.22868775)
    Data Point: (4.3214847, 0.22868775)

Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)

Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions

Saturated Water Content: 0.3

Sample Material: Silty Sand

Liquid Limit: 0 %

Diameter at 10% passing: 0

Diameter at 60% passing: 0

Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf

Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	34 ft	522 ft
Point 2	37 ft	522 ft
Point 3	96 ft	535 ft
Point 4	129 ft	533 ft
Point 5	134 ft	534 ft
Point 6	182 ft	552 ft
Point 7	192 ft	553 ft
Point 8	257 ft	553 ft
Point 9	269 ft	559 ft
Point 10	299 ft	553.1 ft
Point 11	309 ft	555 ft
Point 12	318 ft	557 ft
Point 13	329 ft	556 ft
Point 14	364 ft	557 ft
Point 15	129 ft	521.7 ft
Point 16	129 ft	520.7 ft
Point 17	165 ft	521.2 ft
Point 18	129 ft	519.2 ft
Point 19	192 ft	533 ft
Point 20	165 ft	519.2 ft
Point 21	212 ft	553 ft
Point 22	277 ft	527 ft
Point 23	364 ft	527 ft
Point 24	62 ft	527 ft
Point 25	42 ft	522 ft
Point 26	32 ft	519 ft
Point 27	0 ft	519 ft
Point 28	364 ft	500 ft

Point 29	0 ft	485 ft
Point 30	364 ft	485 ft
Point 31	70 ft	529 ft
Point 32	262 ft	533 ft
Point 33	129 ft	529.2 ft
Point 34	129 ft	527.2 ft
Point 35	165 ft	527.2 ft
Point 36	192 ft	524 ft
Point 37	192 ft	527 ft
Point 38	224 ft	527 ft
Point 39	129 ft	500 ft
Point 40	364 ft	553 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,19,32,21,7,6,5	1,577.5 ft²
Region 2	CCR Ash Moist	14,13,12,11,10,9,8,40	326 ft²
Region 3	CCR Ash Layer	16,25,15,17	61.5 ft²
Region 4	Silty Clay	20,18,26,1,2,25,16,17	284.75 ft²
Region 5	Shale	27,29,30,28,39	6,685.5 ft²
Region 6	Clayey Silt	24,31,33,35,34	161.2 ft²
Region 7	Sand	24,2,25,15,17,36,38,37,35,34	793.75 ft²
Region 8	Silty Clay	31,33,35,37,38,22,32,19,4,3	1,034.2 ft²
Region 9	Clayey Silt	26,27,39,28,23,22,38,36,17,20,18	7,132.6 ft²
Region 10	CCR Ash Wet	32,22,23,40,8,21	3,107 ft²

Slip Results

Slip Surfaces Analysed: 4566 of 4851 converged

Current Slip Surface

Slip Surface: 3,251
Factor of Safety: 2.236
Volume: 516.43255 ft³
Weight: 64,037.637 lbf
Resisting Moment: 2,095,202 lbf·ft
Activating Moment: 936,937.3 lbf·ft
Resisting Force: 36,992.564 lbf
Activating Force: 16,545.725 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (188.07443, 552.60744) ft
Entry: (126.07612, 533.17721) ft
Radius: 50.190629 ft
Center: (145.6336, 579.40062) ft

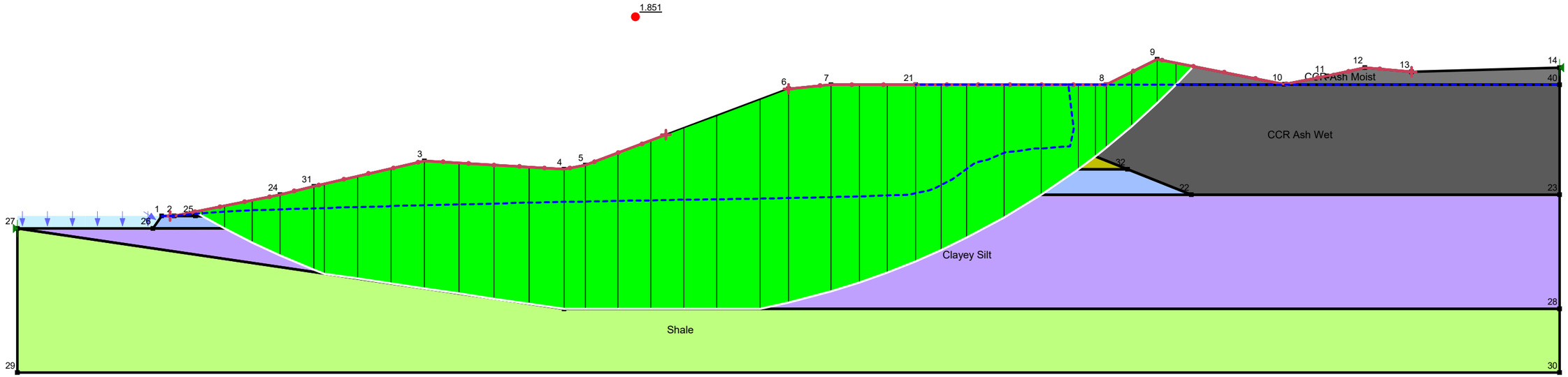
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material

Column 1	187.06203 ft	551.12415 ft	-1,398.2422 psf	-1.1189949 psf	-0.59498013 psf	270 psf	0 psf	Lean Clay Fill
Column 2	185.03722 ft	548.35585 ft	-1,250.1402 psf	254.309 psf	135.21849 psf	270 psf	0 psf	Lean Clay Fill
Column 3	183.01241 ft	545.93990 ft	-1,122.7507 psf	473.9955 psf	252.02788 psf	270 psf	0 psf	Lean Clay Fill
Column 4	180.92293 ft	543.74300 ft	-1,003.828 psf	645.57072 psf	343.25604 psf	270 psf	0 psf	Lean Clay Fill
Column 5	178.76878 ft	541.72967 ft	-896.03303 psf	774.27861 psf	411.69124 psf	270 psf	0 psf	Lean Clay Fill
Column 6	176.61464 ft	539.93673 ft	-802.31771 psf	886.01288 psf	471.1014 psf	270 psf	0 psf	Lean Clay Fill
Column 7	174.46050 ft	538.33510 ft	-718.5197 psf	984.36088 psf	523.39396 psf	270 psf	0 psf	Lean Clay Fill
Column 8	172.30635 ft	536.90302 ft	-641.81808 psf	1,071.7692 psf	569.8698 psf	270 psf	0 psf	Lean Clay Fill
Column 9	170.15221 ft	535.62377 ft	-572.72931 psf	1,149.8165 psf	611.36827 psf	270 psf	0 psf	Lean Clay Fill
Column 10	167.99807 ft	534.48423 ft	-510.98603 psf	1,219.3801 psf	648.35592 psf	270 psf	0 psf	Lean Clay Fill
Column 11	165.84392 ft	533.47397 ft	-456.29515 psf	1,280.7421 psf	680.98267 psf	270 psf	0 psf	Lean Clay Fill
Column 12	163.74129 ft	532.60317 ft	-410.23719 psf	1,341.1546 psf	713.10453 psf	0 psf	0 psf	Silty Clay
Column 13	161.69017 ft	531.85997 ft	-372.08185 psf	1,376.4409 psf	731.8666 psf	0 psf	0 psf	Silty Clay
Column 14	159.63904 ft	531.21550 ft	-339.03809 psf	1,403.5363 psf	746.27351 psf	0 psf	0 psf	Silty Clay
Column 15	157.58792 ft	530.66585 ft	-310.9627 psf	1,421.2209 psf	755.67655 psf	0 psf	0 psf	Silty Clay
Column 16	155.53680 ft	530.20782 ft	-287.68636 psf	1,428.0276 psf	759.29576 psf	0 psf	0 psf	Silty Clay
Column 17	153.48567 ft	529.83888 ft	-269.08108 psf	1,422.3084 psf	756.25479 psf	0 psf	0 psf	Silty Clay
Column 18	151.43455 ft	529.55705 ft	-255.39958 psf	1,402.3203 psf	745.62694 psf	0 psf	0 psf	Silty Clay
Column 19	149.38343 ft	529.36083 ft	-246.61251 psf	1,366.3345 psf	726.49292 psf	0 psf	0 psf	Silty Clay
Column 20	147.33230 ft	529.24924 ft	-242.72225 psf	1,312.7642 psf	698.00912 psf	0 psf	0 psf	Silty Clay
Column 21	145.28118 ft	529.22171 ft	-243.80998 psf	1,240.3066 psf	659.48271 psf	0 psf	0 psf	Silty Clay
Column 22	143.23006 ft	529.27809 ft	-249.91173 psf	1,148.0841 psf	610.44716 psf	0 psf	0 psf	Silty Clay
Column 23	141.17893 ft	529.41867 ft	-261.08463 psf	1,035.7713 psf	550.72934 psf	0 psf	0 psf	Silty Clay
Column 24	139.12781 ft	529.64417 ft	-277.42363 psf	903.68568 psf	480.4982 psf	0 psf	0 psf	Silty Clay
Column 25	137.07669 ft	529.95575 ft	-299.13508 psf	752.827 psf	400.28522 psf	0 psf	0 psf	Silty Clay
Column 26	135.02556 ft	530.35505 ft	-326.39871 psf	584.84861 psf	310.96952 psf	0 psf	0 psf	Silty Clay

Column 27	132.75000 ft	530.90898 ft	-363.62519 psf	410.88083 psf	218.46921 psf	0 psf	0 psf	Silty Clay
Column 28	130.25000 ft	531.64374 ft	-412.61026 psf	229.89739 psf	122.23861 psf	0 psf	0 psf	Silty Clay
Column 29	127.53806 ft	532.61180 ft	-476.76313 psf	67.295038 psf	35.781407 psf	0 psf	0 psf	Silty Clay

APPENDIX H-2:
Short-Term Static Slope Stability Analysis



Slope Stability	
CWLP Short Term Alignment 7 Rev1.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 181
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Tool Version: 23.1.2.11
File Name: CWLP Short Term Alignment 7 Rev1.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 05:07:19 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,200 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

CCR Ash Layer

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Total Cohesion: 900 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (36, 522) ft
Left-Zone Right Coordinate: (153, 541.125) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182, 552) ft
Right-Zone Right Coordinate: (329, 556) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 519) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)
    Data Point: (0.38282598, 0.22868775)
    Data Point: (0.70171264, 0.22868775)
    Data Point: (1.2862257, 0.22868775)
    Data Point: (2.357627, 0.22868775)

Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)

Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	34 ft	522 ft
Point 2	37 ft	522 ft
Point 3	96 ft	535 ft
Point 4	129 ft	533 ft
Point 5	134 ft	534 ft
Point 6	182 ft	552 ft
Point 7	192 ft	553 ft
Point 8	257 ft	553 ft
Point 9	269 ft	559 ft
Point 10	299 ft	553.1 ft
Point 11	309 ft	555 ft
Point 12	318 ft	557 ft
Point 13	329 ft	556 ft
Point 14	364 ft	557 ft
Point 15	129 ft	521.7 ft
Point 16	129 ft	520.7 ft
Point 17	165 ft	521.2 ft
Point 18	129 ft	519.2 ft
Point 19	192 ft	533 ft
Point 20	165 ft	519.2 ft
Point 21	212 ft	553 ft
Point 22	277 ft	527 ft
Point 23	364 ft	527 ft
Point 24	62 ft	527 ft

Point 25	42 ft	522 ft
Point 26	32 ft	519 ft
Point 27	0 ft	519 ft
Point 28	364 ft	500 ft
Point 29	0 ft	485 ft
Point 30	364 ft	485 ft
Point 31	70 ft	529 ft
Point 32	262 ft	533 ft
Point 33	129 ft	529.2 ft
Point 34	129 ft	527.2 ft
Point 35	165 ft	527.2 ft
Point 36	192 ft	524 ft
Point 37	192 ft	527 ft
Point 38	224 ft	527 ft
Point 39	129 ft	500 ft
Point 40	364 ft	553 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,19,32,21,7,6,5	1,577.5 ft²
Region 2	CCR Ash Moist	14,13,12,11,10,9,8,40	326 ft²
Region 3	CCR Ash Layer	16,25,15,17	61.5 ft²
Region 4	Silty Clay	20,18,26,1,2,25,16,17	284.75 ft²
Region 5	Shale	27,29,30,28,39	6,685.5 ft²
Region 6	Clayey Silt	24,31,33,35,34	161.2 ft²
Region 7	Sand	24,2,25,15,17,36,38,37,35,34	793.75 ft²
Region 8	Silty Clay	31,33,35,37,38,22,32,19,4,3	1,034.2 ft²
Region 9	Clayey Silt	26,27,39,28,23,22,38,36,17,20,18	7,132.6 ft²
Region 10	CCR Ash Wet	32,22,23,40,8,21	3,107 ft²

Slip Results

Slip Surfaces Analysed: 3917 of 4851 converged

Current Slip Surface

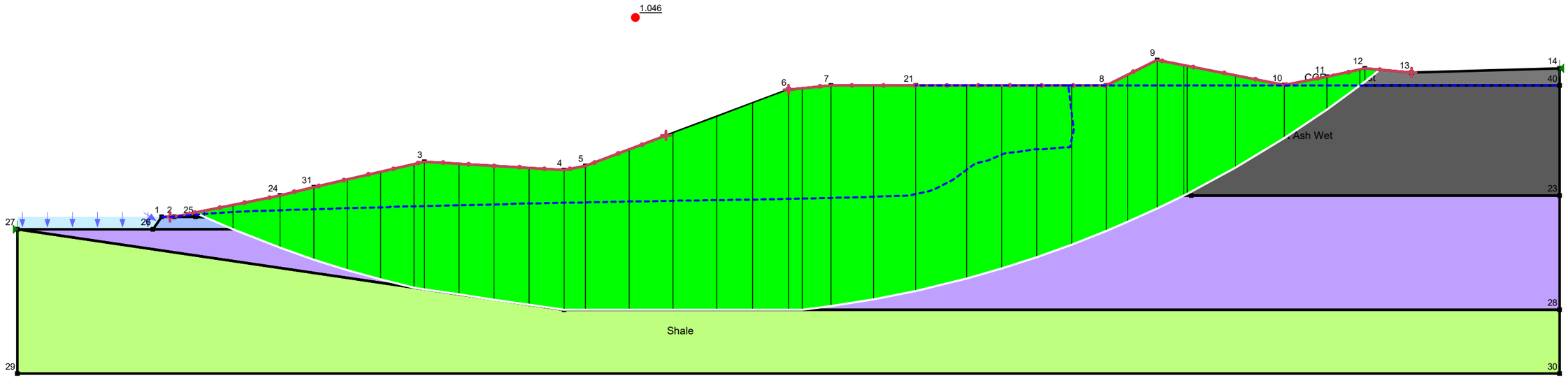
Slip Surface: 379
Factor of Safety: 1.851
Volume: 7,150.3918 ft³
Weight: 858,603.63 lbf
Resisting Moment: 36,995,692 lbf·ft
Activating Moment: 19,986,610 lbf·ft
Resisting Force: 183,718.61 lbf
Activating Force: 99,228.417 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (277.53531, 557.32139) ft
Entry: (41.896834, 522.97937) ft
Radius: 189.00403 ft
Center: (138.54698, 685.40249) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	275.48020 ft	555.16069 ft	-134.89258 psf	182.90059 psf	105.5977 psf	0 psf	0 psf	CCR Ash Moist
Column 2	271.21254 ft	550.81899 ft	28.062901 psf	650.54589 psf	166.79381 psf	0 psf	0 psf	CCR Ash Wet
Column 3	266.00000 ft	545.89715 ft	75.961592 psf	996.11695 psf	246.55489 psf	0 psf	0 psf	CCR Ash Wet
Column 4	260.00000 ft	540.63940 ft	93.726642 psf	1,208.3486 psf	298.66206 psf	0 psf	0 psf	CCR Ash Wet
Column 5	255.68782 ft	537.08610 ft	80.918717 psf	1,394.6898 psf	352.0239 psf	0 psf	0 psf	CCR Ash Wet
Column 6	252.35408 ft	534.52487 ft	113.37612 psf	1,153.6776 psf	0 psf	1,800 psf	0 psf	Lean Clay Fill
Column 7	245.99354 ft	530.00000 ft	207.80604 psf	2,022.003 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 8	237.24093 ft	524.29620 ft	384.85946 psf	2,934.662 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 9	228.41364 ft	519.20583 ft	621.25626 psf	3,625.1287 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 10	221.00000 ft	515.36453 ft	812.59006 psf	4,158.2722 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 11	215.00000 ft	512.58265 ft	957.60238 psf	4,556.696 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 12	208.66667 ft	509.92352 ft	1,099.0693 psf	4,918.4189 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 13	202.00000 ft	507.40329 ft	1,233.6286 psf	5,242.7297 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 14	195.33333 ft	505.16482 ft	1,354.7438 psf	5,540.1104 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 15	187.00000 ft	502.78796 ft	1,483.6447 psf	5,810.7051 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 16	178.63404 ft	500.73065 ft	1,596.3336 psf	5,898.6404 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 17	170.13404 ft	500.00000 ft	1,628.5555 psf	5,837.6079 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 18	161.12500 ft	500.00000 ft	1,616.2904 psf	5,444.4014 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 19	153.37500 ft	500.00000 ft	1,606.594 psf	5,091.4222 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 20	145.62500 ft	500.00000 ft	1,597.2922 psf	4,736.7771 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 21	137.87500 ft	500.00000 ft	1,588.1388 psf	4,380.3484 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 22	131.50000 ft	500.00000 ft	1,580.9139 psf	4,140.0487 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 23	124.87500 ft	500.60756 ft	1,535.2533 psf	4,161.4263 psf	0 psf	800 psf	0 psf	Clayey Silt

Column 24	116.62500 ft	501.82267 ft	1,449.1475 psf	4,077.273 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 25	108.37500 ft	503.03779 ft	1,362.076 psf	3,989.0997 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 26	100.12500 ft	504.25291 ft	1,274.1981 psf	3,897.2861 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 27	92.07768 ft	505.43817 ft	1,187.6522 psf	3,661.6129 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 28	84.23303 ft	506.59358 ft	1,102.0586 psf	3,283.3961 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 29	76.38838 ft	507.74900 ft	1,015.5347 psf	2,904.3317 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 30	71.23303 ft	508.79668 ft	939.93863 psf	2,746.8838 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 31	66.00000 ft	510.92988 ft	795.67244 psf	2,329.3582 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 32	58.71424 ft	514.12461 ft	578.85839 psf	1,740.4875 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 33	52.14272 ft	517.34543 ft	359.88052 psf	1,193.404 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 34	46.23009 ft	520.50540 ft	143.60884 psf	788.1572 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 35	42.75003 ft	522.47771 ft	4.0044307 psf	105.96095 psf	68.770543 psf	0 psf	0 psf	Sand

APPENDIX H-3:
Seismic Slope Stability Analysis



Slope Stability	
CWLP Seismic Alignment 7 Rev1.gsz	
06/26/2024	1:300

Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 178
Date: 06/26/2024
Time: 05:03:45 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Alignment 7 Rev1.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/26/2024
Last Solved Time: 05:03:59 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Lean Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 1,200 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 800 psf
Effective Friction Angle: 0 °
Phi-B: 0 °

CCR Ash Moist

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

CCR Ash Layer

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Total Cohesion: 900 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (36, 522) ft
Left-Zone Right Coordinate: (153, 541.125) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182, 552) ft
Right-Zone Right Coordinate: (329, 556) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 519) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.1

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.22868775
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.232)
    Data Point: (0.20885434, 0.22868775)

Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)

Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	34 ft	522 ft
Point 2	37 ft	522 ft
Point 3	96 ft	535 ft
Point 4	129 ft	533 ft
Point 5	134 ft	534 ft
Point 6	182 ft	552 ft
Point 7	192 ft	553 ft
Point 8	257 ft	553 ft
Point 9	269 ft	559 ft
Point 10	299 ft	553.1 ft
Point 11	309 ft	555 ft
Point 12	318 ft	557 ft
Point 13	329 ft	556 ft
Point 14	364 ft	557 ft
Point 15	129 ft	521.7 ft
Point 16	129 ft	520.7 ft
Point 17	165 ft	521.2 ft
Point 18	129 ft	519.2 ft
Point 19	192 ft	533 ft
Point 20	165 ft	519.2 ft
Point 21	212 ft	553 ft

Point 22	277 ft	527 ft
Point 23	364 ft	527 ft
Point 24	62 ft	527 ft
Point 25	42 ft	522 ft
Point 26	32 ft	519 ft
Point 27	0 ft	519 ft
Point 28	364 ft	500 ft
Point 29	0 ft	485 ft
Point 30	364 ft	485 ft
Point 31	70 ft	529 ft
Point 32	262 ft	533 ft
Point 33	129 ft	529.2 ft
Point 34	129 ft	527.2 ft
Point 35	165 ft	527.2 ft
Point 36	192 ft	524 ft
Point 37	192 ft	527 ft
Point 38	224 ft	527 ft
Point 39	129 ft	500 ft
Point 40	364 ft	553 ft

Regions

	Material	Points	Area
Region 1	Lean Clay Fill	4,19,32,21,7,6,5	1,577.5 ft²
Region 2	CCR Ash Moist	14,13,12,11,10,9,8,40	326 ft²
Region 3	CCR Ash Layer	16,25,15,17	61.5 ft²
Region 4	Silty Clay	20,18,26,1,2,25,16,17	284.75 ft²
Region 5	Shale	27,29,30,28,39	6,685.5 ft²
Region 6	Clayey Silt	24,31,33,35,34	161.2 ft²
Region 7	Sand	24,2,25,15,17,36,38,37,35,34	793.75 ft²
Region 8	Silty Clay	31,33,35,37,38,22,32,19,4,3	1,034.2 ft²
Region 9	Clayey Silt	26,27,39,28,23,22,38,36,17,20,18	7,132.6 ft²
Region 10	CCR Ash Wet	32,22,23,40,8,21	3,107 ft²

Slip Results

Slip Surfaces Analysed: 3436 of 4851 converged

Current Slip Surface

Slip Surface: 444
Factor of Safety: 1.046
Volume: 8,866.2236 ft³
Weight: 1,045,694.8 lbf
Resisting Moment: 56,013,936 lbf·ft
Activating Moment: 53,539,371 lbf·ft
Resisting Force: 200,780.23 lbf
Activating Force: 191,918.96 lbf
Slip Rank: 1 of 4,851 slip surfaces

Exit: (321.55646, 556.67669) ft
Entry: (41.896834, 522.97937) ft
Radius: 268.15497 ft
Center: (154.42852, 766.37967) ft

Slip Columns

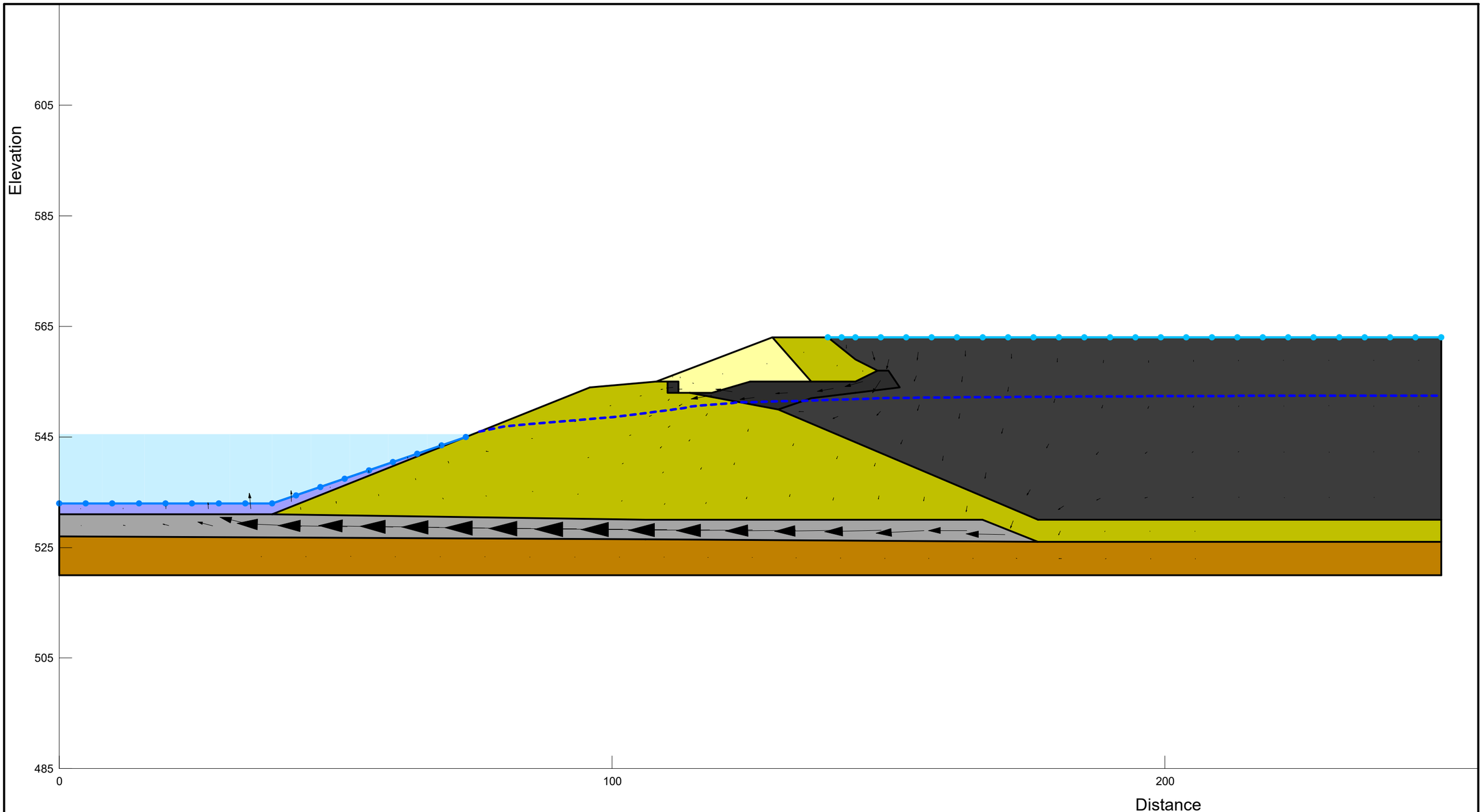
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	319.77823 ft	555.28381 ft	-142.57889 psf	102.88685 psf	59.401752 psf	0 psf	0 psf	CCR Ash Moist
Column 2	317.41802 ft	553.44547 ft	-27.8108 psf	227.90906 psf	131.58336 psf	0 psf	0 psf	CCR Ash Moist
Column 3	312.91802 ft	550.12850 ft	63.495952 psf	473.63074 psf	109.89529 psf	0 psf	0 psf	CCR Ash Wet
Column 4	304.00000 ft	543.89560 ft	192.25398 psf	862.39586 psf	179.56398 psf	0 psf	0 psf	CCR Ash Wet
Column 5	293.25931 ft	537.05879 ft	314.81808 psf	1,457.6805 psf	306.22907 psf	0 psf	0 psf	CCR Ash Wet
Column 6	281.77794 ft	530.48424 ft	405.28746 psf	2,199.8712 psf	480.85727 psf	0 psf	0 psf	CCR Ash Wet
Column 7	275.65735 ft	527.19255 ft	441.74877 psf	2,360.7151 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 8	272.13872 ft	525.46642 ft	526.47309 psf	2,804.3093 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 9	265.50000 ft	522.33986 ft	685.01818 psf	3,129.1543 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 10	259.50000 ft	519.68210 ft	815.25438 psf	3,229.6776 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 11	252.87500 ft	516.98899 ft	940.10937 psf	3,499.4536 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 12	244.62500 ft	513.88710 ft	1,077.3922 psf	3,949.0534 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 13	236.37500 ft	511.08945 ft	1,192.6473 psf	4,370.7133 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 14	228.12500 ft	508.58613 ft	1,291.6559 psf	4,767.4391 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 15	218.00000 ft	505.94233 ft	1,396.3345 psf	5,221.922 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 16	207.00000 ft	503.47792 ft	1,499.9632 psf	5,643.1507 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 17	197.00000 ft	501.67396 ft	1,578.9236 psf	5,941.7063 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 18	188.61685 ft	500.43492 ft	1,634.8027 psf	6,130.0324 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 19	183.61685 ft	500.00000 ft	1,650.9456 psf	6,399.4913 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 20	177.75000 ft	500.00000 ft	1,640.5489 psf	6,207.0483 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 21	169.25000 ft	500.00000 ft	1,627.2914 psf	5,848.9709 psf	0 psf	800 psf	0 psf	Clayey Silt

Column 22	159.83333 ft	500.00000 ft	1,614.6413 psf	5,450.8405 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 23	149.50000 ft	500.00000 ft	1,601.9269 psf	4,995.403 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 24	139.16667 ft	500.00000 ft	1,589.6577 psf	4,535.1539 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 25	131.50000 ft	500.00000 ft	1,580.9139 psf	4,243.5336 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 26	124.87500 ft	500.60756 ft	1,535.2533 psf	4,364.3703 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 27	116.62500 ft	501.82267 ft	1,449.1475 psf	4,272.7408 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 28	108.37500 ft	503.03779 ft	1,362.076 psf	4,175.8125 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 29	100.12500 ft	504.25291 ft	1,274.1981 psf	4,074.0835 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 30	94.80618 ft	505.03630 ft	1,217.003 psf	3,962.968 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 31	89.67696 ft	506.19151 ft	1,136.4326 psf	3,778.5672 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 32	81.80618 ft	508.27820 ft	992.35267 psf	3,292.7271 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 33	73.93539 ft	510.62408 ft	831.05589 psf	2,768.3794 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 34	66.00000 ft	513.26007 ft	649.8754 psf	2,197.3066 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 35	56.42235 ft	516.84817 ft	402.73194 psf	1,487.7832 psf	0 psf	800 psf	0 psf	Clayey Silt
Column 36	47.47716 ft	520.50367 ft	148.5237 psf	976.52302 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 37	43.00323 ft	522.47392 ft	5.648229 psf	127.10094 psf	81.920889 psf	0 psf	0 psf	Sand

APPENDIX I:

Lakeside Ash Pond Profile C-C' Rapid Drawdown Analysis

APPENDIX I-1:
Steady-State Seepage Analysis



Steady-State Seepage	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 468
Date: 06/27/2024
Time: 10:17:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 10:25:32 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d

Duration: 0 d
Ending Time: 0 d

Materials

Silty Clay Fill

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Brown Silty Clay

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

Gray Clayey Silt

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Bottom Ash
K-Function: Bottom Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Clarification Basin Sediment

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Clarification Pond

Category: Hydraulic
Kind: Water Total Head 545.5 ft
Review: No

CCR Ash Impoundment Head

Category: Hydraulic
Kind: Water Total Head 552.5 ft
Review: No

Water K Functions

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361144e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213974e-09)
Data Point: (4.5309023, 2.1089336e-09)
Data Point: (8.384032, 2.0877954e-09)
Data Point: (15.513906, 2.0519885e-09)
Data Point: (28.707105, 1.9912119e-09)
Data Point: (53.119948, 1.8898564e-09)

Data Point: (98.293744, 1.725419e-09)
Data Point: (181.88384, 1.4708561e-09)
Data Point: (336.55989, 1.1128776e-09)
Data Point: (622.77416, 6.8537685e-10)
Data Point: (1,152.3883, 3.0409874e-10)
Data Point: (2,132.3921, 8.7522015e-11)
Data Point: (3,945.8021, 1.6870541e-11)
Data Point: (7,301.3562, 2.5839897e-12)
Data Point: (13,510.511, 3.5542318e-13)
Data Point: (25,000, 2.7181575e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7.55e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7.55e-08)
Data Point: (0.20885434, 7.5468712e-08)
Data Point: (0.38282598, 7.5436557e-08)
Data Point: (0.70171264, 7.5380258e-08)
Data Point: (1.2862257, 7.5274992e-08)
Data Point: (2.357627, 7.5077245e-08)
Data Point: (4.3214847, 7.4700555e-08)
Data Point: (7.9211981, 7.3983234e-08)
Data Point: (14.519403, 7.2631282e-08)
Data Point: (26.613786, 7.0105731e-08)
Data Point: (48.782557, 6.5552978e-08)
Data Point: (89.417486, 5.7729284e-08)
Data Point: (163.90053, 4.5437303e-08)
Data Point: (300.42651, 2.9141376e-08)
Data Point: (550.67599, 1.3159572e-08)
Data Point: (1,009.3785, 3.620589e-09)
Data Point: (1,850.1713, 6.2023858e-10)
Data Point: (3,391.3282, 8.1972245e-11)
Data Point: (6,216.2392, 1.0503207e-11)
Data Point: (11,394.247, 1.335798e-12)
Data Point: (20,885.434, 1.0878876e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Bottom Ash
Saturated Kx: 7.55e-08 ft/sec
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.44)
- Data Point: (0.20885434, 0.43999943)
- Data Point: (0.38282598, 0.43999876)
- Data Point: (0.70171264, 0.43999724)
- Data Point: (1.2862257, 0.43999374)
- Data Point: (2.357627, 0.43998553)
- Data Point: (4.3214847, 0.43996612)
- Data Point: (7.9211981, 0.43991975)
- Data Point: (14.519403, 0.4398082)
- Data Point: (26.613786, 0.43953846)
- Data Point: (48.782557, 0.4388846)
- Data Point: (89.417486, 0.43730204)
- Data Point: (163.90053, 0.43350822)
- Data Point: (300.42651, 0.42465677)
- Data Point: (550.67599, 0.40530206)
- Data Point: (1,009.3785, 0.36835683)
- Data Point: (1,850.1713, 0.31255742)
- Data Point: (3,391.3282, 0.25021932)
- Data Point: (6,216.2392, 0.19676385)
- Data Point: (11,394.247, 0.15695087)
- Data Point: (20,885.434, 0.12794241)

Estimation Properties
- Vol. WC Estimation Method: Sample functions
- Saturated Water Content: 0.44
- Sample Material: Clay
- Liquid Limit: 0 %
- Diameter at 10% passing: 0
- Diameter at 60% passing: 0
- Maximum Suction: 20,885.434 psf
- Minimum Suction: 0.20885434 psf
- Num. Points: 20

Bottom Ash

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.30000001
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.30000001

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.3)
- Data Point: (0.20885434, 0.29999949)
- Data Point: (0.38282598, 0.29999881)
- Data Point: (0.70171264, 0.29999713)
- Data Point: (1.2862257, 0.29999294)
- Data Point: (2.357627, 0.29998232)
- Data Point: (4.3214847, 0.29995521)
- Data Point: (7.9211981, 0.29988546)
- Data Point: (14.519403, 0.29970521)

Data Point: (26.613786, 0.29923852)
Data Point: (48.782557, 0.2980328)
Data Point: (89.417486, 0.29495099)
Data Point: (163.90053, 0.28731159)
Data Point: (300.42651, 0.26976543)
Data Point: (550.67599, 0.23563743)
Data Point: (1,009.3785, 0.18601249)
Data Point: (1,850.1713, 0.13589615)
Data Point: (3,391.3282, 0.098199644)
Data Point: (6,216.2392, 0.07335234)
Data Point: (11,394.247, 0.057019328)
Data Point: (20,885.434, 0.0456656)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)

Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	531 ft
Point 2	38.5 ft	531 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	530 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	136 ft	555 ft
Point 24	177 ft	530 ft
Point 25	136 ft	552 ft

Point 26	250 ft	563 ft
Point 27	0 ft	527 ft
Point 28	0 ft	520 ft
Point 29	250 ft	520 ft
Point 30	0 ft	533 ft
Point 31	38.5 ft	533 ft
Point 32	73.5 ft	545 ft
Point 33	106 ft	530 ft
Point 34	106 ft	526.5 ft
Point 35	167 ft	530 ft
Point 36	177 ft	526 ft
Point 37	250 ft	526 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	
Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	12	23	8 ft	0 °	
Line 19	23	14	11 ft	0 °	
Line 20	5	23	10.63 ft	-48.8 °	
Line 21	9	5	10 ft	0 °	
Line 22	15	25	6.3246 ft	18.4 °	
Line 23	25	16	8.0623 ft	7.13 °	
Line 24	24	15	51.078 ft	-23.1 °	
Line 25	9	6	5 ft	0 °	CCR Ash Impoundment Head
Line 26	26	7	33 ft	90 °	
Line 27	7	24	73 ft	0 °	
Line 28	2	1	38.5 ft	0 °	
Line 29	6	26	106 ft	0 °	CCR Ash Impoundment Head
Line 30	3	32	24.233 ft	21.8 °	
Line 31	32	2	37.696 ft	21.8 °	

Line 32	30	31	38.5 ft	0 °	Clarification Pond
Line 33	1	30	2 ft	90 °	
Line 34	31	32	37 ft	18.9 °	Clarification Pond
Line 35	2	33	67.507 ft	-0.849 °	
Line 36	33	35	61 ft	0 °	
Line 37	27	34	106 ft	-0.27 °	
Line 38	28	29	250 ft	0 °	
Line 39	27	28	7 ft	90 °	
Line 40	1	27	4 ft	90 °	
Line 41	35	36	10.77 ft	-21.8 °	
Line 42	36	34	71.002 ft	-0.403 °	
Line 43	29	37	6 ft	90 °	
Line 44	37	36	73 ft	0 °	
Line 45	37	7	4 ft	90 °	

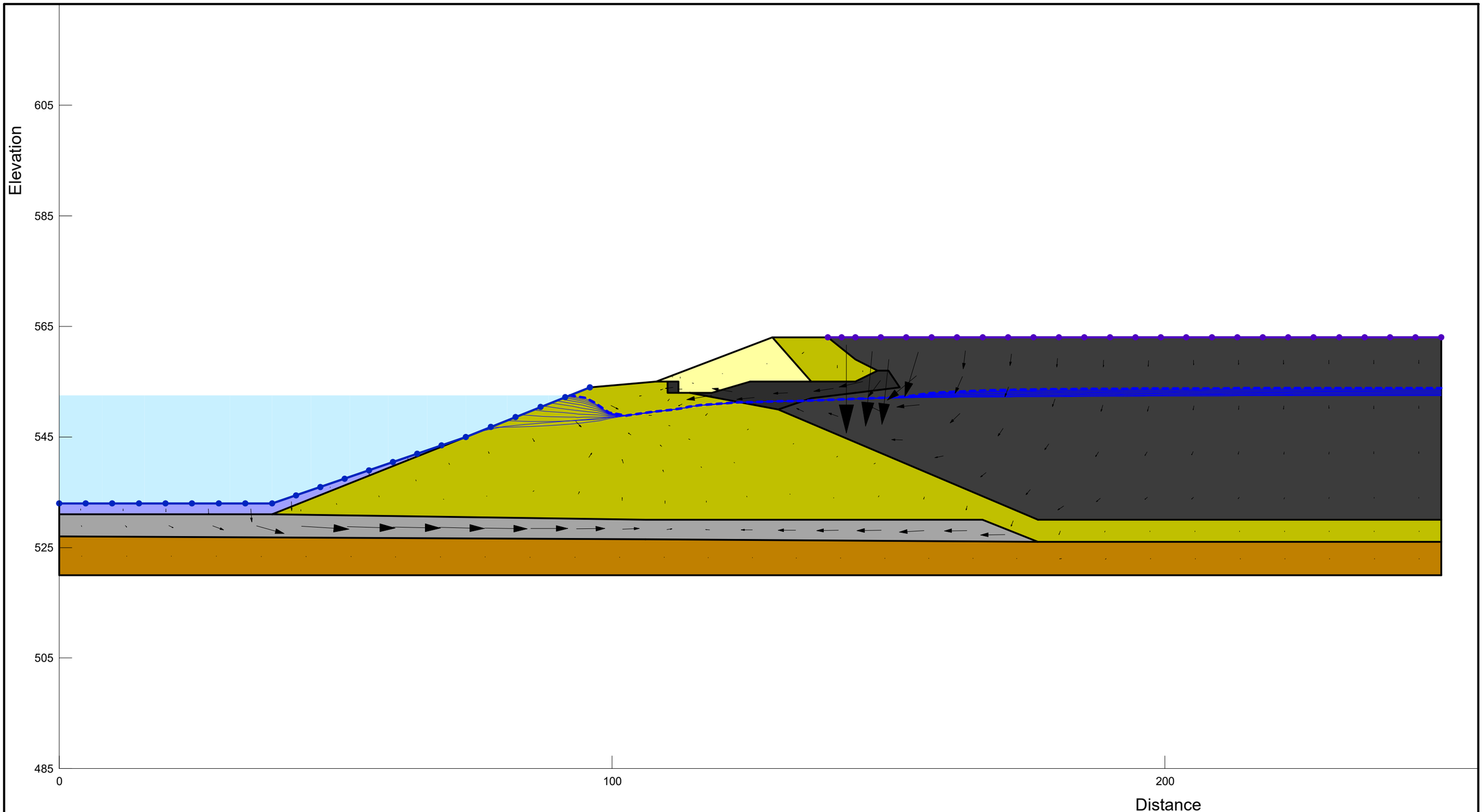
Regions

	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²
Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX I-2:
Rapid Rise Transient Seepage Analysis



Rainfall Event Rise	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Rainfall Event Rise

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 468
Date: 06/27/2024
Time: 10:17:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 10:25:33 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Rainfall Event Rise

Kind: SEEP/W
Parent: Steady-State Seepage
Analysis Type: Transient
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Initial PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Settings
Exclude cumulative values: No
Steps
Starting Time: 0 d
Duration: 1 d
# of Steps: 12
Step Generation Method: Linear
Time Increment: 0.083333333 d
Save Steps Every: 1

Materials

Silty Clay Fill

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Brown Silty Clay

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

Gray Clayey Silt

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Bottom Ash
K-Function: Bottom Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated

Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Clarification Basin Sediment

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Clarification Pond Rainfall Rise

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: Clarification Pond Rainfall Rise Curve
Review: No

CCR Ash Impoundment Rainfall Rise

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: CCR Ash Impoundment Rainfall Rise Curve
Review: No

Water K Functions

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)

Data Point: (0.3864664, 2.1361144e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213974e-09)
Data Point: (4.5309023, 2.1089336e-09)
Data Point: (8.384032, 2.0877954e-09)
Data Point: (15.513906, 2.0519885e-09)
Data Point: (28.707105, 1.9912119e-09)
Data Point: (53.119948, 1.8898564e-09)
Data Point: (98.293744, 1.725419e-09)
Data Point: (181.88384, 1.4708561e-09)
Data Point: (336.55989, 1.1128776e-09)
Data Point: (622.77416, 6.8537685e-10)
Data Point: (1,152.3883, 3.0409874e-10)
Data Point: (2,132.3921, 8.7522015e-11)
Data Point: (3,945.8021, 1.6870541e-11)
Data Point: (7,301.3562, 2.5839897e-12)
Data Point: (13,510.511, 3.5542318e-13)
Data Point: (25,000, 2.7181575e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7.55e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7.55e-08)
Data Point: (0.20885434, 7.5468712e-08)
Data Point: (0.38282598, 7.5436557e-08)
Data Point: (0.70171264, 7.5380258e-08)
Data Point: (1.2862257, 7.5274992e-08)
Data Point: (2.357627, 7.5077245e-08)
Data Point: (4.3214847, 7.4700555e-08)
Data Point: (7.9211981, 7.3983234e-08)
Data Point: (14.519403, 7.2631282e-08)
Data Point: (26.613786, 7.0105731e-08)
Data Point: (48.782557, 6.5552978e-08)
Data Point: (89.417486, 5.7729284e-08)
Data Point: (163.90053, 4.5437303e-08)
Data Point: (300.42651, 2.9141376e-08)
Data Point: (550.67599, 1.3159572e-08)
Data Point: (1,009.3785, 3.620589e-09)
Data Point: (1,850.1713, 6.2023858e-10)

Data Point: (3,391.3282, 8.1972245e-11)
Data Point: (6,216.2392, 1.0503207e-11)
Data Point: (11,394.247, 1.335798e-12)
Data Point: (20,885.434, 1.0878876e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Bottom Ash
Saturated Kx: 7.55e-08 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Hydraulic Boundary Functions

CCR Ash Impoundment Rainfall Rise Curve

Model: Spline Data Point Function
Function: Water Total Head vs. Time
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Y-Intercept: 552.5 ft
Data Points: Time (d), Water Total Head (ft)
Data Point: (0, 552.5)
Data Point: (1, 554)

Clarification Pond Rainfall Rise Curve

Model: Spline Data Point Function
Function: Water Total Head vs. Time
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Y-Intercept: 545.5 ft
Data Points: Time (d), Water Total Head (ft)
Data Point: (0, 545.5)
Data Point: (0.25, 549)
Data Point: (1, 552.54)

Vol. Water Content Functions

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)
Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)

Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999949)
Data Point: (0.38282598, 0.29999881)
Data Point: (0.70171264, 0.29999713)
Data Point: (1.2862257, 0.29999294)
Data Point: (2.357627, 0.29998232)
Data Point: (4.3214847, 0.29995521)
Data Point: (7.9211981, 0.29988546)
Data Point: (14.519403, 0.29970521)
Data Point: (26.613786, 0.29923852)
Data Point: (48.782557, 0.2980328)
Data Point: (89.417486, 0.29495099)
Data Point: (163.90053, 0.28731159)
Data Point: (300.42651, 0.26976543)
Data Point: (550.67599, 0.23563743)
Data Point: (1,009.3785, 0.18601249)
Data Point: (1,850.1713, 0.13589615)
Data Point: (3,391.3282, 0.098199644)
Data Point: (6,216.2392, 0.07335234)
Data Point: (11,394.247, 0.057019328)
Data Point: (20,885.434, 0.0456656)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Clay

Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	531 ft
Point 2	38.5 ft	531 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	530 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	136 ft	555 ft
Point 24	177 ft	530 ft
Point 25	136 ft	552 ft
Point 26	250 ft	563 ft
Point 27	0 ft	527 ft
Point 28	0 ft	520 ft
Point 29	250 ft	520 ft
Point 30	0 ft	533 ft
Point 31	38.5 ft	533 ft
Point 32	73.5 ft	545 ft
Point 33	106 ft	530 ft
Point 34	106 ft	526.5 ft
Point 35	167 ft	530 ft
Point 36	177 ft	526 ft
Point 37	250 ft	526 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	
Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	12	23	8 ft	0 °	
Line 19	23	14	11 ft	0 °	
Line 20	5	23	10.63 ft	-48.8 °	
Line 21	9	5	10 ft	0 °	
Line 22	15	25	6.3246 ft	18.4 °	
Line 23	25	16	8.0623 ft	7.13 °	
Line 24	24	15	51.078 ft	-23.1 °	
Line 25	9	6	5 ft	0 °	CCR Ash Impoundment Rainfall Rise
Line 26	26	7	33 ft	90 °	
Line 27	7	24	73 ft	0 °	
Line 28	2	1	38.5 ft	0 °	
Line 29	6	26	106 ft	0 °	CCR Ash Impoundment Rainfall Rise
Line 30	3	32	24.233 ft	21.8 °	Clarification Pond Rainfall Rise
Line 31	32	2	37.696 ft	21.8 °	
Line 32	30	31	38.5 ft	0 °	Clarification Pond Rainfall Rise
Line 33	1	30	2 ft	90 °	
Line 34	31	32	37 ft	18.9 °	Clarification Pond Rainfall Rise
Line 35	2	33	67.507 ft	-0.849 °	
Line 36	33	35	61 ft	0 °	
Line 37	27	34	106 ft	-0.27 °	
Line 38	28	29	250 ft	0 °	
Line 39	27	28	7 ft	90 °	
Line 40	1	27	4 ft	90 °	
Line 41	35	36	10.77 ft	-21.8 °	
Line 42	36	34	71.002 ft	-0.403 °	
Line 43	29	37	6 ft	90 °	
Line 44	37	36	73 ft	0 °	

Line 45	37	7	4 ft	90 °	

Regions

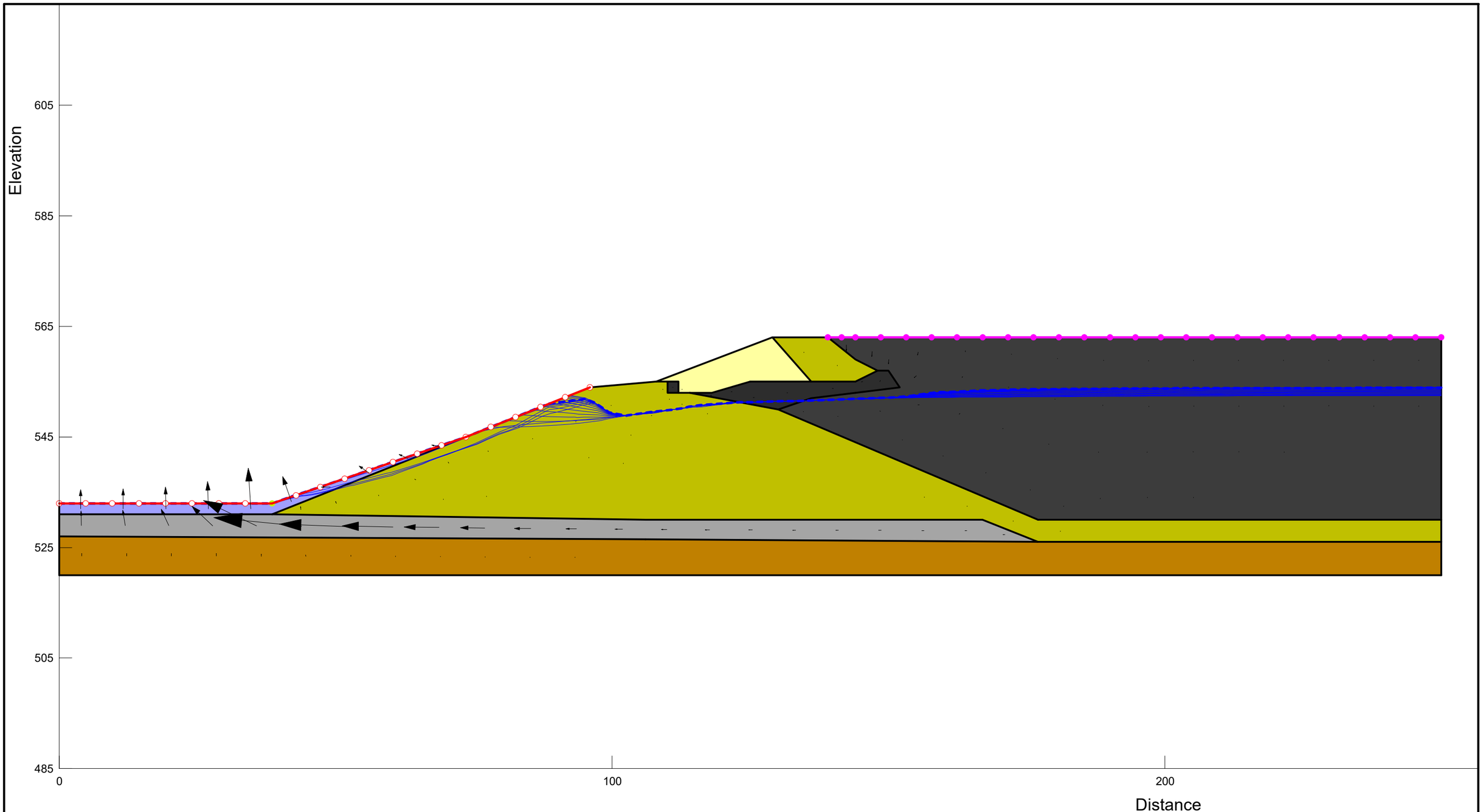
	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²
Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX I-3:

Breach Rapid Drawdown Transient Analysis For Undrained Conditions



Clarification Breach Discharge Short Term	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Clarification Breach Discharge Short Term

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 468
Date: 06/27/2024
Time: 10:17:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 10:25:35 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Clarification Breach Discharge Short Term

Kind: SEEP/W
Parent: Rainfall Event Rise
Analysis Type: Transient
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Initial PWP Conditions from Parent Analysis: Rainfall Event Rise [(last)]
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Settings
Exclude cumulative values: No
Steps
Starting Time: 1 d
Duration: 2 d
# of Steps: 6
Step Generation Method: Exponential
Initial Increment Size: 0.041666667 d
Save Steps Every: 1

Materials

Silty Clay Fill

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Brown Silty Clay

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

Gray Clayey Silt

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Bottom Ash
K-Function: Bottom Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated

Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Clarification Basin Sediment

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

CCR Ash Impoundment Head Post Rainfall

Category: Hydraulic
Kind: Water Total Head 554 ft
Review: No

Clarification Pond Breach Rapid Drawdown

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: Clarification Pond Breach Rapid Drawdown
Review: Yes

Rapid Drawdown Breach

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: Clarification Pond Breach Rapid Drawdown
Review: No

Water K Functions

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361144e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213974e-09)
Data Point: (4.5309023, 2.1089336e-09)
Data Point: (8.384032, 2.0877954e-09)
Data Point: (15.513906, 2.0519885e-09)
Data Point: (28.707105, 1.9912119e-09)
Data Point: (53.119948, 1.8898564e-09)
Data Point: (98.293744, 1.725419e-09)
Data Point: (181.88384, 1.4708561e-09)
Data Point: (336.55989, 1.1128776e-09)
Data Point: (622.77416, 6.8537685e-10)
Data Point: (1,152.3883, 3.0409874e-10)
Data Point: (2,132.3921, 8.7522015e-11)
Data Point: (3,945.8021, 1.6870541e-11)
Data Point: (7,301.3562, 2.5839897e-12)
Data Point: (13,510.511, 3.5542318e-13)
Data Point: (25,000, 2.7181575e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7.55e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7.55e-08)
Data Point: (0.20885434, 7.5468712e-08)
Data Point: (0.38282598, 7.5436557e-08)
Data Point: (0.70171264, 7.5380258e-08)
Data Point: (1.2862257, 7.5274992e-08)
Data Point: (2.357627, 7.5077245e-08)
Data Point: (4.3214847, 7.4700555e-08)
Data Point: (7.9211981, 7.3983234e-08)
Data Point: (14.519403, 7.2631282e-08)
Data Point: (26.613786, 7.0105731e-08)
Data Point: (48.782557, 6.5552978e-08)
Data Point: (89.417486, 5.7729284e-08)

Data Point: (163.90053, 4.5437303e-08)
Data Point: (300.42651, 2.9141376e-08)
Data Point: (550.67599, 1.3159572e-08)
Data Point: (1,009.3785, 3.620589e-09)
Data Point: (1,850.1713, 6.2023858e-10)
Data Point: (3,391.3282, 8.1972245e-11)
Data Point: (6,216.2392, 1.0503207e-11)
Data Point: (11,394.247, 1.335798e-12)
Data Point: (20,885.434, 1.0878876e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Bottom Ash
Saturated Kx: 7.55e-08 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf

Num. Points: 20

Hydraulic Boundary Functions

Clarification Pond Breach Rapid Drawdown

Model: Spline Data Point Function
Function: Water Total Head vs. Time
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Y-Intercept: 552.54 ft
Data Points: Time (d), Water Total Head (ft)
Data Point: (0, 552.54)
Data Point: (0.00521, 538)
Data Point: (0.0104167, 533)

Vol. Water Content Functions

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)
Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)
Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)
Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999949)
Data Point: (0.38282598, 0.29999881)
Data Point: (0.70171264, 0.29999713)
Data Point: (1.2862257, 0.29999294)
Data Point: (2.357627, 0.29998232)
Data Point: (4.3214847, 0.29995521)
Data Point: (7.9211981, 0.29988546)
Data Point: (14.519403, 0.29970521)
Data Point: (26.613786, 0.29923852)
Data Point: (48.782557, 0.2980328)
Data Point: (89.417486, 0.29495099)
Data Point: (163.90053, 0.28731159)
Data Point: (300.42651, 0.26976543)
Data Point: (550.67599, 0.23563743)
Data Point: (1,009.3785, 0.18601249)
Data Point: (1,850.1713, 0.13589615)
Data Point: (3,391.3282, 0.098199644)
Data Point: (6,216.2392, 0.07335234)
Data Point: (11,394.247, 0.057019328)
Data Point: (20,885.434, 0.0456656)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y	Hydraulic Boundary
Point 1	0 ft	531 ft	
Point 2	38.5 ft	531 ft	
Point 3	96 ft	554 ft	
Point 4	108 ft	555 ft	
Point 5	129 ft	563 ft	
Point 6	144 ft	563 ft	
Point 7	250 ft	530 ft	
Point 8	114 ft	553 ft	
Point 9	139 ft	563 ft	
Point 10	148 ft	557 ft	
Point 11	144 ft	559 ft	
Point 12	144 ft	555 ft	
Point 13	118 ft	553 ft	
Point 14	125 ft	555 ft	
Point 15	130 ft	550 ft	
Point 16	144 ft	553 ft	
Point 17	152 ft	554 ft	
Point 18	150 ft	557 ft	
Point 19	110 ft	553 ft	
Point 20	110 ft	555 ft	
Point 21	112 ft	555 ft	
Point 22	112 ft	553 ft	
Point 23	136 ft	555 ft	
Point 24	177 ft	530 ft	
Point 25	136 ft	552 ft	
Point 26	250 ft	563 ft	
Point 27	0 ft	527 ft	
Point 28	0 ft	520 ft	
Point 29	250 ft	520 ft	
Point 30	0 ft	533 ft	
Point 31	38.5 ft	533 ft	Rapid Drawdown Breach
Point 32	73.5 ft	545 ft	
Point 33	106 ft	530 ft	
Point 34	106 ft	526.5 ft	
Point 35	167 ft	530 ft	
Point 36	177 ft	526 ft	
Point 37	250 ft	526 ft	

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	

Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	12	23	8 ft	0 °	
Line 19	23	14	11 ft	0 °	
Line 20	5	23	10.63 ft	-48.8 °	
Line 21	9	5	10 ft	0 °	
Line 22	15	25	6.3246 ft	18.4 °	
Line 23	25	16	8.0623 ft	7.13 °	
Line 24	24	15	51.078 ft	-23.1 °	
Line 25	9	6	5 ft	0 °	CCR Ash Impoundment Head Post Rainfall
Line 26	26	7	33 ft	90 °	
Line 27	7	24	73 ft	0 °	
Line 28	2	1	38.5 ft	0 °	
Line 29	6	26	106 ft	0 °	CCR Ash Impoundment Head Post Rainfall
Line 30	3	32	24.233 ft	21.8 °	Clarification Pond Breach Rapid Drawdown
Line 31	32	2	37.696 ft	21.8 °	
Line 32	30	31	38.5 ft	0 °	Clarification Pond Breach Rapid Drawdown
Line 33	1	30	2 ft	90 °	
Line 34	31	32	37 ft	18.9 °	Clarification Pond Breach Rapid Drawdown
Line 35	2	33	67.507 ft	-0.849 °	
Line 36	33	35	61 ft	0 °	
Line 37	27	34	106 ft	-0.27 °	
Line 38	28	29	250 ft	0 °	
Line 39	27	28	7 ft	90 °	
Line 40	1	27	4 ft	90 °	
Line 41	35	36	10.77 ft	-21.8 °	
Line 42	36	34	71.002 ft	-0.403 °	
Line 43	29	37	6 ft	90 °	
Line 44	37	36	73 ft	0 °	
Line 45	37	7	4 ft	90 °	

Regions

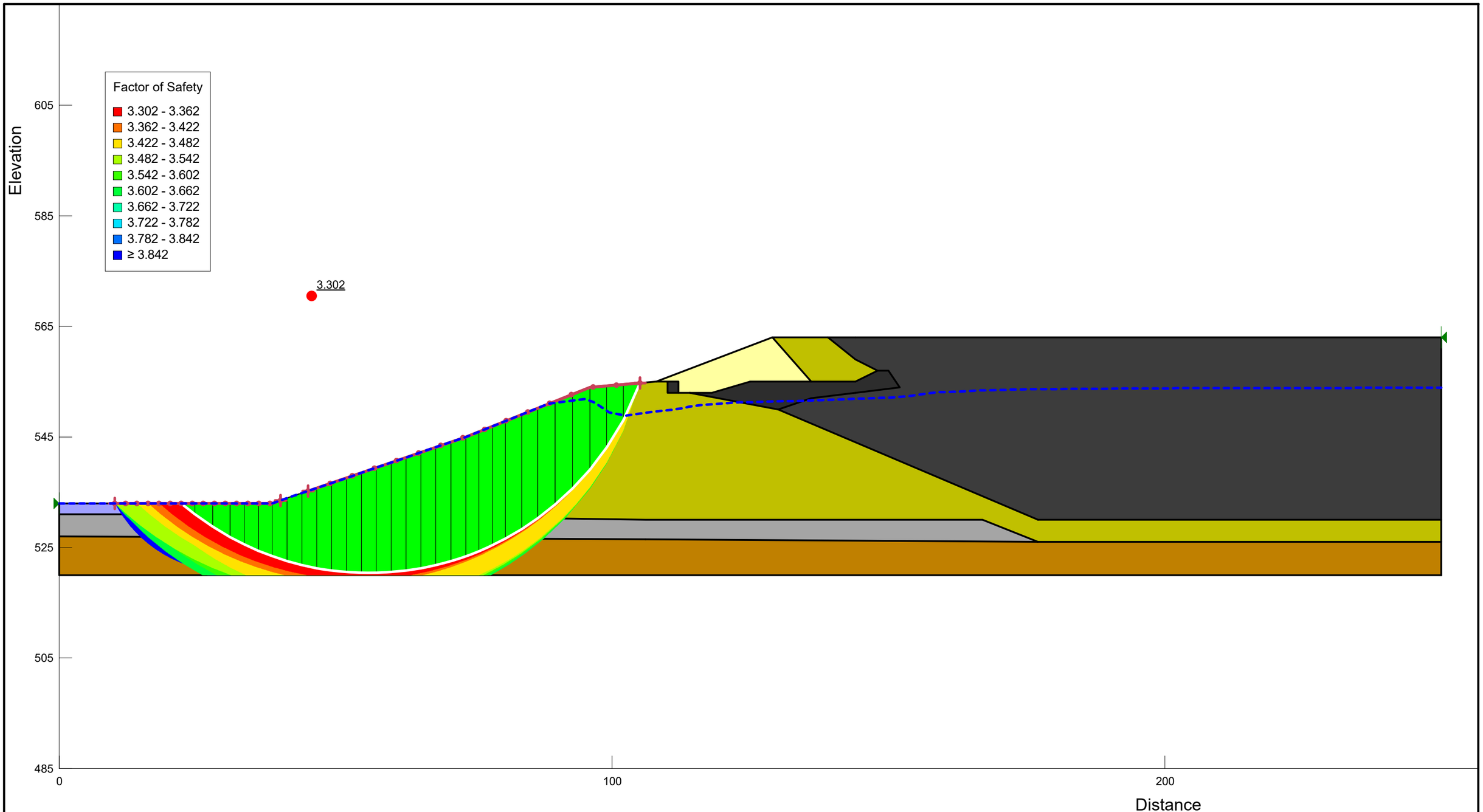
	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²

Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX I-4:
Rapid Drawdown Undrained Slope Stability Analysis



Breach Discharge Slope Stability Undrained Strengths	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Breach Discharge Slope Stability Undrained Strengths

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 468
Date: 06/27/2024
Time: 10:17:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 10:25:52 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Breach Discharge Slope Stability Undrained Strengths

Kind: SLOPE/W
Parent: Clarification Breach Discharge Short Term
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Clarification Breach Discharge Short Term [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 2 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30

Factor of Safety Convergence Settings
Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Silty Clay Fill

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 124 pcf
Total Cohesion: 1,800 psf

Brown Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 1,040 psf

Gray Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 126.5 pcf
Total Cohesion: 500 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Clarification Basin Sediment

Slope Stability Material Model: Undrained (Phi=0)

Unit Weight: 105 pcf
Total Cohesion: 250 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (10, 533) ft
Left-Zone Right Coordinate: (40, 533.51429) ft
Left-Zone Increment: 15
Right Type: Range
Right-Zone Left Coordinate: (45, 535.22857) ft
Right-Zone Right Coordinate: (105, 554.75) ft
Right-Zone Increment: 15
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 533) ft
Right Coordinate: (250, 563) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	531 ft
Point 2	38.5 ft	531 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	530 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft

Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	136 ft	555 ft
Point 24	177 ft	530 ft
Point 25	136 ft	552 ft
Point 26	250 ft	563 ft
Point 27	0 ft	527 ft
Point 28	0 ft	520 ft
Point 29	250 ft	520 ft
Point 30	0 ft	533 ft
Point 31	38.5 ft	533 ft
Point 32	73.5 ft	545 ft
Point 33	106 ft	530 ft
Point 34	106 ft	526.5 ft
Point 35	167 ft	530 ft
Point 36	177 ft	526 ft
Point 37	250 ft	526 ft

Regions

	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²
Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Slip Results

Slip Surfaces Analysed: 1245 of 2816 converged

Current Slip Surface

Slip Surface: 1,229
Factor of Safety: 3.302
Volume: 1,223.8006 ft³
Weight: 150,219.24 lbf
Resisting Moment: 6,144,495.1 lbf·ft
Activating Moment: 1,860,692.5 lbf·ft
Resisting Force: 91,745.011 lbf
Activating Force: 27,789.854 lbf
Slip Rank: 1 of 2,816 slip surfaces
Exit: (105, 554.75) ft
Entry: (22.034286, 533) ft
Radius: 52.115973 ft
Center: (56.007442, 572.52087) ft

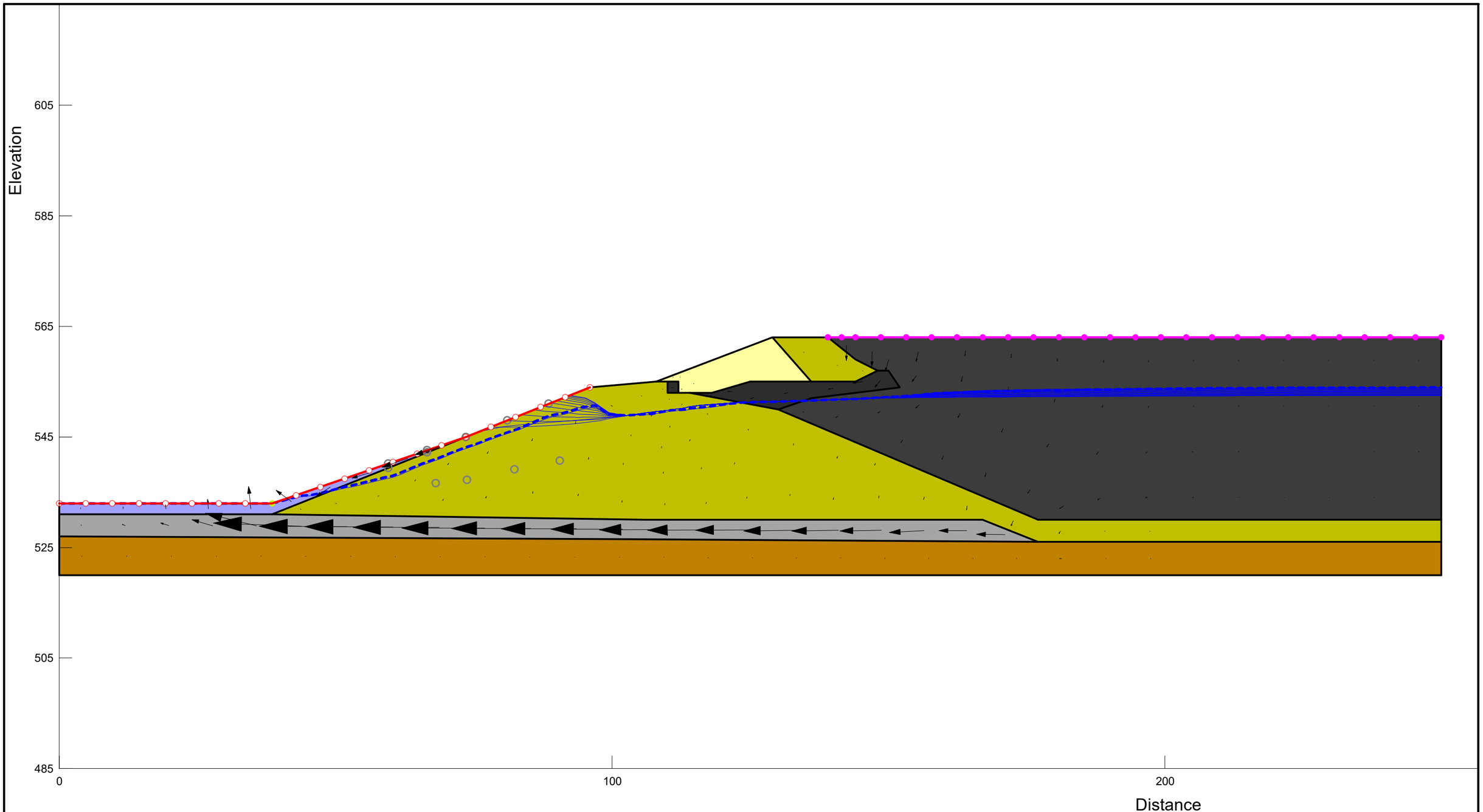
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	103.50000 ft	551.38024 ft	-142.9909 psf	-838.67396 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 2	100.50000 ft	545.53718 ft	171.21872 psf	177.42459 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 3	97.50000 ft	541.08407 ft	330.96599 psf	892.79195 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 4	94.42399 ft	537.38128 ft	444.0906 psf	1,399.999 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 5	91.27198 ft	534.20770 ft	532.66104 psf	1,746.8782 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 6	88.11997 ft	531.52267 ft	599.52855 psf	2,009.5779 psf	0 psf	1,800 psf	0 psf	Silty Clay Fill
Column 7	85.07997 ft	529.30340 ft	678.15917 psf	2,493.4311 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 8	82.15198 ft	527.46898 ft	769.94966 psf	2,598.7765 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 9	79.48999 ft	526.01449 ft	839.70138 psf	2,564.4429 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 10	77.09399 ft	524.87934 ft	891.67667 psf	2,596.8351 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 11	74.69800 ft	523.88868 ft	934.50578 psf	2,608.1566 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 12	72.15385 ft	522.98943 ft	970.08271 psf	2,606.7773 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 13	69.46154 ft	522.19076 ft	997.53326 psf	2,591.9333 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 14	66.76923 ft	521.54671 ft	1,015.2379 psf	2,556.5523 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 15	64.07692 ft	521.05145 ft	1,023.481 psf	2,502.2534 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 16	61.38462 ft	520.70071 ft	1,022.294 psf	2,430.4187 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 17	58.69231 ft	520.49156 ft	1,012.2025 psf	2,342.1998 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 18	56.00000 ft	520.42229 ft	993.35532 psf	2,238.5182 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 19	53.30769 ft	520.49233 ft	965.92533 psf	2,120.0605 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 20	50.61538 ft	520.70226 ft	929.69084 psf	1,987.2704 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 21	47.92308 ft	521.05379 ft	885.02135 psf	1,840.3377 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 22	45.23077 ft	521.54985 ft	833.00237 psf	1,679.1841 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 23	42.53846 ft	522.19474 ft	771.19622 psf	1,503.4447 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 24	39.84615 ft	522.99429 ft	700.73853 psf	1,312.4434 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay

Column 25	37.23250 ft	523.92324 ft	627.23912 psf	1,166.3176 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 26	34.69749 ft	524.98109 ft	545.73842 psf	1,064.8653 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 27	32.16248 ft	526.20176 ft	454.94859 psf	946.79667 psf	0 psf	1,040 psf	0 psf	Brown Silty Clay
Column 28	29.29872 ft	527.80777 ft	346.64784 psf	688.77538 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 29	26.10621 ft	529.88063 ft	209.69272 psf	450.6534 psf	0 psf	500 psf	0 psf	Gray Clayey Silt
Column 30	23.27212 ft	532.00000 ft	67.23485 psf	164.9879 psf	0 psf	250 psf	0 psf	Clarification Basin Sediment

APPENDIX I-5:

Breach Rapid Drawdown Transient Analysis For Drained Conditions



Clarification Breach Discharge Long Term	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Clarification Breach Discharge Long Term

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 468
Date: 06/27/2024
Time: 10:17:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 10:25:33 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Clarification Breach Discharge Long Term

Kind: SEEP/W
Parent: Rainfall Event Rise
Analysis Type: Transient
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Initial PWP Conditions from Parent Analysis: Rainfall Event Rise [(last)]
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Settings
Exclude cumulative values: No
Steps
Starting Time: 1 d
Duration: 14 d
# of Steps: 2
Step Generation Method: Linear
Time Increment: 7 d
Save Steps Every: 1

Materials

Silty Clay Fill

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

Brown Silty Clay

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

Gray Clayey Silt

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-07 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Bottom Ash
K-Function: Bottom Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

Hydraulic
Hydraulic Material Model: Saturated / Unsaturated

Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Clarification Basin Sediment

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

CCR Ash Impoundment Head Post Rainfall

Category: Hydraulic
Kind: Water Total Head 554 ft
Review: No

Clarification Pond Breach Rapid Drawdown

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: Clarification Pond Breach Rapid Drawdown
Review: Yes

Rapid Drawdown Breach

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: Clarification Pond Breach Rapid Drawdown
Review: No

Water K Functions

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361144e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213974e-09)
Data Point: (4.5309023, 2.1089336e-09)
Data Point: (8.384032, 2.0877954e-09)
Data Point: (15.513906, 2.0519885e-09)
Data Point: (28.707105, 1.9912119e-09)
Data Point: (53.119948, 1.8898564e-09)
Data Point: (98.293744, 1.725419e-09)
Data Point: (181.88384, 1.4708561e-09)
Data Point: (336.55989, 1.1128776e-09)
Data Point: (622.77416, 6.8537685e-10)
Data Point: (1,152.3883, 3.0409874e-10)
Data Point: (2,132.3921, 8.7522015e-11)
Data Point: (3,945.8021, 1.6870541e-11)
Data Point: (7,301.3562, 2.5839897e-12)
Data Point: (13,510.511, 3.5542318e-13)
Data Point: (25,000, 2.7181575e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7.55e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7.55e-08)
Data Point: (0.20885434, 7.5468712e-08)
Data Point: (0.38282598, 7.5436557e-08)
Data Point: (0.70171264, 7.5380258e-08)
Data Point: (1.2862257, 7.5274992e-08)
Data Point: (2.357627, 7.5077245e-08)
Data Point: (4.3214847, 7.4700555e-08)
Data Point: (7.9211981, 7.3983234e-08)
Data Point: (14.519403, 7.2631282e-08)
Data Point: (26.613786, 7.0105731e-08)
Data Point: (48.782557, 6.5552978e-08)
Data Point: (89.417486, 5.7729284e-08)

Data Point: (163.90053, 4.5437303e-08)
Data Point: (300.42651, 2.9141376e-08)
Data Point: (550.67599, 1.3159572e-08)
Data Point: (1,009.3785, 3.620589e-09)
Data Point: (1,850.1713, 6.2023858e-10)
Data Point: (3,391.3282, 8.1972245e-11)
Data Point: (6,216.2392, 1.0503207e-11)
Data Point: (11,394.247, 1.335798e-12)
Data Point: (20,885.434, 1.0878876e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Bottom Ash
Saturated Kx: 7.55e-08 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf

Num. Points: 20

Hydraulic Boundary Functions

Clarification Pond Breach Rapid Drawdown

Model: Spline Data Point Function
Function: Water Total Head vs. Time
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Y-Intercept: 552.54 ft
Data Points: Time (d), Water Total Head (ft)
Data Point: (0, 552.54)
Data Point: (0.00521, 538)
Data Point: (0.0104167, 533)

Vol. Water Content Functions

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)
Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)
Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)
Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Bottom Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999949)
Data Point: (0.38282598, 0.29999881)
Data Point: (0.70171264, 0.29999713)
Data Point: (1.2862257, 0.29999294)
Data Point: (2.357627, 0.29998232)
Data Point: (4.3214847, 0.29995521)
Data Point: (7.9211981, 0.29988546)
Data Point: (14.519403, 0.29970521)
Data Point: (26.613786, 0.29923852)
Data Point: (48.782557, 0.2980328)
Data Point: (89.417486, 0.29495099)
Data Point: (163.90053, 0.28731159)
Data Point: (300.42651, 0.26976543)
Data Point: (550.67599, 0.23563743)
Data Point: (1,009.3785, 0.18601249)
Data Point: (1,850.1713, 0.13589615)
Data Point: (3,391.3282, 0.098199644)
Data Point: (6,216.2392, 0.07335234)
Data Point: (11,394.247, 0.057019328)
Data Point: (20,885.434, 0.0456656)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y	Hydraulic Boundary
Point 1	0 ft	531 ft	
Point 2	38.5 ft	531 ft	
Point 3	96 ft	554 ft	
Point 4	108 ft	555 ft	
Point 5	129 ft	563 ft	
Point 6	144 ft	563 ft	
Point 7	250 ft	530 ft	
Point 8	114 ft	553 ft	
Point 9	139 ft	563 ft	
Point 10	148 ft	557 ft	
Point 11	144 ft	559 ft	
Point 12	144 ft	555 ft	
Point 13	118 ft	553 ft	
Point 14	125 ft	555 ft	
Point 15	130 ft	550 ft	
Point 16	144 ft	553 ft	
Point 17	152 ft	554 ft	
Point 18	150 ft	557 ft	
Point 19	110 ft	553 ft	
Point 20	110 ft	555 ft	
Point 21	112 ft	555 ft	
Point 22	112 ft	553 ft	
Point 23	136 ft	555 ft	
Point 24	177 ft	530 ft	
Point 25	136 ft	552 ft	
Point 26	250 ft	563 ft	
Point 27	0 ft	527 ft	
Point 28	0 ft	520 ft	
Point 29	250 ft	520 ft	
Point 30	0 ft	533 ft	
Point 31	38.5 ft	533 ft	Rapid Drawdown Breach
Point 32	73.5 ft	545 ft	
Point 33	106 ft	530 ft	
Point 34	106 ft	526.5 ft	
Point 35	167 ft	530 ft	
Point 36	177 ft	526 ft	
Point 37	250 ft	526 ft	

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	

Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	12	23	8 ft	0 °	
Line 19	23	14	11 ft	0 °	
Line 20	5	23	10.63 ft	-48.8 °	
Line 21	9	5	10 ft	0 °	
Line 22	15	25	6.3246 ft	18.4 °	
Line 23	25	16	8.0623 ft	7.13 °	
Line 24	24	15	51.078 ft	-23.1 °	
Line 25	9	6	5 ft	0 °	CCR Ash Impoundment Head Post Rainfall
Line 26	26	7	33 ft	90 °	
Line 27	7	24	73 ft	0 °	
Line 28	2	1	38.5 ft	0 °	
Line 29	6	26	106 ft	0 °	CCR Ash Impoundment Head Post Rainfall
Line 30	3	32	24.233 ft	21.8 °	Clarification Pond Breach Rapid Drawdown
Line 31	32	2	37.696 ft	21.8 °	
Line 32	30	31	38.5 ft	0 °	Clarification Pond Breach Rapid Drawdown
Line 33	1	30	2 ft	90 °	
Line 34	31	32	37 ft	18.9 °	Clarification Pond Breach Rapid Drawdown
Line 35	2	33	67.507 ft	-0.849 °	
Line 36	33	35	61 ft	0 °	
Line 37	27	34	106 ft	-0.27 °	
Line 38	28	29	250 ft	0 °	
Line 39	27	28	7 ft	90 °	
Line 40	1	27	4 ft	90 °	
Line 41	35	36	10.77 ft	-21.8 °	
Line 42	36	34	71.002 ft	-0.403 °	
Line 43	29	37	6 ft	90 °	
Line 44	37	36	73 ft	0 °	
Line 45	37	7	4 ft	90 °	

Regions

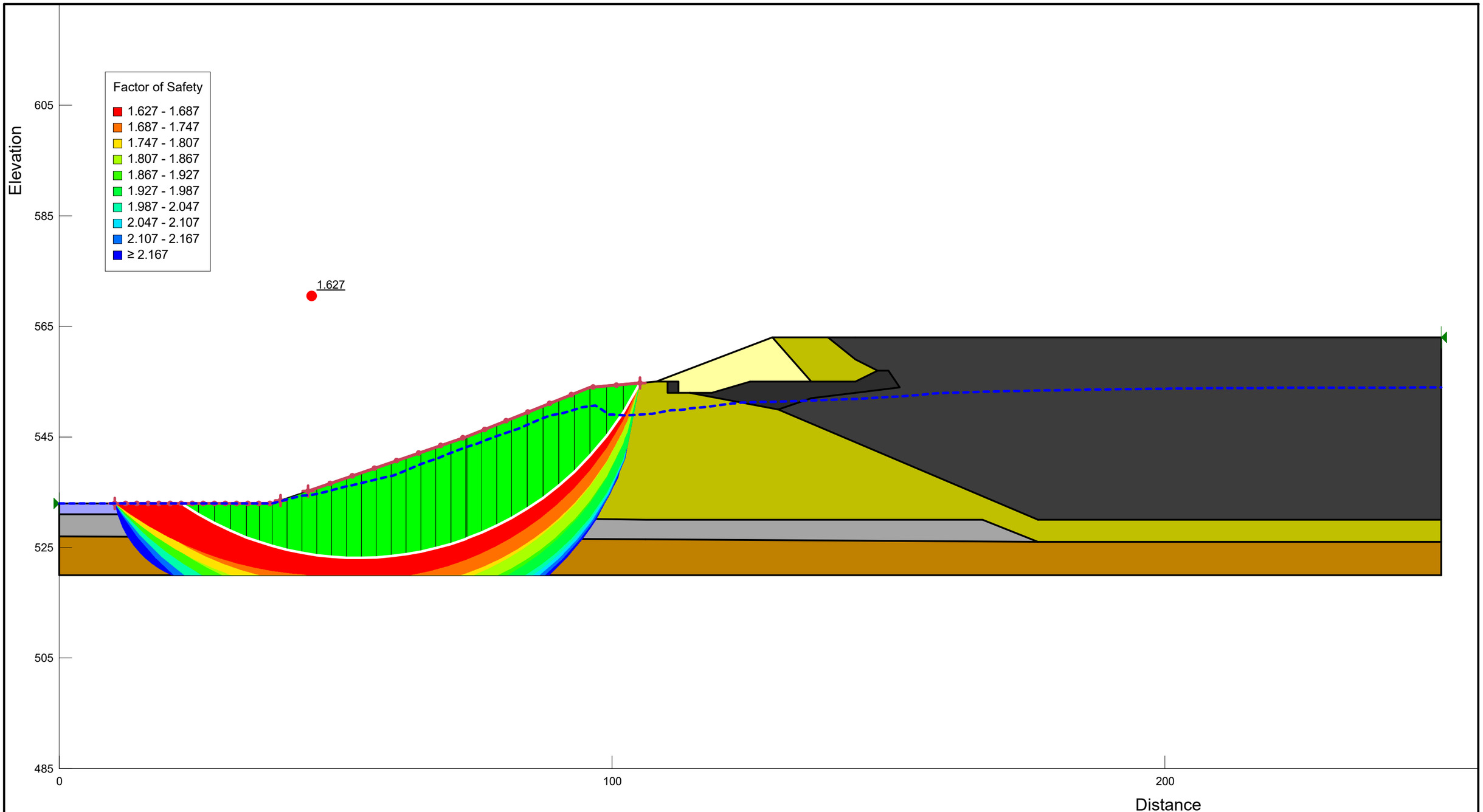
	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²

Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX I-6:
Rapid Drawdown Drained Slope Stability Analysis



Breach Discharge Slope Stability Drained Strengths	
CWLP Rapid Drawdown Alignment 3 w Sed.gsz	
06/27/2024	1:200

Breach Discharge Slope Stability Drained Strengths

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 470
Date: 06/27/2024
Time: 11:23:55 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 w Sed.gsz
Directory: C:\SlopeW\CWLP\Updated Geometry\USEPA\
Last Solved Date: 06/27/2024
Last Solved Time: 11:24:06 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Breach Discharge Slope Stability Drained Strengths

Kind: SLOPE/W
Parent: Clarification Breach Discharge Long Term
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Clarification Breach Discharge Long Term [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 2 ft
  - Minimum Slip Surface Volume: 35.314667 ft³
  - Number of Columns: 30

- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 50
- Solution Settings
  - Search Method: Root Finder
  - Tolerable difference between starting and converged F of S: 3
  - Maximum iterations to calculate converged lambda: 20
  - Max Absolute Lambda: 2

Materials

Silty Clay Fill

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 124 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Brown Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Gray Clayey Silt

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 126.5 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

CCR Wet Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Clarification Basin Sediment

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 105 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (10, 533) ft
Left-Zone Right Coordinate: (40, 533.51429) ft
Left-Zone Increment: 15
Right Type: Range
Right-Zone Left Coordinate: (45, 535.22857) ft
Right-Zone Right Coordinate: (105, 554.75) ft
Right-Zone Increment: 15
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 533) ft
Right Coordinate: (250, 563) ft

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	531 ft
Point 2	38.5 ft	531 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	530 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft

Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	136 ft	555 ft
Point 24	177 ft	530 ft
Point 25	136 ft	552 ft
Point 26	250 ft	563 ft
Point 27	0 ft	527 ft
Point 28	0 ft	520 ft
Point 29	250 ft	520 ft
Point 30	0 ft	533 ft
Point 31	38.5 ft	533 ft
Point 32	73.5 ft	545 ft
Point 33	106 ft	530 ft
Point 34	106 ft	526.5 ft
Point 35	167 ft	530 ft
Point 36	177 ft	526 ft
Point 37	250 ft	526 ft

Regions

	Material	Points	Area
Region 1	Scrubber Sludge	23,14,13,8,22,21,20,4,5	131 ft²
Region 2	Silty Clay Fill	24,15,8,22,19,20,4,3,32,2,33,35,36,37,7	2,247 ft²
Region 3	Bottom Ash	8,15,25,16,17,18,10,12,23,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay Fill	5,23,12,10,11,9	90 ft²
Region 6	CCR Wet Ash	7,24,15,25,16,17,18,10,11,9,6,26	3,315 ft²
Region 7	Clarification Basin Sediment	30,31,32,2,1	112 ft²
Region 8	Gray Clayey Silt	27,34,36,35,33,2,1	663 ft²
Region 9	Brown Silty Clay	28,29,37,36,34,27	1,597.2 ft²

Slip Results

Slip Surfaces Analysed: 2109 of 2816 converged

Current Slip Surface

Slip Surface: 1,228
Factor of Safety: 1.627
Volume: 1,030.9142 ft³

Weight: 126,707.13 lbf
Resisting Moment: 2,974,991.2 lbf·ft
Activating Moment: 1,829,076.6 lbf·ft
Resisting Force: 45,170.814 lbf
Activating Force: 27,769.145 lbf
Slip Rank: 1 of 2,816 slip surfaces
Exit: (105, 554.75) ft
Entry: (22.034286, 533) ft
Radius: 56.860496 ft
Center: (54.049053, 579.99118) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	103.50000 ft	552.09133 ft	-185.82162 psf	15.278212 psf	8.1235693 psf	270 psf	0 psf	Silty Clay Fill
Column 2	100.50000 ft	547.30123 ft	74.517939 psf	450.5872 psf	199.95957 psf	270 psf	0 psf	Silty Clay Fill
Column 3	97.50000 ft	543.38912 ft	230.1356 psf	838.68562 psf	323.57178 psf	270 psf	0 psf	Silty Clay Fill
Column 4	94.57930 ft	540.16271 ft	334.85387 psf	1,115.6248 psf	415.14328 psf	270 psf	0 psf	Silty Clay Fill
Column 5	91.73789 ft	537.45808 ft	415.80167 psf	1,303.4232 psf	471.95671 psf	270 psf	0 psf	Silty Clay Fill
Column 6	88.89649 ft	535.09644 ft	478.15067 psf	1,460.6845 psf	522.42252 psf	270 psf	0 psf	Silty Clay Fill
Column 7	86.05509 ft	533.02551 ft	527.0479 psf	1,594.5394 psf	567.59529 psf	270 psf	0 psf	Silty Clay Fill
Column 8	83.21368 ft	531.20798 ft	568.13877 psf	1,709.7387 psf	606.99943 psf	270 psf	0 psf	Silty Clay Fill
Column 9	80.45221 ft	529.65533 ft	620.40013 psf	1,834.4342 psf	758.61266 psf	0 psf	0 psf	Gray Clayey Silt
Column 10	77.77066 ft	528.33632 ft	680.99272 psf	1,912.2352 psf	769.36571 psf	0 psf	0 psf	Gray Clayey Silt
Column 11	75.08912 ft	527.18636 ft	731.13108 psf	1,976.1426 psf	777.96953 psf	0 psf	0 psf	Gray Clayey Silt
Column 12	73.62417 ft	526.60660 ft	755.59016 psf	2,015.3446 psf	669.82333 psf	0 psf	0 psf	Brown Silty Clay
Column 13	72.15385 ft	526.10875 ft	775.16299 psf	2,040.1994 psf	672.63179 psf	0 psf	0 psf	Brown Silty Clay
Column 14	69.46154 ft	525.27724 ft	805.83334 psf	2,080.6155 psf	677.81369 psf	0 psf	0 psf	Brown Silty Clay
Column 15	66.76923 ft	524.58896 ft	827.43533 psf	2,107.371 psf	680.55389 psf	0 psf	0 psf	Brown Silty Clay
Column 16	64.07692 ft	524.03863 ft	840.13295 psf	2,119.0405 psf	680.00719 psf	0 psf	0 psf	Brown Silty Clay
Column 17	61.38462 ft	523.62219 ft	844.01253 psf	2,113.8088 psf	675.16263 psf	0 psf	0 psf	Brown Silty Clay
Column 18	58.69231 ft	523.33668 ft	839.55515 psf	2,089.5368 psf	664.62702 psf	0 psf	0 psf	Brown Silty Clay
Column 19	56.00000 ft	523.18013 ft	826.858 psf	2,043.8978 psf	647.11154 psf	0 psf	0 psf	Brown Silty Clay

Column 20	53.30769 ft	523.15146 ft	805.95926 psf	1,974.5179 psf	621.33365 psf	0 psf	0 psf	Brown Silty Clay
Column 21	50.61538 ft	523.25048 ft	776.84733 psf	1,879.1423 psf	586.10065 psf	0 psf	0 psf	Brown Silty Clay
Column 22	47.92308 ft	523.47786 ft	739.84719 psf	1,755.7739 psf	540.1778 psf	0 psf	0 psf	Brown Silty Clay
Column 23	45.23077 ft	523.83517 ft	695.36793 psf	1,602.8669 psf	482.52574 psf	0 psf	0 psf	Brown Silty Clay
Column 24	42.53846 ft	524.32492 ft	641.94964 psf	1,419.7761 psf	413.57766 psf	0 psf	0 psf	Brown Silty Clay
Column 25	39.84615 ft	524.95064 ft	581.27368 psf	1,206.2017 psf	332.28012 psf	0 psf	0 psf	Brown Silty Clay
Column 26	37.33686 ft	525.65576 ft	521.09299 psf	1,042.486 psf	277.22959 psf	0 psf	0 psf	Brown Silty Clay
Column 27	35.01059 ft	526.42693 ft	457.37182 psf	936.01548 psf	254.49935 psf	0 psf	0 psf	Brown Silty Clay
Column 28	32.40415 ft	527.43475 ft	378.55028 psf	802.17114 psf	264.70769 psf	0 psf	0 psf	Gray Clayey Silt
Column 29	29.51755 ft	528.71973 ft	290.74317 psf	599.16265 psf	192.72188 psf	0 psf	0 psf	Gray Clayey Silt
Column 30	26.63095 ft	530.20515 ft	191.33643 psf	365.63813 psf	108.91579 psf	0 psf	0 psf	Gray Clayey Silt
Column 31	23.61097 ft	532.00000 ft	68.02123 psf	118.16452 psf	26.661662 psf	0 psf	0 psf	Clarification Basin Sediment

APPENDIX J:
Liquefaction Analysis

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Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

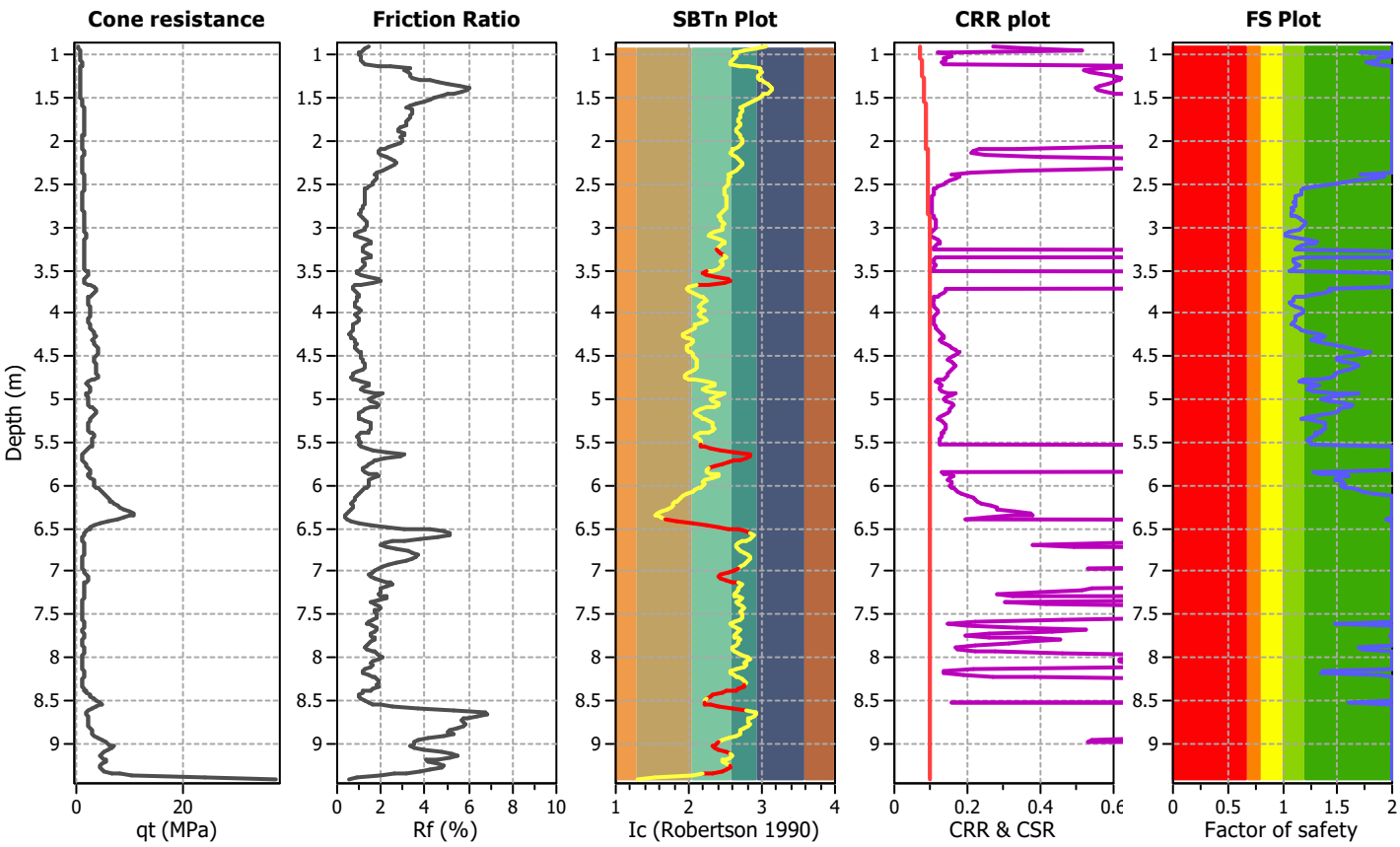
LIQUEFACTION ANALYSIS REPORT

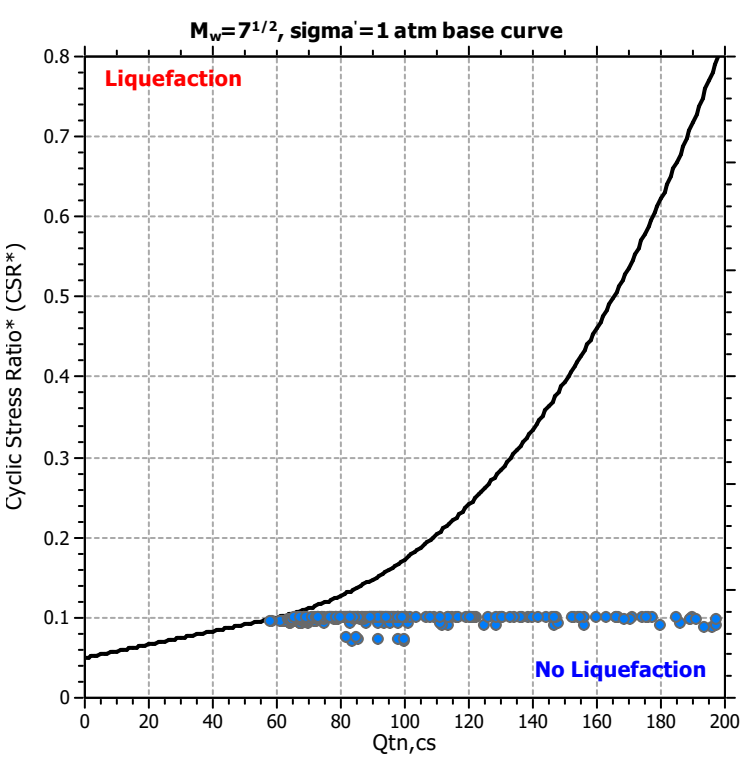
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

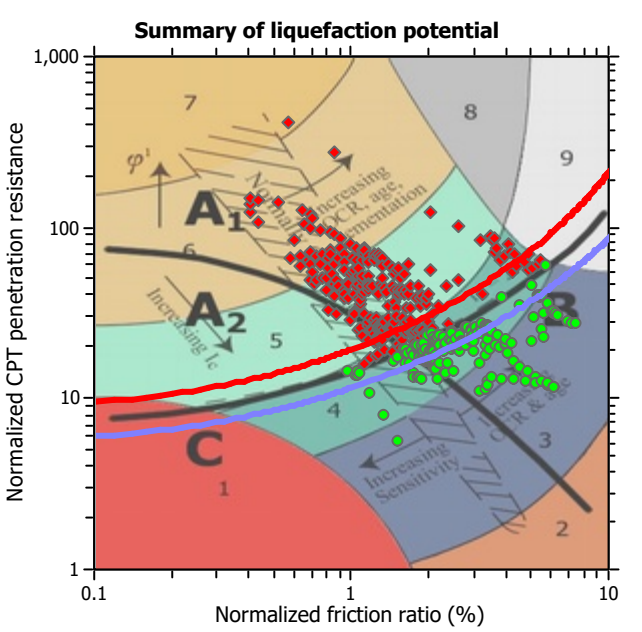
CPT file : CWLP CPT-2L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	0.50 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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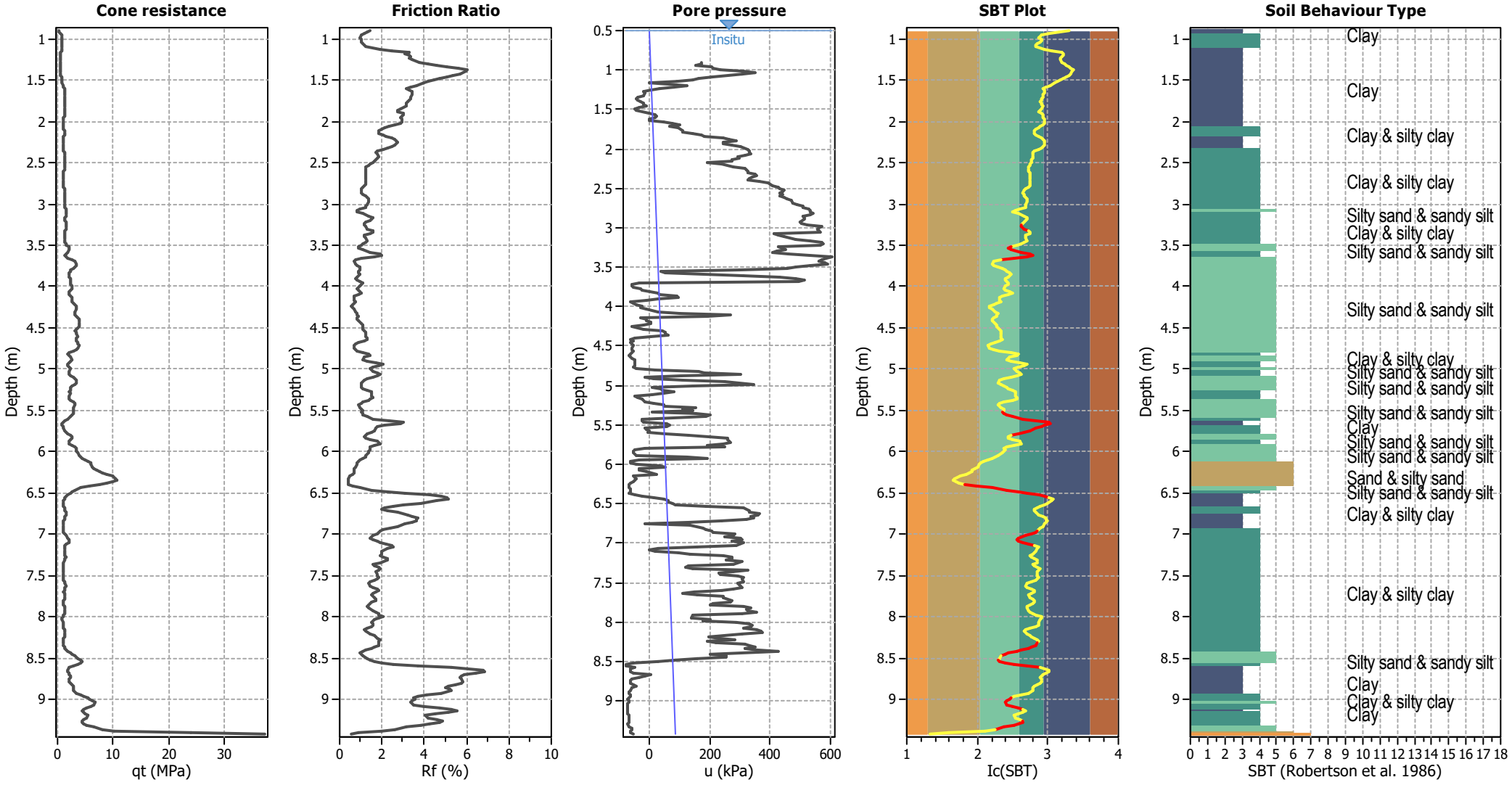
CPT name: CWLP CPT-2L

CPT basic interpretation plots



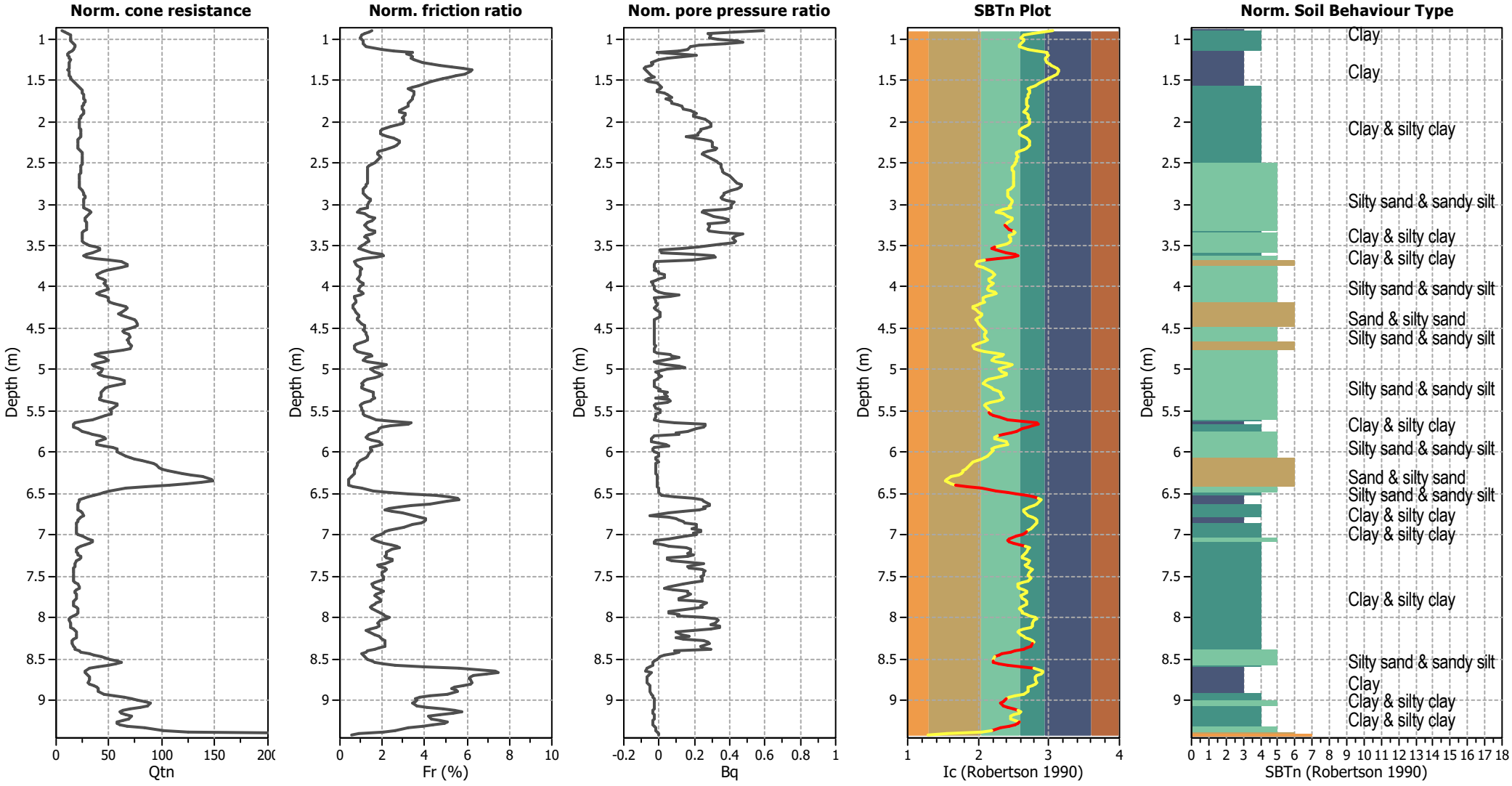
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



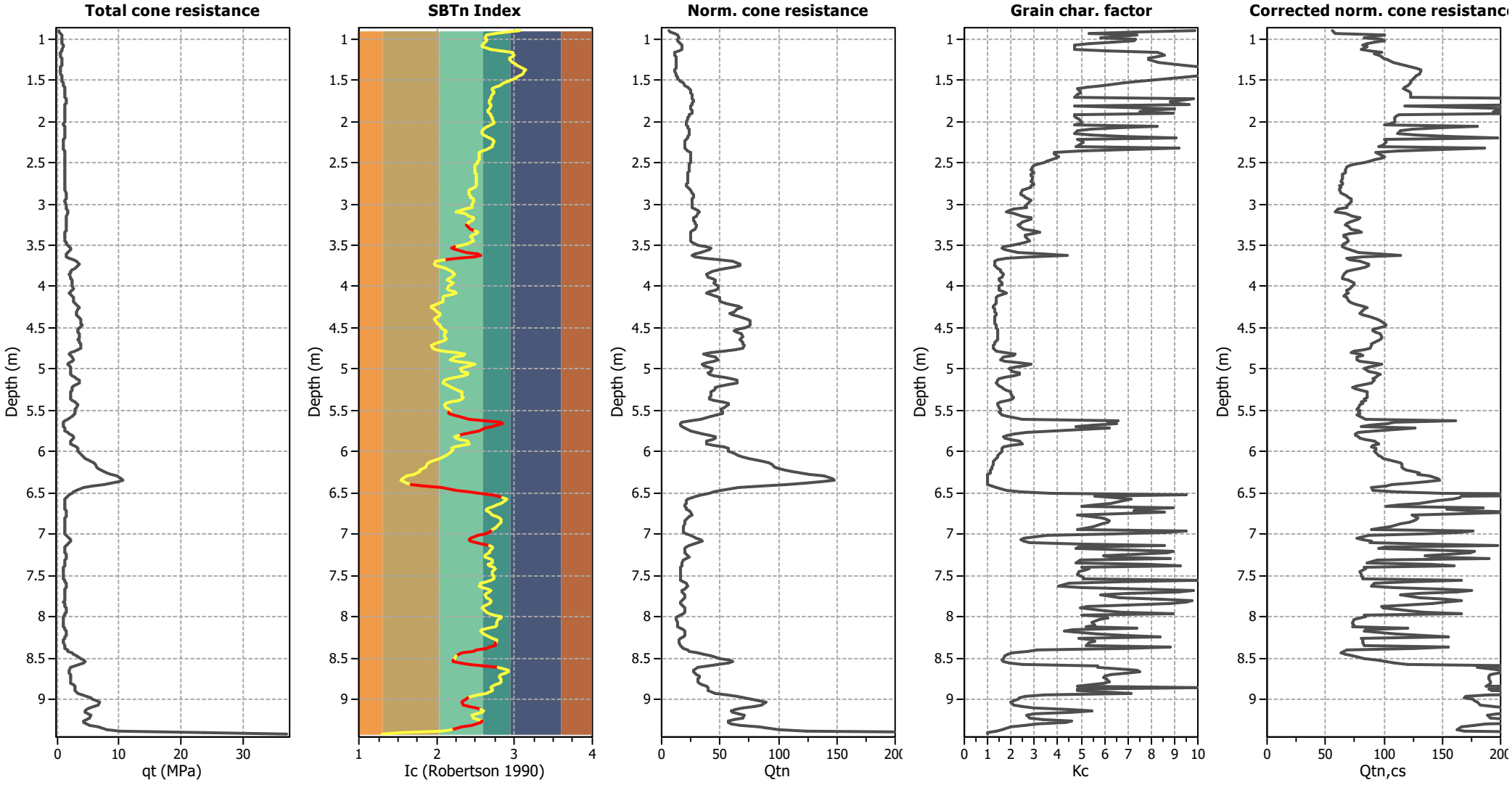
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



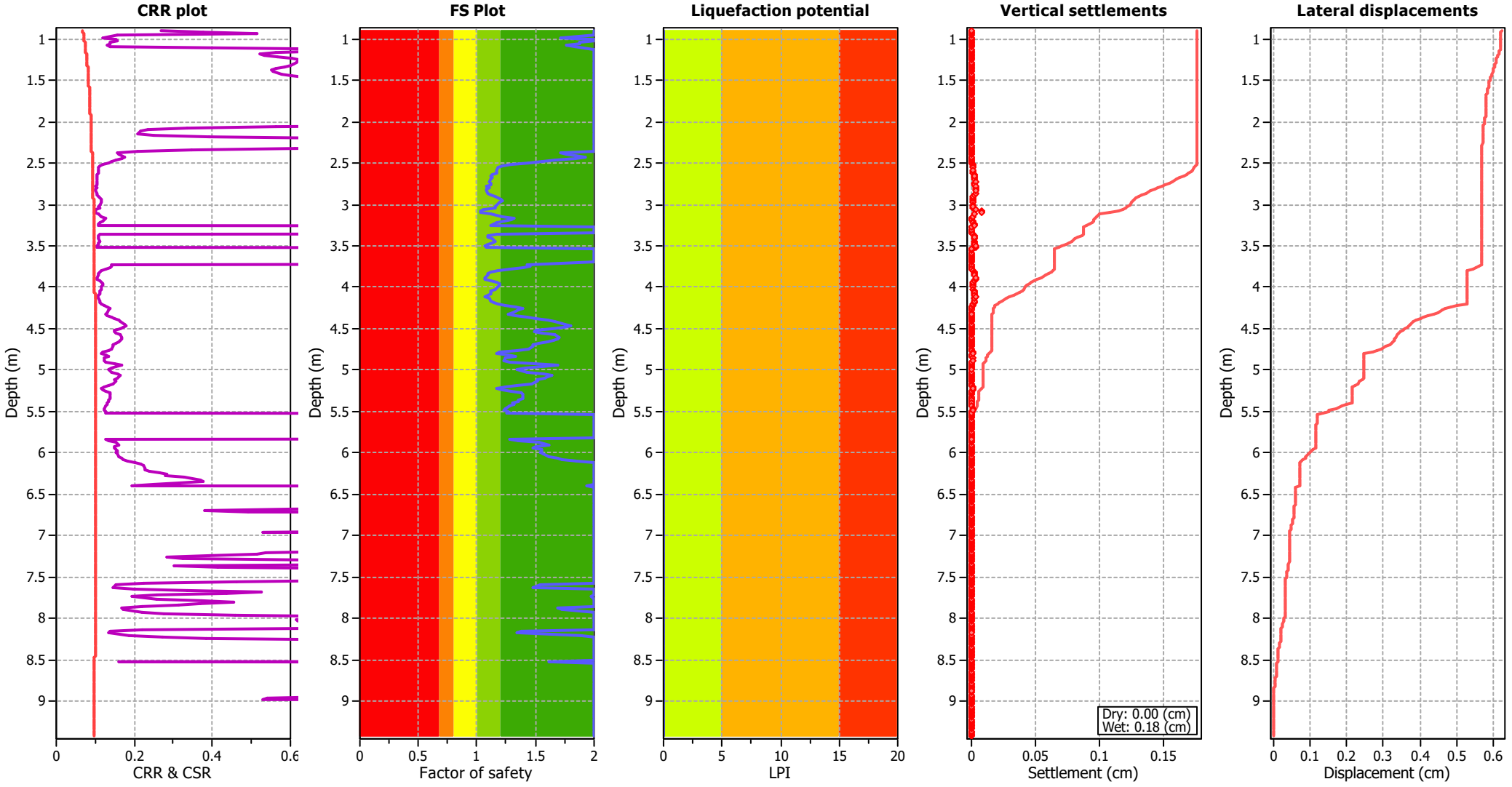
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

This software is licensed to: Chritina Matthews

CPT name: CWLP CPT-2L

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

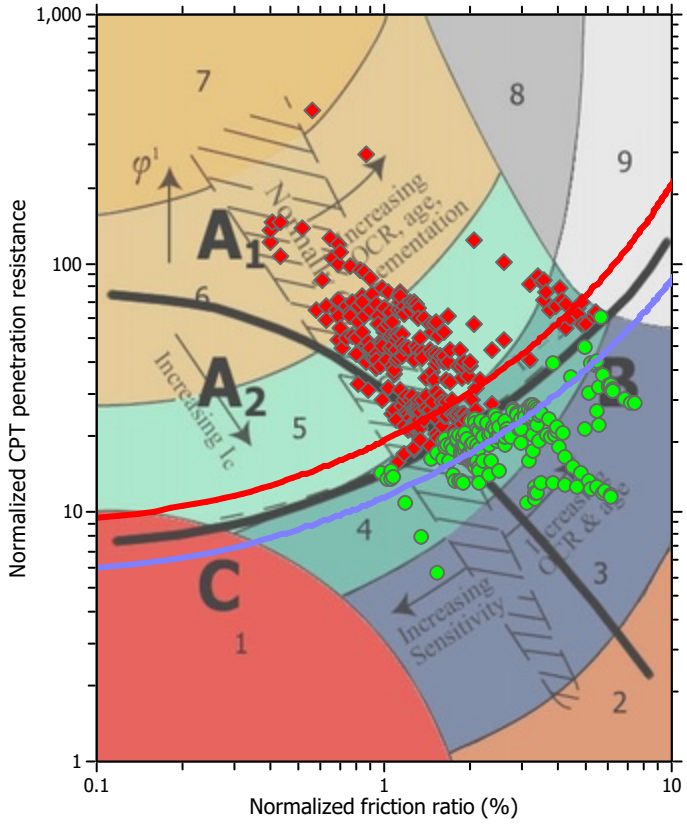
F.S. color scheme

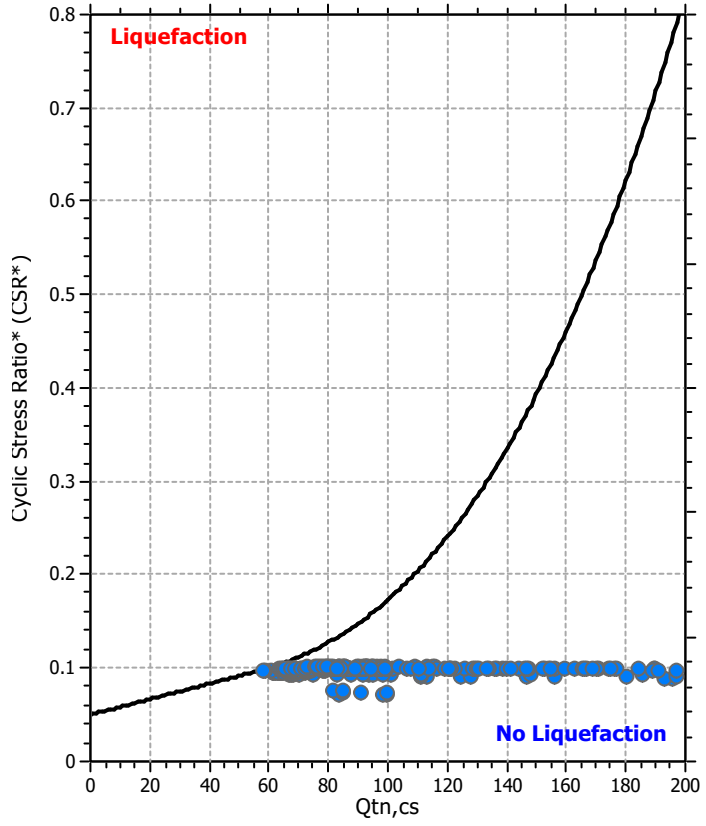
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

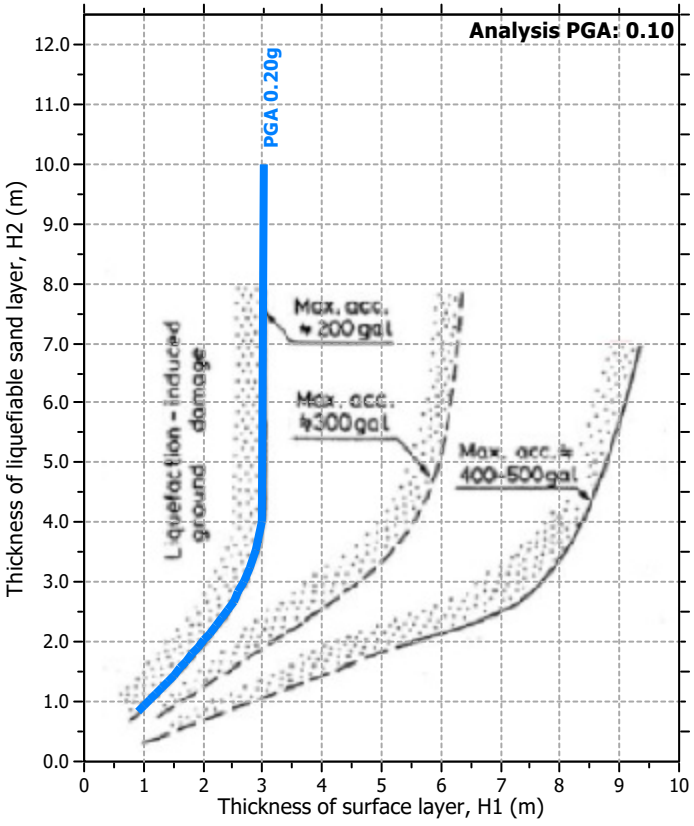
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



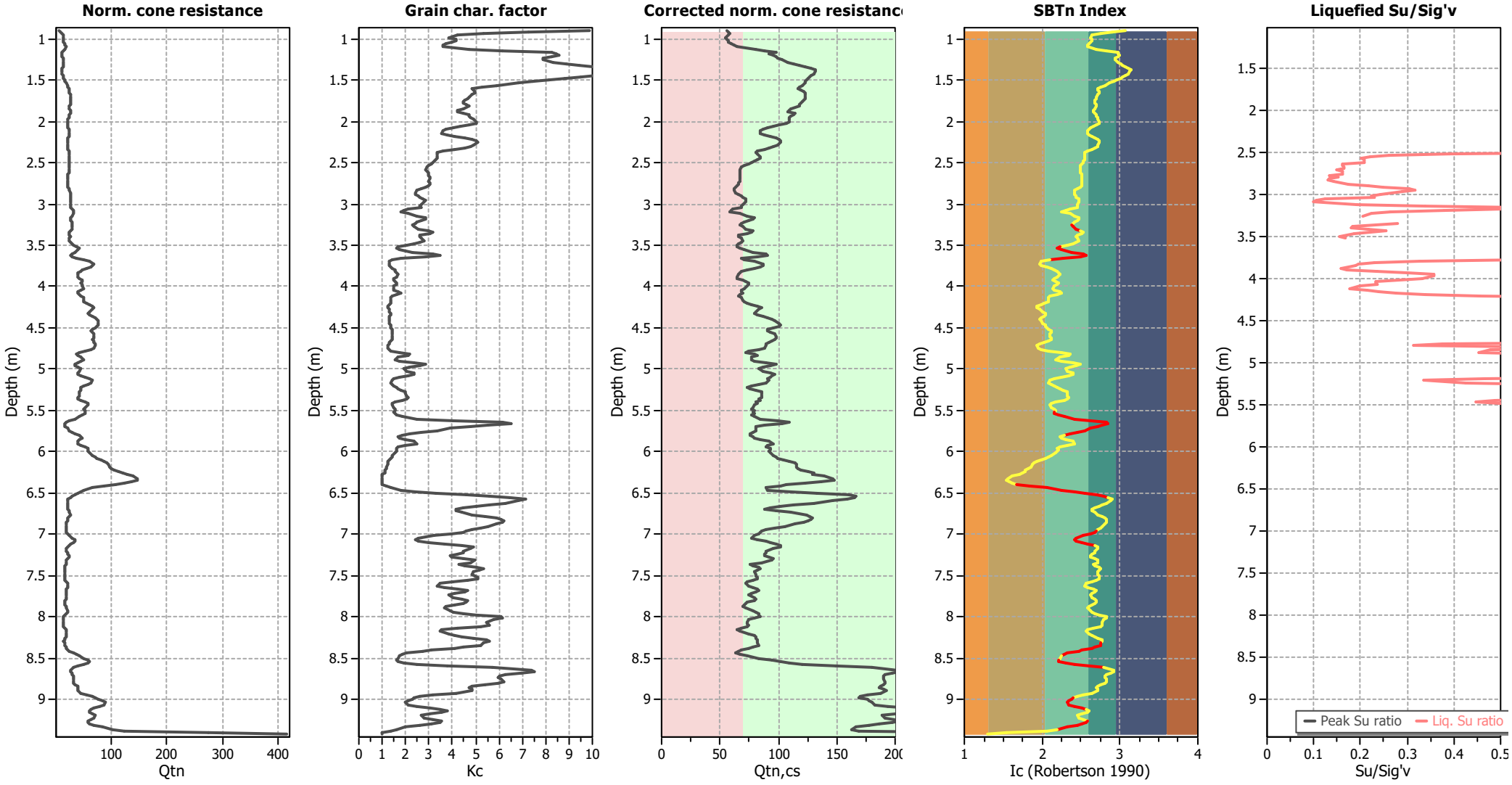




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

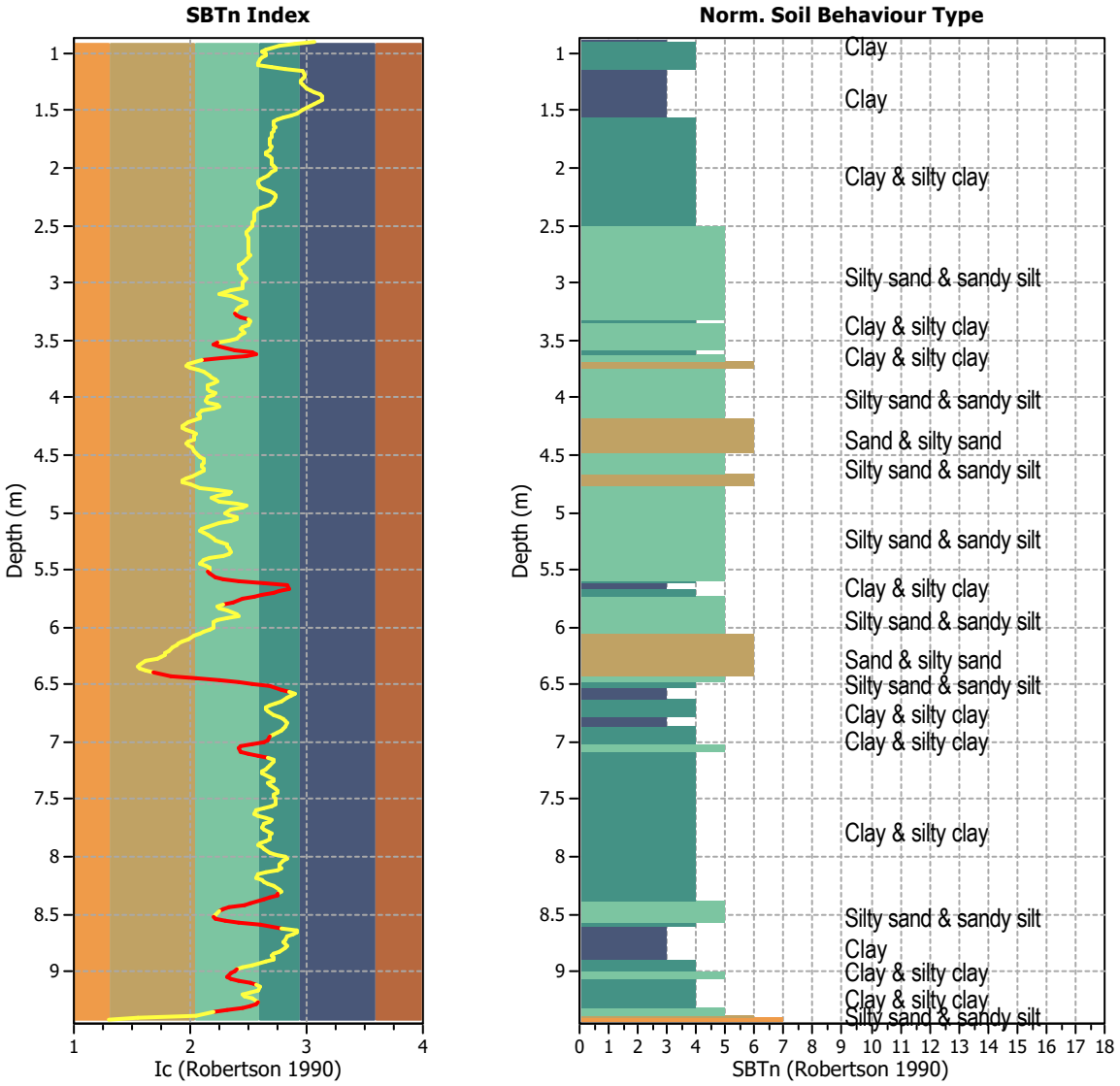
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	3

General statistics

Total points in CPT file:	427
Total points excluded:	80
Exclusion percentage:	18.74%
Number of layers detected:	13

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	4	Start depth: 3.28 (m)	5	Silty sand & sandy silt
		End depth: 3.34 (m)	4	Clay & silty clay
Transition layer 2	5	Start depth: 3.54 (m)	5	Silty sand & sandy silt
		End depth: 3.62 (m)	4	Clay & silty clay
Transition layer 3	5	Start depth: 3.62 (m)	4	Clay & silty clay
		End depth: 3.70 (m)	6	Sand & silty sand
Transition layer 4	7	Start depth: 5.54 (m)	5	Silty sand & sandy silt
		End depth: 5.66 (m)	3	Clay
Transition layer 5	9	Start depth: 5.66 (m)	3	Clay
		End depth: 5.82 (m)	5	Silty sand & sandy silt
Transition layer 6	9	Start depth: 6.42 (m)	6	Sand & silty sand
		End depth: 6.58 (m)	3	Clay
Transition layer 7	5	Start depth: 6.98 (m)	4	Clay & silty clay
		End depth: 7.06 (m)	5	Silty sand & sandy silt
Transition layer 8	6	Start depth: 7.06 (m)	5	Silty sand & sandy silt
		End depth: 7.16 (m)	4	Clay & silty clay
Transition layer 9	9	Start depth: 8.34 (m)	4	Clay & silty clay
		End depth: 8.50 (m)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 8.54 (m)	5	Silty sand & sandy silt
		End depth: 8.64 (m)	3	Clay
Transition layer 11	3	Start depth: 9.00 (m)	4	Clay & silty clay
		End depth: 9.04 (m)	5	Silty sand & sandy silt
Transition layer 12	6	Start depth: 9.04 (m)	5	Silty sand & sandy silt
		End depth: 9.14 (m)	4	Clay & silty clay
Transition layer 13	6	Start depth: 9.28 (m)	4	Clay & silty clay
		End depth: 9.38 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.27	4.40	172.40	62.64	14.23
2	0.92	0.27	4.40	172.40	52.39	14.58
3	0.94	0.61	7.30	154.80	43.66	14.91
4	0.96	0.71	7.70	206.80	37.78	15.14
5	0.98	0.69	6.90	213.70	35.95	15.13
6	1.00	0.71	6.70	233.70	37.70	15.10
7	1.02	0.57	7.70	311.80	37.66	15.18
8	1.04	0.71	8.10	351.50	36.56	15.24
9	1.06	0.81	7.60	309.30	35.28	15.45
10	1.08	0.81	11.60	207.60	34.38	15.63
11	1.10	0.93	11.70	165.80	34.38	15.76
12	1.12	0.94	11.10	146.10	40.63	16.20
13	1.14	0.69	28.20	90.20	47.36	16.23
14	1.16	0.57	16.10	-1.00	56.46	16.26
15	1.18	0.56	16.60	66.40	57.14	16.07
16	1.20	0.56	20.00	126.90	57.63	16.18
17	1.22	0.59	20.80	83.20	56.40	16.29
18	1.24	0.67	21.20	34.50	54.87	16.37
19	1.26	0.69	23.00	5.10	54.79	16.46
20	1.28	0.67	25.60	-20.00	56.73	16.57
21	1.30	0.67	28.10	-13.60	58.84	16.66
22	1.32	0.67	30.00	-21.60	60.99	16.75
23	1.34	0.65	32.60	-38.10	63.44	16.82
24	1.36	0.63	35.00	-43.10	66.33	16.89
25	1.38	0.60	36.80	-37.20	68.28	16.93
26	1.40	0.61	37.20	-30.00	67.91	16.93
27	1.42	0.64	35.20	-20.70	66.02	16.93
28	1.44	0.67	35.20	-20.10	63.62	16.93
29	1.46	0.69	35.30	-11.50	61.23	16.95
30	1.48	0.75	35.30	-35.40	58.71	16.97
31	1.50	0.80	34.90	-47.70	55.92	17.00
32	1.52	0.86	35.90	-41.30	53.03	17.06
33	1.54	0.95	37.90	-1.60	50.30	17.13
34	1.56	1.01	38.20	17.80	46.31	17.20
35	1.58	1.19	38.20	22.10	43.25	17.24
36	1.60	1.25	38.70	17.60	41.22	17.29
37	1.62	1.26	41.00	-1.20	41.45	17.35
38	1.64	1.24	43.30	2.10	41.87	17.40
39	1.66	1.27	44.10	49.50	41.79	17.44
40	1.68	1.31	44.90	76.00	41.11	17.47
41	1.70	1.33	45.30	102.60	40.62	17.49
42	1.72	1.34	45.60	67.80	40.14	17.50
43	1.74	1.37	45.30	96.50	39.70	17.49
44	1.76	1.38	44.60	109.90	39.22	17.48
45	1.78	1.37	43.30	112.20	39.29	17.44
46	1.80	1.30	41.60	145.90	39.97	17.40
47	1.82	1.23	41.10	172.00	40.55	17.36
48	1.84	1.25	40.40	183.40	39.41	17.21

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.22	27.70	244.60	38.10	17.24
50	1.88	1.39	41.80	264.00	37.96	17.24
51	1.90	1.24	40.20	286.90	39.37	17.34
52	1.92	1.20	37.90	246.50	40.52	17.26
53	1.94	1.17	35.80	243.30	40.63	17.18
54	1.96	1.14	33.50	276.40	40.88	17.12
55	1.98	1.10	33.50	302.30	41.51	17.09
56	2.00	1.07	34.40	326.00	42.09	17.06
57	2.02	1.05	31.80	333.20	41.92	17.01
58	2.04	1.05	29.20	331.50	40.55	16.91
59	2.06	1.08	26.50	339.20	38.68	16.82
60	2.08	1.12	24.70	319.10	36.80	16.75
61	2.10	1.15	23.40	295.10	35.36	16.69
62	2.12	1.17	22.40	299.50	34.52	16.67
63	2.14	1.19	23.00	275.40	34.31	16.68
64	2.16	1.20	24.10	275.90	35.42	16.76
65	2.18	1.16	27.40	190.70	37.20	16.82
66	2.20	1.09	27.80	242.70	39.47	16.87
67	2.22	1.04	29.00	280.10	41.12	16.87
68	2.24	1.00	28.70	316.20	42.02	16.87
69	2.26	1.00	28.50	323.40	42.34	16.86
70	2.28	0.99	28.20	326.00	41.61	16.81
71	2.30	1.00	24.80	326.00	40.89	16.75
72	2.32	0.99	24.30	351.30	39.56	16.67
73	2.34	1.02	22.90	358.20	37.29	16.63
74	2.36	1.16	21.20	340.50	34.59	16.59
75	2.38	1.22	20.50	330.60	32.89	16.61
76	2.40	1.24	23.00	328.80	32.88	16.68
77	2.42	1.24	24.70	367.10	33.21	16.74
78	2.44	1.24	23.90	395.30	33.01	16.72
79	2.46	1.23	22.00	409.60	32.59	16.66
80	2.48	1.21	21.30	428.00	32.30	16.62
81	2.50	1.21	21.20	435.60	32.02	16.53
82	2.52	1.16	17.80	446.00	31.44	16.43
83	2.54	1.16	16.40	442.10	30.63	16.30
84	2.56	1.16	15.50	435.50	30.18	16.23
85	2.58	1.14	14.90	441.90	30.07	16.19
86	2.60	1.14	14.90	435.70	30.39	16.18
87	2.62	1.12	15.40	448.30	30.62	16.17
88	2.64	1.10	14.60	458.80	30.83	16.16
89	2.66	1.09	14.60	471.60	30.88	16.13
90	2.68	1.08	14.50	479.40	30.94	16.13
91	2.70	1.09	14.50	491.80	30.94	16.12
92	2.72	1.08	14.40	509.00	30.84	16.10
93	2.74	1.07	13.90	512.60	31.00	16.08
94	2.76	1.04	13.90	528.80	31.09	16.05
95	2.78	1.04	13.30	534.10	30.83	16.02
96	2.80	1.07	12.90	537.00	29.91	16.02

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	1.14	13.40	546.80	28.45	16.02
98	2.84	1.22	12.90	536.90	27.26	16.08
99	2.86	1.28	13.90	510.20	26.83	16.17
100	2.88	1.31	16.10	517.10	26.99	16.29
101	2.90	1.34	17.20	516.00	27.50	16.39
102	2.92	1.33	18.00	502.60	28.09	16.43
103	2.94	1.28	18.30	505.20	29.20	16.48
104	2.96	1.24	19.70	525.40	29.71	16.47
105	2.98	1.24	17.90	574.50	29.42	16.44
106	3.00	1.27	16.80	564.70	28.64	16.38
107	3.02	1.28	17.10	558.90	28.35	16.36
108	3.04	1.26	16.70	562.40	28.51	16.36
109	3.06	1.25	16.90	570.40	24.49	16.20
110	3.08	1.71	9.10	416.00	22.35	16.19
111	3.10	1.65	15.20	431.10	20.98	16.18
112	3.12	1.55	16.10	447.30	24.50	16.49
113	3.14	1.45	22.20	486.10	27.46	16.64
114	3.16	1.35	24.00	536.50	29.83	16.74
115	3.18	1.31	22.70	575.80	29.72	16.70
116	3.20	1.40	20.30	578.20	28.81	16.62
117	3.22	1.36	19.10	567.20	27.35	16.51
118	3.24	1.41	16.80	428.00	26.60	16.46
119	3.26	1.48	17.70	443.70	25.88	16.45
120	3.28	1.49	18.40	451.40	26.25	16.51
121	3.30	1.43	19.50	425.60	27.68	16.55
122	3.32	1.31	20.10	408.90	30.68	16.63
123	3.34	1.18	24.40	461.70	31.70	16.55
124	3.36	1.17	16.20	607.20	30.97	16.43
125	3.38	1.22	14.20	588.00	28.37	16.23
126	3.40	1.27	15.40	571.50	28.11	16.24
127	3.42	1.22	16.30	565.50	28.81	16.31
128	3.44	1.21	17.20	585.10	29.32	16.37
129	3.46	1.27	18.00	593.10	28.05	16.36
130	3.48	1.39	15.40	532.70	26.09	16.39
131	3.50	1.55	16.90	488.70	23.47	16.41
132	3.52	1.78	17.50	457.80	20.04	16.58
133	3.54	2.44	19.70	298.90	18.84	16.69
134	3.56	2.15	20.70	40.00	20.56	16.87
135	3.58	1.73	27.70	55.20	25.88	16.94
136	3.60	1.39	28.40	311.30	32.06	17.00
137	3.62	1.19	29.80	431.40	33.85	16.91
138	3.64	1.31	23.70	488.70	30.00	16.83
139	3.66	1.76	20.60	513.80	21.52	16.72
140	3.68	2.55	17.30	496.20	15.69	16.82
141	3.70	3.32	23.00	-33.10	12.64	16.96
142	3.72	3.56	24.20	-59.60	12.12	17.18
143	3.74	3.57	28.30	-59.50	12.83	17.28
144	3.76	3.26	30.50	-54.30	14.65	17.33

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	2.79	30.30	-30.90	16.41	17.20
146	3.80	2.44	22.10	-25.40	17.68	16.98
147	3.82	2.24	18.80	27.50	18.47	16.79
148	3.84	2.12	21.10	32.90	19.38	16.69
149	3.86	1.98	18.40	92.70	20.16	16.66
150	3.88	1.97	18.00	96.80	18.95	16.56
151	3.90	2.26	16.00	28.30	17.42	16.60
152	3.92	2.51	18.80	-9.80	17.16	16.79
153	3.94	2.46	26.00	-60.90	18.09	16.94
154	3.96	2.30	24.50	-54.10	19.36	17.03
155	3.98	2.32	25.00	-45.60	18.84	17.03
156	4.00	2.62	25.70	-25.00	17.57	16.99
157	4.02	2.61	20.80	-30.30	16.65	16.88
158	4.04	2.38	18.40	-8.50	17.60	16.79
159	4.06	2.09	22.10	27.20	20.00	16.78
160	4.08	1.88	22.60	101.60	20.94	16.77
161	4.10	2.07	18.50	269.80	18.92	16.71
162	4.12	2.48	17.50	190.90	15.86	16.56
163	4.14	2.58	14.10	-27.40	14.97	16.63
164	4.16	2.58	20.30	-10.80	15.15	16.71
165	4.18	2.63	21.10	-10.60	15.33	16.81
166	4.20	2.73	18.70	2.70	13.81	16.80
167	4.22	3.20	18.60	6.00	12.37	16.82
168	4.24	3.35	20.20	-21.80	11.03	16.86
169	4.26	3.60	19.20	-56.50	11.13	17.00
170	4.28	3.56	25.40	-20.70	12.00	17.04
171	4.30	2.94	23.20	44.80	13.18	17.07
172	4.32	3.05	22.40	52.80	14.21	17.08
173	4.34	3.08	27.20	55.20	14.08	17.20
174	4.36	3.34	30.00	61.20	13.64	17.35
175	4.38	3.72	31.20	2.70	12.55	17.38
176	4.40	3.81	27.80	-49.30	12.06	17.46
177	4.42	3.92	34.60	-61.20	12.44	17.58
178	4.44	3.94	41.20	-54.60	13.31	17.76
179	4.46	3.94	44.30	-61.20	13.92	17.86
180	4.48	3.95	45.60	-59.10	14.22	17.82
181	4.50	3.61	37.70	-54.20	14.73	17.73
182	4.52	3.35	37.40	-59.00	15.41	17.59
183	4.54	3.13	34.20	-57.20	16.15	17.60
184	4.56	3.30	40.00	-54.80	16.24	17.69
185	4.58	3.62	45.90	-58.30	15.78	17.81
186	4.60	3.73	43.90	-63.60	15.76	17.85
187	4.62	3.46	44.00	-66.80	16.14	17.85
188	4.64	3.43	46.60	-61.50	16.44	17.83
189	4.66	3.52	42.40	-56.10	15.31	17.72
190	4.68	3.64	31.70	-46.30	13.54	17.52
191	4.70	3.76	26.60	-48.60	12.13	17.34
192	4.72	3.85	27.00	-46.80	11.24	17.26

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	4.03	24.90	-48.70	11.41	17.23
194	4.76	3.54	24.90	-51.90	12.86	17.18
195	4.78	2.70	26.10	-41.70	15.36	16.98
196	4.80	2.16	17.70	17.70	20.35	16.94
197	4.82	1.75	27.70	162.90	24.63	17.03
198	4.84	1.84	35.80	184.50	24.04	17.20
199	4.86	2.55	28.20	302.10	20.03	17.16
200	4.88	2.70	20.40	107.20	18.42	17.15
201	4.90	2.36	33.40	-15.30	20.90	17.24
202	4.92	2.04	36.60	15.60	26.13	17.35
203	4.94	1.67	35.00	110.10	29.89	17.39
204	4.96	1.69	41.50	248.80	28.17	17.33
205	4.98	2.17	29.00	347.60	24.65	17.33
206	5.00	2.40	31.50	144.90	22.41	17.31
207	5.02	2.22	37.00	9.60	23.73	17.39
208	5.04	2.06	36.70	37.90	26.16	17.46
209	5.06	2.01	40.40	43.20	26.48	17.54
210	5.08	2.31	44.80	83.30	24.21	17.60
211	5.10	2.73	39.40	47.10	20.86	17.71
212	5.12	3.26	45.80	10.00	17.59	17.70
213	5.14	3.58	37.20	-49.10	15.80	17.70
214	5.16	3.66	35.80	-41.10	15.08	17.60
215	5.18	3.35	35.70	-25.90	16.29	17.43
216	5.20	2.41	26.00	-15.90	17.61	17.21
217	5.22	2.48	22.60	15.60	18.72	17.03
218	5.24	2.50	26.20	50.10	19.75	17.13
219	5.26	2.28	33.10	46.20	21.43	17.24
220	5.28	2.16	31.60	155.30	23.31	17.33
221	5.30	2.22	35.50	109.90	23.37	17.35
222	5.32	2.29	34.90	144.60	23.52	17.34
223	5.34	2.11	30.30	9.70	24.26	17.31
224	5.36	1.97	34.10	154.30	23.70	17.26
225	5.38	2.32	30.70	202.40	21.86	17.36
226	5.40	2.81	35.90	186.70	17.99	17.39
227	5.42	3.48	30.50	-23.10	16.21	17.43
228	5.44	3.28	30.20	-26.10	15.53	17.34
229	5.46	2.95	28.70	-17.30	16.63	17.28
230	5.48	2.76	28.00	58.30	17.67	17.25
231	5.50	2.73	29.40	69.00	17.89	17.34
232	5.52	3.12	35.70	56.00	17.39	17.32
233	5.54	2.94	25.60	-13.10	17.81	17.35
234	5.56	2.66	32.20	-7.50	19.28	17.25
235	5.58	2.28	30.50	-0.20	22.15	17.22
236	5.60	1.95	27.50	-3.10	27.42	17.08
237	5.62	1.14	28.60	54.70	36.86	17.04
238	5.64	0.90	36.20	131.30	47.49	16.89
239	5.66	0.84	24.80	258.80	48.89	16.68
240	5.68	0.84	16.20	261.70	44.45	16.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.88	16.60	263.90	40.95	16.23
242	5.72	0.99	18.50	267.80	36.42	16.42
243	5.74	1.38	21.80	247.40	32.86	16.63
244	5.76	1.48	24.30	194.40	28.54	16.80
245	5.78	1.80	24.50	250.30	24.94	16.96
246	5.80	2.38	27.40	-12.90	21.73	17.15
247	5.82	2.74	32.70	-47.80	20.04	17.30
248	5.84	2.75	32.00	-50.80	20.43	17.37
249	5.86	2.44	33.20	-53.40	22.87	17.42
250	5.88	2.07	39.80	-42.00	26.53	17.46
251	5.90	1.85	40.60	125.30	27.09	17.52
252	5.92	2.41	39.60	191.60	23.36	17.62
253	5.94	3.31	43.60	-34.10	19.97	17.76
254	5.96	3.47	47.80	-62.30	18.96	17.89
255	5.98	3.31	50.70	-61.20	19.26	17.90
256	6.00	3.22	45.30	-41.90	18.94	17.88
257	6.02	3.57	45.40	34.50	17.92	17.94
258	6.04	4.00	54.70	51.80	16.51	18.01
259	6.06	4.26	49.40	-34.40	15.45	18.07
260	6.08	4.51	49.90	-31.90	14.08	18.06
261	6.10	4.93	49.50	-9.70	12.46	18.08
262	6.12	5.67	47.00	25.60	11.11	18.12
263	6.14	6.04	50.30	-52.60	10.28	18.17
264	6.16	6.14	52.40	-47.20	9.85	18.17
265	6.18	6.23	45.70	-43.40	9.19	18.14
266	6.20	6.71	44.80	-46.50	8.42	18.11
267	6.22	7.03	46.50	-51.00	7.75	18.14
268	6.24	7.49	46.90	-61.50	7.64	18.31
269	6.26	8.11	63.50	-66.40	7.15	18.41
270	6.28	8.68	56.40	-67.50	6.34	18.45
271	6.30	9.47	48.60	-68.60	4.76	18.37
272	6.32	11.21	45.50	-64.10	3.76	18.27
273	6.34	10.85	41.50	-62.40	3.47	18.22
274	6.36	9.95	41.80	-65.80	3.87	18.09
275	6.38	8.78	35.00	-49.60	4.50	17.90
276	6.40	7.55	27.50	-22.00	5.00	17.75
277	6.42	6.16	33.40	11.90	8.90	17.73
278	6.44	3.60	41.90	45.90	14.49	17.82
279	6.46	2.87	49.00	60.90	20.93	17.84
280	6.48	2.87	49.00	60.90	27.01	18.08
281	6.50	2.23	83.10	75.70	32.47	18.25
282	6.52	1.92	85.80	85.10	39.85	18.34
283	6.54	1.67	82.30	189.90	44.85	18.21
284	6.56	1.25	70.20	311.80	48.78	18.03
285	6.58	1.17	62.50	331.60	51.65	17.85
286	6.60	1.15	58.80	334.20	50.45	17.67
287	6.62	1.12	44.10	365.40	47.98	17.44
288	6.64	1.11	33.00	360.10	44.79	17.16

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.11	29.40	336.10	42.12	16.96
290	6.68	1.16	27.50	349.00	39.35	16.83
291	6.70	1.24	22.30	321.90	37.70	16.78
292	6.72	1.25	25.00	243.00	37.63	17.12
293	6.74	1.62	49.40	135.20	39.00	17.38
294	6.76	1.50	45.80	-13.10	41.22	17.61
295	6.78	1.33	50.20	134.20	43.95	17.54
296	6.80	1.22	45.80	176.00	46.30	17.51
297	6.82	1.20	45.00	185.50	47.07	17.44
298	6.84	1.17	43.80	208.20	47.55	17.39
299	6.86	1.12	40.50	211.50	47.42	17.31
300	6.88	1.11	37.10	282.00	46.23	17.16
301	6.90	1.11	30.20	278.00	44.58	17.00
302	6.92	1.08	26.40	250.80	42.84	16.83
303	6.94	1.09	24.60	304.10	41.14	16.69
304	6.96	1.12	20.60	308.60	39.87	16.59
305	6.98	1.10	20.40	274.10	39.09	16.61
306	7.00	1.19	24.80	313.60	36.63	16.69
307	7.02	1.47	23.20	290.50	32.26	16.85
308	7.04	1.91	26.30	160.80	27.69	17.06
309	7.06	2.37	33.10	30.70	26.77	17.34
310	7.08	2.26	41.90	0.10	27.93	17.50
311	7.10	2.01	41.60	16.80	30.73	17.46
312	7.12	1.68	32.80	97.20	34.76	17.36
313	7.14	1.38	38.40	135.70	38.97	17.23
314	7.16	1.21	34.70	244.20	41.60	17.10
315	7.18	1.20	25.20	272.20	40.92	16.92
316	7.20	1.22	25.10	273.20	39.38	16.80
317	7.22	1.23	25.80	256.20	39.11	16.83
318	7.24	1.26	26.80	309.50	37.80	16.89
319	7.26	1.44	27.70	280.10	36.12	16.98
320	7.28	1.57	30.10	127.70	36.47	17.06
321	7.30	1.36	32.50	120.70	39.24	17.06
322	7.32	1.14	30.50	146.30	41.66	16.88
323	7.34	1.08	19.60	325.60	40.94	16.62
324	7.36	1.14	17.10	280.70	38.33	16.40
325	7.38	1.16	18.50	233.40	39.63	16.43
326	7.40	1.00	21.60	234.30	42.03	16.49
327	7.42	0.99	21.30	296.20	43.58	16.47
328	7.44	1.00	18.30	311.00	42.74	16.43
329	7.46	1.03	19.30	308.10	41.49	16.39
330	7.48	1.05	18.60	310.90	41.25	16.42
331	7.50	1.06	19.70	292.30	41.82	16.43
332	7.52	0.99	20.10	299.50	42.50	16.45
333	7.54	1.01	19.70	303.00	42.32	16.43
334	7.56	1.06	18.60	310.40	40.30	16.40
335	7.58	1.15	17.60	280.30	36.98	16.40
336	7.60	1.36	18.20	240.60	33.89	16.53

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.59	22.20	147.60	33.18	16.69
338	7.64	1.48	25.10	112.50	34.80	16.75
339	7.66	1.24	22.50	160.40	37.95	16.71
340	7.68	1.15	22.00	246.10	40.13	16.63
341	7.70	1.15	22.00	246.10	39.62	16.55
342	7.72	1.19	18.20	273.60	37.39	16.51
343	7.74	1.34	19.20	269.10	35.98	16.53
344	7.76	1.34	22.10	212.10	36.97	16.66
345	7.78	1.23	24.80	201.30	38.77	16.61
346	7.80	1.09	18.00	314.90	40.08	16.48
347	7.82	1.06	16.60	337.20	39.84	16.28
348	7.84	1.04	15.80	322.30	39.22	16.24
349	7.86	1.12	16.20	326.90	37.44	16.27
350	7.88	1.26	17.00	355.00	35.17	16.34
351	7.90	1.37	17.30	310.10	34.77	16.53
352	7.92	1.41	24.00	145.50	36.16	16.71
353	7.94	1.34	26.60	138.10	36.99	16.77
354	7.96	1.36	21.00	200.90	39.36	16.73
355	7.98	1.10	23.60	178.80	42.17	16.58
356	8.00	0.89	20.40	289.40	47.01	16.43
357	8.02	0.83	16.20	330.70	47.48	16.22
358	8.04	0.88	14.70	340.70	45.52	16.08
359	8.06	0.92	14.40	334.90	44.16	16.06
360	8.08	0.91	14.90	315.40	44.45	16.10
361	8.10	0.89	16.10	357.20	44.68	16.13
362	8.12	0.92	15.50	372.50	42.91	16.13
363	8.14	1.04	14.40	377.00	37.82	16.18
364	8.16	1.39	15.70	307.20	34.26	16.20
365	8.18	1.36	14.70	199.80	33.61	16.38
366	8.20	1.34	20.60	232.30	35.80	16.58
367	8.22	1.35	25.70	285.60	37.26	16.70
368	8.24	1.34	21.60	192.90	38.81	16.71
369	8.26	1.18	22.10	223.80	41.37	16.59
370	8.28	0.96	20.70	316.40	44.17	16.51
371	8.30	1.00	19.20	333.60	44.82	16.46
372	8.32	1.07	20.20	354.00	43.60	16.50
373	8.34	1.09	21.70	318.00	43.06	16.58
374	8.36	1.12	22.90	357.80	39.24	16.61
375	8.38	1.46	19.60	427.40	37.17	16.56
376	8.40	1.29	18.20	201.30	31.42	16.59
377	8.42	1.94	20.80	257.20	29.22	16.65
378	8.44	1.94	20.80	257.20	23.57	16.91
379	8.46	3.01	26.70	159.90	22.17	17.16
380	8.48	2.94	34.10	88.20	20.44	17.53
381	8.50	3.56	44.70	31.10	19.72	17.94
382	8.52	4.68	63.90	-51.90	19.25	18.32
383	8.54	4.72	81.00	-76.50	19.54	18.52
384	8.56	4.31	76.20	-77.30	22.46	18.61

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	3.57	90.40	-47.10	27.17	18.64
386	8.60	2.82	100.30	-63.80	35.73	18.71
387	8.62	2.02	118.50	-64.90	45.24	18.77
388	8.64	1.85	132.40	-53.20	52.82	18.81
389	8.66	1.84	133.20	3.40	53.28	18.83
390	8.68	2.00	125.30	-13.00	51.01	18.84
391	8.70	2.15	126.60	-32.80	48.05	18.85
392	8.72	2.30	128.30	-58.40	46.65	18.89
393	8.74	2.33	132.70	-60.70	46.40	18.90
394	8.76	2.24	129.60	-62.60	46.98	18.88
395	8.78	2.16	123.20	-63.50	47.58	18.88
396	8.80	2.23	132.70	-53.70	46.62	18.93
397	8.82	2.51	141.00	-44.50	43.77	19.02
398	8.84	2.92	143.20	-55.80	41.25	19.09
399	8.86	2.94	144.70	-64.10	40.40	19.12
400	8.88	2.80	146.60	-67.50	41.00	19.14
401	8.90	2.87	152.60	-65.60	41.11	19.18
402	8.92	3.06	159.40	-62.10	37.53	19.29
403	8.94	4.07	169.00	-61.00	32.03	19.43
404	8.96	5.23	177.80	-65.50	28.37	19.55
405	8.98	5.23	184.70	-71.20	26.41	19.65
406	9.00	5.66	196.40	-69.80	25.78	19.79
407	9.02	6.52	235.20	-68.60	24.38	19.90
408	9.04	6.95	226.70	-72.70	23.37	19.98
409	9.06	7.03	228.20	-73.00	24.34	19.97
410	9.08	5.78	240.60	-72.30	27.03	19.97
411	9.10	5.17	248.20	-72.00	31.07	19.96
412	9.12	4.76	253.60	-72.10	33.84	19.94
413	9.14	4.42	250.60	-72.10	35.47	19.91
414	9.16	4.37	243.30	-71.70	34.15	19.87
415	9.18	5.07	220.80	-65.60	31.08	19.86
416	9.20	5.74	225.40	-67.20	28.56	19.85
417	9.22	5.59	218.60	-66.50	29.31	19.84
418	9.24	4.60	218.80	-67.30	31.89	19.79
419	9.26	4.23	218.00	-69.30	34.17	19.73
420	9.28	4.38	206.80	-69.20	33.78	19.69
421	9.30	4.54	195.30	-71.90	31.39	19.66
422	9.32	5.09	191.20	-66.70	28.37	19.72
423	9.34	6.14	213.30	-58.10	23.24	19.84
424	9.36	8.54	212.80	-56.00	18.96	19.93
425	9.38	9.61	198.40	-62.50	14.55	19.99
426	9.40	12.28	199.60	-64.60	3.54	20.32
427	9.42	49.58	213.60	-55.50	0.33	20.52

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.81	3.92	8.88	1.00	0.093	1.38	0.068	1.00	1.00	0.068	No
2	0.92	13.10	4.12	8.98	0.99	0.094	1.38	0.069	1.00	1.00	0.069	No
3	0.94	13.40	4.32	9.08	0.99	0.095	1.38	0.069	1.00	1.00	0.069	No
4	0.96	13.70	4.51	9.19	0.99	0.096	1.38	0.070	1.00	1.00	0.070	No
5	0.98	14.00	4.71	9.29	0.99	0.097	1.38	0.071	1.00	1.00	0.071	No
6	1.00	14.30	4.91	9.40	0.99	0.098	1.38	0.071	1.00	1.00	0.071	No
7	1.02	14.61	5.10	9.51	0.99	0.099	1.38	0.072	1.00	1.00	0.072	No
8	1.04	14.91	5.30	9.61	0.99	0.100	1.38	0.073	1.00	1.00	0.073	No
9	1.06	15.22	5.49	9.73	0.99	0.101	1.38	0.073	1.00	1.00	0.073	No
10	1.08	15.53	5.69	9.84	0.99	0.102	1.38	0.074	1.00	1.00	0.074	No
11	1.10	15.85	5.89	9.96	0.99	0.103	1.38	0.075	1.00	1.00	0.075	No
12	1.12	16.17	6.08	10.09	0.99	0.103	1.38	0.075	1.00	1.00	0.075	No
13	1.14	16.50	6.28	10.22	0.99	0.104	1.38	0.076	1.00	1.00	0.076	No
14	1.16	16.82	6.47	10.35	0.99	0.105	1.38	0.076	1.00	1.00	0.076	No
15	1.18	17.14	6.67	10.47	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
16	1.20	17.47	6.87	10.60	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
17	1.22	17.79	7.06	10.73	0.99	0.107	1.38	0.078	1.00	1.00	0.078	No
18	1.24	18.12	7.26	10.86	0.99	0.108	1.38	0.078	1.00	1.00	0.078	No
19	1.26	18.45	7.46	10.99	0.99	0.108	1.38	0.079	1.00	1.00	0.079	No
20	1.28	18.78	7.65	11.13	0.99	0.109	1.38	0.079	1.00	1.00	0.079	No
21	1.30	19.11	7.85	11.27	0.99	0.109	1.38	0.080	1.00	1.00	0.080	No
22	1.32	19.45	8.04	11.41	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
23	1.34	19.79	8.24	11.55	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
24	1.36	20.12	8.44	11.69	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
25	1.38	20.46	8.63	11.83	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
26	1.40	20.80	8.83	11.97	0.99	0.112	1.38	0.081	1.00	1.00	0.081	No
27	1.42	21.14	9.03	12.11	0.99	0.112	1.38	0.082	1.00	1.00	0.082	No
28	1.44	21.48	9.22	12.26	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No
29	1.46	21.82	9.42	12.40	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No
30	1.48	22.16	9.61	12.54	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
31	1.50	22.50	9.81	12.69	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
32	1.52	22.84	10.01	12.83	0.99	0.115	1.38	0.083	1.00	1.00	0.083	No
33	1.54	23.18	10.20	12.98	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
34	1.56	23.52	10.40	13.13	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
35	1.58	23.87	10.59	13.27	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
36	1.60	24.21	10.79	13.42	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
37	1.62	24.56	10.99	13.57	0.99	0.116	1.38	0.085	1.00	1.00	0.085	No
38	1.64	24.91	11.18	13.73	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
39	1.66	25.26	11.38	13.88	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
40	1.68	25.61	11.58	14.03	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
41	1.70	25.96	11.77	14.19	0.99	0.118	1.38	0.085	1.00	1.00	0.085	No
42	1.72	26.31	11.97	14.34	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
43	1.74	26.66	12.16	14.49	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
44	1.76	27.01	12.36	14.65	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
45	1.78	27.36	12.56	14.80	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
46	1.80	27.70	12.75	14.95	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
47	1.82	28.05	12.95	15.10	0.99	0.119	1.38	0.087	1.00	1.00	0.087	No
48	1.84	28.39	13.15	15.25	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	1.86	28.74	13.34	15.40	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
50	1.88	29.08	13.54	15.55	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
51	1.90	29.43	13.73	15.70	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
52	1.92	29.78	13.93	15.85	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
53	1.94	30.12	14.13	15.99	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
54	1.96	30.46	14.32	16.14	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
55	1.98	30.80	14.52	16.29	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
56	2.00	31.15	14.72	16.43	0.99	0.122	1.38	0.088	1.00	1.00	0.088	No
57	2.02	31.49	14.91	16.57	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
58	2.04	31.82	15.11	16.72	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
59	2.06	32.16	15.30	16.86	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
60	2.08	32.49	15.50	17.00	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
61	2.10	32.83	15.70	17.13	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
62	2.12	33.16	15.89	17.27	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
63	2.14	33.50	16.09	17.41	0.99	0.123	1.38	0.090	1.00	1.00	0.090	No
64	2.16	33.83	16.28	17.55	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
65	2.18	34.17	16.48	17.69	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
66	2.20	34.50	16.68	17.83	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
67	2.22	34.84	16.87	17.97	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
68	2.24	35.18	17.07	18.11	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
69	2.26	35.52	17.27	18.25	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
70	2.28	35.85	17.46	18.39	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
71	2.30	36.19	17.66	18.53	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
72	2.32	36.52	17.85	18.67	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
73	2.34	36.85	18.05	18.80	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
74	2.36	37.19	18.25	18.94	0.98	0.126	1.38	0.091	1.00	1.00	0.091	No
75	2.38	37.52	18.44	19.08	0.98	0.126	1.38	0.091	1.00	1.00	0.091	No
76	2.40	37.85	18.64	19.21	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
77	2.42	38.19	18.84	19.35	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
78	2.44	38.52	19.03	19.49	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
79	2.46	38.85	19.23	19.63	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
80	2.48	39.19	19.42	19.76	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
81	2.50	39.52	19.62	19.90	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
82	2.52	39.85	19.82	20.03	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
83	2.54	40.17	20.01	20.16	0.98	0.127	1.38	0.093	1.00	1.00	0.093	No
84	2.56	40.50	20.21	20.29	0.98	0.127	1.38	0.093	1.00	1.00	0.093	No
85	2.58	40.82	20.40	20.42	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
86	2.60	41.14	20.60	20.54	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
87	2.62	41.47	20.80	20.67	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
88	2.64	41.79	20.99	20.80	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
89	2.66	42.11	21.19	20.92	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
90	2.68	42.44	21.39	21.05	0.98	0.129	1.38	0.093	1.00	1.00	0.093	No
91	2.70	42.76	21.58	21.18	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
92	2.72	43.08	21.78	21.30	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
93	2.74	43.40	21.97	21.43	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
94	2.76	43.72	22.17	21.55	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
95	2.78	44.04	22.37	21.68	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
96	2.80	44.36	22.56	21.80	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	44.68	22.76	21.92	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
98	2.84	45.00	22.96	22.05	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
99	2.86	45.33	23.15	22.18	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
100	2.88	45.65	23.35	22.31	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
101	2.90	45.98	23.54	22.44	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
102	2.92	46.31	23.74	22.57	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
103	2.94	46.64	23.94	22.70	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
104	2.96	46.97	24.13	22.84	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
105	2.98	47.30	24.33	22.97	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
106	3.00	47.63	24.53	23.10	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
107	3.02	47.95	24.72	23.23	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
108	3.04	48.28	24.92	23.36	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
109	3.06	48.60	25.11	23.49	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
110	3.08	48.93	25.31	23.62	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
111	3.10	49.25	25.51	23.75	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
112	3.12	49.58	25.70	23.88	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
113	3.14	49.91	25.90	24.02	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
114	3.16	50.25	26.09	24.15	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
115	3.18	50.58	26.29	24.29	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
116	3.20	50.92	26.49	24.43	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
117	3.22	51.25	26.68	24.56	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
118	3.24	51.57	26.88	24.69	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
119	3.26	51.90	27.08	24.83	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
120	3.28	52.23	27.27	24.96	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
121	3.30	52.56	27.47	25.10	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
122	3.32	52.90	27.66	25.23	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
123	3.34	53.23	27.86	25.37	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
124	3.36	53.56	28.06	25.50	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
125	3.38	53.88	28.25	25.63	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
126	3.40	54.21	28.45	25.76	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
127	3.42	54.53	28.65	25.89	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
128	3.44	54.86	28.84	26.02	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
129	3.46	55.19	29.04	26.15	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
130	3.48	55.51	29.23	26.28	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
131	3.50	55.84	29.43	26.41	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
132	3.52	56.17	29.63	26.55	0.98	0.134	1.38	0.098	1.00	1.00	0.098	No
133	3.54	56.51	29.82	26.69	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
134	3.56	56.85	30.02	26.83	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
135	3.58	57.18	30.21	26.97	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
136	3.60	57.52	30.41	27.11	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
137	3.62	57.86	30.61	27.26	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
138	3.64	58.20	30.80	27.40	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
139	3.66	58.53	31.00	27.53	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
140	3.68	58.87	31.20	27.67	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
141	3.70	59.21	31.39	27.82	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
142	3.72	59.55	31.59	27.96	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
143	3.74	59.90	31.78	28.11	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
144	3.76	60.24	31.98	28.26	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	60.59	32.18	28.41	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
146	3.80	60.93	32.37	28.56	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
147	3.82	61.26	32.57	28.70	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
148	3.84	61.60	32.77	28.83	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
149	3.86	61.93	32.96	28.97	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
150	3.88	62.26	33.16	29.10	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
151	3.90	62.59	33.35	29.24	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
152	3.92	62.93	33.55	29.38	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
153	3.94	63.27	33.75	29.52	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
154	3.96	63.61	33.94	29.67	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
155	3.98	63.95	34.14	29.81	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
156	4.00	64.29	34.34	29.95	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
157	4.02	64.63	34.53	30.10	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
158	4.04	64.96	34.73	30.24	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
159	4.06	65.30	34.92	30.38	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
160	4.08	65.63	35.12	30.51	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
161	4.10	65.97	35.32	30.65	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
162	4.12	66.30	35.51	30.79	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
163	4.14	66.63	35.71	30.92	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
164	4.16	66.97	35.90	31.06	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
165	4.18	67.30	36.10	31.20	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
166	4.20	67.64	36.30	31.34	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
167	4.22	67.97	36.49	31.48	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
168	4.24	68.31	36.69	31.62	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
169	4.26	68.65	36.89	31.77	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
170	4.28	68.99	37.08	31.91	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
171	4.30	69.33	37.28	32.06	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
172	4.32	69.68	37.47	32.20	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
173	4.34	70.02	37.67	32.35	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
174	4.36	70.37	37.87	32.50	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
175	4.38	70.71	38.06	32.65	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
176	4.40	71.06	38.26	32.80	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
177	4.42	71.42	38.46	32.96	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
178	4.44	71.77	38.65	33.12	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
179	4.46	72.13	38.85	33.28	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
180	4.48	72.48	39.04	33.44	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
181	4.50	72.84	39.24	33.60	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
182	4.52	73.19	39.44	33.75	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
183	4.54	73.54	39.63	33.91	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
184	4.56	73.90	39.83	34.07	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
185	4.58	74.25	40.02	34.23	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
186	4.60	74.61	40.22	34.39	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
187	4.62	74.97	40.42	34.55	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
188	4.64	75.32	40.61	34.71	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
189	4.66	75.68	40.81	34.87	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
190	4.68	76.03	41.01	35.02	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
191	4.70	76.37	41.20	35.17	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
192	4.72	76.72	41.40	35.32	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	77.06	41.59	35.47	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
194	4.76	77.41	41.79	35.62	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
195	4.78	77.75	41.99	35.76	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
196	4.80	78.09	42.18	35.90	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
197	4.82	78.43	42.38	36.05	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
198	4.84	78.77	42.58	36.20	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
199	4.86	79.11	42.77	36.34	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
200	4.88	79.46	42.97	36.49	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
201	4.90	79.80	43.16	36.64	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
202	4.92	80.15	43.36	36.79	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
203	4.94	80.50	43.56	36.94	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
204	4.96	80.84	43.75	37.09	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
205	4.98	81.19	43.95	37.24	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
206	5.00	81.54	44.15	37.39	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
207	5.02	81.88	44.34	37.54	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
208	5.04	82.23	44.54	37.70	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
209	5.06	82.58	44.73	37.85	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
210	5.08	82.94	44.93	38.01	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
211	5.10	83.29	45.13	38.16	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
212	5.12	83.64	45.32	38.32	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
213	5.14	84.00	45.52	38.48	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
214	5.16	84.35	45.71	38.64	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
215	5.18	84.70	45.91	38.79	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
216	5.20	85.04	46.11	38.94	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
217	5.22	85.38	46.30	39.08	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
218	5.24	85.73	46.50	39.23	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
219	5.26	86.07	46.70	39.38	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
220	5.28	86.42	46.89	39.53	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
221	5.30	86.77	47.09	39.68	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
222	5.32	87.11	47.28	39.83	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
223	5.34	87.46	47.48	39.98	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
224	5.36	87.80	47.68	40.13	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
225	5.38	88.15	47.87	40.28	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
226	5.40	88.50	48.07	40.43	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
227	5.42	88.85	48.27	40.58	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
228	5.44	89.19	48.46	40.73	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
229	5.46	89.54	48.66	40.88	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
230	5.48	89.88	48.85	41.03	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
231	5.50	90.23	49.05	41.18	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
232	5.52	90.58	49.25	41.33	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
233	5.54	90.92	49.44	41.48	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
234	5.56	91.27	49.64	41.63	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
235	5.58	91.61	49.83	41.78	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
236	5.60	91.96	50.03	41.92	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
237	5.62	92.30	50.23	42.07	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
238	5.64	92.63	50.42	42.21	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
239	5.66	92.97	50.62	42.35	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
240	5.68	93.29	50.82	42.48	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	93.62	51.01	42.61	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
242	5.72	93.95	51.21	42.74	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
243	5.74	94.28	51.40	42.88	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
244	5.76	94.62	51.60	43.02	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
245	5.78	94.96	51.80	43.16	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
246	5.80	95.30	51.99	43.31	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
247	5.82	95.64	52.19	43.46	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
248	5.84	95.99	52.39	43.61	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
249	5.86	96.34	52.58	43.76	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
250	5.88	96.69	52.78	43.91	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
251	5.90	97.04	52.97	44.07	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
252	5.92	97.39	53.17	44.22	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
253	5.94	97.75	53.37	44.38	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
254	5.96	98.11	53.56	44.54	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
255	5.98	98.46	53.76	44.70	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
256	6.00	98.82	53.96	44.87	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
257	6.02	99.18	54.15	45.03	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
258	6.04	99.54	54.35	45.19	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
259	6.06	99.90	54.54	45.36	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
260	6.08	100.26	54.74	45.52	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
261	6.10	100.62	54.94	45.69	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
262	6.12	100.99	55.13	45.85	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
263	6.14	101.35	55.33	46.02	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
264	6.16	101.71	55.52	46.19	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
265	6.18	102.08	55.72	46.36	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
266	6.20	102.44	55.92	46.52	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
267	6.22	102.80	56.11	46.69	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
268	6.24	103.17	56.31	46.86	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
269	6.26	103.54	56.51	47.03	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
270	6.28	103.91	56.70	47.20	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
271	6.30	104.27	56.90	47.37	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
272	6.32	104.64	57.09	47.54	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
273	6.34	105.00	57.29	47.71	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
274	6.36	105.36	57.49	47.88	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
275	6.38	105.72	57.68	48.04	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
276	6.40	106.08	57.88	48.20	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
277	6.42	106.43	58.08	48.36	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
278	6.44	106.79	58.27	48.52	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
279	6.46	107.14	58.47	48.68	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
280	6.48	107.51	58.66	48.84	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
281	6.50	107.87	58.86	49.01	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
282	6.52	108.24	59.06	49.18	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
283	6.54	108.60	59.25	49.35	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
284	6.56	108.96	59.45	49.51	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
285	6.58	109.32	59.64	49.68	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
286	6.60	109.67	59.84	49.83	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
287	6.62	110.02	60.04	49.99	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
288	6.64	110.37	60.23	50.13	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
289	6.66	110.70	60.43	50.28	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
290	6.68	111.04	60.63	50.42	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
291	6.70	111.38	60.82	50.56	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
292	6.72	111.72	61.02	50.70	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
293	6.74	112.07	61.21	50.85	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
294	6.76	112.42	61.41	51.01	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
295	6.78	112.77	61.61	51.16	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
296	6.80	113.12	61.80	51.32	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
297	6.82	113.47	62.00	51.47	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
298	6.84	113.82	62.20	51.62	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
299	6.86	114.16	62.39	51.77	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
300	6.88	114.51	62.59	51.92	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
301	6.90	114.85	62.78	52.06	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
302	6.92	115.18	62.98	52.20	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
303	6.94	115.52	63.18	52.34	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
304	6.96	115.85	63.37	52.48	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
305	6.98	116.18	63.57	52.61	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
306	7.00	116.51	63.77	52.75	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
307	7.02	116.85	63.96	52.89	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
308	7.04	117.19	64.16	53.03	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
309	7.06	117.54	64.35	53.19	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
310	7.08	117.89	64.55	53.34	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
311	7.10	118.24	64.75	53.49	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
312	7.12	118.59	64.94	53.64	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
313	7.14	118.93	65.14	53.79	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
314	7.16	119.27	65.33	53.94	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
315	7.18	119.61	65.53	54.08	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
316	7.20	119.95	65.73	54.22	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
317	7.22	120.28	65.92	54.36	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
318	7.24	120.62	66.12	54.50	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
319	7.26	120.96	66.32	54.64	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
320	7.28	121.30	66.51	54.79	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
321	7.30	121.64	66.71	54.93	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
322	7.32	121.98	66.90	55.08	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
323	7.34	122.31	67.10	55.21	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
324	7.36	122.64	67.30	55.34	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
325	7.38	122.97	67.49	55.48	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
326	7.40	123.30	67.69	55.61	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
327	7.42	123.63	67.89	55.74	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
328	7.44	123.96	68.08	55.88	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
329	7.46	124.29	68.28	56.01	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
330	7.48	124.61	68.47	56.14	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
331	7.50	124.94	68.67	56.27	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
332	7.52	125.27	68.87	56.41	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
333	7.54	125.60	69.06	56.54	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
334	7.56	125.93	69.26	56.67	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
335	7.58	126.26	69.45	56.80	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
336	7.60	126.59	69.65	56.94	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	126.92	69.85	57.07	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
338	7.64	127.26	70.04	57.21	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
339	7.66	127.59	70.24	57.35	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
340	7.68	127.92	70.44	57.49	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
341	7.70	128.25	70.63	57.62	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
342	7.72	128.58	70.83	57.76	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
343	7.74	128.91	71.02	57.89	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
344	7.76	129.25	71.22	58.03	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
345	7.78	129.58	71.42	58.16	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
346	7.80	129.91	71.61	58.30	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
347	7.82	130.23	71.81	58.43	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
348	7.84	130.56	72.01	58.55	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
349	7.86	130.88	72.20	58.68	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
350	7.88	131.21	72.40	58.81	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
351	7.90	131.54	72.59	58.95	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
352	7.92	131.88	72.79	59.09	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
353	7.94	132.21	72.99	59.23	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
354	7.96	132.55	73.18	59.36	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
355	7.98	132.88	73.38	59.50	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
356	8.00	133.21	73.58	59.63	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
357	8.02	133.53	73.77	59.76	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
358	8.04	133.85	73.97	59.89	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
359	8.06	134.17	74.16	60.01	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
360	8.08	134.50	74.36	60.14	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
361	8.10	134.82	74.56	60.26	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
362	8.12	135.14	74.75	60.39	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
363	8.14	135.46	74.95	60.52	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
364	8.16	135.79	75.14	60.64	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
365	8.18	136.12	75.34	60.78	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
366	8.20	136.45	75.54	60.91	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
367	8.22	136.78	75.73	61.05	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
368	8.24	137.12	75.93	61.19	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
369	8.26	137.45	76.13	61.32	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
370	8.28	137.78	76.32	61.46	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
371	8.30	138.11	76.52	61.59	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
372	8.32	138.44	76.71	61.72	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
373	8.34	138.77	76.91	61.86	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
374	8.36	139.10	77.11	61.99	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
375	8.38	139.43	77.30	62.13	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
376	8.40	139.76	77.50	62.27	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
377	8.42	140.10	77.70	62.40	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
378	8.44	140.44	77.89	62.54	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
379	8.46	140.78	78.09	62.69	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
380	8.48	141.13	78.28	62.85	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
381	8.50	141.49	78.48	63.01	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
382	8.52	141.85	78.68	63.18	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
383	8.54	142.22	78.87	63.35	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
384	8.56	142.60	79.07	63.53	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	142.97	79.26	63.70	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
386	8.60	143.34	79.46	63.88	0.93	0.136	1.38	0.098	1.00	1.00	2.000	Yes
387	8.62	143.72	79.66	64.06	0.93	0.135	1.38	0.098	1.00	1.00	2.000	Yes
388	8.64	144.10	79.85	64.24	0.93	0.135	1.38	0.098	1.00	1.00	2.000	Yes
389	8.66	144.47	80.05	64.42	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
390	8.68	144.85	80.25	64.60	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
391	8.70	145.23	80.44	64.78	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
392	8.72	145.60	80.64	64.97	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
393	8.74	145.98	80.83	65.15	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
394	8.76	146.36	81.03	65.33	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
395	8.78	146.74	81.23	65.51	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
396	8.80	147.12	81.42	65.69	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
397	8.82	147.50	81.62	65.88	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
398	8.84	147.88	81.82	66.06	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
399	8.86	148.26	82.01	66.25	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
400	8.88	148.64	82.21	66.43	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
401	8.90	149.03	82.40	66.62	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
402	8.92	149.41	82.60	66.81	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
403	8.94	149.80	82.80	67.00	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
404	8.96	150.19	82.99	67.20	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
405	8.98	150.58	83.19	67.40	0.92	0.134	1.38	0.097	1.00	1.00	0.097	No
406	9.00	150.98	83.39	67.60	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
407	9.02	151.38	83.58	67.80	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
408	9.04	151.78	83.78	68.00	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
409	9.06	152.18	83.97	68.20	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
410	9.08	152.58	84.17	68.41	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
411	9.10	152.98	84.37	68.61	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
412	9.12	153.37	84.56	68.81	0.92	0.133	1.38	0.097	1.00	1.00	2.000	Yes
413	9.14	153.77	84.76	69.01	0.92	0.133	1.38	0.097	1.00	1.00	2.000	Yes
414	9.16	154.17	84.95	69.22	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
415	9.18	154.57	85.15	69.42	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
416	9.20	154.96	85.35	69.62	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
417	9.22	155.36	85.54	69.82	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
418	9.24	155.76	85.74	70.02	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
419	9.26	156.15	85.94	70.22	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
420	9.28	156.55	86.13	70.41	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
421	9.30	156.94	86.33	70.61	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
422	9.32	157.33	86.52	70.81	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
423	9.34	157.73	86.72	71.01	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
424	9.36	158.13	86.92	71.21	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
425	9.38	158.53	87.11	71.42	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
426	9.40	158.93	87.31	71.63	0.92	0.132	1.38	0.096	1.00	1.00	0.096	No
427	9.42	159.35	87.51	71.84	0.92	0.132	1.38	0.096	1.00	1.00	0.096	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.30	3.06	1.54	1.00	5.65	9.86	55.69	0.270	No	Yes	2.00
2	0.92	0.41	2.91	1.35	0.96	7.87	7.30	57.42	0.375	No	Yes	2.00
3	0.94	0.56	2.76	1.18	0.91	10.79	5.36	57.79	0.515	No	Yes	2.00
4	0.96	0.70	2.65	1.06	0.86	13.57	7.38	100.16	0.156	No	No	2.00
5	0.98	0.74	2.61	0.98	0.85	14.31	5.85	83.66	0.121	No	No	1.71
6	1.00	0.70	2.65	1.04	0.86	13.48	7.30	98.42	0.152	No	No	2.00
7	1.02	0.71	2.65	1.08	0.86	13.76	7.27	100.03	0.156	No	No	2.00
8	1.04	0.75	2.62	1.06	0.85	14.47	6.33	91.60	0.136	No	No	1.87
9	1.06	0.82	2.60	1.12	0.84	15.98	5.35	85.56	0.138	No	No	1.88
10	1.08	0.89	2.58	1.18	0.84	17.25	4.74	81.84	0.131	No	No	1.77
11	1.10	0.92	2.58	1.26	0.84	17.94	4.75	85.18	0.137	No	No	1.84
12	1.12	0.88	2.70	1.97	0.88	17.02	4.74	80.70	0.812	No	Yes	2.00
13	1.14	0.75	2.82	2.53	0.93	14.43	6.15	88.75	0.688	No	Yes	2.00
14	1.16	0.61	2.97	3.40	0.99	11.79	8.28	97.64	0.563	No	Yes	2.00
15	1.18	0.57	2.98	3.18	0.99	10.92	8.45	92.20	0.521	No	Yes	2.00
16	1.20	0.58	2.99	3.38	0.99	11.17	8.57	95.75	0.533	No	Yes	2.00
17	1.22	0.62	2.97	3.43	0.99	11.90	8.26	98.35	0.568	No	Yes	2.00
18	1.24	0.66	2.95	3.39	0.98	12.62	7.89	99.57	0.602	No	Yes	2.00
19	1.26	0.68	2.94	3.52	0.98	13.04	7.87	102.61	0.622	No	Yes	2.00
20	1.28	0.67	2.97	3.90	0.99	12.93	8.35	107.92	0.617	No	Yes	2.00
21	1.30	0.67	3.01	4.32	1.00	12.76	8.87	113.19	0.608	No	Yes	2.00
22	1.32	0.66	3.04	4.75	1.00	12.55	9.43	118.31	0.599	No	Yes	2.00
23	1.34	0.64	3.07	5.24	1.00	12.25	10.07	123.33	0.584	No	Yes	2.00
24	1.36	0.62	3.11	5.81	1.00	11.83	10.85	128.28	0.564	No	Yes	2.00
25	1.38	0.61	3.14	6.21	1.00	11.55	11.39	131.51	0.551	No	Yes	2.00
26	1.40	0.61	3.13	6.17	1.00	11.65	11.28	131.49	0.556	No	Yes	2.00
27	1.42	0.63	3.11	5.86	1.00	12.07	10.76	129.93	0.576	No	Yes	2.00
28	1.44	0.66	3.07	5.50	1.00	12.64	10.12	127.92	0.603	No	Yes	2.00
29	1.46	0.70	3.04	5.20	1.00	13.38	9.49	126.89	0.638	No	Yes	2.00
30	1.48	0.74	3.00	4.89	1.00	14.19	8.84	125.42	0.677	No	Yes	2.00
31	1.50	0.79	2.96	4.58	0.98	15.23	8.15	124.10	0.727	No	Yes	2.00
32	1.52	0.86	2.92	4.31	0.97	16.58	7.45	123.47	0.791	No	Yes	2.00
33	1.54	0.94	2.87	4.08	0.95	18.05	6.81	122.98	0.861	No	Yes	2.00
34	1.56	1.05	2.81	3.70	0.93	20.33	5.92	120.39	0.970	No	Yes	2.00
35	1.58	1.15	2.75	3.40	0.90	22.28	5.27	117.45	1.063	No	Yes	2.00
36	1.60	1.24	2.71	3.24	0.89	23.93	4.86	116.29	1.141	No	Yes	2.00
37	1.62	1.25	2.72	3.34	0.89	24.23	4.91	118.84	1.156	No	Yes	2.00
38	1.64	1.26	2.73	3.46	0.90	24.40	4.99	121.73	1.164	No	Yes	2.00
39	1.66	1.28	2.72	3.51	0.90	24.79	4.97	123.31	1.183	No	Yes	2.00
40	1.68	1.32	2.71	3.47	0.89	25.48	4.84	123.26	1.216	No	Yes	2.00
41	1.70	1.34	2.70	3.44	0.89	26.00	4.74	123.23	1.240	No	Yes	2.00
42	1.72	1.36	2.69	3.39	0.88	26.42	9.82	259.38	3.600	No	No	2.00
43	1.74	1.38	2.69	3.34	0.88	26.73	9.31	248.90	3.600	No	No	2.00
44	1.76	1.39	2.68	3.26	0.88	26.92	8.79	236.70	3.600	No	No	2.00
45	1.78	1.37	2.68	3.21	0.88	26.51	8.87	235.23	3.600	No	No	2.00
46	1.80	1.33	2.69	3.23	0.88	25.64	9.61	246.48	3.600	No	No	2.00
47	1.82	1.29	2.70	3.25	0.89	24.91	4.72	117.72	1.188	No	Yes	2.00
48	1.84	1.27	2.68	2.94	0.88	24.45	8.99	219.95	3.600	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	1.32	2.65	2.83	0.87	25.55	7.68	196.25	0.705	No	No	2.00
50	1.88	1.33	2.65	2.81	0.87	25.65	7.54	193.51	0.679	No	No	2.00
51	1.90	1.32	2.68	3.09	0.88	25.53	8.96	228.71	3.600	No	No	2.00
52	1.92	1.25	2.70	3.11	0.89	24.08	4.72	113.61	1.148	No	Yes	2.00
53	1.94	1.21	2.70	3.02	0.89	23.35	4.74	110.70	1.114	No	Yes	2.00
54	1.96	1.18	2.71	2.97	0.89	22.74	4.79	108.94	1.085	No	Yes	2.00
55	1.98	1.15	2.72	3.01	0.89	22.17	4.92	109.02	1.058	No	Yes	2.00
56	2.00	1.13	2.73	3.03	0.90	21.62	5.03	108.86	1.031	No	Yes	2.00
57	2.02	1.11	2.73	2.95	0.90	21.31	5.00	106.57	1.017	No	Yes	2.00
58	2.04	1.12	2.70	2.69	0.89	21.40	4.72	101.12	1.021	No	Yes	2.00
59	2.06	1.14	2.67	2.42	0.87	21.88	8.24	180.26	0.562	No	No	2.00
60	2.08	1.17	2.63	2.18	0.86	22.52	6.52	146.78	0.337	No	No	2.00
61	2.10	1.20	2.60	2.01	0.85	23.07	5.41	124.79	0.235	No	No	2.00
62	2.12	1.22	2.58	1.93	0.84	23.49	4.84	113.69	0.217	No	No	2.00
63	2.14	1.24	2.58	1.92	0.84	23.77	4.70	111.72	0.210	No	No	2.00
64	2.16	1.23	2.60	2.08	0.85	23.56	5.45	128.47	0.249	No	No	2.00
65	2.18	1.19	2.64	2.29	0.86	22.81	6.86	156.41	0.392	No	No	2.00
66	2.20	1.14	2.68	2.55	0.88	21.77	9.06	197.25	0.714	No	No	2.00
67	2.22	1.09	2.71	2.70	0.89	20.82	4.84	100.72	0.993	No	Yes	2.00
68	2.24	1.06	2.73	2.79	0.90	20.33	5.02	102.04	0.970	No	Yes	2.00
69	2.26	1.05	2.73	2.80	0.90	20.05	5.08	101.96	0.956	No	Yes	2.00
70	2.28	1.05	2.72	2.67	0.90	20.09	4.94	99.17	0.958	No	Yes	2.00
71	2.30	1.05	2.71	2.53	0.89	20.07	4.79	96.21	0.957	No	Yes	2.00
72	2.32	1.06	2.68	2.33	0.88	20.29	9.17	186.04	0.611	No	No	2.00
73	2.34	1.12	2.64	2.11	0.86	21.36	6.94	148.28	0.345	No	No	2.00
74	2.36	1.19	2.58	1.86	0.84	22.84	4.88	111.44	0.209	No	No	2.00
75	2.38	1.27	2.55	1.76	0.83	24.24	3.86	93.67	0.156	No	No	1.71
76	2.40	1.29	2.55	1.81	0.83	24.79	3.86	95.58	0.161	No	No	1.76
77	2.42	1.30	2.56	1.88	0.83	25.00	4.04	101.07	0.176	No	No	1.92
78	2.44	1.31	2.55	1.86	0.83	25.03	3.93	98.35	0.168	No	No	1.83
79	2.46	1.30	2.54	1.78	0.83	24.89	3.70	92.12	0.153	No	No	1.66
80	2.48	1.29	2.54	1.72	0.83	24.72	3.55	87.84	0.143	No	No	1.55
81	2.50	1.27	2.53	1.63	0.82	24.30	3.41	82.90	0.133	No	No	1.44
82	2.52	1.25	2.52	1.52	0.82	23.97	3.14	75.21	0.120	No	No	1.29
83	2.54	1.24	2.50	1.38	0.81	23.66	2.97	70.29	0.112	No	No	1.21
84	2.56	1.23	2.49	1.31	0.81	23.51	2.90	68.20	0.110	No	No	1.18
85	2.58	1.22	2.49	1.28	0.81	23.31	2.88	67.24	0.108	No	No	1.17
86	2.60	1.21	2.49	1.29	0.81	23.00	2.93	67.50	0.109	No	No	1.17
87	2.62	1.19	2.50	1.30	0.81	22.75	2.97	67.54	0.109	No	No	1.17
88	2.64	1.18	2.50	1.30	0.81	22.51	2.87	64.51	0.105	No	No	1.13
89	2.66	1.17	2.50	1.29	0.81	22.30	2.89	64.36	0.105	No	No	1.12
90	2.68	1.17	2.51	1.29	0.82	22.22	2.91	64.76	0.105	No	No	1.13
91	2.70	1.17	2.51	1.29	0.82	22.19	2.91	64.63	0.105	No	No	1.12
92	2.72	1.17	2.50	1.27	0.81	22.15	2.87	63.54	0.104	No	No	1.11
93	2.74	1.15	2.51	1.27	0.82	21.90	2.94	64.38	0.105	No	No	1.12
94	2.76	1.14	2.51	1.25	0.82	21.61	2.98	64.38	0.105	No	No	1.11
95	2.78	1.14	2.50	1.22	0.81	21.62	2.87	61.93	0.102	No	No	1.08
96	2.80	1.17	2.48	1.17	0.81	22.27	2.86	63.73	0.104	No	No	1.10

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	1.23	2.45	1.10	0.79	23.47	2.65	62.19	0.102	No	No	1.08
98	2.84	1.30	2.42	1.06	0.78	24.85	2.48	61.76	0.102	No	No	1.08
99	2.86	1.36	2.41	1.09	0.78	25.91	2.43	62.93	0.103	No	No	1.09
100	2.88	1.40	2.41	1.16	0.78	26.71	2.45	65.41	0.106	No	No	1.12
101	2.90	1.42	2.43	1.25	0.79	27.02	2.52	68.05	0.109	No	No	1.15
102	2.92	1.41	2.44	1.31	0.79	26.85	2.60	69.76	0.112	No	No	1.17
103	2.94	1.37	2.47	1.41	0.80	26.18	2.76	72.19	0.115	No	No	1.21
104	2.96	1.35	2.48	1.43	0.81	25.66	2.83	72.67	0.116	No	No	1.22
105	2.98	1.35	2.47	1.39	0.80	25.67	2.79	71.58	0.114	No	No	1.20
106	3.00	1.36	2.45	1.31	0.80	25.94	2.68	69.42	0.111	No	No	1.16
107	3.02	1.37	2.45	1.28	0.79	26.00	2.63	68.49	0.110	No	No	1.15
108	3.04	1.36	2.45	1.29	0.80	25.86	2.66	68.70	0.110	No	No	1.15
109	3.06	1.49	2.35	0.98	0.76	28.53	2.14	61.02	0.101	No	No	1.06
110	3.08	1.62	2.30	0.88	0.74	30.95	1.91	59.04	0.099	No	No	1.03
111	3.10	1.71	2.26	0.81	0.72	32.75	1.78	58.20	0.098	No	No	1.03
112	3.12	1.63	2.35	1.13	0.76	31.10	2.14	66.54	0.107	No	No	1.12
113	3.14	1.53	2.43	1.40	0.79	29.25	2.51	73.49	0.117	No	No	1.22
114	3.16	1.46	2.48	1.63	0.81	27.82	2.85	79.27	0.126	No	No	1.31
115	3.18	1.45	2.48	1.60	0.81	27.61	2.83	78.23	0.125	No	No	1.29
116	3.20	1.46	2.46	1.47	0.80	27.72	2.70	74.83	0.119	No	No	1.24
117	3.22	1.48	2.42	1.31	0.79	28.18	2.50	70.40	0.112	No	No	1.17
118	3.24	1.50	2.40	1.24	0.78	28.51	2.40	68.38	0.110	No	No	1.14
119	3.26	1.53	2.39	1.19	0.77	29.22	2.31	67.38	0.108	No	No	1.12
120	3.28	1.54	2.40	1.25	0.78	29.34	2.35	69.05	4.000	Yes	No	2.00
121	3.30	1.48	2.43	1.35	0.79	28.17	2.54	71.62	4.000	Yes	No	2.00
122	3.32	1.38	2.50	1.61	0.81	26.14	2.98	77.86	4.000	Yes	No	2.00
123	3.34	1.30	2.52	1.62	0.82	24.64	3.26	80.32	4.000	Yes	No	2.00
124	3.36	1.28	2.51	1.48	0.82	24.29	2.93	71.07	0.113	No	No	1.17
125	3.38	1.32	2.45	1.21	0.79	24.99	2.64	65.91	0.107	No	No	1.10
126	3.40	1.33	2.44	1.20	0.79	25.26	2.60	65.72	0.106	No	No	1.10
127	3.42	1.33	2.46	1.28	0.80	25.20	2.70	68.03	0.109	No	No	1.12
128	3.44	1.33	2.47	1.34	0.80	25.21	2.77	69.94	0.112	No	No	1.15
129	3.46	1.39	2.44	1.27	0.79	26.31	2.59	68.20	0.110	No	No	1.13
130	3.48	1.49	2.39	1.17	0.77	28.40	2.33	66.25	0.107	No	No	1.10
131	3.50	1.66	2.33	1.04	0.75	31.63	2.02	64.02	0.104	No	No	1.07
132	3.52	1.99	2.23	0.93	0.71	38.24	1.70	64.85	0.105	No	No	1.08
133	3.54	2.17	2.20	0.91	0.70	41.65	1.60	66.74	4.000	Yes	No	2.00
134	3.56	2.13	2.25	1.10	0.72	40.85	1.74	71.08	4.000	Yes	No	2.00
135	3.58	1.78	2.39	1.49	0.77	33.98	2.31	78.38	4.000	Yes	No	2.00
136	3.60	1.48	2.53	2.01	0.83	28.14	3.43	96.55	4.000	Yes	No	2.00
137	3.62	1.37	2.57	2.08	0.84	25.88	4.42	114.31	4.000	Yes	No	2.00
138	3.64	1.50	2.48	1.71	0.81	28.50	2.87	81.91	4.000	Yes	No	2.00
139	3.66	1.96	2.27	1.08	0.73	37.52	1.83	68.54	4.000	Yes	No	2.00
140	3.68	2.60	2.10	0.80	0.66	50.13	1.41	70.83	4.000	Yes	No	2.00
141	3.70	3.17	1.99	0.69	0.62	61.34	1.30	79.61	4.000	Yes	No	2.00
142	3.72	3.48	1.97	0.74	0.61	67.42	1.28	86.51	0.140	No	No	1.43
143	3.74	3.45	2.00	0.82	0.62	66.98	1.30	87.32	0.142	No	No	1.45
144	3.76	3.20	2.06	0.95	0.65	61.93	1.37	84.67	0.136	No	No	1.39

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	2.82	2.12	1.00	0.67	54.54	1.45	79.05	0.126	No	No	1.28
146	3.80	2.49	2.16	0.98	0.69	47.93	1.52	73.04	0.116	No	No	1.18
147	3.82	2.27	2.18	0.94	0.70	43.58	1.58	68.69	0.110	No	No	1.12
148	3.84	2.12	2.21	0.94	0.71	40.66	1.64	66.80	0.108	No	No	1.10
149	3.86	2.03	2.23	0.97	0.72	38.94	1.71	66.41	0.107	No	No	1.09
150	3.88	2.08	2.20	0.87	0.70	39.85	1.61	64.19	0.105	No	No	1.06
151	3.90	2.25	2.15	0.80	0.68	43.22	1.51	65.15	0.106	No	No	1.07
152	3.92	2.41	2.14	0.86	0.68	46.26	1.49	69.01	0.111	No	No	1.12
153	3.94	2.42	2.17	0.98	0.69	46.43	1.55	71.99	0.115	No	No	1.16
154	3.96	2.35	2.21	1.10	0.71	45.13	1.64	74.09	0.118	No	No	1.20
155	3.98	2.41	2.20	1.07	0.70	46.22	1.60	74.09	0.118	No	No	1.20
156	4.00	2.51	2.16	0.97	0.69	48.30	1.52	73.25	0.117	No	No	1.18
157	4.02	2.54	2.13	0.88	0.68	48.77	1.46	71.32	0.114	No	No	1.15
158	4.04	2.36	2.16	0.89	0.69	45.35	1.52	68.88	0.110	No	No	1.12
159	4.06	2.13	2.23	1.02	0.71	40.69	1.69	68.88	0.110	No	No	1.12
160	4.08	2.04	2.26	1.07	0.72	38.94	1.77	69.06	0.111	No	No	1.12
161	4.10	2.18	2.20	0.93	0.70	41.68	1.61	67.03	0.108	No	No	1.09
162	4.12	2.40	2.10	0.72	0.67	46.09	1.42	65.51	0.106	No	No	1.07
163	4.14	2.56	2.07	0.70	0.65	49.13	1.38	67.81	0.109	No	No	1.10
164	4.16	2.59	2.08	0.73	0.66	49.86	1.39	69.21	0.111	No	No	1.12
165	4.18	2.65	2.08	0.78	0.66	50.89	1.40	71.05	0.113	No	No	1.15
166	4.20	2.85	2.03	0.70	0.64	54.95	1.34	73.39	0.117	No	No	1.18
167	4.22	3.09	1.98	0.63	0.62	59.69	1.29	77.02	0.122	No	No	1.24
168	4.24	3.38	1.93	0.58	0.60	65.39	1.25	82.00	0.131	No	No	1.33
169	4.26	3.50	1.93	0.63	0.60	67.72	1.26	85.11	0.137	No	No	1.39
170	4.28	3.37	1.96	0.69	0.61	65.09	1.28	83.32	0.134	No	No	1.35
171	4.30	3.19	2.01	0.76	0.63	61.57	1.31	80.94	0.129	No	No	1.30
172	4.32	3.03	2.05	0.82	0.65	58.51	1.35	78.98	0.126	No	No	1.27
173	4.34	3.17	2.04	0.86	0.64	61.11	1.35	82.20	0.132	No	No	1.33
174	4.36	3.39	2.03	0.89	0.64	65.46	1.33	87.04	0.141	No	No	1.42
175	4.38	3.62	1.99	0.83	0.62	70.15	1.30	90.86	0.150	No	No	1.51
176	4.40	3.81	1.97	0.83	0.62	73.87	1.28	94.66	0.159	No	No	1.60
177	4.42	3.88	1.98	0.91	0.62	75.26	1.29	97.24	0.166	No	No	1.67
178	4.44	3.93	2.01	1.04	0.63	76.08	1.32	100.31	0.174	No	No	1.75
179	4.46	3.94	2.04	1.13	0.64	76.28	1.34	102.17	0.179	No	No	1.81
180	4.48	3.82	2.05	1.13	0.65	74.06	1.35	100.01	0.173	No	No	1.74
181	4.50	3.63	2.06	1.13	0.65	70.19	1.37	96.20	0.163	No	No	1.64
182	4.52	3.35	2.09	1.11	0.66	64.74	1.40	90.61	0.149	No	No	1.50
183	4.54	3.25	2.11	1.17	0.67	62.73	1.44	90.07	0.148	No	No	1.49
184	4.56	3.34	2.11	1.23	0.67	64.46	1.44	92.86	0.154	No	No	1.56
185	4.58	3.54	2.10	1.25	0.67	68.41	1.42	96.95	0.165	No	No	1.66
186	4.60	3.59	2.10	1.27	0.67	69.41	1.42	98.32	0.168	No	No	1.70
187	4.62	3.53	2.11	1.30	0.67	68.15	1.44	97.83	0.167	No	No	1.68
188	4.64	3.46	2.12	1.31	0.68	66.76	1.45	96.86	0.165	No	No	1.66
189	4.66	3.52	2.08	1.17	0.66	67.98	1.40	94.84	0.159	No	No	1.61
190	4.68	3.63	2.02	0.94	0.64	69.10	1.33	91.63	0.152	No	No	1.53
191	4.70	3.74	1.97	0.78	0.62	69.65	1.28	89.40	0.146	No	No	1.48
192	4.72	3.87	1.93	0.69	0.61	70.93	1.26	89.34	0.146	No	No	1.47

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	3.80	1.94	0.69	0.61	69.56	1.26	87.92	0.143	No	No	1.44
194	4.76	3.42	2.00	0.76	0.63	63.60	1.30	82.96	0.133	No	No	1.34
195	4.78	2.80	2.08	0.84	0.66	53.46	1.40	74.71	0.119	No	No	1.20
196	4.80	2.21	2.24	1.12	0.72	42.08	1.72	72.47	0.115	No	No	1.16
197	4.82	1.93	2.36	1.46	0.77	36.64	2.16	78.96	0.126	No	No	1.27
198	4.84	2.08	2.34	1.53	0.76	39.55	2.09	82.58	0.132	No	No	1.33
199	4.86	2.40	2.23	1.21	0.72	45.76	1.70	77.57	0.123	No	No	1.24
200	4.88	2.56	2.18	1.10	0.70	48.93	1.57	76.94	0.122	No	No	1.23
201	4.90	2.37	2.26	1.32	0.73	45.21	1.77	80.02	0.128	No	No	1.28
202	4.92	2.03	2.39	1.80	0.78	38.47	2.34	89.91	0.148	No	No	1.48
203	4.94	1.82	2.48	2.17	0.81	34.35	2.86	98.18	0.168	No	No	1.69
204	4.96	1.88	2.44	1.95	0.80	35.56	2.61	92.78	0.154	No	No	1.55
205	4.98	2.13	2.36	1.66	0.77	40.37	2.16	87.08	0.141	No	No	1.42
206	5.00	2.29	2.30	1.47	0.74	43.61	1.91	83.43	0.134	No	No	1.35
207	5.02	2.24	2.33	1.63	0.76	42.55	2.05	87.33	0.142	No	No	1.43
208	5.04	2.10	2.39	1.88	0.78	39.86	2.34	93.31	0.156	No	No	1.56
209	5.06	2.14	2.40	1.98	0.78	40.53	2.38	96.54	0.164	No	No	1.65
210	5.08	2.36	2.34	1.82	0.76	44.92	2.11	94.65	0.159	No	No	1.60
211	5.10	2.77	2.25	1.61	0.73	53.09	1.77	93.79	0.157	No	No	1.58
212	5.12	3.19	2.16	1.31	0.69	60.02	1.52	91.11	0.150	No	No	1.51
213	5.14	3.50	2.10	1.16	0.67	64.42	1.42	91.38	0.151	No	No	1.52
214	5.16	3.52	2.08	1.05	0.66	64.21	1.39	88.94	0.145	No	No	1.46
215	5.18	3.14	2.12	1.06	0.68	57.67	1.44	83.22	0.134	No	No	1.34
216	5.20	2.75	2.16	1.06	0.69	50.89	1.52	77.32	0.123	No	No	1.24
217	5.22	2.47	2.19	1.05	0.70	46.00	1.59	73.31	0.117	No	No	1.17
218	5.24	2.42	2.22	1.17	0.72	45.55	1.67	76.17	0.121	No	No	1.22
219	5.26	2.33	2.27	1.35	0.73	44.23	1.82	80.41	0.128	No	No	1.29
220	5.28	2.24	2.32	1.55	0.75	42.41	2.01	85.12	0.137	No	No	1.38
221	5.30	2.25	2.32	1.57	0.75	42.62	2.01	85.84	0.139	No	No	1.40
222	5.32	2.22	2.33	1.57	0.76	42.11	2.03	85.49	0.138	No	No	1.39
223	5.34	2.14	2.35	1.61	0.76	40.56	2.11	85.67	0.138	No	No	1.39
224	5.36	2.15	2.33	1.53	0.76	40.77	2.05	83.56	0.134	No	No	1.35
225	5.38	2.40	2.28	1.45	0.74	45.11	1.86	83.86	0.135	No	No	1.35
226	5.40	2.89	2.17	1.15	0.70	52.50	1.54	81.04	0.129	No	No	1.30
227	5.42	3.20	2.11	1.04	0.68	56.92	1.44	81.91	0.131	No	No	1.32
228	5.44	3.23	2.09	0.95	0.67	56.98	1.41	80.07	0.128	No	No	1.28
229	5.46	3.00	2.13	1.00	0.68	53.26	1.46	77.84	0.124	No	No	1.24
230	5.48	2.82	2.16	1.05	0.69	50.45	1.52	76.82	0.122	No	No	1.23
231	5.50	2.88	2.17	1.11	0.70	51.52	1.54	79.19	0.126	No	No	1.27
232	5.52	2.94	2.15	1.06	0.69	52.13	1.51	78.47	0.125	No	No	1.26
233	5.54	2.91	2.16	1.11	0.69	51.70	1.53	79.20	4.000	Yes	No	2.00
234	5.56	2.63	2.21	1.16	0.71	47.18	1.64	77.16	4.000	Yes	No	2.00
235	5.58	2.30	2.29	1.36	0.74	42.04	1.89	79.37	4.000	Yes	No	2.00
236	5.60	1.79	2.42	1.70	0.79	33.61	2.51	84.24	4.000	Yes	No	2.00
237	5.62	1.34	2.63	2.47	0.87	24.63	6.57	161.88	4.000	Yes	No	2.00
238	5.64	0.99	2.83	3.34	0.95	17.65	6.18	109.04	4.000	Yes	Yes	2.00
239	5.66	0.90	2.85	3.19	0.96	15.91	6.49	103.28	4.000	Yes	Yes	2.00
240	5.68	0.90	2.77	2.38	0.93	15.94	5.52	88.03	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.95	2.71	2.00	0.90	16.89	4.80	81.16	4.000	Yes	Yes	2.00
242	5.72	1.13	2.62	1.84	0.87	20.37	6.21	126.55	4.000	Yes	No	2.00
243	5.74	1.32	2.55	1.75	0.84	24.25	3.85	93.30	4.000	Yes	No	2.00
244	5.76	1.59	2.45	1.57	0.81	29.48	2.66	78.46	4.000	Yes	No	2.00
245	5.78	1.91	2.36	1.40	0.77	34.72	2.19	76.10	4.000	Yes	No	2.00
246	5.80	2.32	2.28	1.27	0.74	41.21	1.85	76.09	4.000	Yes	No	2.00
247	5.82	2.62	2.23	1.22	0.72	45.84	1.70	77.72	4.000	Yes	No	2.00
248	5.84	2.63	2.24	1.29	0.73	46.19	1.73	79.84	0.127	No	No	1.28
249	5.86	2.41	2.31	1.51	0.75	42.96	1.96	84.23	0.136	No	No	1.36
250	5.88	2.12	2.40	1.87	0.79	38.59	2.39	92.19	0.153	No	No	1.53
251	5.90	2.12	2.42	1.97	0.79	38.69	2.46	95.30	0.160	No	No	1.61
252	5.92	2.54	2.32	1.69	0.76	45.14	2.01	90.82	0.150	No	No	1.50
253	5.94	3.07	2.23	1.47	0.72	53.17	1.69	89.87	0.147	No	No	1.48
254	5.96	3.35	2.20	1.45	0.71	57.58	1.61	92.78	0.154	No	No	1.55
255	5.98	3.32	2.21	1.49	0.71	57.04	1.63	93.22	0.155	No	No	1.56
256	6.00	3.36	2.20	1.45	0.71	57.38	1.61	92.37	0.153	No	No	1.54
257	6.02	3.60	2.17	1.39	0.70	60.79	1.54	93.55	0.156	No	No	1.57
258	6.04	3.94	2.12	1.30	0.68	65.73	1.45	95.61	0.161	No	No	1.62
259	6.06	4.25	2.09	1.24	0.67	70.10	1.40	98.26	0.168	No	No	1.69
260	6.08	4.56	2.04	1.11	0.65	74.04	1.35	99.59	0.172	No	No	1.73
261	6.10	5.03	1.98	0.99	0.63	80.25	1.29	103.75	0.184	No	No	1.85
262	6.12	5.54	1.93	0.90	0.61	86.93	1.26	109.19	0.201	No	No	2.00
263	6.14	5.94	1.90	0.85	0.59	92.16	1.23	113.71	0.217	No	No	2.00
264	6.16	6.13	1.88	0.82	0.59	94.32	1.22	115.18	0.222	No	No	2.00
265	6.18	6.35	1.85	0.76	0.58	96.83	1.20	116.14	0.226	No	No	2.00
266	6.20	6.65	1.81	0.70	0.56	100.20	1.17	117.00	0.229	No	No	2.00
267	6.22	7.07	1.78	0.66	0.55	105.42	1.13	119.29	0.238	No	No	2.00
268	6.24	7.53	1.78	0.70	0.55	112.04	1.12	126.01	0.266	No	No	2.00
269	6.26	8.08	1.75	0.70	0.54	119.22	1.09	129.86	0.284	No	No	2.00
270	6.28	8.74	1.71	0.65	0.53	127.31	1.01	128.89	0.279	No	No	2.00
271	6.30	9.78	1.62	0.52	0.49	138.70	1.00	138.70	0.328	No	No	2.00
272	6.32	10.50	1.56	0.43	0.47	146.20	1.00	146.20	0.371	No	No	2.00
273	6.34	10.66	1.54	0.41	0.46	147.40	1.00	147.40	0.378	No	No	2.00
274	6.36	9.85	1.57	0.40	0.47	136.90	1.00	136.90	0.319	No	No	2.00
275	6.38	8.75	1.61	0.40	0.49	122.63	1.00	122.63	0.252	No	No	2.00
276	6.40	7.49	1.68	0.43	0.51	106.66	1.00	106.66	0.193	No	No	1.94
277	6.42	5.77	1.84	0.60	0.57	85.42	1.19	101.53	4.000	Yes	No	2.00
278	6.44	4.22	2.06	1.01	0.66	65.83	1.36	89.58	4.000	Yes	No	2.00
279	6.46	3.13	2.26	1.54	0.73	51.01	1.77	90.43	4.000	Yes	No	2.00
280	6.48	2.67	2.41	2.36	0.79	45.14	2.45	110.70	4.000	Yes	No	2.00
281	6.50	2.35	2.54	3.23	0.84	40.84	3.64	148.62	4.000	Yes	No	2.00
282	6.52	1.96	2.69	4.53	0.90	34.98	9.48	331.62	4.000	Yes	No	2.00
283	6.54	1.65	2.78	5.17	0.93	29.68	5.61	166.45	4.000	Yes	Yes	2.00
284	6.56	1.41	2.85	5.52	0.96	25.48	6.47	164.79	4.000	Yes	Yes	2.00
285	6.58	1.24	2.89	5.63	0.98	22.38	7.12	159.45	4.000	Yes	Yes	2.00
286	6.60	1.20	2.87	5.04	0.97	21.49	6.85	147.14	1.025	No	Yes	2.00
287	6.62	1.18	2.83	4.21	0.95	20.82	6.29	130.97	0.993	No	Yes	2.00
288	6.64	1.17	2.78	3.34	0.93	20.24	5.59	113.23	0.966	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	1.19	2.73	2.78	0.92	20.19	5.04	101.74	0.963	No	Yes	2.00
290	6.68	1.23	2.68	2.36	0.90	20.67	8.94	184.80	0.600	No	No	2.00
291	6.70	1.27	2.65	2.15	0.88	21.17	7.30	154.56	0.381	No	No	2.00
292	6.72	1.41	2.65	2.48	0.88	23.65	7.24	171.32	0.493	No	No	2.00
293	6.74	1.48	2.67	2.93	0.89	24.97	8.57	214.02	3.600	No	No	2.00
294	6.76	1.50	2.71	3.50	0.91	25.53	4.86	124.03	1.218	No	Yes	2.00
295	6.78	1.37	2.76	3.77	0.93	23.37	5.42	126.64	1.115	No	Yes	2.00
296	6.80	1.28	2.81	4.03	0.94	21.87	5.92	129.48	1.043	No	Yes	2.00
297	6.82	1.23	2.82	4.02	0.95	20.96	6.09	127.59	1.000	No	Yes	2.00
298	6.84	1.20	2.83	3.98	0.95	20.30	6.19	125.71	0.968	No	Yes	2.00
299	6.86	1.17	2.82	3.83	0.95	19.77	6.16	121.85	0.943	No	Yes	2.00
300	6.88	1.15	2.80	3.45	0.94	19.30	5.90	113.99	0.921	No	Yes	2.00
301	6.90	1.15	2.78	3.03	0.93	18.94	5.55	105.15	0.904	No	Yes	2.00
302	6.92	1.14	2.74	2.64	0.92	18.66	5.19	96.79	0.890	No	Yes	2.00
303	6.94	1.15	2.71	2.32	0.91	18.55	4.84	89.82	0.885	No	Yes	2.00
304	6.96	1.15	2.69	2.11	0.90	18.54	9.50	176.19	0.530	No	No	2.00
305	6.98	1.19	2.67	2.05	0.89	18.97	8.66	164.37	4.000	Yes	No	2.00
306	7.00	1.30	2.63	1.92	0.88	20.76	6.38	132.51	4.000	Yes	No	2.00
307	7.02	1.57	2.53	1.71	0.84	24.71	3.53	87.34	4.000	Yes	No	2.00
308	7.04	1.94	2.43	1.51	0.80	30.30	2.54	77.07	4.000	Yes	No	2.00
309	7.06	2.19	2.41	1.63	0.79	34.13	2.42	82.59	4.000	Yes	No	2.00
310	7.08	2.22	2.44	1.85	0.80	34.70	2.58	89.39	4.000	Yes	No	2.00
311	7.10	1.99	2.50	2.07	0.83	31.37	2.82	88.53	4.000	Yes	No	2.00
312	7.12	1.70	2.59	2.37	0.86	27.07	5.00	135.25	4.000	Yes	No	2.00
313	7.14	1.45	2.67	2.66	0.90	23.12	8.54	197.47	4.000	Yes	No	2.00
314	7.16	1.30	2.72	2.78	0.91	20.72	4.93	102.24	4.000	Yes	Yes	2.00
315	7.18	1.25	2.71	2.50	0.91	19.82	4.80	95.12	0.945	No	Yes	2.00
316	7.20	1.26	2.68	2.22	0.90	19.77	8.96	177.22	0.538	No	No	2.00
317	7.22	1.28	2.67	2.22	0.90	20.09	8.68	174.28	0.515	No	No	2.00
318	7.24	1.36	2.65	2.16	0.89	21.16	7.40	156.48	0.393	No	No	2.00
319	7.26	1.47	2.62	2.10	0.87	22.76	5.98	136.00	0.283	No	No	2.00
320	7.28	1.49	2.62	2.20	0.88	23.12	6.25	144.54	0.325	No	No	2.00
321	7.30	1.38	2.68	2.47	0.90	21.52	8.82	189.73	0.644	No	No	2.00
322	7.32	1.23	2.72	2.49	0.92	19.04	4.95	94.17	0.908	No	Yes	2.00
323	7.34	1.16	2.71	2.16	0.91	17.81	4.80	85.55	0.850	No	Yes	2.00
324	7.36	1.17	2.66	1.75	0.89	17.77	7.90	140.31	0.303	No	No	2.00
325	7.38	1.14	2.68	1.87	0.90	17.31	9.23	159.88	0.414	No	No	2.00
326	7.40	1.09	2.73	2.11	0.92	16.59	5.02	83.31	0.791	No	Yes	2.00
327	7.42	1.05	2.76	2.21	0.93	15.84	5.34	84.60	0.756	No	Yes	2.00
328	7.44	1.06	2.74	2.10	0.92	15.96	5.17	82.44	0.761	No	Yes	2.00
329	7.46	1.08	2.72	1.96	0.91	16.22	4.91	79.67	0.774	No	Yes	2.00
330	7.48	1.10	2.71	1.97	0.91	16.48	4.86	80.17	0.786	No	Yes	2.00
331	7.50	1.09	2.73	2.02	0.92	16.29	4.98	81.08	0.777	No	Yes	2.00
332	7.52	1.07	2.74	2.09	0.92	16.08	5.12	82.27	0.767	No	Yes	2.00
333	7.54	1.07	2.73	2.05	0.92	16.03	5.08	81.42	0.764	No	Yes	2.00
334	7.56	1.12	2.70	1.87	0.91	16.69	10.00	166.90	0.461	No	No	2.00
335	7.58	1.24	2.63	1.63	0.88	18.25	6.67	121.76	0.223	No	No	2.00
336	7.60	1.40	2.57	1.51	0.86	20.66	4.44	91.78	0.152	No	No	1.54

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	1.51	2.55	1.58	0.85	22.19	4.03	89.33	0.146	No	No	1.48
338	7.64	1.46	2.59	1.75	0.86	21.56	5.02	108.34	0.198	No	No	2.00
339	7.66	1.32	2.65	1.95	0.89	19.49	7.54	146.86	0.337	No	No	2.00
340	7.68	1.21	2.69	2.04	0.91	17.90	9.80	175.39	0.524	No	No	2.00
341	7.70	1.20	2.68	1.93	0.90	17.67	9.22	162.99	0.434	No	No	2.00
342	7.72	1.27	2.64	1.73	0.89	18.56	7.02	130.35	0.257	No	No	2.00
343	7.74	1.33	2.61	1.65	0.87	19.40	5.87	113.77	0.195	No	No	1.97
344	7.76	1.34	2.63	1.82	0.88	19.59	6.67	130.59	0.258	No	No	2.00
345	7.78	1.26	2.67	1.91	0.90	18.38	8.33	153.16	0.373	No	No	2.00
346	7.80	1.18	2.69	1.89	0.91	17.04	9.75	166.09	0.456	No	No	2.00
347	7.82	1.12	2.69	1.70	0.90	16.07	9.47	152.21	0.367	No	No	2.00
348	7.84	1.13	2.68	1.62	0.90	16.13	8.80	141.93	0.311	No	No	2.00
349	7.86	1.20	2.64	1.53	0.89	17.09	7.07	120.79	0.219	No	No	2.00
350	7.88	1.30	2.60	1.43	0.87	18.57	5.28	98.01	0.168	No	No	1.69
351	7.90	1.39	2.59	1.54	0.86	19.89	5.00	99.43	0.171	No	No	1.73
352	7.92	1.41	2.62	1.77	0.88	20.19	6.00	121.24	0.221	No	No	2.00
353	7.94	1.40	2.63	1.88	0.88	20.08	6.68	134.15	0.274	No	No	2.00
354	7.96	1.30	2.68	2.04	0.90	18.61	8.95	166.51	0.458	No	No	2.00
355	7.98	1.16	2.73	2.12	0.92	16.49	5.05	83.31	0.787	No	Yes	2.00
356	8.00	0.99	2.82	2.35	0.95	13.96	6.07	84.79	0.666	No	Yes	2.00
357	8.02	0.92	2.83	2.17	0.96	12.91	6.18	79.79	0.616	No	Yes	2.00
358	8.04	0.93	2.79	1.89	0.94	12.97	5.75	74.57	0.618	No	Yes	2.00
359	8.06	0.96	2.77	1.77	0.93	13.31	5.46	72.70	0.635	No	Yes	2.00
360	8.08	0.96	2.77	1.82	0.94	13.35	5.52	73.75	0.637	No	Yes	2.00
361	8.10	0.97	2.78	1.86	0.94	13.38	5.57	74.55	0.638	No	Yes	2.00
362	8.12	1.01	2.75	1.75	0.93	14.00	5.20	72.84	0.668	No	Yes	2.00
363	8.14	1.18	2.65	1.46	0.89	16.26	7.42	120.55	0.219	No	No	2.00
364	8.16	1.31	2.58	1.27	0.86	18.11	4.67	84.57	0.136	No	No	1.38
365	8.18	1.41	2.56	1.34	0.86	19.43	4.27	82.97	0.133	No	No	1.35
366	8.20	1.39	2.61	1.62	0.87	19.36	5.74	111.06	0.187	No	No	1.89
367	8.22	1.38	2.64	1.82	0.89	19.28	6.92	133.32	0.270	No	No	2.00
368	8.24	1.33	2.67	1.94	0.90	18.53	8.37	155.10	0.384	No	No	2.00
369	8.26	1.20	2.72	2.02	0.92	16.64	4.89	81.33	0.794	No	Yes	2.00
370	8.28	1.10	2.77	2.16	0.94	15.10	5.46	82.53	0.720	No	Yes	2.00
371	8.30	1.07	2.78	2.16	0.94	14.63	5.60	81.97	0.698	No	Yes	2.00
372	8.32	1.11	2.76	2.09	0.93	15.23	5.34	81.43	0.727	No	Yes	2.00
373	8.34	1.15	2.75	2.13	0.93	15.83	5.23	82.84	4.000	Yes	Yes	2.00
374	8.36	1.29	2.68	1.86	0.90	17.63	8.82	155.58	4.000	Yes	No	2.00
375	8.38	1.35	2.64	1.68	0.89	18.37	6.83	125.58	4.000	Yes	No	2.00
376	8.40	1.62	2.52	1.32	0.84	21.93	3.13	68.59	4.000	Yes	No	2.00
377	8.42	1.77	2.47	1.22	0.82	23.91	2.76	65.97	4.000	Yes	No	2.00
378	8.44	2.34	2.33	1.04	0.77	31.40	2.04	63.91	4.000	Yes	No	2.00
379	8.46	2.66	2.29	1.08	0.75	35.72	1.89	67.46	4.000	Yes	No	2.00
380	8.48	3.19	2.24	1.15	0.74	42.72	1.73	73.89	4.000	Yes	No	2.00
381	8.50	3.73	2.22	1.32	0.73	50.09	1.67	83.64	4.000	Yes	No	2.00
382	8.52	4.32	2.21	1.51	0.72	57.95	1.63	94.66	0.159	No	No	1.61
383	8.54	4.56	2.22	1.67	0.73	61.29	1.66	101.48	4.000	Yes	No	2.00
384	8.56	4.19	2.30	2.04	0.76	56.85	1.92	109.04	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	3.56	2.42	2.61	0.80	48.88	2.47	120.87	4.000	Yes	No	2.00
386	8.60	2.79	2.61	3.89	0.88	39.15	5.68	222.54	4.000	Yes	No	2.00
387	8.62	2.22	2.79	5.64	0.94	31.60	5.69	179.83	4.000	Yes	Yes	2.00
388	8.64	1.90	2.91	7.31	0.99	27.17	7.40	201.05	4.000	Yes	Yes	2.00
389	8.66	1.89	2.92	7.45	0.99	27.07	7.51	203.27	1.291	No	Yes	2.00
390	8.68	1.99	2.88	6.94	0.98	28.38	6.98	197.95	1.354	No	Yes	2.00
391	8.70	2.15	2.84	6.34	0.96	30.36	6.30	191.41	1.448	No	Yes	2.00
392	8.72	2.25	2.81	6.13	0.95	31.77	5.99	190.44	1.515	No	Yes	2.00
393	8.74	2.28	2.81	6.10	0.95	32.06	5.94	190.47	1.529	No	Yes	2.00
394	8.76	2.23	2.82	6.16	0.96	31.32	6.07	190.03	1.494	No	Yes	2.00
395	8.78	2.20	2.83	6.26	0.96	30.79	6.20	190.88	1.469	No	Yes	2.00
396	8.80	2.29	2.81	6.17	0.95	32.01	5.99	191.67	1.527	No	Yes	2.00
397	8.82	2.55	2.76	5.79	0.93	35.40	5.38	190.46	1.689	No	Yes	2.00
398	8.84	2.78	2.71	5.42	0.92	38.51	4.87	187.33	1.837	No	Yes	2.00
399	8.86	2.88	2.70	5.31	0.91	39.67	10.12	401.58	3.600	No	No	2.00
400	8.88	2.86	2.71	5.46	0.92	39.37	4.81	189.56	1.878	No	Yes	2.00
401	8.90	2.90	2.71	5.56	0.92	39.85	4.84	192.77	1.901	No	Yes	2.00
402	8.92	3.32	2.64	5.06	0.89	45.35	7.15	324.40	3.600	No	No	2.00
403	8.94	4.11	2.53	4.26	0.85	55.47	3.42	189.61	0.714	No	No	2.00
404	8.96	4.83	2.45	3.78	0.82	64.59	2.64	170.37	0.540	No	No	2.00
405	8.98	5.36	2.40	3.57	0.80	71.24	2.37	169.06	0.529	No	No	2.00
406	9.00	5.79	2.38	3.64	0.79	76.71	2.29	176.01	4.000	Yes	No	2.00
407	9.02	6.36	2.35	3.53	0.78	83.84	2.13	178.23	4.000	Yes	No	2.00
408	9.04	6.82	2.32	3.45	0.77	89.43	2.01	180.12	4.000	Yes	No	2.00
409	9.06	6.58	2.35	3.61	0.78	86.28	2.12	183.02	4.000	Yes	No	2.00
410	9.08	5.98	2.42	4.10	0.80	78.93	2.45	193.71	4.000	Yes	No	2.00
411	9.10	5.22	2.51	4.88	0.84	69.45	2.97	206.28	4.000	Yes	No	2.00
412	9.12	4.77	2.57	5.43	0.86	63.65	4.41	280.82	4.000	Yes	No	2.00
413	9.14	4.51	2.60	5.73	0.88	60.11	5.49	329.81	4.000	Yes	No	2.00
414	9.16	4.61	2.58	5.35	0.87	61.13	4.60	281.26	4.000	No	No	2.00
415	9.18	5.05	2.51	4.70	0.84	66.38	2.97	197.44	0.796	No	No	2.00
416	9.20	5.45	2.45	4.18	0.82	71.09	2.66	189.42	0.712	No	No	2.00
417	9.22	5.30	2.47	4.30	0.83	69.00	2.77	191.29	0.731	No	No	2.00
418	9.24	4.79	2.53	4.71	0.85	62.60	3.35	209.71	4.000	No	No	2.00
419	9.26	4.39	2.58	5.07	0.87	57.40	4.61	264.73	4.000	No	No	2.00
420	9.28	4.37	2.57	4.91	0.86	56.93	4.37	248.97	4.000	Yes	No	2.00
421	9.30	4.66	2.52	4.40	0.84	60.21	3.11	187.33	4.000	Yes	No	2.00
422	9.32	5.24	2.45	3.93	0.82	67.30	2.64	177.54	4.000	Yes	No	2.00
423	9.34	6.58	2.32	3.20	0.77	83.31	2.00	166.55	4.000	Yes	No	2.00
424	9.36	8.09	2.20	2.63	0.72	100.98	1.61	162.72	4.000	Yes	No	2.00
425	9.38	10.13	2.06	2.04	0.67	124.39	1.36	169.53	4.000	Yes	No	2.00
426	9.40	23.81	1.55	0.86	0.48	275.25	1.00	275.25	4.000	No	No	2.00
427	9.42	37.13	1.29	0.57	0.38	415.53	1.00	415.53	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	1.71	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	1.87	0.00	0.00	0.02	0.00
1.06	1.88	0.00	0.00	0.02	0.00	1.08	1.77	0.00	0.00	0.02	0.00
1.10	1.84	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	1.71	0.00	0.00	0.02	0.00	2.40	1.76	0.00	0.00	0.02	0.00
2.42	1.92	0.00	0.00	0.02	0.00	2.44	1.83	0.00	0.00	0.02	0.00
2.46	1.66	0.00	0.00	0.02	0.00	2.48	1.55	0.00	0.00	0.02	0.00
2.50	1.44	0.00	0.00	0.02	0.00	2.52	1.29	0.00	0.00	0.02	0.00
2.54	1.21	0.00	0.00	0.02	0.00	2.56	1.18	0.00	0.00	0.02	0.00
2.58	1.17	0.00	0.00	0.02	0.00	2.60	1.17	0.00	0.00	0.02	0.00
2.62	1.17	0.00	0.00	0.02	0.00	2.64	1.13	0.00	0.00	0.02	0.00
2.66	1.12	0.00	0.00	0.02	0.00	2.68	1.13	0.00	0.00	0.02	0.00
2.70	1.12	0.00	0.00	0.02	0.00	2.72	1.11	0.00	0.00	0.02	0.00
2.74	1.12	0.00	0.00	0.02	0.00	2.76	1.11	0.00	0.00	0.02	0.00
2.78	1.08	0.00	0.00	0.02	0.00	2.80	1.10	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	1.08	0.00	0.00	0.02	0.00	2.84	1.08	0.00	0.00	0.02	0.00
2.86	1.09	0.00	0.00	0.02	0.00	2.88	1.12	0.00	0.00	0.02	0.00
2.90	1.15	0.00	0.00	0.02	0.00	2.92	1.17	0.00	0.00	0.02	0.00
2.94	1.21	0.00	0.00	0.02	0.00	2.96	1.22	0.00	0.00	0.02	0.00
2.98	1.20	0.00	0.00	0.02	0.00	3.00	1.16	0.00	0.00	0.02	0.00
3.02	1.15	0.00	0.00	0.02	0.00	3.04	1.15	0.00	0.00	0.02	0.00
3.06	1.06	0.00	0.00	0.02	0.00	3.08	1.03	0.00	0.00	0.02	0.00
3.10	1.03	0.00	0.00	0.02	0.00	3.12	1.12	0.00	0.00	0.02	0.00
3.14	1.22	0.00	0.00	0.02	0.00	3.16	1.31	0.00	0.00	0.02	0.00
3.18	1.29	0.00	0.00	0.02	0.00	3.20	1.24	0.00	0.00	0.02	0.00
3.22	1.17	0.00	0.00	0.02	0.00	3.24	1.14	0.00	0.00	0.02	0.00
3.26	1.12	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	1.17	0.00	0.00	0.02	0.00
3.38	1.10	0.00	0.00	0.02	0.00	3.40	1.10	0.00	0.00	0.02	0.00
3.42	1.12	0.00	0.00	0.02	0.00	3.44	1.15	0.00	0.00	0.02	0.00
3.46	1.13	0.00	0.00	0.02	0.00	3.48	1.10	0.00	0.00	0.02	0.00
3.50	1.07	0.00	0.00	0.02	0.00	3.52	1.08	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	1.43	0.00	0.00	0.02	0.00
3.74	1.45	0.00	0.00	0.02	0.00	3.76	1.39	0.00	0.00	0.02	0.00
3.78	1.28	0.00	0.00	0.02	0.00	3.80	1.18	0.00	0.00	0.02	0.00
3.82	1.12	0.00	0.00	0.02	0.00	3.84	1.10	0.00	0.00	0.02	0.00
3.86	1.09	0.00	0.00	0.02	0.00	3.88	1.06	0.00	0.00	0.02	0.00
3.90	1.07	0.00	0.00	0.02	0.00	3.92	1.12	0.00	0.00	0.02	0.00
3.94	1.16	0.00	0.00	0.02	0.00	3.96	1.20	0.00	0.00	0.02	0.00
3.98	1.20	0.00	0.00	0.02	0.00	4.00	1.18	0.00	0.00	0.02	0.00
4.02	1.15	0.00	0.00	0.02	0.00	4.04	1.12	0.00	0.00	0.02	0.00
4.06	1.12	0.00	0.00	0.02	0.00	4.08	1.12	0.00	0.00	0.02	0.00
4.10	1.09	0.00	0.00	0.02	0.00	4.12	1.07	0.00	0.00	0.02	0.00
4.14	1.10	0.00	0.00	0.02	0.00	4.16	1.12	0.00	0.00	0.02	0.00
4.18	1.15	0.00	0.00	0.02	0.00	4.20	1.18	0.00	0.00	0.02	0.00
4.22	1.24	0.00	0.00	0.02	0.00	4.24	1.33	0.00	0.00	0.02	0.00
4.26	1.39	0.00	0.00	0.02	0.00	4.28	1.35	0.00	0.00	0.02	0.00
4.30	1.30	0.00	0.00	0.02	0.00	4.32	1.27	0.00	0.00	0.02	0.00
4.34	1.33	0.00	0.00	0.02	0.00	4.36	1.42	0.00	0.00	0.02	0.00
4.38	1.51	0.00	0.00	0.02	0.00	4.40	1.60	0.00	0.00	0.02	0.00
4.42	1.67	0.00	0.00	0.02	0.00	4.44	1.75	0.00	0.00	0.02	0.00
4.46	1.81	0.00	0.00	0.02	0.00	4.48	1.74	0.00	0.00	0.02	0.00
4.50	1.64	0.00	0.00	0.02	0.00	4.52	1.50	0.00	0.00	0.02	0.00
4.54	1.49	0.00	0.00	0.02	0.00	4.56	1.56	0.00	0.00	0.02	0.00
4.58	1.66	0.00	0.00	0.02	0.00	4.60	1.70	0.00	0.00	0.02	0.00
4.62	1.68	0.00	0.00	0.02	0.00	4.64	1.66	0.00	0.00	0.02	0.00
4.66	1.61	0.00	0.00	0.02	0.00	4.68	1.53	0.00	0.00	0.02	0.00
4.70	1.48	0.00	0.00	0.02	0.00	4.72	1.47	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	1.44	0.00	0.00	0.02	0.00	4.76	1.34	0.00	0.00	0.02	0.00
4.78	1.20	0.00	0.00	0.02	0.00	4.80	1.16	0.00	0.00	0.02	0.00
4.82	1.27	0.00	0.00	0.02	0.00	4.84	1.33	0.00	0.00	0.02	0.00
4.86	1.24	0.00	0.00	0.02	0.00	4.88	1.23	0.00	0.00	0.02	0.00
4.90	1.28	0.00	0.00	0.02	0.00	4.92	1.48	0.00	0.00	0.02	0.00
4.94	1.69	0.00	0.00	0.02	0.00	4.96	1.55	0.00	0.00	0.02	0.00
4.98	1.42	0.00	0.00	0.02	0.00	5.00	1.35	0.00	0.00	0.02	0.00
5.02	1.43	0.00	0.00	0.02	0.00	5.04	1.56	0.00	0.00	0.02	0.00
5.06	1.65	0.00	0.00	0.02	0.00	5.08	1.60	0.00	0.00	0.02	0.00
5.10	1.58	0.00	0.00	0.02	0.00	5.12	1.51	0.00	0.00	0.02	0.00
5.14	1.52	0.00	0.00	0.02	0.00	5.16	1.46	0.00	0.00	0.02	0.00
5.18	1.34	0.00	0.00	0.02	0.00	5.20	1.24	0.00	0.00	0.02	0.00
5.22	1.17	0.00	0.00	0.02	0.00	5.24	1.22	0.00	0.00	0.02	0.00
5.26	1.29	0.00	0.00	0.02	0.00	5.28	1.38	0.00	0.00	0.02	0.00
5.30	1.40	0.00	0.00	0.02	0.00	5.32	1.39	0.00	0.00	0.02	0.00
5.34	1.39	0.00	0.00	0.02	0.00	5.36	1.35	0.00	0.00	0.02	0.00
5.38	1.35	0.00	0.00	0.02	0.00	5.40	1.30	0.00	0.00	0.02	0.00
5.42	1.32	0.00	0.00	0.02	0.00	5.44	1.28	0.00	0.00	0.02	0.00
5.46	1.24	0.00	0.00	0.02	0.00	5.48	1.23	0.00	0.00	0.02	0.00
5.50	1.27	0.00	0.00	0.02	0.00	5.52	1.26	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	1.28	0.00	0.00	0.02	0.00
5.86	1.36	0.00	0.00	0.02	0.00	5.88	1.53	0.00	0.00	0.02	0.00
5.90	1.61	0.00	0.00	0.02	0.00	5.92	1.50	0.00	0.00	0.02	0.00
5.94	1.48	0.00	0.00	0.02	0.00	5.96	1.55	0.00	0.00	0.02	0.00
5.98	1.56	0.00	0.00	0.02	0.00	6.00	1.54	0.00	0.00	0.02	0.00
6.02	1.57	0.00	0.00	0.02	0.00	6.04	1.62	0.00	0.00	0.02	0.00
6.06	1.69	0.00	0.00	0.02	0.00	6.08	1.73	0.00	0.00	0.02	0.00
6.10	1.85	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	1.94	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	1.54	0.00	0.00	0.02	0.00
7.62	1.48	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	1.97	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	1.69	0.00	0.00	0.02	0.00
7.90	1.73	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	1.38	0.00	0.00	0.02	0.00
8.18	1.35	0.00	0.00	0.02	0.00	8.20	1.89	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	1.61	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	2.00	0.00	0.00	0.02	0.00
9.42	2.00	0.00	0.00	0.02	0.00						

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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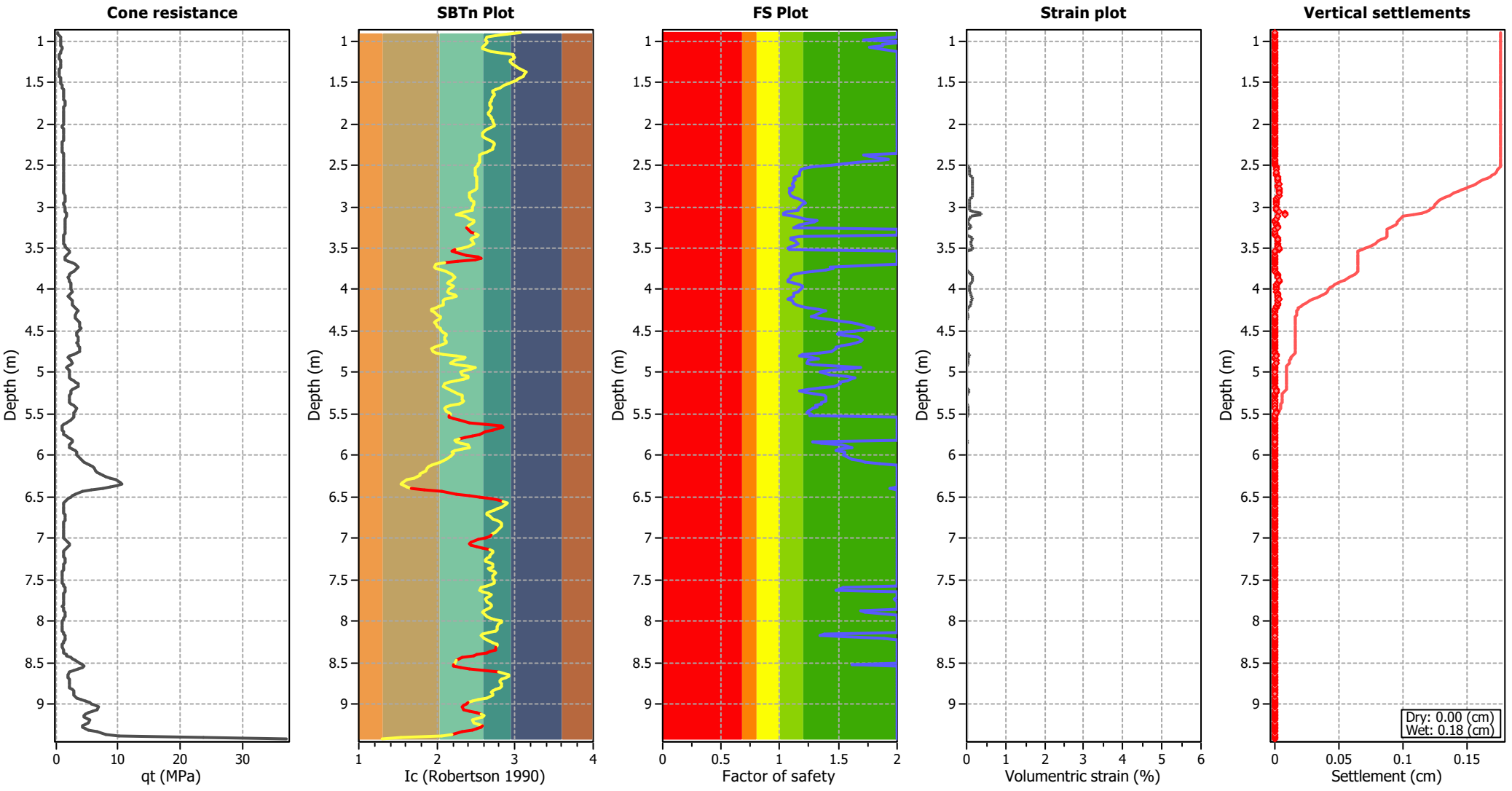
CPT name: CWLP CPT-2L

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
0.90	55.69	2.00	0.00	0.95	0.00	0.92	57.42	2.00	0.00	0.95	0.00
0.94	57.79	2.00	0.00	0.95	0.00	0.96	100.16	2.00	0.00	0.95	0.00
0.98	83.66	1.71	0.00	0.95	0.00	1.00	98.42	2.00	0.00	0.94	0.00
1.02	100.03	2.00	0.00	0.94	0.00	1.04	91.60	1.87	0.00	0.94	0.00
1.06	85.56	1.88	0.00	0.94	0.00	1.08	81.84	1.77	0.00	0.94	0.00
1.10	85.18	1.84	0.00	0.94	0.00	1.12	80.70	2.00	0.00	0.94	0.00
1.14	88.75	2.00	0.00	0.94	0.00	1.16	97.64	2.00	0.00	0.94	0.00
1.18	92.20	2.00	0.00	0.93	0.00	1.20	95.75	2.00	0.00	0.93	0.00
1.22	98.35	2.00	0.00	0.93	0.00	1.24	99.57	2.00	0.00	0.93	0.00
1.26	102.61	2.00	0.00	0.93	0.00	1.28	107.92	2.00	0.00	0.93	0.00
1.30	113.19	2.00	0.00	0.93	0.00	1.32	118.31	2.00	0.00	0.93	0.00
1.34	123.33	2.00	0.00	0.93	0.00	1.36	128.28	2.00	0.00	0.92	0.00
1.38	131.51	2.00	0.00	0.92	0.00	1.40	131.49	2.00	0.00	0.92	0.00
1.42	129.93	2.00	0.00	0.92	0.00	1.44	127.92	2.00	0.00	0.92	0.00
1.46	126.89	2.00	0.00	0.92	0.00	1.48	125.42	2.00	0.00	0.92	0.00
1.50	124.10	2.00	0.00	0.92	0.00	1.52	123.47	2.00	0.00	0.92	0.00
1.54	122.98	2.00	0.00	0.91	0.00	1.56	120.39	2.00	0.00	0.91	0.00
1.58	117.45	2.00	0.00	0.91	0.00	1.60	116.29	2.00	0.00	0.91	0.00
1.62	118.84	2.00	0.00	0.91	0.00	1.64	121.73	2.00	0.00	0.91	0.00
1.66	123.31	2.00	0.00	0.91	0.00	1.68	123.26	2.00	0.00	0.91	0.00
1.70	123.23	2.00	0.00	0.91	0.00	1.72	259.38	2.00	0.00	0.90	0.00
1.74	248.90	2.00	0.00	0.90	0.00	1.76	236.70	2.00	0.00	0.90	0.00
1.78	235.23	2.00	0.00	0.90	0.00	1.80	246.48	2.00	0.00	0.90	0.00
1.82	117.72	2.00	0.00	0.90	0.00	1.84	219.95	2.00	0.00	0.90	0.00
1.86	196.25	2.00	0.00	0.90	0.00	1.88	193.51	2.00	0.00	0.90	0.00
1.90	228.71	2.00	0.00	0.89	0.00	1.92	113.61	2.00	0.00	0.89	0.00
1.94	110.70	2.00	0.00	0.89	0.00	1.96	108.94	2.00	0.00	0.89	0.00
1.98	109.02	2.00	0.00	0.89	0.00	2.00	108.86	2.00	0.00	0.89	0.00
2.02	106.57	2.00	0.00	0.89	0.00	2.04	101.12	2.00	0.00	0.89	0.00
2.06	180.26	2.00	0.00	0.89	0.00	2.08	146.78	2.00	0.00	0.88	0.00
2.10	124.79	2.00	0.00	0.88	0.00	2.12	113.69	2.00	0.00	0.88	0.00
2.14	111.72	2.00	0.00	0.88	0.00	2.16	128.47	2.00	0.00	0.88	0.00
2.18	156.41	2.00	0.00	0.88	0.00	2.20	197.25	2.00	0.00	0.88	0.00
2.22	100.72	2.00	0.00	0.88	0.00	2.24	102.04	2.00	0.00	0.88	0.00
2.26	101.96	2.00	0.00	0.87	0.00	2.28	99.17	2.00	0.00	0.87	0.00
2.30	96.21	2.00	0.00	0.87	0.00	2.32	186.04	2.00	0.00	0.87	0.00
2.34	148.28	2.00	0.00	0.87	0.00	2.36	111.44	2.00	0.00	0.87	0.00
2.38	93.67	1.71	0.00	0.87	0.00	2.40	95.58	1.76	0.00	0.87	0.00
2.42	101.07	1.92	0.00	0.87	0.00	2.44	98.35	1.83	0.00	0.86	0.00
2.46	92.12	1.66	0.00	0.86	0.00	2.48	87.84	1.55	0.00	0.86	0.00
2.50	82.90	1.44	0.00	0.86	0.00	2.52	75.21	1.29	0.03	0.86	0.00
2.54	70.29	1.21	0.06	0.86	0.00	2.56	68.20	1.18	0.07	0.86	0.00
2.58	67.24	1.17	0.08	0.86	0.00	2.60	67.50	1.17	0.08	0.86	0.00
2.62	67.54	1.17	0.08	0.85	0.00	2.64	64.51	1.13	0.13	0.85	0.00
2.66	64.36	1.12	0.13	0.85	0.00	2.68	64.76	1.13	0.13	0.85	0.00
2.70	64.63	1.12	0.13	0.85	0.00	2.72	63.54	1.11	0.14	0.85	0.00
2.74	64.38	1.12	0.14	0.85	0.00	2.76	64.38	1.11	0.14	0.85	0.00
2.78	61.93	1.08	0.16	0.85	0.00	2.80	63.73	1.10	0.15	0.84	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.82	62.19	1.08	0.16	0.84	0.00	2.84	61.76	1.08	0.17	0.84	0.00
2.86	62.93	1.09	0.16	0.84	0.00	2.88	65.41	1.12	0.13	0.84	0.00
2.90	68.05	1.15	0.08	0.84	0.00	2.92	69.76	1.17	0.07	0.84	0.00
2.94	72.19	1.21	0.06	0.84	0.00	2.96	72.67	1.22	0.06	0.84	0.00
2.98	71.58	1.20	0.07	0.83	0.00	3.00	69.42	1.16	0.08	0.83	0.00
3.02	68.49	1.15	0.08	0.83	0.00	3.04	68.70	1.15	0.08	0.83	0.00
3.06	61.02	1.06	0.18	0.83	0.00	3.08	59.04	1.03	0.37	0.83	0.01
3.10	58.20	1.03	0.39	0.83	0.01	3.12	66.54	1.12	0.13	0.83	0.00
3.14	73.49	1.22	0.06	0.83	0.00	3.16	79.27	1.31	0.02	0.82	0.00
3.18	78.23	1.29	0.03	0.82	0.00	3.20	74.83	1.24	0.05	0.82	0.00
3.22	70.40	1.17	0.07	0.82	0.00	3.24	68.38	1.14	0.12	0.82	0.00
3.26	67.38	1.12	0.13	0.82	0.00	3.28	69.05	2.00	0.00	0.82	0.00
3.30	71.62	2.00	0.00	0.82	0.00	3.32	77.86	2.00	0.00	0.82	0.00
3.34	80.32	2.00	0.00	0.81	0.00	3.36	71.07	1.17	0.07	0.81	0.00
3.38	65.91	1.10	0.14	0.81	0.00	3.40	65.72	1.10	0.14	0.81	0.00
3.42	68.03	1.12	0.12	0.81	0.00	3.44	69.94	1.15	0.11	0.81	0.00
3.46	68.20	1.13	0.12	0.81	0.00	3.48	66.25	1.10	0.14	0.81	0.00
3.50	64.02	1.07	0.16	0.81	0.00	3.52	64.85	1.08	0.15	0.80	0.00
3.54	66.74	2.00	0.00	0.80	0.00	3.56	71.08	2.00	0.00	0.80	0.00
3.58	78.38	2.00	0.00	0.80	0.00	3.60	96.55	2.00	0.00	0.80	0.00
3.62	114.31	2.00	0.00	0.80	0.00	3.64	81.91	2.00	0.00	0.80	0.00
3.66	68.54	2.00	0.00	0.80	0.00	3.68	70.83	2.00	0.00	0.80	0.00
3.70	79.61	2.00	0.00	0.79	0.00	3.72	86.51	1.43	0.00	0.79	0.00
3.74	87.32	1.45	0.00	0.79	0.00	3.76	84.67	1.39	0.00	0.79	0.00
3.78	79.05	1.28	0.03	0.79	0.00	3.80	73.04	1.18	0.06	0.79	0.00
3.82	68.69	1.12	0.12	0.79	0.00	3.84	66.80	1.10	0.14	0.79	0.00
3.86	66.41	1.09	0.14	0.79	0.00	3.88	64.19	1.06	0.16	0.78	0.00
3.90	65.15	1.07	0.15	0.78	0.00	3.92	69.01	1.12	0.12	0.78	0.00
3.94	71.99	1.16	0.07	0.78	0.00	3.96	74.09	1.20	0.06	0.78	0.00
3.98	74.09	1.20	0.06	0.78	0.00	4.00	73.25	1.18	0.06	0.78	0.00
4.02	71.32	1.15	0.07	0.78	0.00	4.04	68.88	1.12	0.12	0.78	0.00
4.06	68.88	1.12	0.12	0.77	0.00	4.08	69.06	1.12	0.12	0.77	0.00
4.10	67.03	1.09	0.13	0.77	0.00	4.12	65.51	1.07	0.15	0.77	0.00
4.14	67.81	1.10	0.13	0.77	0.00	4.16	69.21	1.12	0.12	0.77	0.00
4.18	71.05	1.15	0.10	0.77	0.00	4.20	73.39	1.18	0.06	0.77	0.00
4.22	77.02	1.24	0.05	0.77	0.00	4.24	82.00	1.33	0.02	0.76	0.00
4.26	85.11	1.39	0.00	0.76	0.00	4.28	83.32	1.35	0.02	0.76	0.00
4.30	80.94	1.30	0.02	0.76	0.00	4.32	78.98	1.27	0.03	0.76	0.00
4.34	82.20	1.33	0.02	0.76	0.00	4.36	87.04	1.42	0.00	0.76	0.00
4.38	90.86	1.51	0.00	0.76	0.00	4.40	94.66	1.60	0.00	0.76	0.00
4.42	97.24	1.67	0.00	0.75	0.00	4.44	100.31	1.75	0.00	0.75	0.00
4.46	102.17	1.81	0.00	0.75	0.00	4.48	100.01	1.74	0.00	0.75	0.00
4.50	96.20	1.64	0.00	0.75	0.00	4.52	90.61	1.50	0.00	0.75	0.00
4.54	90.07	1.49	0.00	0.75	0.00	4.56	92.86	1.56	0.00	0.75	0.00
4.58	96.95	1.66	0.00	0.75	0.00	4.60	98.32	1.70	0.00	0.74	0.00
4.62	97.83	1.68	0.00	0.74	0.00	4.64	96.86	1.66	0.00	0.74	0.00
4.66	94.84	1.61	0.00	0.74	0.00	4.68	91.63	1.53	0.00	0.74	0.00
4.70	89.40	1.48	0.00	0.74	0.00	4.72	89.34	1.47	0.00	0.74	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.74	87.92	1.44	0.00	0.74	0.00	4.76	82.96	1.34	0.02	0.74	0.00
4.78	74.71	1.20	0.06	0.73	0.00	4.80	72.47	1.16	0.07	0.73	0.00
4.82	78.96	1.27	0.03	0.73	0.00	4.84	82.58	1.33	0.02	0.73	0.00
4.86	77.57	1.24	0.04	0.73	0.00	4.88	76.94	1.23	0.05	0.73	0.00
4.90	80.02	1.28	0.02	0.73	0.00	4.92	89.91	1.48	0.00	0.73	0.00
4.94	98.18	1.69	0.00	0.73	0.00	4.96	92.78	1.55	0.00	0.72	0.00
4.98	87.08	1.42	0.00	0.72	0.00	5.00	83.43	1.35	0.02	0.72	0.00
5.02	87.33	1.43	0.00	0.72	0.00	5.04	93.31	1.56	0.00	0.72	0.00
5.06	96.54	1.65	0.00	0.72	0.00	5.08	94.65	1.60	0.00	0.72	0.00
5.10	93.79	1.58	0.00	0.72	0.00	5.12	91.11	1.51	0.00	0.72	0.00
5.14	91.38	1.52	0.00	0.71	0.00	5.16	88.94	1.46	0.00	0.71	0.00
5.18	83.22	1.34	0.02	0.71	0.00	5.20	77.32	1.24	0.04	0.71	0.00
5.22	73.31	1.17	0.06	0.71	0.00	5.24	76.17	1.22	0.05	0.71	0.00
5.26	80.41	1.29	0.02	0.71	0.00	5.28	85.12	1.38	0.00	0.71	0.00
5.30	85.84	1.40	0.00	0.71	0.00	5.32	85.49	1.39	0.00	0.70	0.00
5.34	85.67	1.39	0.00	0.70	0.00	5.36	83.56	1.35	0.02	0.70	0.00
5.38	83.86	1.35	0.00	0.70	0.00	5.40	81.04	1.30	0.02	0.70	0.00
5.42	81.91	1.32	0.02	0.70	0.00	5.44	80.07	1.28	0.02	0.70	0.00
5.46	77.84	1.24	0.04	0.70	0.00	5.48	76.82	1.23	0.04	0.70	0.00
5.50	79.19	1.27	0.03	0.69	0.00	5.52	78.47	1.26	0.03	0.69	0.00
5.54	79.20	2.00	0.00	0.69	0.00	5.56	77.16	2.00	0.00	0.69	0.00
5.58	79.37	2.00	0.00	0.69	0.00	5.60	84.24	2.00	0.00	0.69	0.00
5.62	161.88	2.00	0.00	0.69	0.00	5.64	109.04	2.00	0.00	0.69	0.00
5.66	103.28	2.00	0.00	0.69	0.00	5.68	88.03	2.00	0.00	0.68	0.00
5.70	81.16	2.00	0.00	0.68	0.00	5.72	126.55	2.00	0.00	0.68	0.00
5.74	93.30	2.00	0.00	0.68	0.00	5.76	78.46	2.00	0.00	0.68	0.00
5.78	76.10	2.00	0.00	0.68	0.00	5.80	76.09	2.00	0.00	0.68	0.00
5.82	77.72	2.00	0.00	0.68	0.00	5.84	79.84	1.28	0.02	0.68	0.00
5.86	84.23	1.36	0.00	0.67	0.00	5.88	92.19	1.53	0.00	0.67	0.00
5.90	95.30	1.61	0.00	0.67	0.00	5.92	90.82	1.50	0.00	0.67	0.00
5.94	89.87	1.48	0.00	0.67	0.00	5.96	92.78	1.55	0.00	0.67	0.00
5.98	93.22	1.56	0.00	0.67	0.00	6.00	92.37	1.54	0.00	0.67	0.00
6.02	93.55	1.57	0.00	0.67	0.00	6.04	95.61	1.62	0.00	0.66	0.00
6.06	98.26	1.69	0.00	0.66	0.00	6.08	99.59	1.73	0.00	0.66	0.00
6.10	103.75	1.85	0.00	0.66	0.00	6.12	109.19	2.00	0.00	0.66	0.00
6.14	113.71	2.00	0.00	0.66	0.00	6.16	115.18	2.00	0.00	0.66	0.00
6.18	116.14	2.00	0.00	0.66	0.00	6.20	117.00	2.00	0.00	0.66	0.00
6.22	119.29	2.00	0.00	0.65	0.00	6.24	126.01	2.00	0.00	0.65	0.00
6.26	129.86	2.00	0.00	0.65	0.00	6.28	128.89	2.00	0.00	0.65	0.00
6.30	138.70	2.00	0.00	0.65	0.00	6.32	146.20	2.00	0.00	0.65	0.00
6.34	147.40	2.00	0.00	0.65	0.00	6.36	136.90	2.00	0.00	0.65	0.00
6.38	122.63	2.00	0.00	0.65	0.00	6.40	106.66	1.94	0.00	0.64	0.00
6.42	101.53	2.00	0.00	0.64	0.00	6.44	89.58	2.00	0.00	0.64	0.00
6.46	90.43	2.00	0.00	0.64	0.00	6.48	110.70	2.00	0.00	0.64	0.00
6.50	148.62	2.00	0.00	0.64	0.00	6.52	331.62	2.00	0.00	0.64	0.00
6.54	166.45	2.00	0.00	0.64	0.00	6.56	164.79	2.00	0.00	0.64	0.00
6.58	159.45	2.00	0.00	0.63	0.00	6.60	147.14	2.00	0.00	0.63	0.00
6.62	130.97	2.00	0.00	0.63	0.00	6.64	113.23	2.00	0.00	0.63	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.66	101.74	2.00	0.00	0.63	0.00	6.68	184.80	2.00	0.00	0.63	0.00
6.70	154.56	2.00	0.00	0.63	0.00	6.72	171.32	2.00	0.00	0.63	0.00
6.74	214.02	2.00	0.00	0.63	0.00	6.76	124.03	2.00	0.00	0.62	0.00
6.78	126.64	2.00	0.00	0.62	0.00	6.80	129.48	2.00	0.00	0.62	0.00
6.82	127.59	2.00	0.00	0.62	0.00	6.84	125.71	2.00	0.00	0.62	0.00
6.86	121.85	2.00	0.00	0.62	0.00	6.88	113.99	2.00	0.00	0.62	0.00
6.90	105.15	2.00	0.00	0.62	0.00	6.92	96.79	2.00	0.00	0.62	0.00
6.94	89.82	2.00	0.00	0.61	0.00	6.96	176.19	2.00	0.00	0.61	0.00
6.98	164.37	2.00	0.00	0.61	0.00	7.00	132.51	2.00	0.00	0.61	0.00
7.02	87.34	2.00	0.00	0.61	0.00	7.04	77.07	2.00	0.00	0.61	0.00
7.06	82.59	2.00	0.00	0.61	0.00	7.08	89.39	2.00	0.00	0.61	0.00
7.10	88.53	2.00	0.00	0.61	0.00	7.12	135.25	2.00	0.00	0.60	0.00
7.14	197.47	2.00	0.00	0.60	0.00	7.16	102.24	2.00	0.00	0.60	0.00
7.18	95.12	2.00	0.00	0.60	0.00	7.20	177.22	2.00	0.00	0.60	0.00
7.22	174.28	2.00	0.00	0.60	0.00	7.24	156.48	2.00	0.00	0.60	0.00
7.26	136.00	2.00	0.00	0.60	0.00	7.28	144.54	2.00	0.00	0.60	0.00
7.30	189.73	2.00	0.00	0.59	0.00	7.32	94.17	2.00	0.00	0.59	0.00
7.34	85.55	2.00	0.00	0.59	0.00	7.36	140.31	2.00	0.00	0.59	0.00
7.38	159.88	2.00	0.00	0.59	0.00	7.40	83.31	2.00	0.00	0.59	0.00
7.42	84.60	2.00	0.00	0.59	0.00	7.44	82.44	2.00	0.00	0.59	0.00
7.46	79.67	2.00	0.00	0.59	0.00	7.48	80.17	2.00	0.00	0.58	0.00
7.50	81.08	2.00	0.00	0.58	0.00	7.52	82.27	2.00	0.00	0.58	0.00
7.54	81.42	2.00	0.00	0.58	0.00	7.56	166.90	2.00	0.00	0.58	0.00
7.58	121.76	2.00	0.00	0.58	0.00	7.60	91.78	1.54	0.00	0.58	0.00
7.62	89.33	1.48	0.00	0.58	0.00	7.64	108.34	2.00	0.00	0.58	0.00
7.66	146.86	2.00	0.00	0.57	0.00	7.68	175.39	2.00	0.00	0.57	0.00
7.70	162.99	2.00	0.00	0.57	0.00	7.72	130.35	2.00	0.00	0.57	0.00
7.74	113.77	1.97	0.00	0.57	0.00	7.76	130.59	2.00	0.00	0.57	0.00
7.78	153.16	2.00	0.00	0.57	0.00	7.80	166.09	2.00	0.00	0.57	0.00
7.82	152.21	2.00	0.00	0.57	0.00	7.84	141.93	2.00	0.00	0.56	0.00
7.86	120.79	2.00	0.00	0.56	0.00	7.88	98.01	1.69	0.00	0.56	0.00
7.90	99.43	1.73	0.00	0.56	0.00	7.92	121.24	2.00	0.00	0.56	0.00
7.94	134.15	2.00	0.00	0.56	0.00	7.96	166.51	2.00	0.00	0.56	0.00
7.98	83.31	2.00	0.00	0.56	0.00	8.00	84.79	2.00	0.00	0.56	0.00
8.02	79.79	2.00	0.00	0.55	0.00	8.04	74.57	2.00	0.00	0.55	0.00
8.06	72.70	2.00	0.00	0.55	0.00	8.08	73.75	2.00	0.00	0.55	0.00
8.10	74.55	2.00	0.00	0.55	0.00	8.12	72.84	2.00	0.00	0.55	0.00
8.14	120.55	2.00	0.00	0.55	0.00	8.16	84.57	1.38	0.00	0.55	0.00
8.18	82.97	1.35	0.01	0.55	0.00	8.20	111.06	1.89	0.00	0.54	0.00
8.22	133.32	2.00	0.00	0.54	0.00	8.24	155.10	2.00	0.00	0.54	0.00
8.26	81.33	2.00	0.00	0.54	0.00	8.28	82.53	2.00	0.00	0.54	0.00
8.30	81.97	2.00	0.00	0.54	0.00	8.32	81.43	2.00	0.00	0.54	0.00
8.34	82.84	2.00	0.00	0.54	0.00	8.36	155.58	2.00	0.00	0.54	0.00
8.38	125.58	2.00	0.00	0.53	0.00	8.40	68.59	2.00	0.00	0.53	0.00
8.42	65.97	2.00	0.00	0.53	0.00	8.44	63.91	2.00	0.00	0.53	0.00
8.46	67.46	2.00	0.00	0.53	0.00	8.48	73.89	2.00	0.00	0.53	0.00
8.50	83.64	2.00	0.00	0.53	0.00	8.52	94.66	1.61	0.00	0.53	0.00
8.54	101.48	2.00	0.00	0.53	0.00	8.56	109.04	2.00	0.00	0.52	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.58	120.87	2.00	0.00	0.52	0.00	8.60	222.54	2.00	0.00	0.52	0.00
8.62	179.83	2.00	0.00	0.52	0.00	8.64	201.05	2.00	0.00	0.52	0.00
8.66	203.27	2.00	0.00	0.52	0.00	8.68	197.95	2.00	0.00	0.52	0.00
8.70	191.41	2.00	0.00	0.52	0.00	8.72	190.44	2.00	0.00	0.52	0.00
8.74	190.47	2.00	0.00	0.51	0.00	8.76	190.03	2.00	0.00	0.51	0.00
8.78	190.88	2.00	0.00	0.51	0.00	8.80	191.67	2.00	0.00	0.51	0.00
8.82	190.46	2.00	0.00	0.51	0.00	8.84	187.33	2.00	0.00	0.51	0.00
8.86	401.58	2.00	0.00	0.51	0.00	8.88	189.56	2.00	0.00	0.51	0.00
8.90	192.77	2.00	0.00	0.51	0.00	8.92	324.40	2.00	0.00	0.50	0.00
8.94	189.61	2.00	0.00	0.50	0.00	8.96	170.37	2.00	0.00	0.50	0.00
8.98	169.06	2.00	0.00	0.50	0.00	9.00	176.01	2.00	0.00	0.50	0.00
9.02	178.23	2.00	0.00	0.50	0.00	9.04	180.12	2.00	0.00	0.50	0.00
9.06	183.02	2.00	0.00	0.50	0.00	9.08	193.71	2.00	0.00	0.50	0.00
9.10	206.28	2.00	0.00	0.49	0.00	9.12	280.82	2.00	0.00	0.49	0.00
9.14	329.81	2.00	0.00	0.49	0.00	9.16	281.26	2.00	0.00	0.49	0.00
9.18	197.44	2.00	0.00	0.49	0.00	9.20	189.42	2.00	0.00	0.49	0.00
9.22	191.29	2.00	0.00	0.49	0.00	9.24	209.71	2.00	0.00	0.49	0.00
9.26	264.73	2.00	0.00	0.49	0.00	9.28	248.97	2.00	0.00	0.48	0.00
9.30	187.33	2.00	0.00	0.48	0.00	9.32	177.54	2.00	0.00	0.48	0.00
9.34	166.55	2.00	0.00	0.48	0.00	9.36	162.72	2.00	0.00	0.48	0.00
9.38	169.53	2.00	0.00	0.48	0.00	9.40	275.25	2.00	0.00	0.48	0.00
9.42	415.53	2.00	0.00	0.48	0.00						

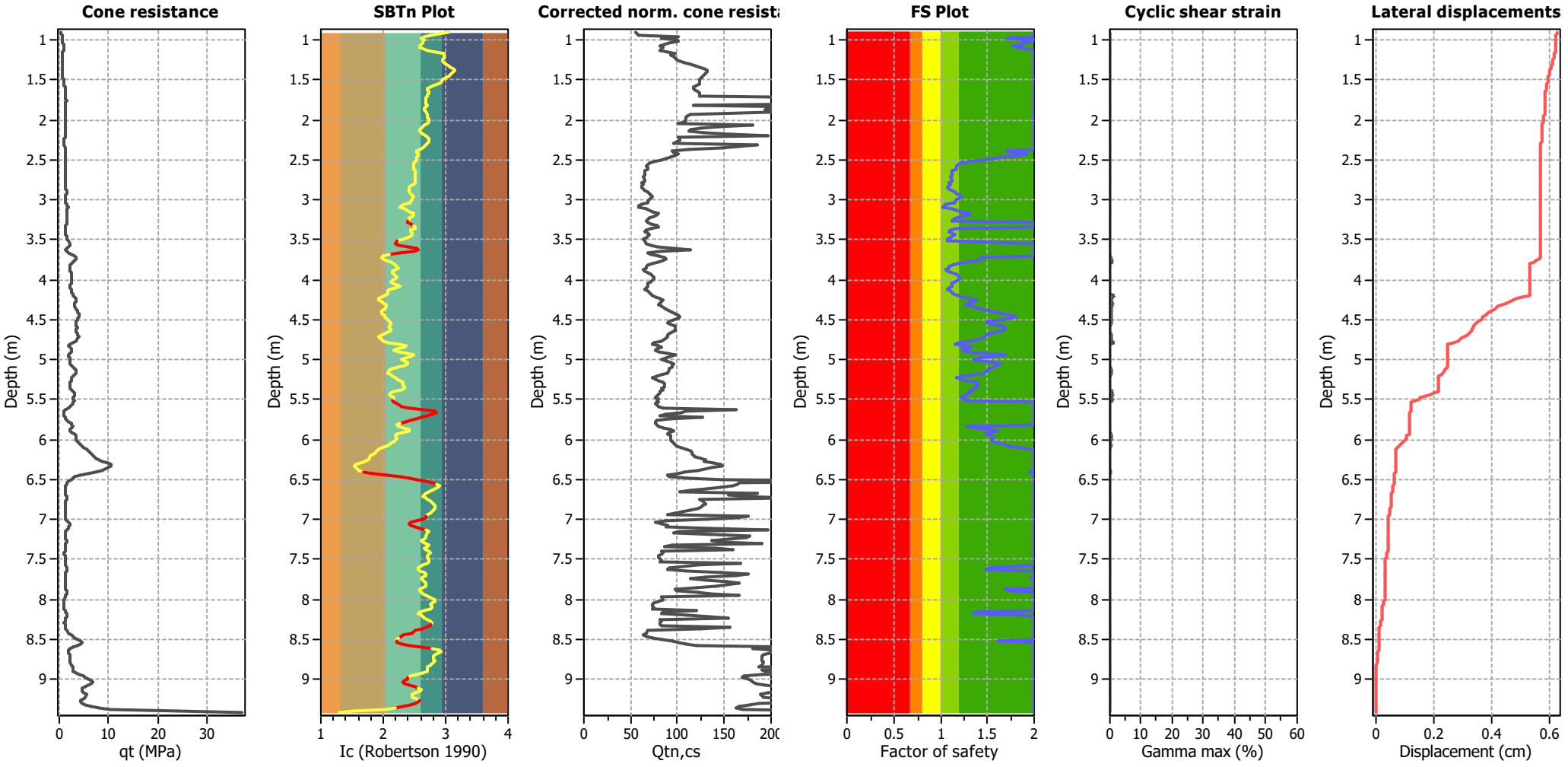
Total estimated settlement: 0.18

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements

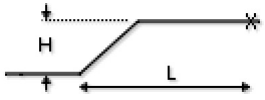
Geometric parameters: Level ground (or gently sloping) with free face (L: 50.00 m - H: 4.60 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
0.90	0.30	5.65	1.47	55.69	2.00	0.00	0.12	0.00
0.92	0.41	7.87	1.30	57.42	2.00	0.00	0.10	0.00
0.94	0.56	10.79	1.15	57.79	2.00	0.00	0.09	0.00
0.96	0.70	13.57	1.04	100.16	2.00	1.09	0.00	0.00
0.98	0.74	14.31	0.96	83.66	1.71	2.82	0.00	0.00
1.00	0.70	13.48	1.02	98.42	2.00	0.86	0.00	0.00
1.02	0.71	13.76	1.05	100.03	2.00	1.53	0.00	0.00
1.04	0.75	14.47	1.04	91.60	1.87	3.21	0.00	0.00
1.06	0.82	15.98	1.10	85.56	1.88	6.47	0.00	0.00
1.08	0.89	17.25	1.16	81.84	1.77	8.99	0.00	0.00
1.10	0.92	17.94	1.24	85.18	1.84	10.30	0.00	0.00
1.12	0.88	17.02	1.94	80.70	2.00	8.55	0.07	0.00
1.14	0.75	14.43	2.47	88.75	2.00	3.10	0.07	0.00
1.16	0.61	11.79	3.30	97.64	2.00	0.00	0.08	0.00
1.18	0.57	10.92	3.08	92.20	2.00	0.00	0.09	0.00
1.20	0.58	11.17	3.28	95.75	2.00	0.00	0.09	0.00
1.22	0.62	11.90	3.33	98.35	2.00	0.00	0.08	0.00
1.24	0.66	12.62	3.30	99.57	2.00	0.00	0.08	0.00
1.26	0.68	13.04	3.43	102.61	2.00	0.00	0.08	0.00
1.28	0.67	12.93	3.79	107.92	2.00	0.00	0.08	0.00
1.30	0.67	12.76	4.19	113.19	2.00	0.00	0.08	0.00
1.32	0.66	12.55	4.61	118.31	2.00	0.00	0.08	0.00
1.34	0.64	12.25	5.08	123.33	2.00	0.00	0.08	0.00
1.36	0.62	11.83	5.62	128.28	2.00	0.00	0.08	0.00
1.38	0.61	11.55	6.00	131.51	2.00	0.00	0.08	0.00
1.40	0.61	11.65	5.96	131.49	2.00	0.00	0.08	0.00
1.42	0.63	12.07	5.67	129.93	2.00	0.00	0.08	0.00
1.44	0.66	12.64	5.32	127.92	2.00	0.00	0.08	0.00
1.46	0.70	13.38	5.04	126.89	2.00	0.60	0.08	0.00
1.48	0.74	14.19	4.75	125.42	2.00	2.55	0.08	0.00
1.50	0.79	15.23	4.45	124.10	2.00	4.89	0.07	0.00
1.52	0.86	16.58	4.20	123.47	2.00	7.68	0.07	0.00
1.54	0.94	18.05	3.98	122.98	2.00	10.50	0.06	0.00
1.56	1.05	20.33	3.62	120.39	2.00	14.42	0.06	0.00
1.58	1.15	22.28	3.33	117.45	2.00	17.44	0.05	0.00
1.60	1.24	23.93	3.18	116.29	2.00	19.80	0.05	0.00
1.62	1.25	24.23	3.27	118.84	2.00	20.21	0.05	0.00
1.64	1.26	24.40	3.39	121.73	2.00	20.44	0.05	0.00
1.66	1.28	24.79	3.44	123.31	2.00	20.97	0.05	0.00
1.68	1.32	25.48	3.40	123.26	2.00	21.88	0.05	0.00
1.70	1.34	26.00	3.37	123.23	2.00	22.54	0.05	0.00
1.72	1.36	26.42	3.33	259.38	2.00	23.07	0.00	0.00
1.74	1.38	26.73	3.27	248.90	2.00	23.45	0.00	0.00
1.76	1.39	26.92	3.19	236.70	2.00	23.68	0.00	0.00
1.78	1.37	26.51	3.15	235.23	2.00	23.18	0.00	0.00
1.80	1.33	25.64	3.17	246.48	2.00	22.07	0.00	0.00
1.82	1.29	24.91	3.18	117.72	2.00	21.13	0.05	0.00
1.84	1.27	24.45	2.87	219.95	2.00	20.51	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
1.86	1.32	25.55	2.77	196.25	2.00	21.97	0.00	0.00
1.88	1.33	25.65	2.75	193.51	2.00	22.09	0.00	0.00
1.90	1.32	25.53	3.02	228.71	2.00	21.94	0.00	0.00
1.92	1.25	24.08	3.04	113.61	2.00	20.00	0.05	0.00
1.94	1.21	23.35	2.95	110.70	2.00	18.99	0.05	0.00
1.96	1.18	22.74	2.90	108.94	2.00	18.12	0.05	0.00
1.98	1.15	22.17	2.93	109.02	2.00	17.28	0.05	0.00
2.00	1.13	21.62	2.95	108.86	2.00	16.45	0.06	0.00
2.02	1.11	21.31	2.86	106.57	2.00	15.98	0.06	0.00
2.04	1.12	21.40	2.61	101.12	2.00	16.11	0.06	0.00
2.06	1.14	21.88	2.35	180.26	2.00	16.84	0.00	0.00
2.08	1.17	22.52	2.12	146.78	2.00	17.79	0.00	0.00
2.10	1.20	23.07	1.96	124.79	2.00	18.59	0.00	0.00
2.12	1.22	23.49	1.87	113.69	2.00	19.19	0.00	0.00
2.14	1.24	23.77	1.87	111.72	2.00	19.57	0.00	0.00
2.16	1.23	23.56	2.02	128.47	2.00	19.29	0.00	0.00
2.18	1.19	22.81	2.22	156.41	2.00	18.22	0.00	0.00
2.20	1.14	21.77	2.47	197.25	2.00	16.67	0.00	0.00
2.22	1.09	20.82	2.62	100.72	2.00	15.20	0.06	0.00
2.24	1.06	20.33	2.70	102.04	2.00	14.41	0.06	0.00
2.26	1.05	20.05	2.71	101.96	2.00	13.96	0.06	0.00
2.28	1.05	20.09	2.58	99.17	2.00	14.03	0.06	0.00
2.30	1.05	20.07	2.45	96.21	2.00	13.99	0.06	0.00
2.32	1.06	20.29	2.25	186.04	2.00	14.36	0.00	0.00
2.34	1.12	21.36	2.04	148.28	2.00	16.05	0.00	0.00
2.36	1.19	22.84	1.80	111.44	2.00	18.25	0.00	0.00
2.38	1.27	24.24	1.70	93.67	1.71	20.22	0.00	0.00
2.40	1.29	24.79	1.76	95.58	1.76	20.96	0.00	0.00
2.42	1.30	25.00	1.83	101.07	1.92	21.24	0.00	0.00
2.44	1.31	25.03	1.80	98.35	1.83	21.28	0.00	0.00
2.46	1.30	24.89	1.72	92.12	1.66	21.10	0.00	0.00
2.48	1.29	24.72	1.66	87.84	1.55	20.88	0.00	0.00
2.50	1.27	24.30	1.58	82.90	1.44	20.30	0.00	0.00
2.52	1.25	23.97	1.47	75.21	1.29	19.86	0.00	0.00
2.54	1.24	23.66	1.34	70.29	1.21	19.42	0.00	0.00
2.56	1.23	23.51	1.27	68.20	1.18	19.21	0.00	0.00
2.58	1.22	23.31	1.24	67.24	1.17	18.93	0.00	0.00
2.60	1.21	23.00	1.25	67.50	1.17	18.50	0.00	0.00
2.62	1.19	22.75	1.25	67.54	1.17	18.13	0.00	0.00
2.64	1.18	22.51	1.26	64.51	1.13	17.79	0.00	0.00
2.66	1.17	22.30	1.24	64.36	1.12	17.47	0.00	0.00
2.68	1.17	22.22	1.24	64.76	1.13	17.36	0.00	0.00
2.70	1.17	22.19	1.24	64.63	1.12	17.30	0.00	0.00
2.72	1.17	22.15	1.22	63.54	1.11	17.26	0.00	0.00
2.74	1.15	21.90	1.22	64.38	1.12	16.87	0.00	0.00
2.76	1.14	21.61	1.20	64.38	1.11	16.43	0.00	0.00
2.78	1.14	21.62	1.17	61.93	1.08	16.44	0.00	0.00
2.80	1.17	22.27	1.13	63.73	1.10	17.43	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
2.82	1.23	23.47	1.06	62.19	1.08	19.17	0.00	0.00
2.84	1.30	24.85	1.03	61.76	1.08	21.05	0.00	0.00
2.86	1.36	25.91	1.05	62.93	1.09	22.42	0.00	0.00
2.88	1.40	26.71	1.12	65.41	1.12	23.43	0.00	0.00
2.90	1.42	27.02	1.21	68.05	1.15	23.81	0.00	0.00
2.92	1.41	26.85	1.27	69.76	1.17	23.59	0.00	0.00
2.94	1.37	26.18	1.36	72.19	1.21	22.77	0.00	0.00
2.96	1.35	25.66	1.38	72.67	1.22	22.11	0.00	0.00
2.98	1.35	25.67	1.35	71.58	1.20	22.12	0.00	0.00
3.00	1.36	25.94	1.27	69.42	1.16	22.46	0.00	0.00
3.02	1.37	26.00	1.24	68.49	1.15	22.54	0.00	0.00
3.04	1.36	25.86	1.24	68.70	1.15	22.36	0.00	0.00
3.06	1.49	28.53	0.95	61.02	1.06	25.61	0.00	0.00
3.08	1.62	30.95	0.85	59.04	1.03	28.29	0.00	0.00
3.10	1.71	32.75	0.79	58.20	1.03	30.15	0.00	0.00
3.12	1.63	31.10	1.10	66.54	1.12	28.45	0.00	0.00
3.14	1.53	29.25	1.36	73.49	1.22	26.43	0.00	0.00
3.16	1.46	27.82	1.57	79.27	1.31	24.77	0.00	0.00
3.18	1.45	27.61	1.54	78.23	1.29	24.52	0.00	0.00
3.20	1.46	27.72	1.42	74.83	1.24	24.65	0.00	0.00
3.22	1.48	28.18	1.27	70.40	1.17	25.20	0.00	0.00
3.24	1.50	28.51	1.19	68.38	1.14	25.58	0.00	0.00
3.26	1.53	29.22	1.15	67.38	1.12	26.39	0.00	0.00
3.28	1.54	29.34	1.20	69.05	2.00	26.53	0.00	0.00
3.30	1.48	28.17	1.31	71.62	2.00	25.19	0.00	0.00
3.32	1.38	26.14	1.55	77.86	2.00	22.72	0.00	0.00
3.34	1.30	24.64	1.55	80.32	2.00	20.77	0.00	0.00
3.36	1.28	24.29	1.42	71.07	1.17	20.29	0.00	0.00
3.38	1.32	24.99	1.16	65.91	1.10	21.23	0.00	0.00
3.40	1.33	25.26	1.15	65.72	1.10	21.59	0.00	0.00
3.42	1.33	25.20	1.22	68.03	1.12	21.50	0.00	0.00
3.44	1.33	25.21	1.29	69.94	1.15	21.52	0.00	0.00
3.46	1.39	26.31	1.22	68.20	1.13	22.93	0.00	0.00
3.48	1.49	28.40	1.12	66.25	1.10	25.45	0.00	0.00
3.50	1.66	31.63	1.00	64.02	1.07	29.01	0.00	0.00
3.52	1.99	38.24	0.90	64.85	1.08	35.27	0.00	0.00
3.54	2.17	41.65	0.89	66.74	2.00	38.09	0.00	0.00
3.56	2.13	40.85	1.07	71.08	2.00	37.45	0.00	0.00
3.58	1.78	33.98	1.44	78.38	2.00	31.37	0.00	0.00
3.60	1.48	28.14	1.93	96.55	2.00	25.14	0.00	0.00
3.62	1.37	25.88	1.99	114.31	2.00	22.38	0.00	0.00
3.64	1.50	28.50	1.64	81.91	2.00	25.56	0.00	0.00
3.66	1.96	37.52	1.05	68.54	2.00	34.64	0.00	0.00
3.68	2.60	50.13	0.78	70.83	2.00	44.21	0.00	0.00
3.70	3.17	61.34	0.68	79.61	2.00	50.87	0.00	0.00
3.72	3.48	67.42	0.72	86.51	1.43	53.99	0.43	0.01
3.74	3.45	66.98	0.80	87.32	1.45	53.77	0.40	0.01
3.76	3.20	61.93	0.93	84.67	1.39	51.19	0.51	0.01

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
3.78	2.82	54.54	0.98	79.05	1.28	46.99	0.86	0.02
3.80	2.49	47.93	0.95	73.04	1.18	42.73	0.00	0.00
3.82	2.27	43.58	0.91	68.69	1.12	39.59	0.00	0.00
3.84	2.12	40.66	0.92	66.80	1.10	37.30	0.00	0.00
3.86	2.03	38.94	0.94	66.41	1.09	35.87	0.00	0.00
3.88	2.08	39.85	0.84	64.19	1.06	36.63	0.00	0.00
3.90	2.25	43.22	0.78	65.15	1.07	39.31	0.00	0.00
3.92	2.41	46.26	0.84	69.01	1.12	41.56	0.00	0.00
3.94	2.42	46.43	0.96	71.99	1.16	41.68	0.00	0.00
3.96	2.35	45.13	1.07	74.09	1.20	40.74	0.00	0.00
3.98	2.41	46.22	1.04	74.09	1.20	41.53	0.00	0.00
4.00	2.51	48.30	0.95	73.25	1.18	42.98	0.00	0.00
4.02	2.54	48.77	0.85	71.32	1.15	43.30	0.00	0.00
4.04	2.36	45.35	0.86	68.88	1.12	40.90	0.00	0.00
4.06	2.13	40.69	0.99	68.88	1.12	37.32	0.00	0.00
4.08	2.04	38.94	1.03	69.06	1.12	35.87	0.00	0.00
4.10	2.18	41.68	0.90	67.03	1.09	38.11	0.00	0.00
4.12	2.40	46.09	0.70	65.51	1.07	41.43	0.00	0.00
4.14	2.56	49.13	0.68	67.81	1.10	43.54	0.00	0.00
4.16	2.59	49.86	0.71	69.21	1.12	44.03	0.00	0.00
4.18	2.65	50.89	0.76	71.05	1.15	44.70	0.00	0.00
4.20	2.85	54.95	0.68	73.39	1.18	47.24	1.47	0.03
4.22	3.09	59.69	0.62	77.02	1.24	49.97	1.09	0.02
4.24	3.38	65.39	0.57	82.00	1.33	52.98	0.70	0.01
4.26	3.50	67.72	0.62	85.11	1.39	54.13	0.52	0.01
4.28	3.37	65.09	0.67	83.32	1.35	52.83	0.62	0.01
4.30	3.19	61.57	0.74	80.94	1.30	50.99	0.77	0.01
4.32	3.03	58.51	0.80	78.98	1.27	49.31	0.92	0.02
4.34	3.17	61.11	0.84	82.20	1.33	50.75	0.69	0.01
4.36	3.39	65.46	0.87	87.04	1.42	53.02	0.44	0.01
4.38	3.62	70.15	0.82	90.86	1.51	55.30	0.58	0.01
4.40	3.81	73.87	0.82	94.66	1.60	57.00	0.45	0.01
4.42	3.88	75.26	0.89	97.24	1.67	57.62	0.37	0.01
4.44	3.93	76.08	1.02	100.31	1.75	57.98	0.30	0.01
4.46	3.94	76.28	1.11	102.17	1.81	58.06	0.26	0.00
4.48	3.82	74.06	1.11	100.01	1.74	57.09	0.31	0.01
4.50	3.63	70.19	1.11	96.20	1.64	55.32	0.40	0.01
4.52	3.35	64.74	1.09	90.61	1.50	52.65	0.31	0.01
4.54	3.25	62.73	1.14	90.07	1.49	51.61	0.33	0.01
4.56	3.34	64.46	1.20	92.86	1.56	52.50	0.25	0.00
4.58	3.54	68.41	1.22	96.95	1.66	54.47	0.17	0.00
4.60	3.59	69.41	1.24	98.32	1.70	54.95	0.14	0.00
4.62	3.53	68.15	1.27	97.83	1.68	54.35	0.15	0.00
4.64	3.46	66.76	1.28	96.86	1.66	53.66	0.17	0.00
4.66	3.52	67.98	1.14	94.84	1.61	54.26	0.20	0.00
4.68	3.63	69.10	0.92	91.63	1.53	54.80	0.28	0.01
4.70	3.74	69.65	0.76	89.40	1.48	55.06	0.64	0.01
4.72	3.87	70.93	0.68	89.34	1.47	55.66	0.64	0.01

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
4.74	3.80	69.56	0.67	87.92	1.44	55.02	0.71	0.01
4.76	3.42	63.60	0.74	82.96	1.34	52.06	0.65	0.01
4.78	2.80	53.46	0.82	74.71	1.20	46.33	1.35	0.02
4.80	2.21	42.08	1.08	72.47	1.16	38.43	0.00	0.00
4.82	1.93	36.64	1.40	78.96	1.27	33.86	0.00	0.00
4.84	2.08	39.55	1.47	82.58	1.33	36.38	0.00	0.00
4.86	2.40	45.76	1.17	77.57	1.24	41.20	0.00	0.00
4.88	2.56	48.93	1.07	76.94	1.23	43.41	0.00	0.00
4.90	2.37	45.21	1.27	80.02	1.28	40.80	0.00	0.00
4.92	2.03	38.47	1.73	89.91	1.48	35.47	0.00	0.00
4.94	1.82	34.35	2.07	98.18	1.69	31.73	0.00	0.00
4.96	1.88	35.56	1.87	92.78	1.55	32.87	0.00	0.00
4.98	2.13	40.37	1.60	87.08	1.42	37.06	0.00	0.00
5.00	2.29	43.61	1.42	83.43	1.35	39.61	0.00	0.00
5.02	2.24	42.55	1.57	87.33	1.43	38.79	0.00	0.00
5.04	2.10	39.86	1.81	93.31	1.56	36.64	0.00	0.00
5.06	2.14	40.53	1.90	96.54	1.65	37.19	0.00	0.00
5.08	2.36	44.92	1.76	94.65	1.60	40.59	0.00	0.00
5.10	2.77	53.09	1.56	93.79	1.58	46.10	0.23	0.00
5.12	3.19	60.02	1.28	91.11	1.51	50.15	0.30	0.01
5.14	3.50	64.42	1.13	91.38	1.52	52.49	0.29	0.01
5.16	3.52	64.21	1.03	88.94	1.46	52.38	0.37	0.01
5.18	3.14	57.67	1.04	83.22	1.34	48.83	0.64	0.01
5.20	2.75	50.89	1.02	77.32	1.24	44.70	0.00	0.00
5.22	2.47	46.00	1.01	73.31	1.17	41.37	0.00	0.00
5.24	2.42	45.55	1.13	76.17	1.22	41.04	0.00	0.00
5.26	2.33	44.23	1.30	80.41	1.29	40.07	0.00	0.00
5.28	2.24	42.41	1.49	85.12	1.38	38.69	0.00	0.00
5.30	2.25	42.62	1.51	85.84	1.40	38.85	0.00	0.00
5.32	2.22	42.11	1.51	85.49	1.39	38.46	0.00	0.00
5.34	2.14	40.56	1.55	85.67	1.39	37.21	0.00	0.00
5.36	2.15	40.77	1.47	83.56	1.35	37.39	0.00	0.00
5.38	2.40	45.11	1.40	83.86	1.35	40.72	0.00	0.00
5.40	2.89	52.50	1.12	81.04	1.30	45.73	0.78	0.01
5.42	3.20	56.92	1.01	81.91	1.32	48.40	0.73	0.01
5.44	3.23	56.98	0.92	80.07	1.28	48.43	0.86	0.02
5.46	3.00	53.26	0.97	77.84	1.24	46.20	1.04	0.02
5.48	2.82	50.45	1.02	76.82	1.23	44.41	0.00	0.00
5.50	2.88	51.52	1.08	79.19	1.27	45.11	0.93	0.02
5.52	2.94	52.13	1.03	78.47	1.26	45.50	0.99	0.02
5.54	2.91	51.70	1.07	79.20	2.00	45.23	0.00	0.00
5.56	2.63	47.18	1.12	77.16	2.00	42.21	0.00	0.00
5.58	2.30	42.04	1.31	79.37	2.00	38.40	0.00	0.00
5.60	1.79	33.61	1.61	84.24	2.00	31.01	0.00	0.00
5.62	1.34	24.63	2.30	161.88	2.00	20.75	0.00	0.00
5.64	0.99	17.65	3.03	109.04	2.00	9.75	0.07	0.00
5.66	0.90	15.91	2.86	103.28	2.00	6.32	0.07	0.00
5.68	0.90	15.94	2.13	88.03	2.00	6.39	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
5.70	0.95	16.89	1.80	81.16	2.00	8.30	0.07	0.00
5.72	1.13	20.37	1.68	126.55	2.00	14.49	0.00	0.00
5.74	1.32	24.25	1.63	93.30	2.00	20.24	0.00	0.00
5.76	1.59	29.48	1.48	78.46	2.00	26.68	0.00	0.00
5.78	1.91	34.72	1.33	76.10	2.00	32.08	0.00	0.00
5.80	2.32	41.21	1.22	76.09	2.00	37.74	0.00	0.00
5.82	2.62	45.84	1.17	77.72	2.00	41.25	0.00	0.00
5.84	2.63	46.19	1.24	79.84	1.28	41.50	0.00	0.00
5.86	2.41	42.96	1.45	84.23	1.36	39.12	0.00	0.00
5.88	2.12	38.59	1.79	92.19	1.53	35.58	0.00	0.00
5.90	2.12	38.69	1.88	95.30	1.61	35.66	0.00	0.00
5.92	2.54	45.14	1.63	90.82	1.50	40.74	0.00	0.00
5.94	3.07	53.17	1.42	89.87	1.48	46.15	0.35	0.01
5.96	3.35	57.58	1.41	92.78	1.55	48.78	0.26	0.00
5.98	3.32	57.04	1.44	93.22	1.56	48.47	0.25	0.00
6.00	3.36	57.38	1.40	92.37	1.54	48.66	0.27	0.00
6.02	3.60	60.79	1.35	93.55	1.57	50.57	0.24	0.00
6.04	3.94	65.73	1.26	95.61	1.62	53.15	0.19	0.00
6.06	4.25	70.10	1.21	98.26	1.69	55.27	0.35	0.01
6.08	4.56	74.04	1.09	99.59	1.73	57.08	0.32	0.01
6.10	5.03	80.25	0.97	103.75	1.85	59.74	0.24	0.00
6.12	5.54	86.93	0.88	109.19	2.00	62.38	0.00	0.00
6.14	5.94	92.16	0.84	113.71	2.00	64.30	0.00	0.00
6.16	6.13	94.32	0.81	115.18	2.00	65.07	0.00	0.00
6.18	6.35	96.83	0.75	116.14	2.00	65.94	0.00	0.00
6.20	6.65	100.20	0.69	117.00	2.00	67.07	0.00	0.00
6.22	7.07	105.42	0.65	119.29	2.00	68.74	0.00	0.00
6.24	7.53	112.04	0.69	126.01	2.00	70.75	0.00	0.00
6.26	8.08	119.22	0.69	129.86	2.00	72.80	0.00	0.00
6.28	8.74	127.31	0.64	128.89	2.00	74.97	0.00	0.00
6.30	9.78	138.70	0.51	138.70	2.00	77.80	0.00	0.00
6.32	10.50	146.20	0.43	146.20	2.00	79.54	0.00	0.00
6.34	10.66	147.40	0.40	147.40	2.00	79.81	0.00	0.00
6.36	9.85	136.90	0.40	136.90	2.00	77.37	0.00	0.00
6.38	8.75	122.63	0.40	122.63	2.00	73.73	0.00	0.00
6.40	7.49	106.66	0.43	106.66	1.94	69.13	0.47	0.01
6.42	5.77	85.42	0.59	101.53	2.00	61.80	0.00	0.00
6.44	4.22	65.83	0.98	89.58	2.00	53.20	0.00	0.00
6.46	3.13	51.01	1.49	90.43	2.00	44.78	0.00	0.00
6.48	2.67	45.14	2.26	110.70	2.00	40.75	0.00	0.00
6.50	2.35	40.84	3.09	148.62	2.00	37.44	0.00	0.00
6.52	1.96	34.98	4.28	331.62	2.00	32.33	0.00	0.00
6.54	1.65	29.68	4.83	166.45	2.00	26.91	0.04	0.00
6.56	1.41	25.48	5.09	164.79	2.00	21.87	0.05	0.00
6.58	1.24	22.38	5.13	159.45	2.00	17.59	0.05	0.00
6.60	1.20	21.49	4.58	147.14	2.00	16.25	0.06	0.00
6.62	1.18	20.82	3.82	130.97	2.00	15.21	0.06	0.00
6.64	1.17	20.24	3.03	113.23	2.00	14.27	0.06	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.66	1.19	20.19	2.52	101.74	2.00	14.19	0.06	0.00
6.68	1.23	20.67	2.14	184.80	2.00	14.97	0.00	0.00
6.70	1.27	21.17	1.96	154.56	2.00	15.76	0.00	0.00
6.72	1.41	23.65	2.28	171.32	2.00	19.41	0.00	0.00
6.74	1.48	24.97	2.71	214.02	2.00	21.20	0.00	0.00
6.76	1.50	25.53	3.24	124.03	2.00	21.93	0.05	0.00
6.78	1.37	23.37	3.45	126.64	2.00	19.02	0.05	0.00
6.80	1.28	21.87	3.68	129.48	2.00	16.83	0.06	0.00
6.82	1.23	20.96	3.65	127.59	2.00	15.43	0.06	0.00
6.84	1.20	20.30	3.61	125.71	2.00	14.37	0.06	0.00
6.86	1.17	19.77	3.46	121.85	2.00	13.49	0.06	0.00
6.88	1.15	19.30	3.11	113.99	2.00	12.71	0.06	0.00
6.90	1.15	18.94	2.73	105.15	2.00	12.09	0.06	0.00
6.92	1.14	18.66	2.37	96.79	2.00	11.59	0.06	0.00
6.94	1.15	18.55	2.08	89.82	2.00	11.39	0.06	0.00
6.96	1.15	18.54	1.89	176.19	2.00	11.38	0.00	0.00
6.98	1.19	18.97	1.85	164.37	2.00	12.14	0.00	0.00
7.00	1.30	20.76	1.75	132.51	2.00	15.11	0.00	0.00
7.02	1.57	24.71	1.58	87.34	2.00	20.86	0.00	0.00
7.04	1.94	30.30	1.42	77.07	2.00	27.59	0.00	0.00
7.06	2.19	34.13	1.54	82.59	2.00	31.51	0.00	0.00
7.08	2.22	34.70	1.75	89.39	2.00	32.07	0.00	0.00
7.10	1.99	31.37	1.95	88.53	2.00	28.73	0.00	0.00
7.12	1.70	27.07	2.21	135.25	2.00	23.86	0.00	0.00
7.14	1.45	23.12	2.44	197.47	2.00	18.67	0.00	0.00
7.16	1.30	20.72	2.52	102.24	2.00	15.05	0.06	0.00
7.18	1.25	19.82	2.26	95.12	2.00	13.58	0.06	0.00
7.20	1.26	19.77	2.01	177.22	2.00	13.50	0.00	0.00
7.22	1.28	20.09	2.02	174.28	2.00	14.02	0.00	0.00
7.24	1.36	21.16	1.97	156.48	2.00	15.74	0.00	0.00
7.26	1.47	22.76	1.92	136.00	2.00	18.14	0.00	0.00
7.28	1.49	23.12	2.02	144.54	2.00	18.66	0.00	0.00
7.30	1.38	21.52	2.25	189.73	2.00	16.30	0.00	0.00
7.32	1.23	19.04	2.25	94.17	2.00	12.25	0.06	0.00
7.34	1.16	17.81	1.93	85.55	2.00	10.06	0.06	0.00
7.36	1.17	17.77	1.57	140.31	2.00	9.97	0.00	0.00
7.38	1.14	17.31	1.67	159.88	2.00	9.12	0.00	0.00
7.40	1.09	16.59	1.87	83.31	2.00	7.71	0.07	0.00
7.42	1.05	15.84	1.95	84.60	2.00	6.19	0.07	0.00
7.44	1.06	15.96	1.86	82.44	2.00	6.43	0.07	0.00
7.46	1.08	16.22	1.73	79.67	2.00	6.96	0.07	0.00
7.48	1.10	16.48	1.75	80.17	2.00	7.49	0.07	0.00
7.50	1.09	16.29	1.79	81.08	2.00	7.10	0.07	0.00
7.52	1.07	16.08	1.85	82.27	2.00	6.68	0.07	0.00
7.54	1.07	16.03	1.81	81.42	2.00	6.57	0.07	0.00
7.56	1.12	16.69	1.66	166.90	2.00	7.90	0.00	0.00
7.58	1.24	18.25	1.47	121.76	2.00	10.86	0.00	0.00
7.60	1.40	20.66	1.38	91.78	1.54	14.96	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.62	1.51	22.19	1.45	89.33	1.48	17.30	0.00	0.00
7.64	1.46	21.56	1.59	108.34	2.00	16.36	0.00	0.00
7.66	1.32	19.49	1.76	146.86	2.00	13.02	0.00	0.00
7.68	1.21	17.90	1.83	175.39	2.00	10.21	0.00	0.00
7.70	1.20	17.67	1.72	162.99	2.00	9.80	0.00	0.00
7.72	1.27	18.56	1.56	130.35	2.00	11.41	0.00	0.00
7.74	1.33	19.40	1.49	113.77	1.97	12.87	0.00	0.00
7.76	1.34	19.59	1.64	130.59	2.00	13.20	0.00	0.00
7.78	1.26	18.38	1.71	153.16	2.00	11.09	0.00	0.00
7.80	1.18	17.04	1.68	166.09	2.00	8.58	0.00	0.00
7.82	1.12	16.07	1.50	152.21	2.00	6.65	0.00	0.00
7.84	1.13	16.13	1.44	141.93	2.00	6.78	0.00	0.00
7.86	1.20	17.09	1.36	120.79	2.00	8.68	0.00	0.00
7.88	1.30	18.57	1.29	98.01	1.69	11.43	0.00	0.00
7.90	1.39	19.89	1.40	99.43	1.73	13.69	0.00	0.00
7.92	1.41	20.19	1.61	121.24	2.00	14.20	0.00	0.00
7.94	1.40	20.08	1.71	134.15	2.00	14.01	0.00	0.00
7.96	1.30	18.61	1.83	166.51	2.00	11.51	0.00	0.00
7.98	1.16	16.49	1.87	83.31	2.00	7.52	0.07	0.00
8.00	0.99	13.96	2.03	84.79	2.00	2.02	0.08	0.00
8.02	0.92	12.91	1.85	79.79	2.00	0.00	0.08	0.00
8.04	0.93	12.97	1.62	74.57	2.00	0.00	0.08	0.00
8.06	0.96	13.31	1.53	72.70	2.00	0.44	0.08	0.00
8.08	0.96	13.35	1.57	73.75	2.00	0.54	0.08	0.00
8.10	0.97	13.38	1.60	74.55	2.00	0.61	0.08	0.00
8.12	1.01	14.00	1.51	72.84	2.00	2.11	0.08	0.00
8.14	1.18	16.26	1.29	120.55	2.00	7.04	0.00	0.00
8.16	1.31	18.11	1.14	84.57	1.38	10.60	0.00	0.00
8.18	1.41	19.43	1.21	82.97	1.35	12.92	0.00	0.00
8.20	1.39	19.36	1.46	111.06	1.89	12.81	0.00	0.00
8.22	1.38	19.28	1.64	133.32	2.00	12.66	0.00	0.00
8.24	1.33	18.53	1.74	155.10	2.00	11.35	0.00	0.00
8.26	1.20	16.64	1.79	81.33	2.00	7.80	0.07	0.00
8.28	1.10	15.10	1.88	82.53	2.00	4.61	0.07	0.00
8.30	1.07	14.63	1.88	81.97	2.00	3.57	0.07	0.00
8.32	1.11	15.23	1.83	81.43	2.00	4.90	0.07	0.00
8.34	1.15	15.83	1.87	82.84	2.00	6.16	0.07	0.00
8.36	1.29	17.63	1.66	155.58	2.00	9.72	0.00	0.00
8.38	1.35	18.37	1.50	125.58	2.00	11.08	0.00	0.00
8.40	1.62	21.93	1.21	68.59	2.00	16.92	0.00	0.00
8.42	1.77	23.91	1.13	65.97	2.00	19.78	0.00	0.00
8.44	2.34	31.40	0.97	63.91	2.00	28.77	0.00	0.00
8.46	2.66	35.72	1.02	67.46	2.00	33.02	0.00	0.00
8.48	3.19	42.72	1.10	73.89	2.00	38.93	0.00	0.00
8.50	3.73	50.09	1.27	83.64	2.00	44.18	0.00	0.00
8.52	4.32	57.95	1.46	94.66	1.61	48.99	0.20	0.00
8.54	4.56	61.29	1.62	101.48	2.00	50.84	0.00	0.00
8.56	4.19	56.85	1.97	109.04	2.00	48.36	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.58	3.56	48.88	2.50	120.87	2.00	43.37	0.00	0.00
8.60	2.79	39.15	3.69	222.54	2.00	36.05	0.00	0.00
8.62	2.22	31.60	5.27	179.83	2.00	28.98	0.04	0.00
8.64	1.90	27.17	6.75	201.05	2.00	23.99	0.05	0.00
8.66	1.89	27.07	6.88	203.27	2.00	23.87	0.05	0.00
8.68	1.99	28.38	6.44	197.95	2.00	25.43	0.04	0.00
8.70	2.15	30.36	5.91	191.41	2.00	27.66	0.04	0.00
8.72	2.25	31.77	5.73	190.44	2.00	29.15	0.04	0.00
8.74	2.28	32.06	5.71	190.47	2.00	29.45	0.04	0.00
8.76	2.23	31.32	5.75	190.03	2.00	28.69	0.04	0.00
8.78	2.20	30.79	5.84	190.88	2.00	28.12	0.04	0.00
8.80	2.29	32.01	5.77	191.67	2.00	29.40	0.04	0.00
8.82	2.55	35.40	5.46	190.46	2.00	32.73	0.03	0.00
8.84	2.78	38.51	5.14	187.33	2.00	35.50	0.03	0.00
8.86	2.88	39.67	5.03	401.58	2.00	36.48	0.00	0.00
8.88	2.86	39.37	5.18	189.56	2.00	36.23	0.03	0.00
8.90	2.90	39.85	5.27	192.77	2.00	36.63	0.03	0.00
8.92	3.32	45.35	4.83	324.40	2.00	40.90	0.00	0.00
8.94	4.11	55.47	4.11	189.61	2.00	47.55	0.00	0.00
8.96	4.83	64.59	3.67	170.37	2.00	52.57	0.00	0.00
8.98	5.36	71.24	3.47	169.06	2.00	55.81	0.00	0.00
9.00	5.79	76.71	3.55	176.01	2.00	58.25	0.00	0.00
9.02	6.36	83.84	3.45	178.23	2.00	61.18	0.00	0.00
9.04	6.82	89.43	3.37	180.12	2.00	63.31	0.00	0.00
9.06	6.58	86.28	3.53	183.02	2.00	62.13	0.00	0.00
9.08	5.98	78.93	3.99	193.71	2.00	59.19	0.00	0.00
9.10	5.22	69.45	4.74	206.28	2.00	54.97	0.00	0.00
9.12	4.77	63.65	5.26	280.82	2.00	52.09	0.00	0.00
9.14	4.51	60.11	5.53	329.81	2.00	50.20	0.00	0.00
9.16	4.61	61.13	5.17	281.26	2.00	50.76	0.00	0.00
9.18	5.05	66.38	4.55	197.44	2.00	53.47	0.00	0.00
9.20	5.45	71.09	4.06	189.42	2.00	55.74	0.00	0.00
9.22	5.30	69.00	4.17	191.29	2.00	54.75	0.00	0.00
9.24	4.79	62.60	4.56	209.71	2.00	51.54	0.00	0.00
9.26	4.39	57.40	4.89	264.73	2.00	48.68	0.00	0.00
9.28	4.37	56.93	4.73	248.97	2.00	48.41	0.00	0.00
9.30	4.66	60.21	4.25	187.33	2.00	50.25	0.00	0.00
9.32	5.24	67.30	3.81	177.54	2.00	53.93	0.00	0.00
9.34	6.58	83.31	3.13	166.55	2.00	60.97	0.00	0.00
9.36	8.09	100.98	2.57	162.72	2.00	67.32	0.00	0.00
9.38	10.13	124.39	2.01	169.53	2.00	74.20	0.00	0.00
9.40	23.81	275.25	0.86	275.25	2.00	100.00	0.00	0.00
9.42	37.13	415.53	0.56	415.53	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)

Total estimated displacement: 0.62

Abbreviations

q_t:	Total cone resistance
Q_{tn}:	Adjusted cone resistance to an effective overburden stress of 1 atm
R_f:	Friction ration
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
FS:	Calculated factor of safety against liquefaction
D_r:	Calculated relative density
$Gamma_{max}$:	Calculated maximum cyclic shear strain
Lat. disp.:	Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.30	5.65	9.86	55.69	3.06	0.50	2.30
0.92	0.41	7.87	7.30	57.42	2.91	0.09	0.65
0.94	0.56	10.79	5.36	57.79	2.76	0.09	0.65
0.96	0.70	13.57	4.19	56.92	2.65	0.75	0.75
0.98	0.74	14.31	3.86	55.20	2.61	0.72	0.72
1.00	0.70	13.48	4.18	56.32	2.65	0.75	0.75
1.02	0.71	13.76	4.17	57.38	2.65	0.75	0.75
1.04	0.75	14.47	3.97	57.45	2.62	0.73	0.73
1.06	0.82	15.98	3.74	59.74	2.60	0.72	0.72
1.08	0.89	17.25	3.58	61.78	2.58	0.68	0.71
1.10	0.92	17.94	3.58	64.28	2.58	0.72	0.72
1.12	0.88	17.02	4.74	80.70	2.70	0.62	0.71
1.14	0.75	14.43	6.15	88.75	2.82	0.73	0.73
1.16	0.61	11.79	8.28	97.64	2.97	0.74	0.74
1.18	0.57	10.92	8.45	92.20	2.98	0.73	0.73
1.20	0.58	11.17	8.57	95.75	2.99	0.74	0.74
1.22	0.62	11.90	8.26	98.35	2.97	0.74	0.74
1.24	0.66	12.62	7.89	99.57	2.95	0.75	0.75
1.26	0.68	13.04	7.87	102.61	2.94	0.75	0.75
1.28	0.67	12.93	8.35	107.92	2.97	0.76	0.76
1.30	0.67	12.76	8.87	113.19	3.01	2.49	4.10
1.32	0.66	12.55	9.43	118.31	3.04	2.63	3.98
1.34	0.64	12.25	10.07	123.33	3.07	2.82	3.84
1.36	0.62	11.83	10.85	128.28	3.11	2.99	3.66
1.38	0.61	11.55	11.39	131.51	3.14	3.11	3.53
1.40	0.61	11.65	11.28	131.49	3.13	3.11	3.52
1.42	0.63	12.07	10.76	129.93	3.11	2.91	3.61
1.44	0.66	12.64	10.12	127.92	3.07	2.87	3.73
1.46	0.70	13.38	9.49	126.89	3.04	2.85	3.90
1.48	0.74	14.19	8.84	125.42	3.00	2.81	4.09
1.50	0.79	15.23	8.15	124.10	2.96	0.79	0.79
1.52	0.86	16.58	7.45	123.47	2.92	0.79	0.79
1.54	0.94	18.05	6.81	122.98	2.87	0.79	0.79
1.56	1.05	20.33	5.92	120.39	2.81	0.78	0.78
1.58	1.15	22.28	5.27	117.45	2.75	0.78	0.78
1.60	1.24	23.93	4.86	116.29	2.71	0.78	0.78
1.62	1.25	24.23	4.91	118.84	2.72	0.78	0.78
1.64	1.26	24.40	4.99	121.73	2.73	0.79	0.79
1.66	1.28	24.79	4.97	123.31	2.72	0.79	0.79
1.68	1.32	25.48	4.84	123.26	2.71	0.79	0.79
1.70	1.34	26.00	4.74	123.23	2.70	0.79	0.79
1.72	1.36	26.42	4.65	122.74	2.69	0.94	0.94
1.74	1.38	26.73	4.56	121.83	2.69	0.93	0.93
1.76	1.39	26.92	4.47	120.20	2.68	0.92	0.92
1.78	1.37	26.51	4.48	118.76	2.68	0.92	0.92
1.80	1.33	25.64	4.61	118.20	2.69	0.93	0.93
1.82	1.29	24.91	4.72	117.72	2.70	0.78	0.78
1.84	1.27	24.45	4.50	110.08	2.68	0.91	0.91

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.32	25.55	4.25	108.70	2.65	0.88	0.88
1.88	1.33	25.65	4.23	108.42	2.65	0.88	0.88
1.90	1.32	25.53	4.50	114.77	2.68	0.92	0.92
1.92	1.25	24.08	4.72	113.61	2.70	0.77	0.77
1.94	1.21	23.35	4.74	110.70	2.70	0.77	0.77
1.96	1.18	22.74	4.79	108.94	2.71	0.76	0.76
1.98	1.15	22.17	4.92	109.02	2.72	0.76	0.76
2.00	1.13	21.62	5.03	108.86	2.73	0.76	0.76
2.02	1.11	21.31	5.00	106.57	2.73	0.76	0.76
2.04	1.12	21.40	4.72	101.12	2.70	0.75	0.75
2.06	1.14	21.88	4.36	95.43	2.67	0.86	0.86
2.08	1.17	22.52	4.01	90.32	2.63	0.82	0.82
2.10	1.20	23.07	3.75	86.56	2.60	0.79	0.79
2.12	1.22	23.49	3.61	84.73	2.58	0.77	0.77
2.14	1.24	23.77	3.57	84.84	2.58	0.77	0.77
2.16	1.23	23.56	3.76	88.67	2.60	0.80	0.80
2.18	1.19	22.81	4.08	93.17	2.64	0.84	0.84
2.20	1.14	21.77	4.51	98.25	2.68	0.88	0.88
2.22	1.09	20.82	4.84	100.72	2.71	0.75	0.75
2.24	1.06	20.33	5.02	102.04	2.73	0.75	0.75
2.26	1.05	20.05	5.08	101.96	2.73	0.75	0.75
2.28	1.05	20.09	4.94	99.17	2.72	0.75	0.75
2.30	1.05	20.07	4.79	96.21	2.71	0.74	0.74
2.32	1.06	20.29	4.53	91.98	2.68	0.87	0.87
2.34	1.12	21.36	4.10	87.62	2.64	0.82	0.82
2.36	1.19	22.84	3.62	82.61	2.58	0.77	0.77
2.38	1.27	24.24	3.33	80.74	2.55	0.74	0.74
2.40	1.29	24.79	3.33	82.51	2.55	0.74	0.74
2.42	1.30	25.00	3.38	84.60	2.56	0.75	0.75
2.44	1.31	25.03	3.35	83.86	2.55	0.74	0.74
2.46	1.30	24.89	3.28	81.66	2.54	0.73	0.73
2.48	1.29	24.72	3.23	79.96	2.54	0.72	0.72
2.50	1.27	24.30	3.19	77.48	2.53	0.71	0.71
2.52	1.25	23.97	3.10	74.25	2.52	0.39	0.70
2.54	1.24	23.66	2.97	70.29	2.50	0.26	0.68
2.56	1.23	23.51	2.90	68.20	2.49	0.22	0.68
2.58	1.22	23.31	2.88	67.24	2.49	0.20	0.68
2.60	1.21	23.00	2.93	67.50	2.49	0.21	0.68
2.62	1.19	22.75	2.97	67.54	2.50	0.21	0.68
2.64	1.18	22.51	3.00	67.57	2.50	0.16	0.67
2.66	1.17	22.30	3.01	67.09	2.50	0.16	0.67
2.68	1.17	22.22	3.02	67.09	2.51	0.17	0.67
2.70	1.17	22.19	3.02	66.97	2.51	0.16	0.67
2.72	1.17	22.15	3.00	66.51	2.50	0.15	0.67
2.74	1.15	21.90	3.03	66.31	2.51	0.16	0.67
2.76	1.14	21.61	3.04	65.73	2.51	0.16	0.67
2.78	1.14	21.62	3.00	64.87	2.50	0.13	0.66
2.80	1.17	22.27	2.86	63.73	2.48	0.15	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	1.23	23.47	2.65	62.19	2.45	0.13	0.66
2.84	1.30	24.85	2.48	61.76	2.42	0.13	0.66
2.86	1.36	25.91	2.43	62.93	2.41	0.14	0.66
2.88	1.40	26.71	2.45	65.41	2.41	0.17	0.67
2.90	1.42	27.02	2.52	68.05	2.43	0.22	0.68
2.92	1.41	26.85	2.60	69.76	2.44	0.25	0.68
2.94	1.37	26.18	2.76	72.19	2.47	0.31	0.69
2.96	1.35	25.66	2.83	72.67	2.48	0.32	0.69
2.98	1.35	25.67	2.79	71.58	2.47	0.29	0.69
3.00	1.36	25.94	2.68	69.42	2.45	0.24	0.68
3.02	1.37	26.00	2.63	68.49	2.45	0.23	0.68
3.04	1.36	25.86	2.66	68.70	2.45	0.23	0.68
3.06	1.49	28.53	2.14	61.02	2.35	0.12	0.66
3.08	1.62	30.95	1.91	59.04	2.30	0.10	0.65
3.10	1.71	32.75	1.78	58.20	2.26	0.10	0.65
3.12	1.63	31.10	2.14	66.54	2.35	0.19	0.67
3.14	1.53	29.25	2.51	73.49	2.43	0.34	0.69
3.16	1.46	27.82	2.85	79.27	2.48	0.55	0.71
3.18	1.45	27.61	2.83	78.23	2.48	0.50	0.70
3.20	1.46	27.72	2.70	74.83	2.46	0.38	0.70
3.22	1.48	28.18	2.50	70.40	2.42	0.26	0.68
3.24	1.50	28.51	2.40	68.38	2.40	0.22	0.68
3.26	1.53	29.22	2.31	67.38	2.39	0.21	0.68
3.28	1.54	29.34	2.35	69.05	2.40	0.24	0.68
3.30	1.48	28.17	2.54	71.62	2.43	0.29	0.69
3.32	1.38	26.14	2.98	77.86	2.50	0.49	0.70
3.34	1.30	24.64	3.14	77.33	2.52	0.60	0.71
3.36	1.28	24.29	3.02	73.42	2.51	0.28	0.69
3.38	1.32	24.99	2.64	65.91	2.45	0.18	0.67
3.40	1.33	25.26	2.60	65.72	2.44	0.18	0.67
3.42	1.33	25.20	2.70	68.03	2.46	0.22	0.68
3.44	1.33	25.21	2.77	69.94	2.47	0.25	0.68
3.46	1.39	26.31	2.59	68.20	2.44	0.22	0.68
3.48	1.49	28.40	2.33	66.25	2.39	0.19	0.67
3.50	1.66	31.63	2.02	64.02	2.33	0.16	0.67
3.52	1.99	38.24	1.70	64.85	2.23	0.17	0.67
3.54	2.17	41.65	1.60	66.74	2.20	0.19	0.67
3.56	2.13	40.85	1.74	71.08	2.25	0.28	0.69
3.58	1.78	33.98	2.31	78.38	2.39	0.51	0.70
3.60	1.48	28.14	3.20	89.90	2.53	0.74	0.74
3.62	1.37	25.88	3.49	90.37	2.57	0.77	0.77
3.64	1.50	28.50	2.87	81.91	2.48	0.68	0.71
3.66	1.96	37.52	1.83	68.54	2.27	0.23	0.68
3.68	2.60	50.13	1.41	70.83	2.10	0.27	0.69
3.70	3.17	61.34	1.30	79.61	1.99	0.57	0.71
3.72	3.48	67.42	1.28	86.51	1.97	0.72	0.72
3.74	3.45	66.98	1.30	87.32	2.00	0.72	0.72
3.76	3.20	61.93	1.37	84.67	2.06	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	2.82	54.54	1.45	79.05	2.12	0.54	0.70
3.80	2.49	47.93	1.52	73.04	2.16	0.33	0.69
3.82	2.27	43.58	1.58	68.69	2.18	0.23	0.68
3.84	2.12	40.66	1.64	66.80	2.21	0.20	0.68
3.86	2.03	38.94	1.71	66.41	2.23	0.19	0.67
3.88	2.08	39.85	1.61	64.19	2.20	0.16	0.67
3.90	2.25	43.22	1.51	65.15	2.15	0.17	0.67
3.92	2.41	46.26	1.49	69.01	2.14	0.23	0.68
3.94	2.42	46.43	1.55	71.99	2.17	0.30	0.69
3.96	2.35	45.13	1.64	74.09	2.21	0.36	0.69
3.98	2.41	46.22	1.60	74.09	2.20	0.36	0.69
4.00	2.51	48.30	1.52	73.25	2.16	0.33	0.69
4.02	2.54	48.77	1.46	71.32	2.13	0.28	0.69
4.04	2.36	45.35	1.52	68.88	2.16	0.23	0.68
4.06	2.13	40.69	1.69	68.88	2.23	0.23	0.68
4.08	2.04	38.94	1.77	69.06	2.26	0.24	0.68
4.10	2.18	41.68	1.61	67.03	2.20	0.20	0.68
4.12	2.40	46.09	1.42	65.51	2.10	0.18	0.67
4.14	2.56	49.13	1.38	67.81	2.07	0.21	0.68
4.16	2.59	49.86	1.39	69.21	2.08	0.24	0.68
4.18	2.65	50.89	1.40	71.05	2.08	0.28	0.69
4.20	2.85	54.95	1.34	73.39	2.03	0.34	0.69
4.22	3.09	59.69	1.29	77.02	1.98	0.46	0.70
4.24	3.38	65.39	1.25	82.00	1.93	0.69	0.71
4.26	3.50	67.72	1.26	85.11	1.93	0.72	0.72
4.28	3.37	65.09	1.28	83.32	1.96	0.71	0.71
4.30	3.19	61.57	1.31	80.94	2.01	0.63	0.71
4.32	3.03	58.51	1.35	78.98	2.05	0.54	0.70
4.34	3.17	61.11	1.35	82.20	2.04	0.70	0.71
4.36	3.39	65.46	1.33	87.04	2.03	0.72	0.72
4.38	3.62	70.15	1.30	90.86	1.99	0.73	0.73
4.40	3.81	73.87	1.28	94.66	1.97	0.74	0.74
4.42	3.88	75.26	1.29	97.24	1.98	0.74	0.74
4.44	3.93	76.08	1.32	100.31	2.01	0.75	0.75
4.46	3.94	76.28	1.34	102.17	2.04	0.75	0.75
4.48	3.82	74.06	1.35	100.01	2.05	0.75	0.75
4.50	3.63	70.19	1.37	96.20	2.06	0.74	0.74
4.52	3.35	64.74	1.40	90.61	2.09	0.73	0.73
4.54	3.25	62.73	1.44	90.07	2.11	0.73	0.73
4.56	3.34	64.46	1.44	92.86	2.11	0.73	0.73
4.58	3.54	68.41	1.42	96.95	2.10	0.74	0.74
4.60	3.59	69.41	1.42	98.32	2.10	0.74	0.74
4.62	3.53	68.15	1.44	97.83	2.11	0.74	0.74
4.64	3.46	66.76	1.45	96.86	2.12	0.74	0.74
4.66	3.52	67.98	1.40	94.84	2.08	0.74	0.74
4.68	3.63	69.10	1.33	91.63	2.02	0.73	0.73
4.70	3.74	69.65	1.28	89.40	1.97	0.73	0.73
4.72	3.87	70.93	1.26	89.34	1.93	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	3.80	69.56	1.26	87.92	1.94	0.72	0.72
4.76	3.42	63.60	1.30	82.96	2.00	0.71	0.71
4.78	2.80	53.46	1.40	74.71	2.08	0.38	0.69
4.80	2.21	42.08	1.72	72.47	2.24	0.31	0.69
4.82	1.93	36.64	2.16	78.96	2.36	0.54	0.70
4.84	2.08	39.55	2.09	82.58	2.34	0.71	0.71
4.86	2.40	45.76	1.70	77.57	2.23	0.48	0.70
4.88	2.56	48.93	1.57	76.94	2.18	0.45	0.70
4.90	2.37	45.21	1.77	80.02	2.26	0.58	0.71
4.92	2.03	38.47	2.34	89.91	2.39	0.73	0.73
4.94	1.82	34.35	2.86	98.18	2.48	0.74	0.74
4.96	1.88	35.56	2.61	92.78	2.44	0.73	0.73
4.98	2.13	40.37	2.16	87.08	2.36	0.72	0.72
5.00	2.29	43.61	1.91	83.43	2.30	0.71	0.71
5.02	2.24	42.55	2.05	87.33	2.33	0.72	0.72
5.04	2.10	39.86	2.34	93.31	2.39	0.74	0.74
5.06	2.14	40.53	2.38	96.54	2.40	0.74	0.74
5.08	2.36	44.92	2.11	94.65	2.34	0.74	0.74
5.10	2.77	53.09	1.77	93.79	2.25	0.74	0.74
5.12	3.19	60.02	1.52	91.11	2.16	0.73	0.73
5.14	3.50	64.42	1.42	91.38	2.10	0.73	0.73
5.16	3.52	64.21	1.39	88.94	2.08	0.73	0.73
5.18	3.14	57.67	1.44	83.22	2.12	0.71	0.71
5.20	2.75	50.89	1.52	77.32	2.16	0.47	0.70
5.22	2.47	46.00	1.59	73.31	2.19	0.33	0.69
5.24	2.42	45.55	1.67	76.17	2.22	0.42	0.70
5.26	2.33	44.23	1.82	80.41	2.27	0.60	0.71
5.28	2.24	42.41	2.01	85.12	2.32	0.72	0.72
5.30	2.25	42.62	2.01	85.84	2.32	0.72	0.72
5.32	2.22	42.11	2.03	85.49	2.33	0.72	0.72
5.34	2.14	40.56	2.11	85.67	2.35	0.72	0.72
5.36	2.15	40.77	2.05	83.56	2.33	0.71	0.71
5.38	2.40	45.11	1.86	83.86	2.28	0.72	0.72
5.40	2.89	52.50	1.54	81.04	2.17	0.64	0.71
5.42	3.20	56.92	1.44	81.91	2.11	0.68	0.71
5.44	3.23	56.98	1.41	80.07	2.09	0.59	0.71
5.46	3.00	53.26	1.46	77.84	2.13	0.49	0.70
5.48	2.82	50.45	1.52	76.82	2.16	0.45	0.70
5.50	2.88	51.52	1.54	79.19	2.17	0.55	0.71
5.52	2.94	52.13	1.51	78.47	2.15	0.51	0.70
5.54	2.91	51.70	1.53	79.20	2.16	0.55	0.71
5.56	2.63	47.18	1.64	77.16	2.21	0.46	0.70
5.58	2.30	42.04	1.89	79.37	2.29	0.55	0.71
5.60	1.79	33.61	2.51	84.24	2.42	0.72	0.72
5.62	1.34	24.63	4.02	99.07	2.63	0.84	0.84
5.64	0.99	17.65	6.18	109.04	2.83	0.76	0.76
5.66	0.90	15.91	6.49	103.28	2.85	0.75	0.75
5.68	0.90	15.94	5.52	88.03	2.77	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.95	16.89	4.80	81.16	2.71	0.64	0.71
5.72	1.13	20.37	3.94	80.32	2.62	0.79	0.79
5.74	1.32	24.25	3.33	80.66	2.55	0.74	0.74
5.76	1.59	29.48	2.66	78.46	2.45	0.51	0.70
5.78	1.91	34.72	2.19	76.10	2.36	0.42	0.70
5.80	2.32	41.21	1.85	76.09	2.28	0.42	0.70
5.82	2.62	45.84	1.70	77.72	2.23	0.48	0.70
5.84	2.63	46.19	1.73	79.84	2.24	0.58	0.71
5.86	2.41	42.96	1.96	84.23	2.31	0.72	0.72
5.88	2.12	38.59	2.39	92.19	2.40	0.73	0.73
5.90	2.12	38.69	2.46	95.30	2.42	0.74	0.74
5.92	2.54	45.14	2.01	90.82	2.32	0.73	0.73
5.94	3.07	53.17	1.69	89.87	2.23	0.73	0.73
5.96	3.35	57.58	1.61	92.78	2.20	0.73	0.73
5.98	3.32	57.04	1.63	93.22	2.21	0.74	0.74
6.00	3.36	57.38	1.61	92.37	2.20	0.73	0.73
6.02	3.60	60.79	1.54	93.55	2.17	0.74	0.74
6.04	3.94	65.73	1.45	95.61	2.12	0.74	0.74
6.06	4.25	70.10	1.40	98.26	2.09	0.74	0.74
6.08	4.56	74.04	1.35	99.59	2.04	0.75	0.75
6.10	5.03	80.25	1.29	103.75	1.98	0.76	0.76
6.12	5.54	86.93	1.26	109.19	1.93	0.76	0.76
6.14	5.94	92.16	1.23	113.71	1.90	0.77	0.77
6.16	6.13	94.32	1.22	115.18	1.88	0.77	0.77
6.18	6.35	96.83	1.20	116.14	1.85	0.78	0.78
6.20	6.65	100.20	1.17	117.00	1.81	0.78	0.78
6.22	7.07	105.42	1.13	119.29	1.78	0.78	0.78
6.24	7.53	112.04	1.12	126.01	1.78	0.79	0.79
6.26	8.08	119.22	1.09	129.86	1.75	0.80	0.80
6.28	8.74	127.31	1.01	128.89	1.71	0.80	0.80
6.30	9.78	138.70	1.00	138.70	1.62	0.81	0.81
6.32	10.50	146.20	1.00	146.20	1.56	0.82	0.82
6.34	10.66	147.40	1.00	147.40	1.54	0.82	0.82
6.36	9.85	136.90	1.00	136.90	1.57	0.81	0.81
6.38	8.75	122.63	1.00	122.63	1.61	0.79	0.79
6.40	7.49	106.66	1.00	106.66	1.68	0.76	0.76
6.42	5.77	85.42	1.19	101.53	1.84	0.75	0.75
6.44	4.22	65.83	1.36	89.58	2.06	0.73	0.73
6.46	3.13	51.01	1.77	90.43	2.26	0.73	0.73
6.48	2.67	45.14	2.45	110.70	2.41	0.77	0.77
6.50	2.35	40.84	3.26	133.20	2.54	0.83	0.83
6.52	1.96	34.98	4.59	160.46	2.69	1.00	1.00
6.54	1.65	29.68	5.61	166.45	2.78	0.85	0.85
6.56	1.41	25.48	6.47	164.79	2.85	0.85	0.85
6.58	1.24	22.38	7.12	159.45	2.89	0.84	0.84
6.60	1.20	21.49	6.85	147.14	2.87	0.82	0.82
6.62	1.18	20.82	6.29	130.97	2.83	0.80	0.80
6.64	1.17	20.24	5.59	113.23	2.78	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.19	20.19	5.04	101.74	2.73	0.75	0.75
6.68	1.23	20.67	4.49	92.86	2.68	0.87	0.87
6.70	1.27	21.17	4.18	88.44	2.65	0.83	0.83
6.72	1.41	23.65	4.17	98.51	2.65	0.85	0.85
6.74	1.48	24.97	4.42	110.48	2.67	0.90	0.90
6.76	1.50	25.53	4.86	124.03	2.71	0.79	0.79
6.78	1.37	23.37	5.42	126.64	2.76	0.79	0.79
6.80	1.28	21.87	5.92	129.48	2.81	0.80	0.80
6.82	1.23	20.96	6.09	127.59	2.82	0.79	0.79
6.84	1.20	20.30	6.19	125.71	2.83	0.79	0.79
6.86	1.17	19.77	6.16	121.85	2.82	0.79	0.79
6.88	1.15	19.30	5.90	113.99	2.80	0.77	0.77
6.90	1.15	18.94	5.55	105.15	2.78	0.76	0.76
6.92	1.14	18.66	5.19	96.79	2.74	0.74	0.74
6.94	1.15	18.55	4.84	89.82	2.71	0.73	0.73
6.96	1.15	18.54	4.59	85.14	2.69	0.86	0.86
6.98	1.19	18.97	4.44	84.27	2.67	0.85	0.85
7.00	1.30	20.76	3.98	82.64	2.63	0.80	0.80
7.02	1.57	24.71	3.23	79.77	2.53	0.72	0.72
7.04	1.94	30.30	2.54	77.07	2.43	0.46	0.70
7.06	2.19	34.13	2.42	82.59	2.41	0.71	0.71
7.08	2.22	34.70	2.58	89.39	2.44	0.73	0.73
7.10	1.99	31.37	2.99	93.65	2.50	0.73	0.73
7.12	1.70	27.07	3.65	98.74	2.59	0.81	0.81
7.14	1.45	23.12	4.42	102.17	2.67	0.88	0.88
7.16	1.30	20.72	4.93	102.24	2.72	0.75	0.75
7.18	1.25	19.82	4.80	95.12	2.71	0.74	0.74
7.20	1.26	19.77	4.50	88.90	2.68	0.86	0.86
7.22	1.28	20.09	4.44	89.27	2.67	0.86	0.86
7.24	1.36	21.16	4.20	88.79	2.65	0.84	0.84
7.26	1.47	22.76	3.89	88.49	2.62	0.81	0.81
7.28	1.49	23.12	3.95	91.36	2.62	0.82	0.82
7.30	1.38	21.52	4.47	96.19	2.68	0.88	0.88
7.32	1.23	19.04	4.95	94.17	2.72	0.74	0.74
7.34	1.16	17.81	4.80	85.55	2.71	0.72	0.72
7.36	1.17	17.77	4.30	76.33	2.66	0.81	0.81
7.38	1.14	17.31	4.54	78.68	2.68	0.84	0.84
7.40	1.09	16.59	5.02	83.31	2.73	0.71	0.71
7.42	1.05	15.84	5.34	84.60	2.76	0.72	0.72
7.44	1.06	15.96	5.17	82.44	2.74	0.71	0.71
7.46	1.08	16.22	4.91	79.67	2.72	0.57	0.71
7.48	1.10	16.48	4.86	80.17	2.71	0.59	0.71
7.50	1.09	16.29	4.98	81.08	2.73	0.64	0.71
7.52	1.07	16.08	5.12	82.27	2.74	0.71	0.71
7.54	1.07	16.03	5.08	81.42	2.73	0.66	0.71
7.56	1.12	16.69	4.68	78.04	2.70	0.85	0.85
7.58	1.24	18.25	4.04	73.82	2.63	0.79	0.79
7.60	1.40	20.66	3.50	72.30	2.57	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.51	22.19	3.38	74.98	2.55	0.73	0.73
7.64	1.46	21.56	3.66	78.82	2.59	0.76	0.76
7.66	1.32	19.49	4.22	82.34	2.65	0.82	0.82
7.68	1.21	17.90	4.64	83.09	2.69	0.86	0.86
7.70	1.20	17.67	4.54	80.28	2.68	0.84	0.84
7.72	1.27	18.56	4.12	76.45	2.64	0.80	0.80
7.74	1.33	19.40	3.86	74.92	2.61	0.77	0.77
7.76	1.34	19.59	4.04	79.21	2.63	0.80	0.80
7.78	1.26	18.38	4.38	80.51	2.67	0.83	0.83
7.80	1.18	17.04	4.63	78.94	2.69	0.85	0.85
7.82	1.12	16.07	4.59	73.69	2.69	0.83	0.83
7.84	1.13	16.13	4.47	72.04	2.68	0.82	0.82
7.86	1.20	17.09	4.13	70.56	2.64	0.78	0.78
7.88	1.30	18.57	3.72	69.08	2.60	0.74	0.74
7.90	1.39	19.89	3.65	72.56	2.59	0.75	0.75
7.92	1.41	20.19	3.89	78.65	2.62	0.78	0.78
7.94	1.40	20.08	4.05	81.26	2.63	0.80	0.80
7.96	1.30	18.61	4.49	83.63	2.68	0.85	0.85
7.98	1.16	16.49	5.05	83.31	2.73	0.71	0.71
8.00	0.99	13.96	6.07	84.79	2.82	0.72	0.72
8.02	0.92	12.91	6.18	79.79	2.83	0.57	0.71
8.04	0.93	12.97	5.75	74.57	2.79	0.37	0.69
8.06	0.96	13.31	5.46	72.70	2.77	0.32	0.69
8.08	0.96	13.35	5.52	73.75	2.77	0.35	0.69
8.10	0.97	13.38	5.57	74.55	2.78	0.37	0.69
8.12	1.01	14.00	5.20	72.84	2.75	0.32	0.69
8.14	1.18	16.26	4.20	68.28	2.65	0.78	0.78
8.16	1.31	18.11	3.56	64.50	2.58	0.72	0.72
8.18	1.41	19.43	3.45	67.04	2.56	0.71	0.71
8.20	1.39	19.36	3.83	74.19	2.61	0.77	0.77
8.22	1.38	19.28	4.10	78.98	2.64	0.80	0.80
8.24	1.33	18.53	4.39	81.28	2.67	0.83	0.83
8.26	1.20	16.64	4.89	81.33	2.72	0.65	0.71
8.28	1.10	15.10	5.46	82.53	2.77	0.71	0.71
8.30	1.07	14.63	5.60	81.97	2.78	0.69	0.71
8.32	1.11	15.23	5.34	81.43	2.76	0.66	0.71
8.34	1.15	15.83	5.23	82.84	2.75	0.71	0.71
8.36	1.29	17.63	4.47	78.84	2.68	0.83	0.83
8.38	1.35	18.37	4.08	74.96	2.64	0.79	0.79
8.40	1.62	21.93	3.09	67.84	2.52	0.23	0.68
8.42	1.77	23.91	2.76	65.97	2.47	0.18	0.67
8.44	2.34	31.40	2.04	63.91	2.33	0.15	0.67
8.46	2.66	35.72	1.89	67.46	2.29	0.21	0.68
8.48	3.19	42.72	1.73	73.89	2.24	0.35	0.69
8.50	3.73	50.09	1.67	83.64	2.22	0.72	0.72
8.52	4.32	57.95	1.63	94.66	2.21	0.74	0.74
8.54	4.56	61.29	1.66	101.48	2.22	0.75	0.75
8.56	4.19	56.85	1.92	109.04	2.30	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	3.56	48.88	2.47	120.87	2.42	0.78	0.78
8.60	2.79	39.15	3.82	149.54	2.61	0.91	0.91
8.62	2.22	31.60	5.69	179.83	2.79	0.86	0.86
8.64	1.90	27.17	7.40	201.05	2.91	0.89	0.89
8.66	1.89	27.07	7.51	203.27	2.92	0.89	0.89
8.68	1.99	28.38	6.98	197.95	2.88	0.88	0.88
8.70	2.15	30.36	6.30	191.41	2.84	0.88	0.88
8.72	2.25	31.77	5.99	190.44	2.81	0.88	0.88
8.74	2.28	32.06	5.94	190.47	2.81	0.88	0.88
8.76	2.23	31.32	6.07	190.03	2.82	0.88	0.88
8.78	2.20	30.79	6.20	190.88	2.83	0.88	0.88
8.80	2.29	32.01	5.99	191.67	2.81	0.88	0.88
8.82	2.55	35.40	5.38	190.46	2.76	0.88	0.88
8.84	2.78	38.51	4.87	187.33	2.71	0.87	0.87
8.86	2.88	39.67	4.70	186.33	2.70	1.05	1.05
8.88	2.86	39.37	4.81	189.56	2.71	0.88	0.88
8.90	2.90	39.85	4.84	192.77	2.71	0.88	0.88
8.92	3.32	45.35	4.15	188.06	2.64	1.00	1.00
8.94	4.11	55.47	3.19	177.00	2.53	0.88	0.88
8.96	4.83	64.59	2.64	170.37	2.45	0.85	0.85
8.98	5.36	71.24	2.37	169.06	2.40	0.85	0.85
9.00	5.79	76.71	2.29	176.01	2.38	0.86	0.86
9.02	6.36	83.84	2.13	178.23	2.35	0.86	0.86
9.04	6.82	89.43	2.01	180.12	2.32	0.86	0.86
9.06	6.58	86.28	2.12	183.02	2.35	0.87	0.87
9.08	5.98	78.93	2.45	193.71	2.42	0.88	0.88
9.10	5.22	69.45	3.04	211.03	2.51	0.89	0.89
9.12	4.77	63.65	3.49	222.16	2.57	0.96	0.96
9.14	4.51	60.11	3.77	226.72	2.60	1.00	1.00
9.16	4.61	61.13	3.54	216.57	2.58	0.96	0.96
9.18	5.05	66.38	3.04	201.80	2.51	0.88	0.88
9.20	5.45	71.09	2.66	189.42	2.45	0.88	0.88
9.22	5.30	69.00	2.77	191.29	2.47	0.88	0.88
9.24	4.79	62.60	3.17	198.34	2.53	0.90	0.90
9.26	4.39	57.40	3.55	203.53	2.58	0.95	0.95
9.28	4.37	56.93	3.48	198.10	2.57	0.93	0.93
9.30	4.66	60.21	3.09	185.93	2.52	0.87	0.87
9.32	5.24	67.30	2.64	177.54	2.45	0.86	0.86
9.34	6.58	83.31	2.00	166.55	2.32	0.85	0.85
9.36	8.09	100.98	1.61	162.72	2.20	0.84	0.84
9.38	10.13	124.39	1.36	169.53	2.06	0.85	0.85
9.40	23.81	275.25	1.00	275.25	1.55	0.96	0.96
9.42	37.13	415.53	1.00	415.53	1.29	1.06	1.06

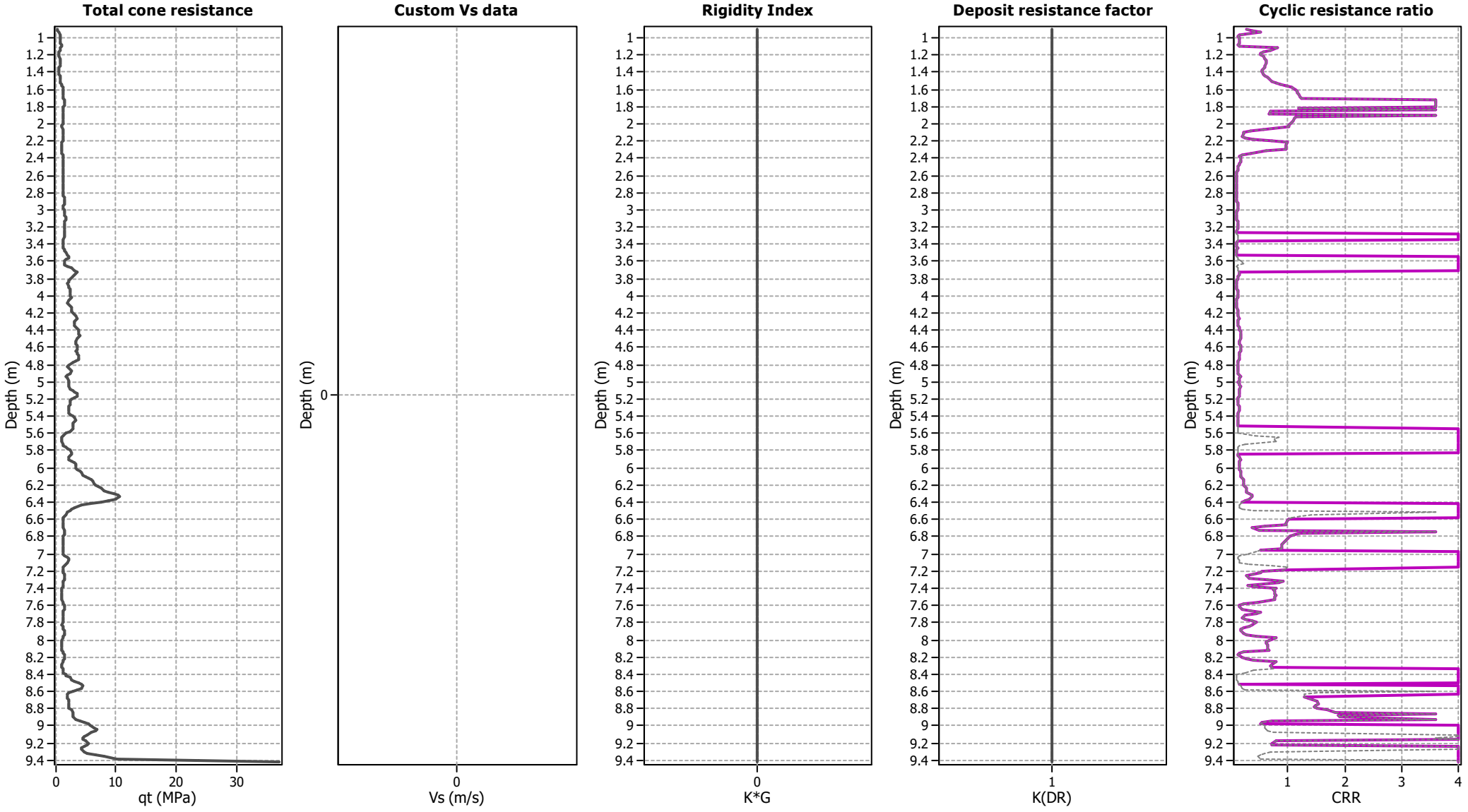
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



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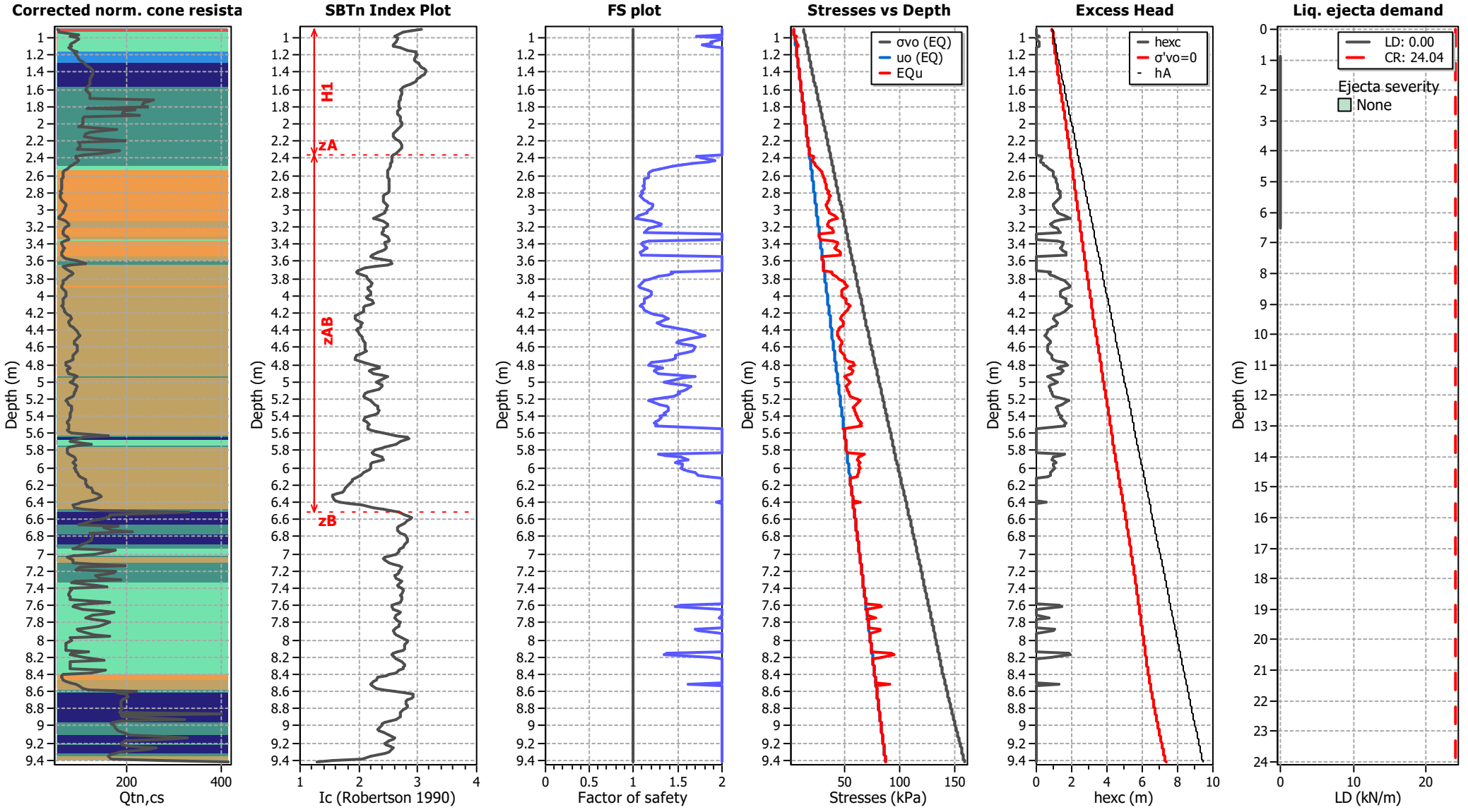
CPT name: CWLP CPT-2L

Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

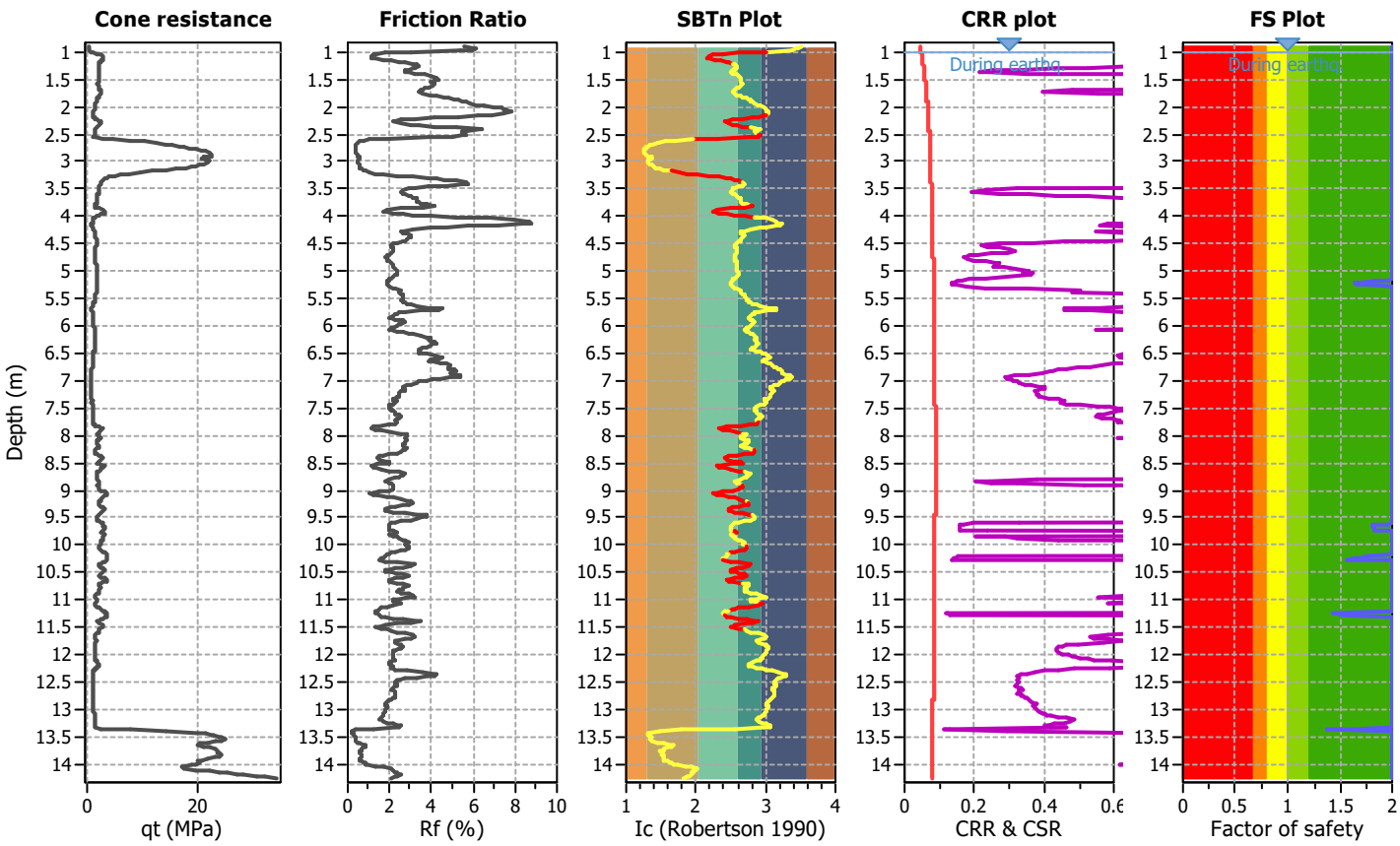
LIQUEFACTION ANALYSIS REPORT

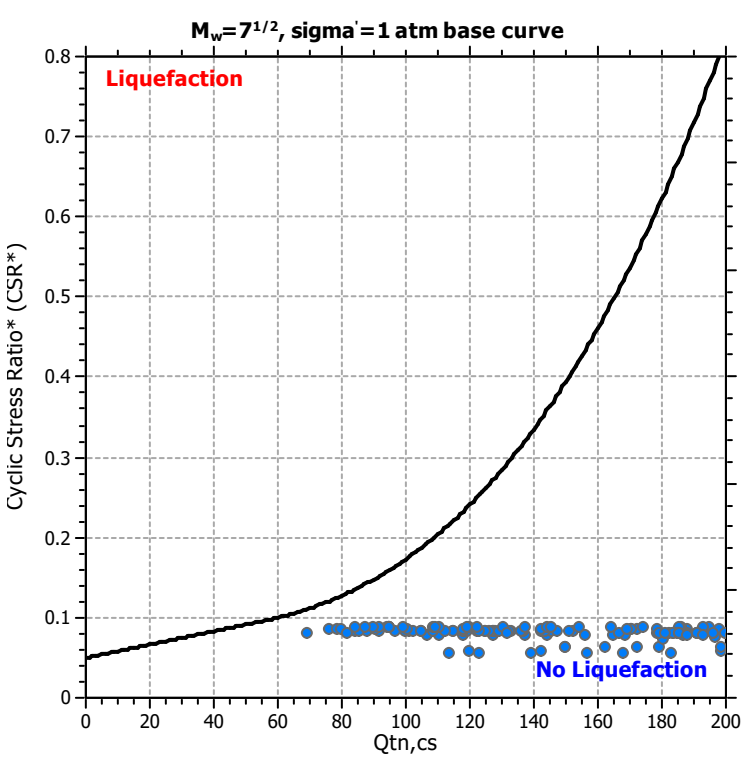
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

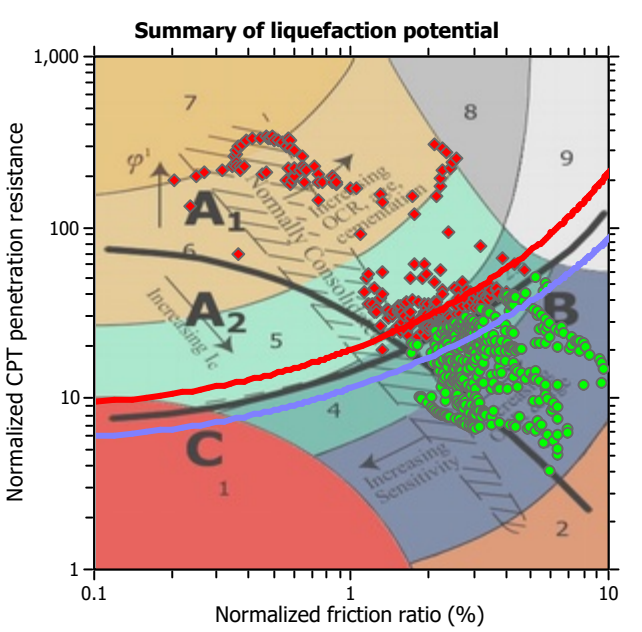
CPT file : CWLP CPT-4L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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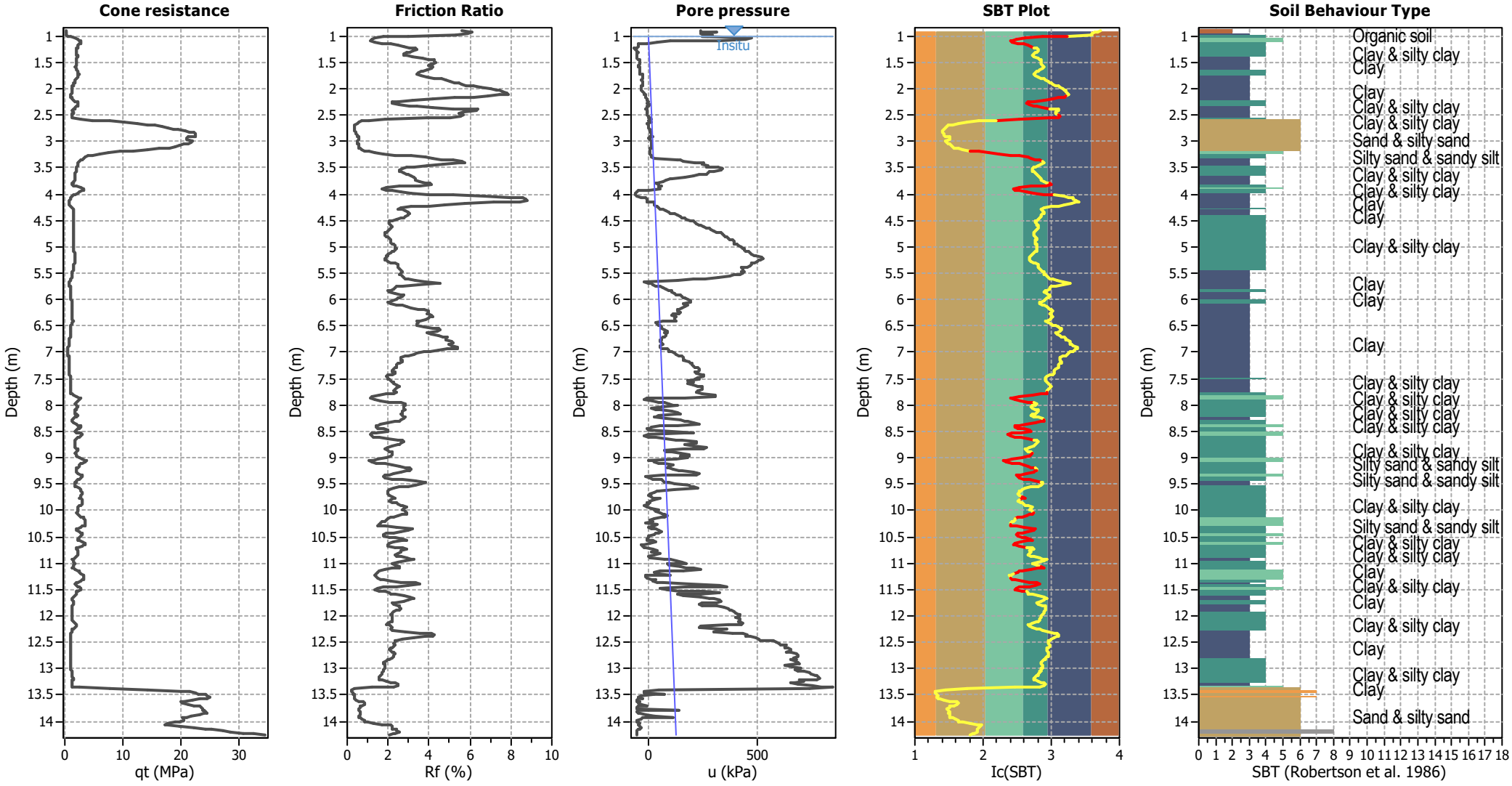
CPT name: CWLP CPT-4L

CPT basic interpretation plots



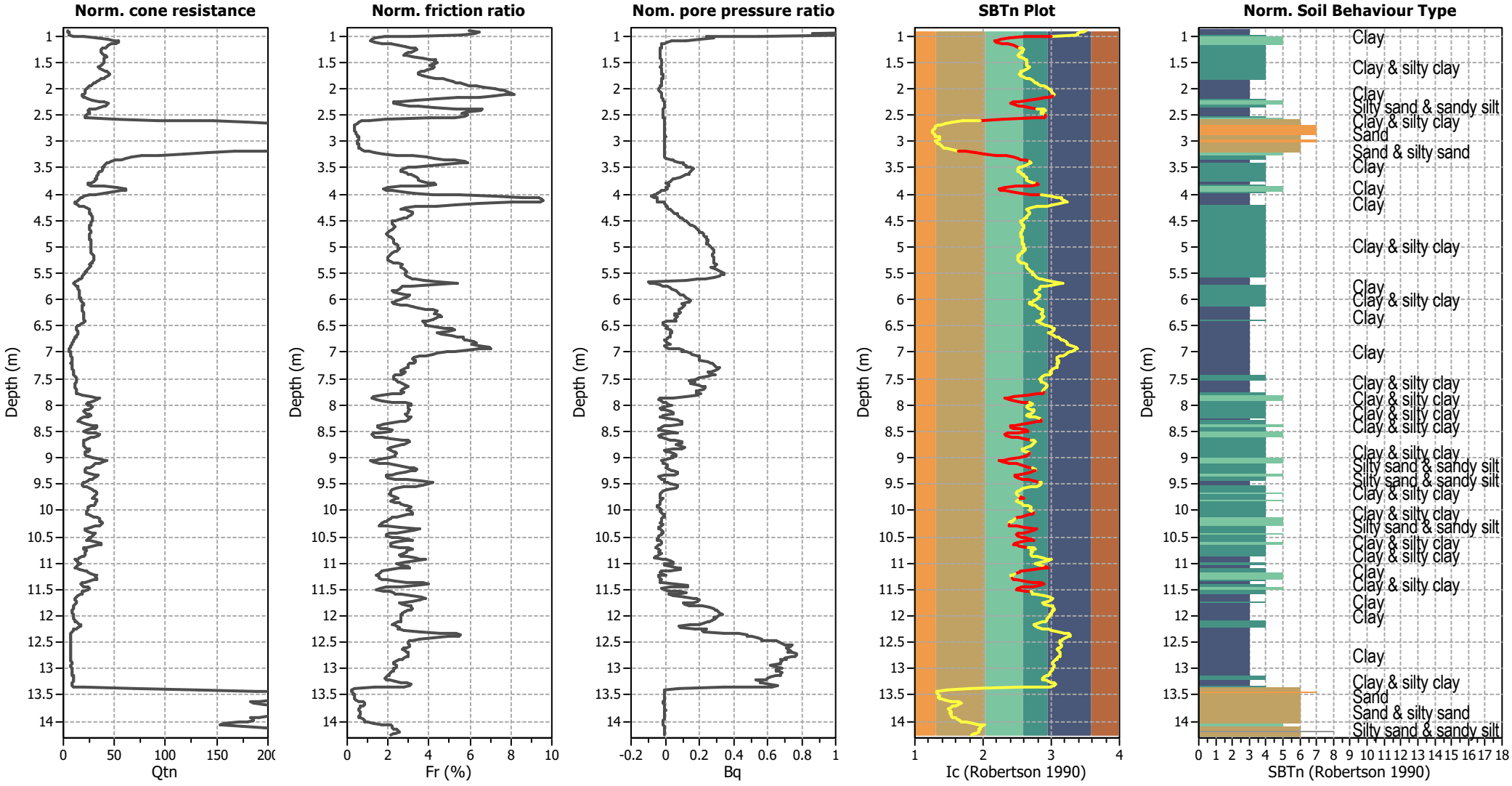
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



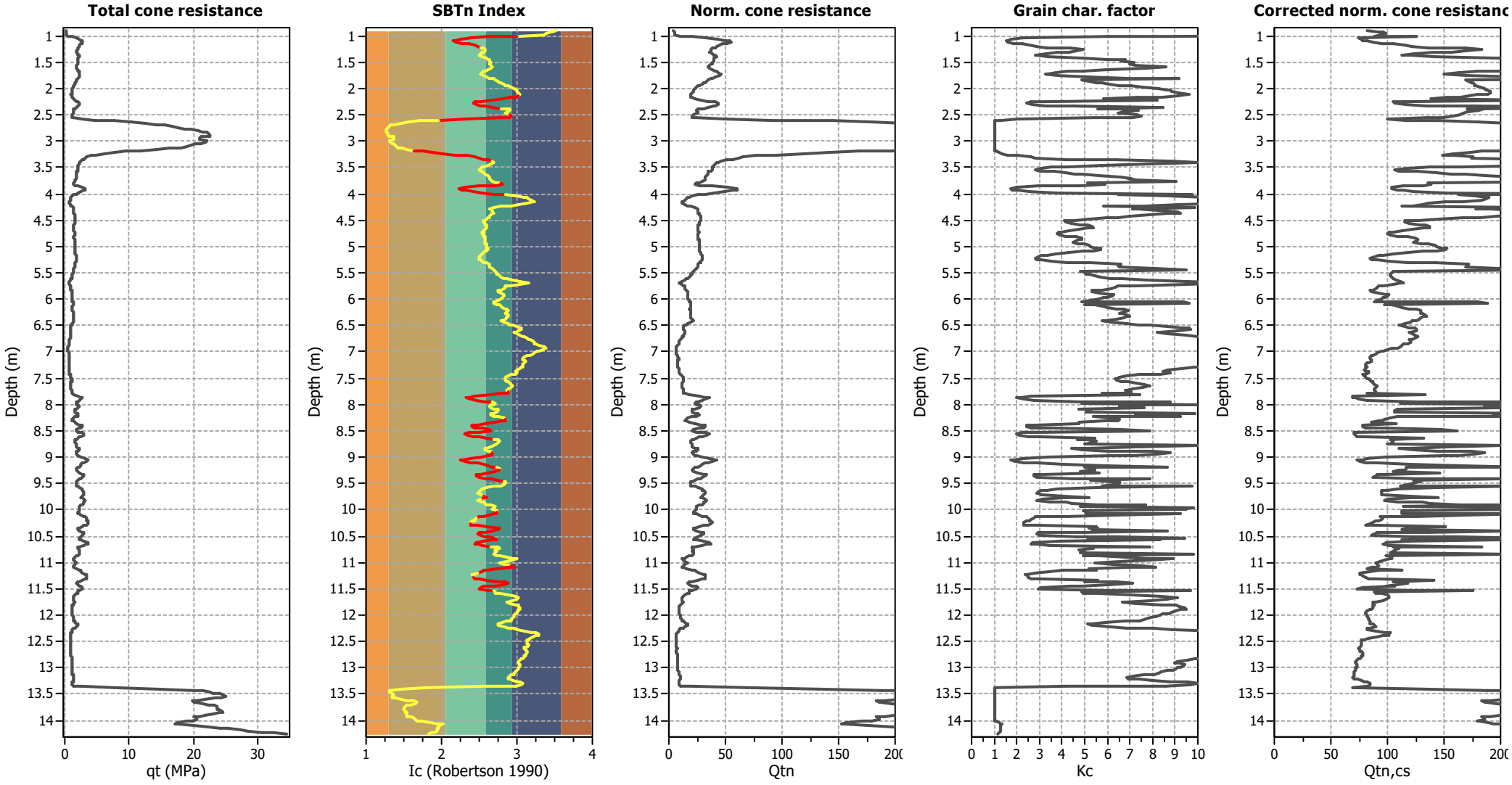
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

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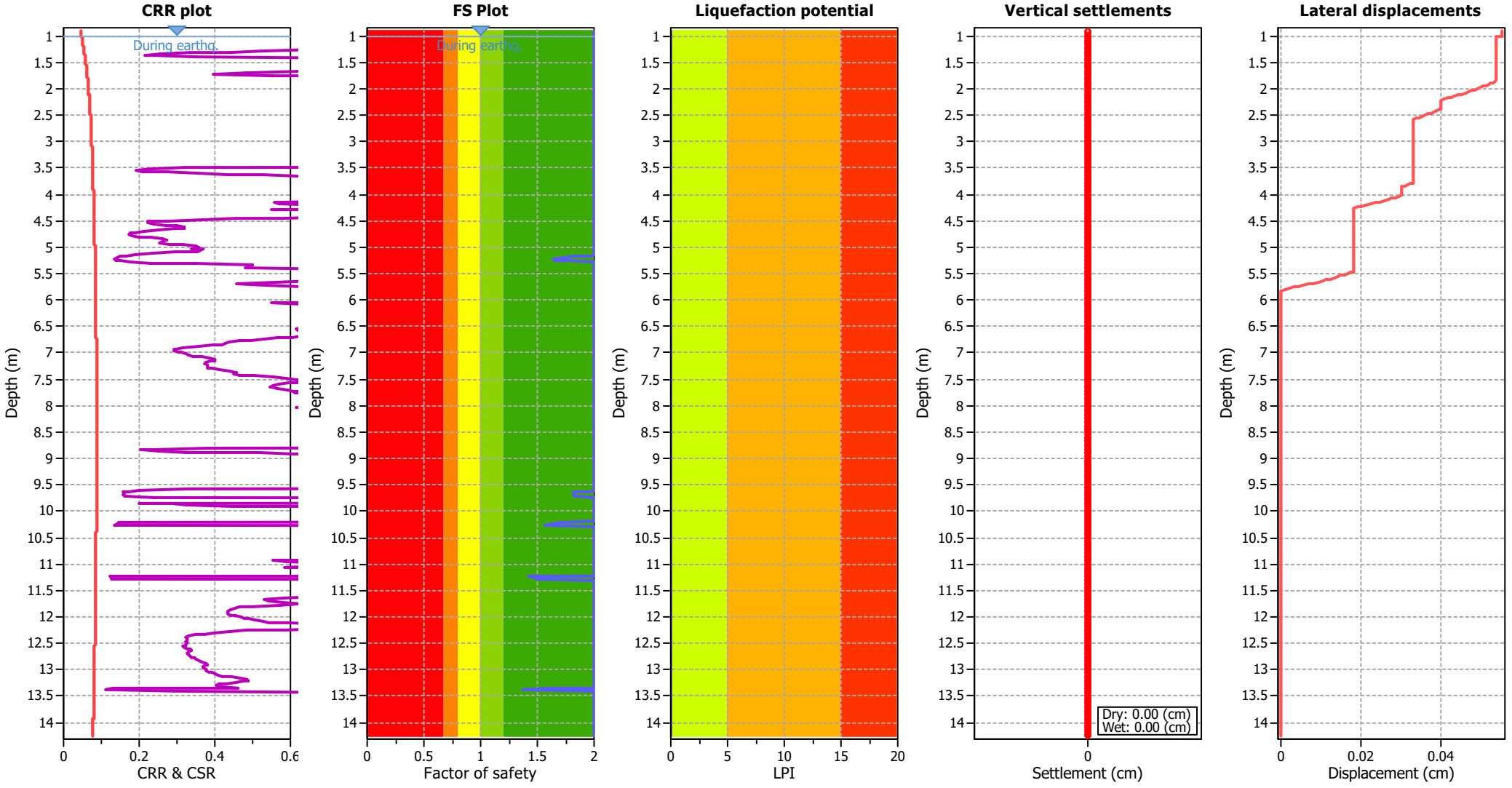
CPT name: CWLP CPT-4L

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

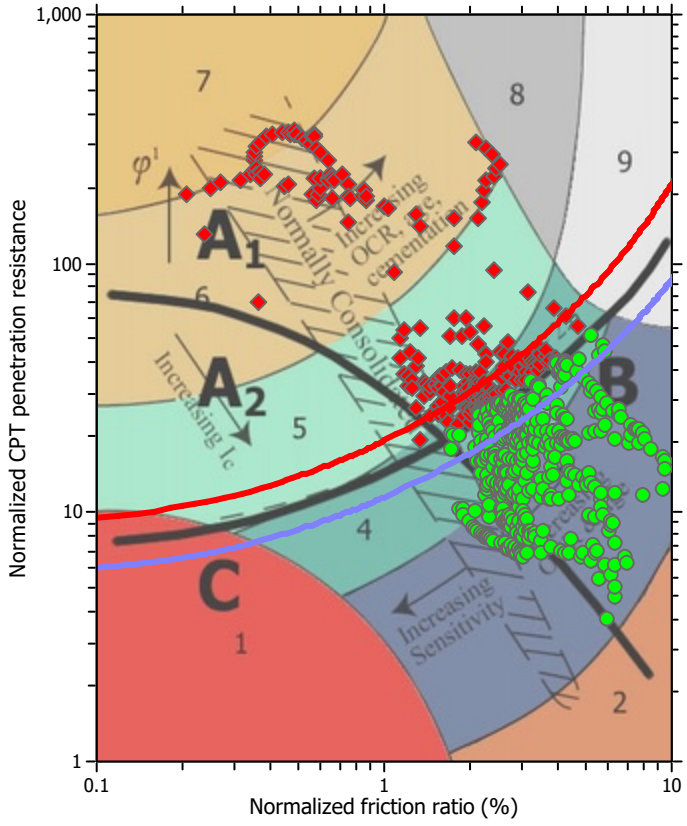
F.S. color scheme

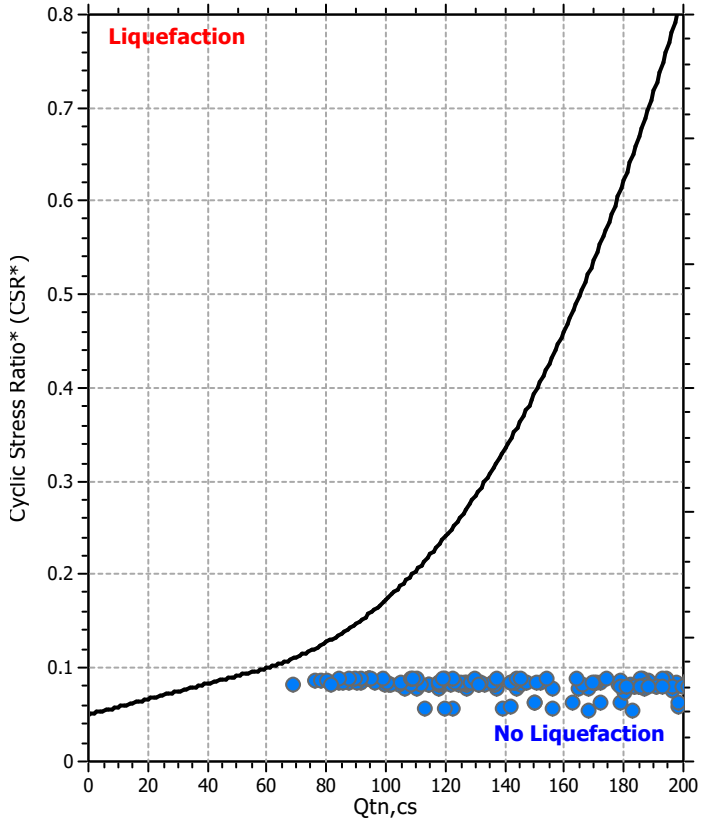
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

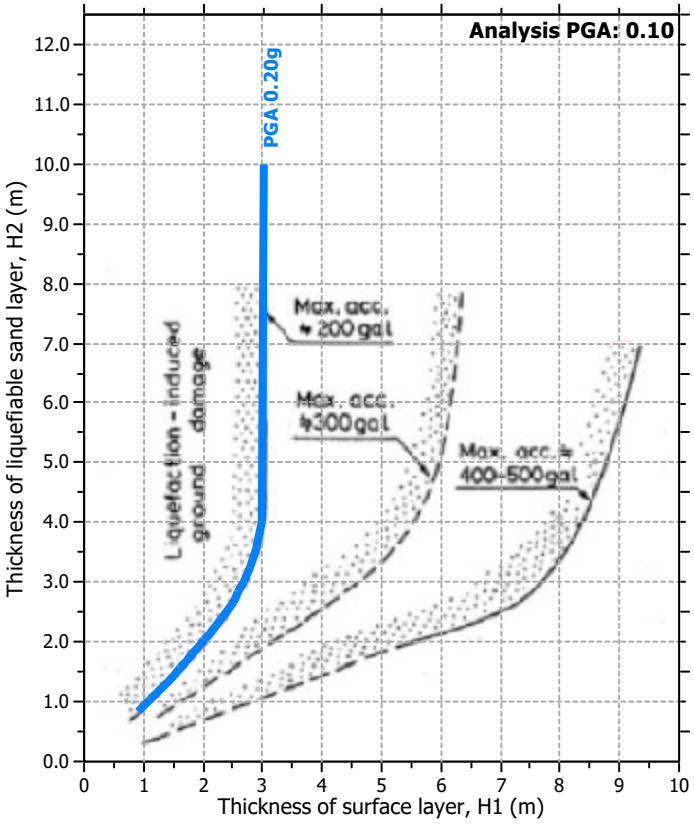
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

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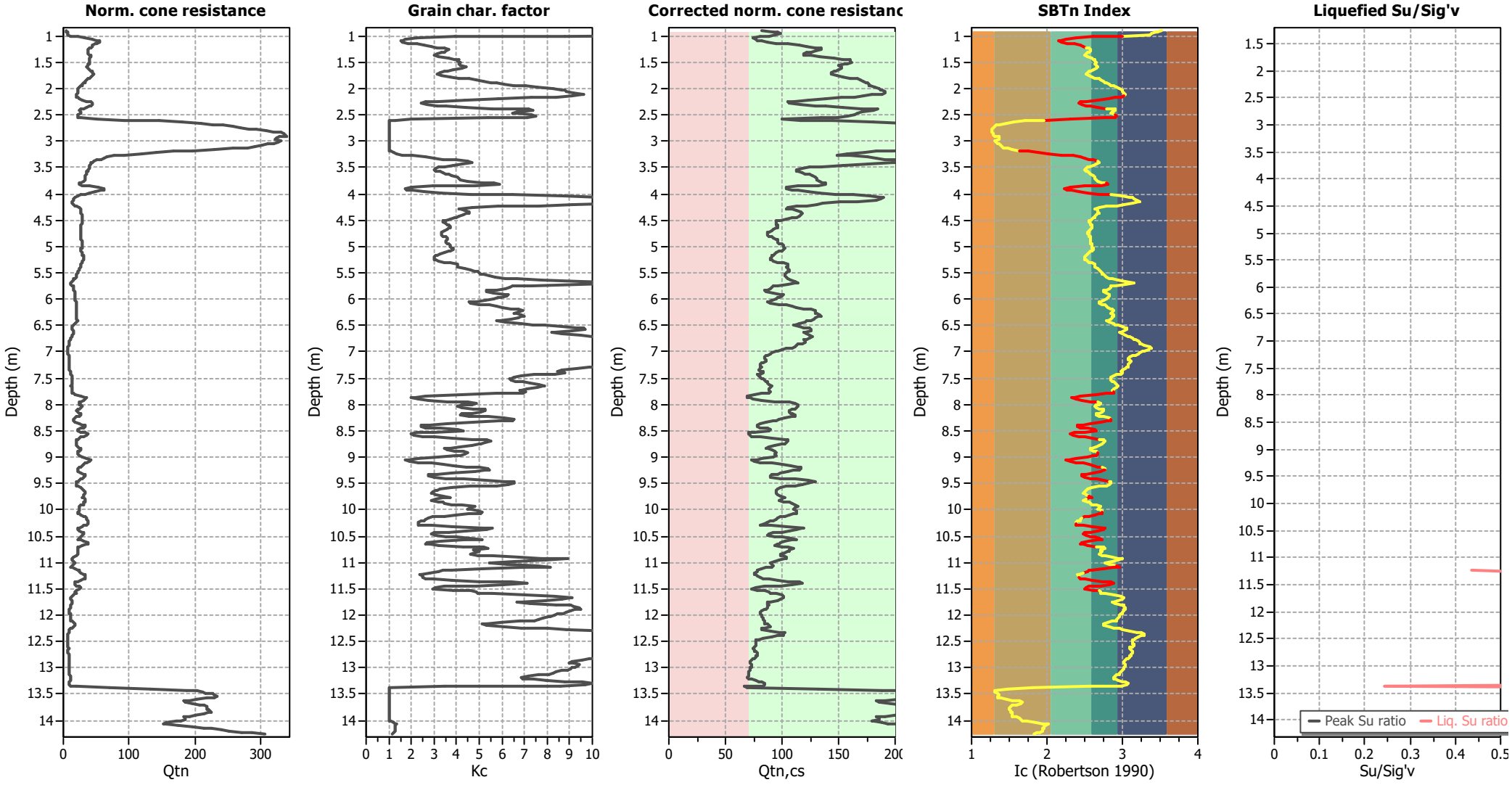
CPT name: CWLP CPT-4L

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

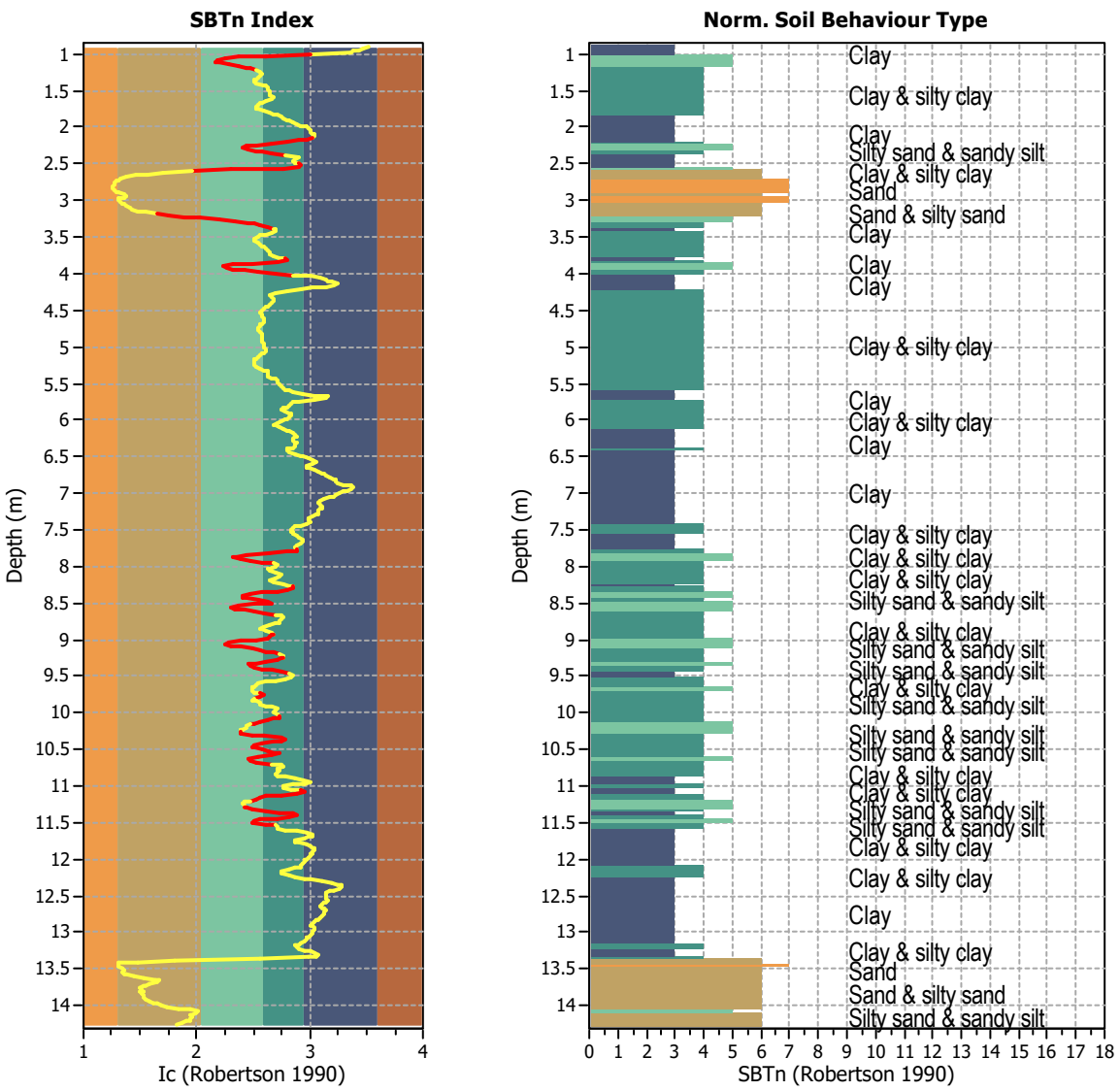
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	669
Total points excluded:	178
Exclusion percentage:	26.61%
Number of layers detected:	29

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	4	Start depth: 1.02 (m)	4	Clay & silty clay
		End depth: 1.08 (m)	5	Silty sand & sandy silt
Transition layer 2	8	Start depth: 1.10 (m)	5	Silty sand & sandy silt
		End depth: 1.24 (m)	4	Clay & silty clay
Transition layer 3	7	Start depth: 2.16 (m)	3	Clay
		End depth: 2.28 (m)	5	Silty sand & sandy silt
Transition layer 4	7	Start depth: 2.28 (m)	5	Silty sand & sandy silt
		End depth: 2.40 (m)	3	Clay
Transition layer 5	6	Start depth: 2.52 (m)	3	Clay
		End depth: 2.62 (m)	6	Sand & silty sand
Transition layer 6	11	Start depth: 3.20 (m)	6	Sand & silty sand
		End depth: 3.40 (m)	3	Clay
Transition layer 7	5	Start depth: 3.82 (m)	3	Clay
		End depth: 3.90 (m)	5	Silty sand & sandy silt
Transition layer 8	8	Start depth: 3.90 (m)	5	Silty sand & sandy silt
		End depth: 4.04 (m)	3	Clay
Transition layer 9	6	Start depth: 7.78 (m)	3	Clay
		End depth: 7.88 (m)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 7.88 (m)	5	Silty sand & sandy silt
		End depth: 7.98 (m)	4	Clay & silty clay
Transition layer 11	6	Start depth: 8.30 (m)	4	Clay & silty clay
		End depth: 8.40 (m)	5	Silty sand & sandy silt
Transition layer 12	5	Start depth: 8.42 (m)	5	Silty sand & sandy silt
		End depth: 8.50 (m)	4	Clay & silty clay
Transition layer 13	4	Start depth: 8.50 (m)	4	Clay & silty clay
		End depth: 8.56 (m)	5	Silty sand & sandy silt
Transition layer 14	7	Start depth: 8.56 (m)	5	Silty sand & sandy silt
		End depth: 8.68 (m)	4	Clay & silty clay
Transition layer 15	7	Start depth: 8.94 (m)	4	Clay & silty clay
		End depth: 9.06 (m)	5	Silty sand & sandy silt
Transition layer 16	9	Start depth: 9.06 (m)	5	Silty sand & sandy silt
		End depth: 9.22 (m)	4	Clay & silty clay
Transition layer 17	5	Start depth: 9.26 (m)	4	Clay & silty clay
		End depth: 9.34 (m)	5	Silty sand & sandy silt
Transition layer 18	7	Start depth: 9.36 (m)	5	Silty sand & sandy silt
		End depth: 9.48 (m)	3	Clay
Transition layer 19	4	Start depth: 9.76 (m)	4	Clay & silty clay
		End depth: 9.82 (m)	5	Silty sand & sandy silt
Transition layer 20	7	Start depth: 10.06 (m)	4	Clay & silty clay
		End depth: 10.18 (m)	5	Silty sand & sandy silt
Transition layer 21	5	Start depth: 10.28 (m)	5	Silty sand & sandy silt
		End depth: 10.36 (m)	4	Clay & silty clay
Transition layer 22	6	Start depth: 10.36 (m)	4	Clay & silty clay
		End depth: 10.46 (m)	5	Silty sand & sandy silt
Transition layer 23	6	Start depth: 10.46 (m)	5	Silty sand & sandy silt
		End depth: 10.56 (m)	4	Clay & silty clay

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 24	4	Start depth: 10.56 (m)	4	Clay & silty clay
		End depth: 10.62 (m)	5	Silty sand & sandy silt
Transition layer 25	5	Start depth: 10.64 (m)	5	Silty sand & sandy silt
		End depth: 10.72 (m)	4	Clay & silty clay
Transition layer 26	8	Start depth: 11.08 (m)	3	Clay
		End depth: 11.22 (m)	5	Silty sand & sandy silt
Transition layer 27	6	Start depth: 11.30 (m)	5	Silty sand & sandy silt
		End depth: 11.40 (m)	3	Clay
Transition layer 28	5	Start depth: 11.40 (m)	3	Clay
		End depth: 11.48 (m)	5	Silty sand & sandy silt
Transition layer 29	4	Start depth: 11.50 (m)	5	Silty sand & sandy silt
		End depth: 11.56 (m)	4	Clay & silty clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.16	11.30	242.90	100.00	15.16
2	0.92	0.16	11.30	242.90	95.67	15.55
3	0.94	0.28	22.00	319.30	92.76	15.69
4	0.96	0.23	15.60	243.90	88.46	15.82
5	0.98	0.24	15.10	296.50	87.28	15.66
6	1.00	0.26	15.50	277.40	58.59	15.91
7	1.02	0.93	16.40	250.50	36.30	16.39
8	1.04	1.80	25.10	478.30	25.45	16.80
9	1.06	2.15	27.70	447.20	20.64	17.09
10	1.08	2.54	28.50	320.60	18.39	17.22
11	1.10	2.83	30.60	102.20	17.77	17.36
12	1.12	2.80	36.70	42.60	18.73	17.52
13	1.14	2.68	42.60	-1.20	21.73	17.70
14	1.16	2.36	52.10	-43.20	25.11	17.84
15	1.18	2.22	57.10	-45.90	28.01	17.94
16	1.20	2.25	60.40	-46.00	29.91	18.01
17	1.22	2.11	64.70	-49.20	31.83	18.07
18	1.24	1.98	69.30	-63.30	33.76	18.07
19	1.26	1.89	63.60	-54.30	34.65	18.03
20	1.28	1.88	60.50	-49.50	34.14	17.94
21	1.30	1.89	56.60	-47.40	33.67	17.88
22	1.32	1.84	54.50	-46.50	32.77	17.84
23	1.34	1.94	53.30	-47.60	31.67	17.83
24	1.36	2.07	54.20	-50.10	30.74	17.91
25	1.38	2.18	62.40	-52.80	30.90	18.02
26	1.40	2.16	68.30	-53.30	32.00	18.14
27	1.42	2.13	74.00	-51.70	34.71	18.23
28	1.44	1.89	83.30	-44.40	36.15	18.32
29	1.46	2.10	86.70	-38.80	37.14	18.38
30	1.48	2.10	87.20	-36.30	36.93	18.39
31	1.50	1.96	86.00	-35.10	37.56	18.38
32	1.52	1.97	86.00	-35.10	37.33	18.33
33	1.54	2.02	76.70	-39.60	37.37	18.27
34	1.56	1.83	75.50	-40.70	37.61	18.18
35	1.58	1.75	70.90	-42.20	39.05	18.15
36	1.60	1.75	74.60	-39.30	39.01	18.15
37	1.62	1.84	75.50	-37.60	38.09	18.20
38	1.64	1.97	77.10	-37.50	36.03	18.25
39	1.66	2.18	78.80	-36.10	34.53	18.29
40	1.68	2.17	78.20	-39.20	33.51	18.31
41	1.70	2.21	78.50	-38.80	32.67	18.30
42	1.72	2.32	74.90	-37.60	31.80	18.34
43	1.74	2.47	84.50	-26.30	31.74	18.36
44	1.76	2.28	81.80	-26.50	32.88	18.38
45	1.78	2.14	81.80	-26.50	35.15	18.37
46	1.80	2.00	87.70	-23.60	37.35	18.37
47	1.82	1.90	87.10	-24.50	39.57	18.38
48	1.84	1.81	88.30	-26.80	41.20	18.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.71	86.00	-26.10	42.97	18.32
50	1.88	1.60	84.70	-24.00	44.32	18.30
51	1.90	1.60	87.00	-22.70	45.64	18.28
52	1.92	1.52	84.90	-23.20	47.10	18.25
53	1.94	1.39	81.90	-22.20	49.15	18.19
54	1.96	1.30	79.30	-30.90	51.34	18.14
55	1.98	1.26	80.90	-31.10	53.62	18.13
56	2.00	1.19	83.30	-29.60	56.35	18.12
57	2.02	1.08	82.30	-30.60	58.07	18.11
58	2.04	1.13	82.10	-29.90	58.51	18.12
59	2.06	1.16	85.10	-21.60	58.74	18.15
60	2.08	1.10	88.80	-14.10	60.06	18.13
61	2.10	1.01	80.20	-13.90	61.69	18.05
62	2.12	0.97	73.40	-11.90	61.50	17.94
63	2.14	0.99	68.40	-9.50	59.63	17.85
64	2.16	1.03	63.90	-9.10	56.90	17.77
65	2.18	1.06	58.50	-8.10	52.34	17.68
66	2.20	1.19	49.70	-3.40	45.90	17.60
67	2.22	1.45	46.50	-2.30	38.66	17.57
68	2.24	1.75	45.60	1.70	31.73	17.61
69	2.26	2.22	44.30	3.20	28.08	17.68
70	2.28	2.28	49.20	-0.70	26.96	17.79
71	2.30	2.24	55.90	9.10	28.86	17.94
72	2.32	2.15	65.60	6.10	31.72	18.06
73	2.34	1.98	71.20	-1.20	34.00	18.14
74	2.36	1.98	71.20	-1.20	38.92	18.20
75	2.38	1.49	85.20	-7.40	44.82	18.24
76	2.40	1.30	90.40	-5.40	51.90	18.22
77	2.42	1.24	80.80	-5.40	52.67	18.14
78	2.44	1.32	73.10	-1.70	49.60	18.08
79	2.46	1.48	73.70	-1.80	48.85	18.04
80	2.48	1.25	73.20	-0.10	49.87	18.00
81	2.50	1.17	68.20	-0.50	52.55	17.89
82	2.52	1.11	60.30	0.30	53.16	17.76
83	2.54	1.05	54.90	3.80	51.70	17.63
84	2.56	1.13	50.00	9.40	43.93	17.60
85	2.58	1.71	46.70	14.70	22.83	17.83
86	2.60	5.06	49.10	11.30	11.95	18.09
87	2.62	7.29	55.60	6.00	6.18	18.43
88	2.64	10.81	66.80	13.60	3.75	18.58
89	2.66	12.80	56.10	-0.90	2.21	18.64
90	2.68	14.06	52.50	1.60	1.22	18.61
91	2.70	15.80	54.90	2.00	0.75	18.66
92	2.72	16.69	58.60	3.80	0.49	18.75
93	2.74	17.64	62.70	5.30	0.33	18.84
94	2.76	18.66	65.80	7.70	0.19	18.93
95	2.78	19.63	69.80	9.50	0.08	19.03
96	2.80	20.54	76.70	11.40	0.01	19.15

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	21.85	84.90	11.90	0.01	19.27
98	2.84	22.26	91.20	13.40	0.04	19.37
99	2.86	22.57	97.20	13.70	0.21	19.47
100	2.88	22.51	109.10	15.20	0.32	19.53
101	2.90	22.57	106.30	12.80	0.47	19.59
102	2.92	22.47	114.40	20.60	1.10	19.68
103	2.94	18.78	142.40	6.40	1.16	19.67
104	2.96	21.88	105.10	8.20	1.13	19.64
105	2.98	22.12	105.80	17.00	0.47	19.52
106	3.00	22.27	103.20	14.10	0.53	19.55
107	3.02	22.01	112.30	17.30	0.66	19.56
108	3.04	21.11	109.80	15.60	0.87	19.57
109	3.06	20.46	108.10	14.50	1.08	19.54
110	3.08	19.72	110.10	14.30	1.32	19.53
111	3.10	18.94	110.00	14.00	1.60	19.51
112	3.12	18.03	107.60	13.50	1.89	19.48
113	3.14	16.99	105.60	13.10	2.50	19.41
114	3.16	13.86	100.10	13.00	3.48	19.32
115	3.18	11.70	98.20	12.00	5.09	19.21
116	3.20	9.45	96.50	10.90	7.18	19.13
117	3.22	7.45	100.90	10.70	10.02	19.06
118	3.24	5.87	102.80	12.70	13.61	19.04
119	3.26	4.86	112.70	13.90	18.77	19.03
120	3.28	3.61	124.50	19.50	23.95	19.05
121	3.30	3.39	132.10	18.60	28.48	19.06
122	3.32	3.19	133.50	30.90	30.79	19.05
123	3.34	2.87	132.50	136.50	33.40	19.03
124	3.36	2.59	136.50	151.30	36.55	19.01
125	3.38	2.36	137.80	163.30	39.24	18.98
126	3.40	2.23	134.30	216.20	40.43	18.92
127	3.42	2.19	121.30	254.90	40.20	18.80
128	3.44	2.09	105.50	251.50	38.15	18.59
129	3.46	2.05	75.20	276.70	35.80	18.34
130	3.48	2.02	65.10	271.50	33.50	18.09
131	3.50	1.93	58.60	321.00	32.31	17.94
132	3.52	1.94	52.50	343.10	31.32	17.83
133	3.54	1.96	49.60	335.00	30.71	17.75
134	3.56	1.88	48.10	304.80	31.14	17.71
135	3.58	1.79	48.40	283.90	32.44	17.69
136	3.60	1.71	49.00	274.60	33.48	17.71
137	3.62	1.77	52.70	269.30	34.08	17.76
138	3.64	1.79	54.30	238.90	34.68	17.80
139	3.66	1.70	54.50	207.90	35.65	17.81
140	3.68	1.66	55.40	172.50	36.92	17.81
141	3.70	1.64	56.70	111.70	37.39	17.82
142	3.72	1.66	55.90	103.60	37.26	17.82
143	3.74	1.70	55.70	81.20	37.68	17.81
144	3.76	1.57	55.90	69.30	39.48	17.77

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	1.38	53.90	45.70	42.51	17.71
146	3.80	1.27	51.90	33.50	44.99	17.65
147	3.82	1.24	51.80	51.60	46.11	17.62
148	3.84	1.24	51.80	51.60	41.05	17.66
149	3.86	1.83	50.90	64.00	30.30	17.80
150	3.88	3.04	52.30	48.20	23.01	17.94
151	3.90	3.33	55.20	55.70	20.15	18.05
152	3.92	3.25	58.50	2.20	21.10	18.15
153	3.94	2.98	66.80	-43.90	23.50	18.17
154	3.96	2.56	65.10	-47.20	27.67	18.17
155	3.98	2.07	66.90	-57.60	32.76	18.09
156	4.00	1.70	65.50	-55.50	40.09	18.02
157	4.02	1.29	68.00	-54.10	48.73	17.98
158	4.04	1.08	75.20	-50.30	58.44	17.98
159	4.06	0.96	80.50	-29.30	64.72	17.99
160	4.08	0.92	78.30	-11.00	68.30	17.98
161	4.10	0.88	77.50	-4.20	69.80	17.92
162	4.12	0.83	72.50	-1.70	71.90	17.83
163	4.14	0.75	65.10	-0.10	76.11	17.52
164	4.16	0.49	37.40	29.30	73.55	17.28
165	4.18	0.75	41.10	30.20	68.19	17.04
166	4.20	0.77	37.50	31.40	59.71	17.08
167	4.22	0.86	35.00	37.20	53.74	17.04
168	4.24	1.02	33.10	41.30	45.81	17.02
169	4.26	1.26	30.50	50.50	40.21	17.07
170	4.28	1.36	33.60	58.50	37.46	17.15
171	4.30	1.40	37.40	70.30	37.79	17.27
172	4.32	1.37	39.90	80.10	38.70	17.34
173	4.34	1.36	41.30	94.30	39.53	17.39
174	4.36	1.37	42.40	103.40	39.63	17.42
175	4.38	1.40	43.10	125.40	39.09	17.45
176	4.40	1.45	43.00	135.50	38.22	17.47
177	4.42	1.49	43.50	147.80	37.36	17.46
178	4.44	1.49	41.70	159.00	36.73	17.43
179	4.46	1.47	39.00	169.60	36.08	17.35
180	4.48	1.46	36.00	178.90	35.09	17.25
181	4.50	1.46	32.00	199.40	34.11	17.16
182	4.52	1.46	31.00	207.90	33.37	17.09
183	4.54	1.45	30.20	218.00	33.46	17.07
184	4.56	1.41	30.40	226.20	33.86	17.05
185	4.58	1.38	30.30	233.50	34.50	17.05
186	4.60	1.36	30.40	241.00	34.94	17.04
187	4.62	1.34	30.00	257.90	35.22	17.03
188	4.64	1.33	29.90	268.30	35.28	17.02
189	4.66	1.33	29.50	280.00	34.97	17.00
190	4.68	1.37	28.90	291.70	34.34	16.99
191	4.70	1.39	28.30	303.60	33.62	16.97
192	4.72	1.41	27.80	316.80	33.09	16.95

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	1.40	26.70	333.50	32.88	16.93
194	4.76	1.40	26.70	344.50	32.78	16.91
195	4.78	1.40	26.60	347.20	32.99	16.92
196	4.80	1.39	27.50	358.80	33.48	16.94
197	4.82	1.36	28.60	361.00	34.12	16.98
198	4.84	1.36	29.20	367.90	34.54	17.02
199	4.86	1.39	30.60	375.30	34.56	17.07
200	4.88	1.44	32.50	392.30	34.33	17.13
201	4.90	1.47	33.30	395.50	34.12	17.18
202	4.92	1.48	33.40	397.70	33.96	17.18
203	4.94	1.48	32.90	393.30	34.32	17.21
204	4.96	1.47	35.70	408.10	34.75	17.24
205	4.98	1.47	36.20	418.70	35.07	17.27
206	5.00	1.48	35.90	428.60	35.14	17.28
207	5.02	1.46	36.00	435.50	35.39	17.28
208	5.04	1.44	36.50	440.30	35.74	17.27
209	5.06	1.43	35.70	442.60	35.73	17.26
210	5.08	1.45	34.80	452.50	35.32	17.23
211	5.10	1.46	34.10	460.70	34.63	17.22
212	5.12	1.50	33.50	468.60	33.62	17.21
213	5.14	1.59	33.20	475.10	32.59	17.22
214	5.16	1.63	33.30	487.00	31.81	17.23
215	5.18	1.66	33.90	498.50	31.34	17.24
216	5.20	1.69	33.50	523.60	31.01	17.25
217	5.22	1.70	33.30	526.20	30.70	17.24
218	5.24	1.70	32.90	516.10	30.82	17.23
219	5.26	1.66	33.10	509.60	31.29	17.23
220	5.28	1.63	33.80	500.70	32.20	17.24
221	5.30	1.58	34.60	491.00	33.50	17.28
222	5.32	1.53	37.40	473.50	35.13	17.32
223	5.34	1.45	38.80	474.10	36.87	17.36
224	5.36	1.40	39.60	469.00	36.78	17.36
225	5.38	1.55	37.50	457.50	36.80	17.35
226	5.40	1.46	38.20	426.40	36.87	17.32
227	5.42	1.35	36.70	436.20	38.59	17.28
228	5.44	1.29	36.10	435.10	39.88	17.23
229	5.46	1.24	35.60	440.00	40.89	17.19
230	5.48	1.19	33.70	431.30	41.52	17.13
231	5.50	1.16	32.50	434.90	41.91	17.08
232	5.52	1.15	31.50	424.90	42.13	17.03
233	5.54	1.12	30.10	397.10	42.80	16.99
234	5.56	1.08	30.60	375.90	43.96	16.96
235	5.58	1.03	30.40	323.70	45.44	16.94
236	5.60	1.00	29.60	263.50	47.33	16.89
237	5.62	0.91	28.30	207.40	49.52	16.82
238	5.64	0.85	27.20	135.80	54.40	16.73
239	5.66	0.69	27.20	-14.40	61.45	16.67
240	5.68	0.59	28.10	0.40	70.16	16.61

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.54	27.30	13.30	69.22	16.57
242	5.72	0.69	24.10	26.40	60.95	16.53
243	5.74	0.84	21.90	39.00	52.49	16.47
244	5.76	0.89	20.60	57.40	48.74	16.45
245	5.78	0.89	21.20	68.40	48.14	16.45
246	5.80	0.88	21.40	81.10	47.29	16.46
247	5.82	0.94	20.50	98.80	45.54	16.44
248	5.84	0.99	19.60	108.40	43.58	16.43
249	5.86	1.01	19.80	111.20	43.54	16.50
250	5.88	1.01	23.80	123.60	45.12	16.63
251	5.90	0.99	27.20	130.70	47.37	16.77
252	5.92	0.96	28.90	146.90	48.00	16.81
253	5.94	1.00	27.00	154.60	47.63	16.80
254	5.96	1.00	26.20	161.80	46.59	16.76
255	5.98	1.00	25.80	166.70	46.03	16.74
256	6.00	1.03	25.50	186.30	44.99	16.73
257	6.02	1.07	24.90	196.80	43.20	16.71
258	6.04	1.13	23.20	197.90	41.14	16.73
259	6.06	1.23	25.10	198.90	39.74	16.75
260	6.08	1.25	25.40	160.30	39.98	16.85
261	6.10	1.22	28.90	167.70	41.92	16.97
262	6.12	1.19	34.70	180.40	43.96	17.08
263	6.14	1.18	34.90	169.00	45.52	17.17
264	6.16	1.18	36.80	155.30	46.81	17.23
265	6.18	1.16	41.40	141.20	48.60	17.33
266	6.20	1.15	45.70	133.90	50.06	17.42
267	6.22	1.16	46.90	138.90	50.67	17.50
268	6.24	1.20	50.80	150.00	49.94	17.53
269	6.26	1.25	48.10	140.20	49.16	17.56
270	6.28	1.26	48.40	119.60	49.54	17.57
271	6.30	1.20	52.80	111.40	50.58	17.61
272	6.32	1.21	53.40	130.80	51.17	17.61
273	6.34	1.22	49.40	129.30	50.37	17.58
274	6.36	1.23	47.80	122.70	50.02	17.56
275	6.38	1.22	50.60	123.30	48.61	17.58
276	6.40	1.38	50.30	129.80	46.35	17.60
277	6.42	1.49	47.60	67.90	45.51	17.55
278	6.44	1.26	43.70	34.90	47.40	17.44
279	6.46	1.08	41.50	43.00	50.54	17.23
280	6.48	0.99	29.90	51.00	52.83	17.05
281	6.50	0.92	30.70	58.60	54.82	16.95
282	6.52	0.87	35.30	65.20	58.03	17.00
283	6.54	0.87	36.00	62.40	60.47	17.07
284	6.56	0.86	37.90	60.60	61.85	17.17
285	6.58	0.88	44.30	79.30	62.06	17.20
286	6.60	0.88	39.30	86.60	59.75	17.23
287	6.62	1.00	39.20	78.70	56.80	17.19
288	6.64	1.00	37.90	87.30	56.22	17.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	0.92	38.20	81.00	58.04	17.19
290	6.68	0.91	41.20	80.20	61.28	17.21
291	6.70	0.86	42.40	78.90	63.30	17.22
292	6.72	0.83	40.30	70.30	65.85	17.19
293	6.74	0.78	40.50	64.80	67.38	17.10
294	6.76	0.74	35.00	61.40	69.25	17.01
295	6.78	0.70	33.80	55.30	71.16	16.94
296	6.80	0.67	35.40	59.60	73.92	16.92
297	6.82	0.64	35.20	64.00	75.36	16.91
298	6.84	0.65	33.60	72.00	75.20	16.86
299	6.86	0.65	30.90	69.80	76.40	16.77
300	6.88	0.56	29.40	55.80	80.37	16.69
301	6.90	0.51	29.40	58.90	85.98	16.60
302	6.92	0.48	27.10	66.40	88.23	16.52
303	6.94	0.48	24.50	90.40	86.63	16.39
304	6.96	0.49	21.50	97.80	84.41	16.31
305	6.98	0.49	21.50	97.80	80.87	16.23
306	7.00	0.52	19.40	110.90	78.47	16.20
307	7.02	0.53	19.30	121.60	75.51	16.13
308	7.04	0.53	17.60	127.30	73.78	16.10
309	7.06	0.55	17.60	145.60	70.98	16.05
310	7.08	0.58	16.60	155.90	67.96	16.05
311	7.10	0.61	16.70	160.00	65.15	16.06
312	7.12	0.64	17.20	165.30	63.69	16.09
313	7.14	0.64	17.30	166.70	64.04	16.11
314	7.16	0.61	17.80	165.70	65.28	16.10
315	7.18	0.59	16.90	187.20	66.18	16.06
316	7.20	0.59	16.00	195.70	65.79	16.00
317	7.22	0.59	15.30	202.40	64.53	15.96
318	7.24	0.61	15.10	206.20	63.96	15.95
319	7.26	0.60	15.50	210.60	63.77	15.96
320	7.28	0.60	15.60	215.80	63.79	15.97
321	7.30	0.61	15.40	230.00	62.76	15.97
322	7.32	0.64	15.30	234.30	60.58	15.98
323	7.34	0.68	15.40	235.60	58.05	16.03
324	7.36	0.73	16.30	229.10	57.24	16.08
325	7.38	0.71	17.10	216.00	58.26	16.16
326	7.40	0.69	18.80	219.80	58.54	16.14
327	7.42	0.70	15.30	250.60	56.68	16.12
328	7.44	0.77	15.80	254.20	53.03	16.12
329	7.46	0.86	17.60	255.40	50.57	16.23
330	7.48	0.92	18.80	231.00	49.21	16.34
331	7.50	0.95	19.80	218.60	48.41	16.41
332	7.52	0.98	20.60	233.30	48.16	16.46
333	7.54	0.99	21.00	185.50	48.54	16.52
334	7.56	0.97	22.50	191.30	49.49	16.52
335	7.58	0.93	21.50	211.60	50.84	16.51
336	7.60	0.89	20.70	184.00	52.28	16.48

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	0.86	21.70	210.60	53.80	16.50
338	7.64	0.86	23.20	232.80	54.89	16.54
339	7.66	0.85	23.10	247.00	54.66	16.55
340	7.68	0.88	22.40	250.40	53.43	16.55
341	7.70	0.92	22.60	252.30	51.57	16.56
342	7.72	0.98	22.60	229.20	50.60	16.58
343	7.74	0.97	23.10	228.10	50.13	16.61
344	7.76	0.98	23.60	224.00	51.22	16.64
345	7.78	0.94	25.00	248.20	50.68	16.59
346	7.80	0.96	20.00	249.00	45.59	16.58
347	7.82	1.34	20.30	307.90	37.84	16.67
348	7.84	1.78	25.30	311.50	28.24	16.97
349	7.86	2.95	29.50	170.10	24.65	17.23
350	7.88	2.80	33.10	-0.20	23.38	17.37
351	7.90	2.57	33.90	-15.80	25.80	17.39
352	7.92	2.29	33.70	20.30	29.37	17.45
353	7.94	2.04	42.70	48.00	34.47	17.56
354	7.96	1.73	49.50	79.80	39.21	17.67
355	7.98	1.71	50.90	93.90	41.41	17.72
356	8.00	1.80	50.90	117.10	40.22	17.82
357	8.02	2.08	60.40	135.30	38.03	17.94
358	8.04	2.29	62.20	67.90	36.83	18.02
359	8.06	2.21	60.00	15.90	38.02	17.93
360	8.08	1.70	50.00	35.10	40.50	17.75
361	8.10	1.58	44.20	57.60	43.02	17.57
362	8.12	1.57	42.90	108.60	43.05	17.50
363	8.14	1.59	43.00	134.90	42.27	17.56
364	8.16	1.75	48.90	149.80	40.17	17.70
365	8.18	2.08	55.10	137.40	37.93	17.85
366	8.20	2.25	58.40	49.80	37.66	17.91
367	8.22	1.93	55.50	37.00	39.63	17.81
368	8.24	1.60	46.00	30.30	43.67	17.57
369	8.26	1.28	35.30	84.40	47.14	17.27
370	8.28	1.15	30.90	147.20	49.10	17.05
371	8.30	1.15	29.50	169.50	48.93	16.99
372	8.32	1.22	30.80	185.40	46.20	16.98
373	8.34	1.37	28.50	207.80	40.76	17.02
374	8.36	1.74	28.00	238.90	34.40	17.16
375	8.38	2.32	35.60	136.50	29.60	17.35
376	8.40	2.66	37.80	56.50	26.93	17.52
377	8.42	2.82	38.50	15.60	26.70	17.57
378	8.44	2.53	39.30	9.30	28.27	17.53
379	8.46	2.18	36.80	-4.70	32.51	17.51
380	8.48	1.83	41.90	4.00	36.89	17.36
381	8.50	1.48	31.10	108.90	38.32	17.23
382	8.52	1.73	27.30	211.30	31.06	17.16
383	8.54	2.88	30.10	169.50	25.18	17.31
384	8.56	3.23	36.00	5.30	22.86	17.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	2.83	34.00	-19.80	24.19	17.42
386	8.60	2.42	30.10	0.70	27.14	17.33
387	8.62	2.16	32.20	38.10	31.08	17.38
388	8.64	2.01	42.20	82.20	35.38	17.51
389	8.66	1.84	46.40	130.70	40.46	17.60
390	8.68	1.50	46.70	156.40	43.38	17.57
391	8.70	1.56	42.50	219.60	44.32	17.52
392	8.72	1.64	42.60	222.60	43.04	17.53
393	8.74	1.67	46.00	177.40	42.08	17.53
394	8.76	1.70	41.40	171.60	42.02	17.48
395	8.78	1.59	37.80	208.30	40.42	17.36
396	8.80	1.69	33.60	268.50	37.71	17.30
397	8.82	1.98	33.80	259.50	35.01	17.37
398	8.84	2.14	40.40	164.20	33.83	17.50
399	8.86	2.18	43.80	73.50	34.59	17.58
400	8.88	2.01	41.60	84.30	36.21	17.56
401	8.90	1.84	41.10	112.10	38.47	17.47
402	8.92	1.65	37.70	149.80	39.21	17.45
403	8.94	1.85	40.40	189.70	38.65	17.48
404	8.96	1.96	42.90	187.20	37.56	17.54
405	8.98	1.94	42.60	149.00	36.53	17.62
406	9.00	2.18	47.20	180.10	32.04	17.79
407	9.02	3.21	54.40	126.80	25.98	17.83
408	9.04	3.72	37.70	6.10	22.07	17.86
409	9.06	3.74	43.20	26.30	20.51	17.71
410	9.08	3.42	37.10	32.80	22.62	17.74
411	9.10	2.93	44.00	46.60	25.79	17.76
412	9.12	2.68	50.60	77.10	30.01	17.88
413	9.14	2.51	56.60	114.10	33.16	17.98
414	9.16	2.42	61.50	99.50	35.98	18.06
415	9.18	2.27	65.90	90.80	39.10	18.05
416	9.20	1.91	60.20	94.70	41.89	17.99
417	9.22	1.84	57.60	116.30	43.84	17.91
418	9.24	1.83	57.60	143.20	44.10	17.87
419	9.26	1.79	54.60	155.00	43.28	17.79
420	9.28	1.81	46.60	207.40	40.97	17.74
421	9.30	2.06	48.50	238.40	35.68	17.82
422	9.32	2.84	57.50	225.50	31.57	17.99
423	9.34	3.12	60.00	70.70	29.00	17.99
424	9.36	2.81	44.50	-11.00	29.30	17.92
425	9.38	2.61	49.60	11.40	30.92	17.84
426	9.40	2.51	53.40	25.90	33.92	17.95
427	9.42	2.37	62.60	65.30	38.32	18.07
428	9.44	1.98	71.80	73.10	43.16	18.14
429	9.46	1.85	72.30	73.60	47.40	18.12
430	9.48	1.75	67.00	99.40	49.01	18.04
431	9.50	1.64	61.90	124.60	49.04	17.93
432	9.52	1.65	56.10	188.40	47.94	17.83

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	1.70	51.40	195.80	45.49	17.76
434	9.56	1.81	49.50	211.70	40.06	17.80
435	9.58	2.48	54.40	230.70	35.58	17.87
436	9.60	2.66	54.00	124.10	32.69	17.94
437	9.62	2.62	53.20	47.90	31.86	17.96
438	9.64	2.76	54.90	43.80	31.32	17.99
439	9.66	2.90	57.30	32.00	30.65	18.05
440	9.68	2.97	59.30	11.40	30.21	18.07
441	9.70	2.96	57.10	13.60	30.38	18.07
442	9.72	2.86	57.30	2.70	31.27	18.04
443	9.74	2.66	57.20	13.80	33.26	18.04
444	9.76	2.46	60.00	20.40	35.04	18.05
445	9.78	2.49	62.00	57.10	33.33	18.09
446	9.80	3.16	60.00	29.80	31.44	18.15
447	9.82	3.11	65.00	10.80	30.25	18.15
448	9.84	2.84	59.90	9.90	32.06	18.19
449	9.86	2.77	68.40	-1.70	33.48	18.25
450	9.88	2.92	76.50	3.20	33.84	18.29
451	9.90	2.90	68.00	-18.40	35.60	18.27
452	9.92	2.30	68.30	-15.10	38.14	18.15
453	9.94	2.10	62.80	-6.00	40.81	18.09
454	9.96	2.26	62.50	19.10	40.15	18.05
455	9.98	2.33	61.60	47.10	39.24	18.06
456	10.00	2.28	62.40	29.90	39.84	18.04
457	10.02	2.11	60.30	38.40	41.62	18.01
458	10.04	1.99	61.30	55.60	42.59	18.00
459	10.06	2.09	61.30	70.90	42.16	18.02
460	10.08	2.22	62.80	79.30	39.64	18.05
461	10.10	2.48	62.00	87.10	36.72	18.10
462	10.12	2.77	63.50	74.70	33.55	18.17
463	10.14	3.12	67.30	63.70	30.69	18.24
464	10.16	3.44	65.90	30.20	29.21	18.24
465	10.18	3.26	61.70	10.40	28.34	18.23
466	10.20	3.38	63.50	9.20	27.83	18.19
467	10.22	3.50	59.40	22.40	26.80	18.19
468	10.24	3.61	58.50	-11.80	25.91	18.17
469	10.26	3.65	59.40	44.30	25.75	18.06
470	10.28	3.18	44.40	31.70	25.87	17.94
471	10.30	3.18	44.40	31.70	30.10	17.98
472	10.32	2.48	72.00	6.30	35.49	18.12
473	10.34	2.22	71.60	14.40	42.90	18.18
474	10.36	1.92	65.90	35.20	44.71	18.09
475	10.38	2.02	60.80	46.90	43.40	18.02
476	10.40	2.28	59.70	61.00	39.09	18.04
477	10.42	2.68	61.80	51.90	34.64	18.08
478	10.44	3.04	59.50	34.30	31.03	18.06
479	10.46	3.13	50.20	26.80	30.10	17.95
480	10.48	2.66	46.80	1.50	31.18	17.88

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	2.57	52.30	1.20	34.21	17.90
482	10.52	2.47	57.20	5.80	36.63	17.99
483	10.54	2.38	62.60	-2.90	39.77	18.06
484	10.56	2.12	65.80	-2.70	42.59	18.07
485	10.58	2.03	63.80	21.70	38.75	18.14
486	10.60	3.19	66.10	37.00	33.00	18.25
487	10.62	3.69	71.50	11.40	28.94	18.39
488	10.64	3.71	78.30	-13.50	28.45	18.38
489	10.66	3.36	63.90	-32.50	29.82	18.27
490	10.68	2.87	56.10	-24.80	32.15	18.02
491	10.70	2.35	48.50	-16.60	38.33	17.90
492	10.72	1.73	57.50	-7.10	42.79	17.88
493	10.74	2.09	59.70	21.40	43.76	17.97
494	10.76	2.37	61.40	41.60	40.78	17.99
495	10.78	2.25	56.80	15.50	41.16	17.98
496	10.80	2.00	58.20	28.10	41.80	17.91
497	10.82	2.13	52.80	56.00	41.01	17.86
498	10.84	2.29	49.90	27.00	40.13	17.80
499	10.86	2.04	50.00	3.80	41.66	17.74
500	10.88	1.79	47.70	6.70	44.68	17.69
501	10.90	1.79	47.70	6.70	49.97	17.61
502	10.92	1.29	47.00	76.40	54.20	17.49
503	10.94	1.21	38.90	105.90	58.91	17.35
504	10.96	1.24	37.40	130.40	55.01	17.28
505	10.98	1.49	37.00	156.20	49.38	17.33
506	11.00	1.76	38.90	173.00	44.52	17.37
507	11.02	1.84	36.80	92.20	44.22	17.37
508	11.04	1.55	37.40	94.10	47.80	17.28
509	11.06	1.24	34.10	147.00	53.42	17.17
510	11.08	1.17	31.50	177.60	56.02	17.05
511	11.10	1.21	30.20	207.20	51.01	17.02
512	11.12	1.58	28.50	240.30	42.75	17.17
513	11.14	2.22	36.70	162.20	35.50	17.33
514	11.16	2.58	36.20	57.00	33.25	17.46
515	11.18	2.31	37.10	29.10	32.13	17.53
516	11.20	2.62	41.00	48.60	29.65	17.60
517	11.22	3.36	40.10	104.50	27.08	17.74
518	11.24	3.42	46.80	-7.70	26.35	17.83
519	11.26	3.13	48.80	-12.30	27.19	17.87
520	11.28	3.22	45.80	-1.80	27.46	17.92
521	11.30	3.48	52.20	14.30	28.15	18.00
522	11.32	3.16	59.60	34.20	30.54	18.02
523	11.34	2.57	52.30	21.70	35.55	18.00
524	11.36	2.18	57.50	44.20	41.77	17.98
525	11.38	1.94	66.40	69.30	48.59	18.02
526	11.40	1.64	68.00	192.00	51.61	17.99
527	11.42	1.71	56.20	330.40	47.14	17.91
528	11.44	2.30	49.80	362.90	41.31	17.81

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
529	11.46	2.30	47.90	179.20	33.77	17.73
530	11.48	3.01	37.80	58.90	31.34	17.59
531	11.50	2.59	33.10	88.60	30.65	17.43
532	11.52	2.12	33.30	144.70	35.91	17.36
533	11.54	1.74	37.10	252.60	40.01	17.40
534	11.56	1.96	40.20	327.00	41.35	17.49
535	11.58	2.06	42.40	241.50	41.54	17.56
536	11.60	1.86	44.20	134.80	44.65	17.57
537	11.62	1.58	44.60	165.80	51.01	17.52
538	11.64	1.26	43.30	243.50	56.62	17.45
539	11.66	1.25	41.90	284.50	59.86	17.39
540	11.68	1.25	40.80	305.10	59.49	17.37
541	11.70	1.26	41.10	327.70	58.04	17.33
542	11.72	1.31	37.60	336.50	55.01	17.31
543	11.74	1.45	36.20	317.90	50.46	17.25
544	11.76	1.59	32.20	246.90	49.74	17.17
545	11.78	1.31	31.40	238.30	52.23	17.10
546	11.80	1.16	32.50	248.20	56.84	17.01
547	11.82	1.13	28.30	313.30	59.43	16.98
548	11.84	1.09	30.10	349.00	60.06	16.93
549	11.86	1.07	29.70	367.50	61.09	16.93
550	11.88	1.06	28.90	374.60	61.12	16.89
551	11.90	1.05	27.10	379.70	60.28	16.82
552	11.92	1.06	25.10	393.10	59.49	16.76
553	11.94	1.06	24.70	399.80	58.70	16.73
554	11.96	1.06	24.60	418.10	58.31	16.73
555	11.98	1.08	25.20	424.90	57.32	16.75
556	12.00	1.14	25.30	419.30	56.56	16.80
557	12.02	1.16	27.30	410.50	55.98	16.83
558	12.04	1.16	26.90	403.20	55.55	16.87
559	12.06	1.20	27.40	420.60	54.62	16.91
560	12.08	1.26	29.00	421.70	53.66	16.97
561	12.10	1.30	30.50	414.10	53.06	17.03
562	12.12	1.32	31.50	423.20	50.34	17.11
563	12.14	1.59	32.80	434.60	46.57	17.21
564	12.16	1.80	35.10	432.00	43.35	17.33
565	12.18	1.91	39.30	370.90	42.69	17.48
566	12.20	1.94	44.60	245.50	43.51	17.50
567	12.22	1.77	38.20	238.40	47.01	17.38
568	12.24	1.30	31.30	330.30	50.47	17.10
569	12.26	1.20	24.40	359.70	55.44	16.86
570	12.28	1.10	25.00	320.40	58.69	16.79
571	12.30	1.02	28.60	305.40	65.60	16.97
572	12.32	0.95	39.40	390.00	72.03	17.12
573	12.34	0.89	40.70	437.90	77.16	17.23
574	12.36	0.85	40.60	454.90	79.32	17.20
575	12.38	0.83	38.00	451.40	79.82	17.16
576	12.40	0.84	37.30	471.70	77.59	17.05

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
577	12.42	0.86	29.90	496.10	74.54	16.89
578	12.44	0.84	24.40	512.40	70.95	16.67
579	12.46	0.83	21.30	513.50	69.24	16.54
580	12.48	0.83	21.80	574.10	68.18	16.49
581	12.50	0.84	21.30	588.90	68.06	16.49
582	12.52	0.83	21.50	599.10	68.10	16.48
583	12.54	0.82	21.30	611.30	68.59	16.48
584	12.56	0.81	21.50	632.50	69.28	16.47
585	12.58	0.79	21.00	626.20	68.80	16.46
586	12.60	0.83	20.80	629.70	67.33	16.45
587	12.62	0.87	20.20	640.50	65.72	16.44
588	12.64	0.86	20.30	655.30	65.07	16.44
589	12.66	0.86	20.30	655.30	66.45	16.45
590	12.68	0.81	21.00	636.20	67.35	16.47
591	12.70	0.83	21.70	654.00	68.03	16.50
592	12.72	0.85	22.10	681.90	67.61	16.53
593	12.74	0.84	22.50	692.10	67.08	16.55
594	12.76	0.87	22.40	689.10	66.86	16.55
595	12.78	0.86	22.30	687.30	65.78	16.55
596	12.80	0.90	22.10	666.10	64.75	16.54
597	12.82	0.91	21.40	684.40	63.65	16.51
598	12.84	0.90	20.40	657.60	62.81	16.47
599	12.86	0.91	19.40	672.50	61.47	16.43
600	12.88	0.96	19.10	688.80	59.83	16.42
601	12.90	0.98	19.30	696.70	59.32	16.42
602	12.92	0.95	19.50	679.90	59.95	16.43
603	12.94	0.94	19.50	627.00	60.92	16.44
604	12.96	0.94	20.20	664.70	60.75	16.45
605	12.98	0.96	20.00	700.80	60.19	16.46
606	13.00	0.96	19.50	696.00	59.81	16.44
607	13.02	0.96	19.40	676.50	59.60	16.43
608	13.04	0.97	19.40	686.30	58.92	16.44
609	13.06	1.01	19.60	717.90	57.96	16.45
610	13.08	1.01	19.50	741.80	57.06	16.45
611	13.10	1.02	19.00	747.60	56.38	16.45
612	13.12	1.05	19.50	765.80	55.53	16.47
613	13.14	1.08	19.90	772.20	53.77	16.51
614	13.16	1.18	20.60	779.00	51.87	16.55
615	13.18	1.22	20.20	786.40	50.51	16.57
616	13.20	1.22	20.60	776.20	50.83	16.61
617	13.22	1.21	22.60	698.00	52.62	16.69
618	13.24	1.16	24.90	713.40	55.24	16.76
619	13.26	1.11	26.00	676.30	58.52	16.82
620	13.28	1.05	27.50	656.30	61.49	16.87
621	13.30	1.03	29.30	687.00	63.24	16.92
622	13.32	1.04	30.30	755.80	62.05	16.95
623	13.34	1.13	29.00	792.40	57.61	16.98
624	13.36	1.33	29.20	848.60	33.48	17.15

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
625	13.38	4.20	26.00	745.10	5.00	17.56
626	13.40	17.08	25.70	52.50	2.50	18.03
627	13.42	20.98	47.40	-15.60	0.50	18.40
628	13.44	21.90	48.60	-17.50	0.58	18.72
629	13.46	21.51	61.60	-17.10	0.57	18.89
630	13.48	24.15	69.60	76.90	0.87	19.11
631	13.50	23.41	85.00	29.30	0.89	19.28
632	13.52	25.02	92.10	-30.90	1.03	19.39
633	13.54	25.30	91.80	-41.40	0.83	19.37
634	13.56	24.83	78.30	-22.00	0.99	19.35
635	13.58	23.12	90.20	-41.00	1.28	19.32
636	13.60	22.23	90.40	-47.50	2.20	19.45
637	13.62	20.44	113.40	-51.20	3.34	19.60
638	13.64	19.23	140.20	-38.80	4.96	19.91
639	13.66	20.15	200.00	-46.00	5.58	20.07
640	13.68	21.11	180.70	-31.90	5.17	20.14
641	13.70	22.79	162.40	-4.00	4.21	20.06
642	13.72	23.30	153.90	-45.30	3.49	19.99
643	13.74	23.74	144.80	-50.30	3.19	19.95
644	13.76	23.94	147.00	-49.70	2.75	19.84
645	13.78	23.51	112.30	141.90	2.93	19.90
646	13.80	23.99	165.70	-42.90	2.92	19.91
647	13.82	24.31	149.60	-47.40	3.25	20.04
648	13.84	24.75	162.40	-42.70	3.11	20.04
649	13.86	24.72	160.70	-33.80	3.30	20.03
650	13.88	22.89	150.50	-10.30	3.28	19.94
651	13.90	22.50	129.30	31.70	3.37	19.76
652	13.92	20.06	107.60	118.30	3.53	19.68
653	13.94	20.15	128.30	-20.40	4.22	19.75
654	13.96	20.30	157.50	-33.30	4.78	19.92
655	13.98	20.97	168.90	-52.80	5.36	20.05
656	14.00	20.25	182.60	-40.50	5.73	20.04
657	14.02	18.43	159.10	-48.60	6.80	20.13
658	14.04	18.43	218.30	-36.70	9.08	20.33
659	14.06	16.16	302.30	-46.50	11.53	20.62
660	14.08	17.11	364.20	-42.00	13.26	20.87
661	14.10	18.95	428.60	-34.60	12.61	21.11
662	14.12	23.30	497.40	-29.90	11.90	21.30
663	14.14	24.26	536.60	-38.10	11.45	21.45
664	14.16	24.99	584.70	-40.30	11.75	21.58
665	14.18	26.94	697.90	-47.50	11.47	21.58
666	14.20	29.89	708.80	-48.70	11.52	21.58
667	14.22	28.71	748.30	-48.10	10.40	21.58
668	14.24	33.74	706.50	-52.50	9.69	21.58
669	14.26	34.99	725.90	-52.50	8.74	21.58

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	13.65	0.00	13.65	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	13.96	0.00	13.96	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	14.27	0.00	14.27	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	14.59	0.00	14.59	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	14.90	0.00	14.90	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	15.22	0.00	15.22	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	15.55	0.20	15.35	0.99	0.065	1.38	0.048	1.00	1.00	2.000	Yes
8	1.04	15.88	0.39	15.49	0.99	0.066	1.38	0.048	1.00	1.00	2.000	Yes
9	1.06	16.23	0.59	15.64	0.99	0.067	1.38	0.049	1.00	1.00	2.000	Yes
10	1.08	16.57	0.78	15.79	0.99	0.068	1.38	0.049	1.00	1.00	2.000	Yes
11	1.10	16.92	0.98	15.94	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
12	1.12	17.27	1.18	16.09	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
13	1.14	17.62	1.37	16.25	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
14	1.16	17.98	1.57	16.41	0.99	0.071	1.38	0.051	1.00	1.00	2.000	Yes
15	1.18	18.34	1.77	16.57	0.99	0.071	1.38	0.052	1.00	1.00	2.000	Yes
16	1.20	18.70	1.96	16.74	0.99	0.072	1.38	0.052	1.00	1.00	2.000	Yes
17	1.22	19.06	2.16	16.90	0.99	0.073	1.38	0.053	1.00	1.00	2.000	Yes
18	1.24	19.42	2.35	17.07	0.99	0.073	1.38	0.053	1.00	1.00	2.000	Yes
19	1.26	19.78	2.55	17.23	0.99	0.074	1.38	0.054	1.00	1.00	0.054	No
20	1.28	20.14	2.75	17.39	0.99	0.075	1.38	0.054	1.00	1.00	0.054	No
21	1.30	20.50	2.94	17.56	0.99	0.075	1.38	0.055	1.00	1.00	0.055	No
22	1.32	20.86	3.14	17.72	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
23	1.34	21.21	3.34	17.88	0.99	0.076	1.38	0.056	1.00	1.00	0.056	No
24	1.36	21.57	3.53	18.04	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
25	1.38	21.93	3.73	18.20	0.99	0.078	1.38	0.056	1.00	1.00	0.056	No
26	1.40	22.29	3.92	18.37	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
27	1.42	22.66	4.12	18.54	0.99	0.079	1.38	0.057	1.00	1.00	0.057	No
28	1.44	23.02	4.32	18.71	0.99	0.079	1.38	0.058	1.00	1.00	0.058	No
29	1.46	23.39	4.51	18.88	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
30	1.48	23.76	4.71	19.05	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
31	1.50	24.13	4.91	19.22	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
32	1.52	24.49	5.10	19.39	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
33	1.54	24.86	5.30	19.56	0.99	0.082	1.38	0.059	1.00	1.00	0.059	No
34	1.56	25.22	5.49	19.73	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
35	1.58	25.59	5.69	19.90	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
36	1.60	25.95	5.89	20.06	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
37	1.62	26.31	6.08	20.23	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
38	1.64	26.68	6.28	20.40	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
39	1.66	27.04	6.47	20.57	0.99	0.085	1.38	0.061	1.00	1.00	0.061	No
40	1.68	27.41	6.67	20.74	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
41	1.70	27.78	6.87	20.91	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
42	1.72	28.14	7.06	21.08	0.99	0.086	1.38	0.062	1.00	1.00	0.062	No
43	1.74	28.51	7.26	21.25	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
44	1.76	28.88	7.46	21.42	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
45	1.78	29.25	7.65	21.59	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
46	1.80	29.61	7.85	21.76	0.99	0.087	1.38	0.064	1.00	1.00	0.064	No
47	1.82	29.98	8.04	21.94	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
48	1.84	30.35	8.24	22.11	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	30.71	8.44	22.28	0.99	0.089	1.38	0.064	1.00	1.00	0.064	No
50	1.88	31.08	8.63	22.45	0.99	0.089	1.38	0.065	1.00	1.00	0.065	No
51	1.90	31.45	8.83	22.62	0.99	0.089	1.38	0.065	1.00	1.00	0.065	No
52	1.92	31.81	9.03	22.79	0.99	0.090	1.38	0.065	1.00	1.00	0.065	No
53	1.94	32.17	9.22	22.95	0.99	0.090	1.38	0.065	1.00	1.00	0.065	No
54	1.96	32.54	9.42	23.12	0.99	0.090	1.38	0.066	1.00	1.00	0.066	No
55	1.98	32.90	9.61	23.29	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
56	2.00	33.26	9.81	23.45	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
57	2.02	33.62	10.01	23.62	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
58	2.04	33.99	10.20	23.78	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
59	2.06	34.35	10.40	23.95	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
60	2.08	34.71	10.59	24.12	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
61	2.10	35.07	10.79	24.28	0.99	0.093	1.38	0.067	1.00	1.00	0.067	No
62	2.12	35.43	10.99	24.44	0.99	0.093	1.38	0.067	1.00	1.00	0.067	No
63	2.14	35.79	11.18	24.61	0.99	0.093	1.38	0.068	1.00	1.00	0.068	No
64	2.16	36.14	11.38	24.76	0.99	0.093	1.38	0.068	1.00	1.00	2.000	Yes
65	2.18	36.50	11.58	24.92	0.99	0.094	1.38	0.068	1.00	1.00	2.000	Yes
66	2.20	36.85	11.77	25.08	0.99	0.094	1.38	0.068	1.00	1.00	2.000	Yes
67	2.22	37.20	11.97	25.23	0.99	0.094	1.38	0.069	1.00	1.00	2.000	Yes
68	2.24	37.55	12.16	25.39	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
69	2.26	37.91	12.36	25.55	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
70	2.28	38.26	12.56	25.71	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
71	2.30	38.62	12.75	25.87	0.98	0.096	1.38	0.069	1.00	1.00	2.000	Yes
72	2.32	38.98	12.95	26.03	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
73	2.34	39.35	13.15	26.20	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
74	2.36	39.71	13.34	26.37	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
75	2.38	40.07	13.54	26.54	0.98	0.097	1.38	0.070	1.00	1.00	2.000	Yes
76	2.40	40.44	13.73	26.70	0.98	0.097	1.38	0.070	1.00	1.00	2.000	Yes
77	2.42	40.80	13.93	26.87	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
78	2.44	41.16	14.13	27.04	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
79	2.46	41.52	14.32	27.20	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
80	2.48	41.88	14.52	27.37	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
81	2.50	42.24	14.72	27.53	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
82	2.52	42.60	14.91	27.69	0.98	0.098	1.38	0.071	1.00	1.00	2.000	Yes
83	2.54	42.95	15.11	27.84	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
84	2.56	43.30	15.30	28.00	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
85	2.58	43.66	15.50	28.16	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
86	2.60	44.02	15.70	28.32	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
87	2.62	44.39	15.89	28.50	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
88	2.64	44.76	16.09	28.67	0.98	0.100	1.38	0.072	1.00	1.00	0.072	No
89	2.66	45.13	16.28	28.85	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
90	2.68	45.51	16.48	29.02	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
91	2.70	45.88	16.68	29.20	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
92	2.72	46.25	16.87	29.38	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
93	2.74	46.63	17.07	29.56	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
94	2.76	47.01	17.27	29.74	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
95	2.78	47.39	17.46	29.93	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
96	2.80	47.77	17.66	30.11	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	48.16	17.85	30.30	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
98	2.84	48.55	18.05	30.49	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
99	2.86	48.93	18.25	30.69	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
100	2.88	49.33	18.44	30.88	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
101	2.90	49.72	18.64	31.08	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
102	2.92	50.11	18.84	31.28	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
103	2.94	50.50	19.03	31.47	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
104	2.96	50.90	19.23	31.67	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
105	2.98	51.29	19.42	31.86	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
106	3.00	51.68	19.62	32.06	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
107	3.02	52.07	19.82	32.25	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
108	3.04	52.46	20.01	32.45	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
109	3.06	52.85	20.21	32.64	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
110	3.08	53.24	20.40	32.84	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
111	3.10	53.63	20.60	33.03	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
112	3.12	54.02	20.80	33.22	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
113	3.14	54.41	20.99	33.42	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
114	3.16	54.80	21.19	33.61	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
115	3.18	55.18	21.39	33.79	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
116	3.20	55.56	21.58	33.98	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
117	3.22	55.94	21.78	34.17	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
118	3.24	56.33	21.97	34.35	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
119	3.26	56.71	22.17	34.54	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
120	3.28	57.09	22.37	34.72	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
121	3.30	57.47	22.56	34.91	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
122	3.32	57.85	22.76	35.09	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
123	3.34	58.23	22.96	35.27	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
124	3.36	58.61	23.15	35.46	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
125	3.38	58.99	23.35	35.64	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
126	3.40	59.37	23.54	35.82	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
127	3.42	59.74	23.74	36.00	0.98	0.105	1.38	0.077	1.00	1.00	0.077	No
128	3.44	60.12	23.94	36.18	0.98	0.105	1.38	0.077	1.00	1.00	0.077	No
129	3.46	60.48	24.13	36.35	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
130	3.48	60.84	24.33	36.52	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
131	3.50	61.20	24.53	36.68	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
132	3.52	61.56	24.72	36.84	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
133	3.54	61.91	24.92	37.00	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
134	3.56	62.27	25.11	37.16	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
135	3.58	62.62	25.31	37.31	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
136	3.60	62.98	25.51	37.47	0.98	0.107	1.38	0.077	1.00	1.00	0.077	No
137	3.62	63.33	25.70	37.63	0.98	0.107	1.38	0.078	1.00	1.00	0.078	No
138	3.64	63.69	25.90	37.79	0.98	0.107	1.38	0.078	1.00	1.00	0.078	No
139	3.66	64.04	26.09	37.95	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
140	3.68	64.40	26.29	38.11	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
141	3.70	64.76	26.49	38.27	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
142	3.72	65.11	26.68	38.43	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
143	3.74	65.47	26.88	38.59	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
144	3.76	65.82	27.08	38.75	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	66.18	27.27	38.91	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
146	3.80	66.53	27.47	39.06	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
147	3.82	66.88	27.66	39.22	0.97	0.108	1.38	0.078	1.00	1.00	2.000	Yes
148	3.84	67.24	27.86	39.38	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
149	3.86	67.59	28.06	39.54	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
150	3.88	67.95	28.25	39.70	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
151	3.90	68.31	28.45	39.86	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
152	3.92	68.68	28.65	40.03	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
153	3.94	69.04	28.84	40.20	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
154	3.96	69.40	29.04	40.37	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
155	3.98	69.76	29.23	40.53	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
156	4.00	70.13	29.43	40.70	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
157	4.02	70.48	29.63	40.86	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
158	4.04	70.84	29.82	41.02	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
159	4.06	71.20	30.02	41.19	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
160	4.08	71.56	30.21	41.35	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
161	4.10	71.92	30.41	41.51	0.97	0.109	1.38	0.080	1.00	1.00	0.080	No
162	4.12	72.28	30.61	41.67	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
163	4.14	72.63	30.80	41.83	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
164	4.16	72.97	31.00	41.98	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
165	4.18	73.32	31.20	42.12	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
166	4.20	73.66	31.39	42.27	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
167	4.22	74.00	31.59	42.41	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
168	4.24	74.34	31.78	42.55	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
169	4.26	74.68	31.98	42.70	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
170	4.28	75.02	32.18	42.85	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
171	4.30	75.37	32.37	43.00	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
172	4.32	75.72	32.57	43.15	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
173	4.34	76.06	32.77	43.30	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
174	4.36	76.41	32.96	43.45	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
175	4.38	76.76	33.16	43.60	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
176	4.40	77.11	33.35	43.76	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
177	4.42	77.46	33.55	43.91	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
178	4.44	77.81	33.75	44.06	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
179	4.46	78.15	33.94	44.21	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
180	4.48	78.50	34.14	44.36	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
181	4.50	78.84	34.34	44.51	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
182	4.52	79.18	34.53	44.65	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
183	4.54	79.53	34.73	44.80	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
184	4.56	79.87	34.92	44.94	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
185	4.58	80.21	35.12	45.09	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
186	4.60	80.55	35.32	45.23	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
187	4.62	80.89	35.51	45.38	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
188	4.64	81.23	35.71	45.52	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
189	4.66	81.57	35.90	45.67	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
190	4.68	81.91	36.10	45.81	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
191	4.70	82.25	36.30	45.95	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
192	4.72	82.59	36.49	46.10	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	82.93	36.69	46.24	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
194	4.76	83.26	36.89	46.38	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
195	4.78	83.60	37.08	46.52	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
196	4.80	83.94	37.28	46.66	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
197	4.82	84.28	37.47	46.81	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
198	4.84	84.62	37.67	46.95	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
199	4.86	84.96	37.87	47.10	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
200	4.88	85.31	38.06	47.24	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
201	4.90	85.65	38.26	47.39	0.97	0.114	1.38	0.082	1.00	1.00	0.082	No
202	4.92	85.99	38.46	47.54	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
203	4.94	86.34	38.65	47.69	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
204	4.96	86.68	38.85	47.83	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
205	4.98	87.03	39.04	47.98	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
206	5.00	87.37	39.24	48.13	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
207	5.02	87.72	39.44	48.28	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
208	5.04	88.06	39.63	48.43	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
209	5.06	88.41	39.83	48.58	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
210	5.08	88.75	40.02	48.73	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
211	5.10	89.10	40.22	48.88	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
212	5.12	89.44	40.42	49.03	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
213	5.14	89.79	40.61	49.17	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
214	5.16	90.13	40.81	49.32	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
215	5.18	90.48	41.01	49.47	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
216	5.20	90.82	41.20	49.62	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
217	5.22	91.17	41.40	49.77	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
218	5.24	91.51	41.59	49.92	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
219	5.26	91.86	41.79	50.07	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
220	5.28	92.20	41.99	50.21	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
221	5.30	92.55	42.18	50.36	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
222	5.32	92.89	42.38	50.51	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
223	5.34	93.24	42.58	50.66	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
224	5.36	93.59	42.77	50.82	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
225	5.38	93.93	42.97	50.97	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
226	5.40	94.28	43.16	51.12	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
227	5.42	94.63	43.36	51.27	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
228	5.44	94.97	43.56	51.41	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
229	5.46	95.31	43.75	51.56	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
230	5.48	95.66	43.95	51.71	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
231	5.50	96.00	44.15	51.85	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
232	5.52	96.34	44.34	52.00	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
233	5.54	96.68	44.54	52.14	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
234	5.56	97.02	44.73	52.28	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
235	5.58	97.36	44.93	52.43	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
236	5.60	97.69	45.13	52.57	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
237	5.62	98.03	45.32	52.71	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
238	5.64	98.37	45.52	52.85	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
239	5.66	98.70	45.71	52.98	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
240	5.68	99.03	45.91	53.12	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	99.36	46.11	53.26	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
242	5.72	99.69	46.30	53.39	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
243	5.74	100.02	46.50	53.52	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
244	5.76	100.35	46.70	53.66	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
245	5.78	100.68	46.89	53.79	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
246	5.80	101.01	47.09	53.92	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
247	5.82	101.34	47.28	54.06	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
248	5.84	101.67	47.48	54.19	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
249	5.86	102.00	47.68	54.32	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
250	5.88	102.33	47.87	54.46	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
251	5.90	102.67	48.07	54.60	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
252	5.92	103.00	48.27	54.74	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
253	5.94	103.34	48.46	54.88	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
254	5.96	103.67	48.66	55.02	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
255	5.98	104.01	48.85	55.15	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
256	6.00	104.34	49.05	55.29	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
257	6.02	104.68	49.25	55.43	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
258	6.04	105.01	49.44	55.57	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
259	6.06	105.35	49.64	55.71	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
260	6.08	105.68	49.83	55.85	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
261	6.10	106.02	50.03	55.99	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
262	6.12	106.36	50.23	56.14	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
263	6.14	106.71	50.42	56.28	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
264	6.16	107.05	50.62	56.43	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
265	6.18	107.40	50.82	56.58	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
266	6.20	107.75	51.01	56.74	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
267	6.22	108.10	51.21	56.89	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
268	6.24	108.45	51.40	57.04	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
269	6.26	108.80	51.60	57.20	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
270	6.28	109.15	51.80	57.35	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
271	6.30	109.50	51.99	57.51	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
272	6.32	109.86	52.19	57.67	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
273	6.34	110.21	52.39	57.82	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
274	6.36	110.56	52.58	57.98	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
275	6.38	110.91	52.78	58.13	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
276	6.40	111.26	52.97	58.29	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
277	6.42	111.61	53.17	58.44	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
278	6.44	111.96	53.37	58.59	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
279	6.46	112.31	53.56	58.74	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
280	6.48	112.65	53.76	58.89	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
281	6.50	112.99	53.96	59.03	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
282	6.52	113.33	54.15	59.17	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
283	6.54	113.67	54.35	59.32	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
284	6.56	114.01	54.54	59.47	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
285	6.58	114.35	54.74	59.61	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
286	6.60	114.70	54.94	59.76	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
287	6.62	115.04	55.13	59.91	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
288	6.64	115.39	55.33	60.06	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	115.73	55.52	60.21	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
290	6.68	116.07	55.72	60.35	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
291	6.70	116.42	55.92	60.50	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
292	6.72	116.76	56.11	60.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
293	6.74	117.11	56.31	60.80	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
294	6.76	117.45	56.51	60.94	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
295	6.78	117.78	56.70	61.08	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
296	6.80	118.12	56.90	61.22	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
297	6.82	118.46	57.09	61.37	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
298	6.84	118.80	57.29	61.51	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
299	6.86	119.13	57.49	61.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
300	6.88	119.47	57.68	61.78	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
301	6.90	119.80	57.88	61.92	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
302	6.92	120.13	58.08	62.05	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
303	6.94	120.46	58.27	62.19	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
304	6.96	120.78	58.47	62.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
305	6.98	121.11	58.66	62.44	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
306	7.00	121.43	58.86	62.57	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
307	7.02	121.75	59.06	62.70	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
308	7.04	122.08	59.25	62.82	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
309	7.06	122.40	59.45	62.95	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
310	7.08	122.72	59.64	63.07	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
311	7.10	123.04	59.84	63.20	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
312	7.12	123.36	60.04	63.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
313	7.14	123.68	60.23	63.45	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
314	7.16	124.01	60.43	63.58	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
315	7.18	124.33	60.63	63.70	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
316	7.20	124.65	60.82	63.83	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
317	7.22	124.97	61.02	63.95	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
318	7.24	125.29	61.21	64.07	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
319	7.26	125.60	61.41	64.19	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
320	7.28	125.92	61.61	64.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
321	7.30	126.24	61.80	64.44	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
322	7.32	126.56	62.00	64.56	0.95	0.120	1.38	0.088	1.00	1.00	0.088	No
323	7.34	126.88	62.20	64.69	0.94	0.120	1.38	0.088	1.00	1.00	0.088	No
324	7.36	127.21	62.39	64.81	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
325	7.38	127.53	62.59	64.94	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
326	7.40	127.85	62.78	65.07	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
327	7.42	128.17	62.98	65.19	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
328	7.44	128.50	63.18	65.32	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
329	7.46	128.82	63.37	65.45	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
330	7.48	129.15	63.57	65.58	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
331	7.50	129.48	63.77	65.71	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
332	7.52	129.81	63.96	65.84	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
333	7.54	130.14	64.16	65.98	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
334	7.56	130.47	64.35	66.11	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
335	7.58	130.80	64.55	66.25	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
336	7.60	131.13	64.75	66.38	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	131.46	64.94	66.51	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
338	7.64	131.79	65.14	66.65	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
339	7.66	132.12	65.33	66.78	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
340	7.68	132.45	65.53	66.92	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
341	7.70	132.78	65.73	67.05	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
342	7.72	133.11	65.92	67.19	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
343	7.74	133.44	66.12	67.32	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
344	7.76	133.78	66.32	67.46	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
345	7.78	134.11	66.51	67.60	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
346	7.80	134.44	66.71	67.73	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
347	7.82	134.77	66.90	67.87	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
348	7.84	135.11	67.10	68.01	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
349	7.86	135.46	67.30	68.16	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
350	7.88	135.80	67.49	68.31	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
351	7.90	136.15	67.69	68.46	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
352	7.92	136.50	67.89	68.62	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
353	7.94	136.85	68.08	68.77	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
354	7.96	137.21	68.28	68.93	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
355	7.98	137.56	68.47	69.09	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
356	8.00	137.92	68.67	69.25	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
357	8.02	138.28	68.87	69.41	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
358	8.04	138.64	69.06	69.57	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
359	8.06	138.99	69.26	69.74	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
360	8.08	139.35	69.45	69.89	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
361	8.10	139.70	69.65	70.05	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
362	8.12	140.05	69.85	70.20	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
363	8.14	140.40	70.04	70.36	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
364	8.16	140.76	70.24	70.52	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
365	8.18	141.11	70.44	70.68	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
366	8.20	141.47	70.63	70.84	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
367	8.22	141.83	70.83	71.00	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
368	8.24	142.18	71.02	71.15	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
369	8.26	142.52	71.22	71.30	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
370	8.28	142.86	71.42	71.45	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
371	8.30	143.20	71.61	71.59	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
372	8.32	143.54	71.81	71.74	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
373	8.34	143.88	72.01	71.88	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
374	8.36	144.23	72.20	72.03	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
375	8.38	144.57	72.40	72.18	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
376	8.40	144.93	72.59	72.33	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
377	8.42	145.28	72.79	72.49	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
378	8.44	145.63	72.99	72.64	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
379	8.46	145.98	73.18	72.79	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
380	8.48	146.32	73.38	72.95	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
381	8.50	146.67	73.58	73.09	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
382	8.52	147.01	73.77	73.24	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
383	8.54	147.36	73.97	73.39	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
384	8.56	147.71	74.16	73.54	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	148.06	74.36	73.70	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
386	8.60	148.40	74.56	73.85	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
387	8.62	148.75	74.75	74.00	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
388	8.64	149.10	74.95	74.15	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
389	8.66	149.45	75.14	74.31	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
390	8.68	149.80	75.34	74.46	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
391	8.70	150.15	75.54	74.62	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
392	8.72	150.50	75.73	74.77	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
393	8.74	150.85	75.93	74.93	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
394	8.76	151.20	76.13	75.08	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
395	8.78	151.55	76.32	75.23	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
396	8.80	151.90	76.52	75.38	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
397	8.82	152.25	76.71	75.53	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
398	8.84	152.60	76.91	75.68	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
399	8.86	152.95	77.11	75.84	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
400	8.88	153.30	77.30	76.00	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
401	8.90	153.65	77.50	76.15	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
402	8.92	154.00	77.70	76.30	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
403	8.94	154.35	77.89	76.45	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
404	8.96	154.70	78.09	76.61	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
405	8.98	155.05	78.28	76.77	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
406	9.00	155.41	78.48	76.93	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
407	9.02	155.76	78.68	77.09	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
408	9.04	156.12	78.87	77.25	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
409	9.06	156.47	79.07	77.40	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
410	9.08	156.83	79.26	77.56	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
411	9.10	157.18	79.46	77.72	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
412	9.12	157.54	79.66	77.88	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
413	9.14	157.90	79.85	78.05	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
414	9.16	158.26	80.05	78.21	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
415	9.18	158.62	80.25	78.38	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
416	9.20	158.98	80.44	78.54	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
417	9.22	159.34	80.64	78.70	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
418	9.24	159.70	80.83	78.86	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
419	9.26	160.05	81.03	79.02	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
420	9.28	160.41	81.23	79.18	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
421	9.30	160.76	81.42	79.34	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
422	9.32	161.12	81.62	79.51	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
423	9.34	161.48	81.82	79.67	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
424	9.36	161.84	82.01	79.83	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
425	9.38	162.20	82.21	79.99	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
426	9.40	162.56	82.40	80.15	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
427	9.42	162.92	82.60	80.32	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
428	9.44	163.28	82.80	80.49	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
429	9.46	163.65	82.99	80.65	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
430	9.48	164.01	83.19	80.82	0.91	0.121	1.38	0.088	1.00	1.00	2.000	Yes
431	9.50	164.36	83.39	80.98	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
432	9.52	164.72	83.58	81.14	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
433	9.54	165.08	83.78	81.30	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
434	9.56	165.43	83.97	81.46	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
435	9.58	165.79	84.17	81.62	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
436	9.60	166.15	84.37	81.78	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
437	9.62	166.51	84.56	81.95	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
438	9.64	166.87	84.76	82.11	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
439	9.66	167.23	84.95	82.27	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
440	9.68	167.59	85.15	82.44	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
441	9.70	167.95	85.35	82.60	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
442	9.72	168.31	85.54	82.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
443	9.74	168.67	85.74	82.93	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
444	9.76	169.03	85.94	83.10	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
445	9.78	169.40	86.13	83.26	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
446	9.80	169.76	86.33	83.43	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
447	9.82	170.12	86.52	83.60	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
448	9.84	170.49	86.72	83.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
449	9.86	170.85	86.92	83.93	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
450	9.88	171.22	87.11	84.10	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
451	9.90	171.58	87.31	84.27	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
452	9.92	171.95	87.51	84.44	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
453	9.94	172.31	87.70	84.61	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
454	9.96	172.67	87.90	84.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
455	9.98	173.03	88.09	84.94	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
456	10.00	173.39	88.29	85.10	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
457	10.02	173.75	88.49	85.26	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
458	10.04	174.11	88.68	85.43	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
459	10.06	174.47	88.88	85.59	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
460	10.08	174.83	89.07	85.76	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
461	10.10	175.19	89.27	85.92	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
462	10.12	175.56	89.47	86.09	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
463	10.14	175.92	89.66	86.26	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
464	10.16	176.29	89.86	86.43	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
465	10.18	176.65	90.06	86.60	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
466	10.20	177.01	90.25	86.76	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
467	10.22	177.38	90.45	86.93	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
468	10.24	177.74	90.64	87.10	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
469	10.26	178.10	90.84	87.26	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
470	10.28	178.46	91.04	87.43	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
471	10.30	178.82	91.23	87.59	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
472	10.32	179.18	91.43	87.75	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
473	10.34	179.55	91.63	87.92	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
474	10.36	179.91	91.82	88.09	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
475	10.38	180.27	92.02	88.25	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
476	10.40	180.63	92.21	88.42	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
477	10.42	180.99	92.41	88.58	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
478	10.44	181.35	92.61	88.75	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
479	10.46	181.71	92.80	88.91	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
480	10.48	182.07	93.00	89.07	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
481	10.50	182.43	93.20	89.23	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
482	10.52	182.79	93.39	89.40	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
483	10.54	183.15	93.59	89.56	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
484	10.56	183.51	93.78	89.73	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
485	10.58	183.87	93.98	89.89	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
486	10.60	184.24	94.18	90.06	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
487	10.62	184.61	94.37	90.23	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
488	10.64	184.97	94.57	90.40	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
489	10.66	185.34	94.76	90.57	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
490	10.68	185.70	94.96	90.74	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
491	10.70	186.06	95.16	90.90	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
492	10.72	186.41	95.35	91.06	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
493	10.74	186.77	95.55	91.22	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
494	10.76	187.13	95.75	91.39	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
495	10.78	187.49	95.94	91.55	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
496	10.80	187.85	96.14	91.71	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
497	10.82	188.21	96.33	91.87	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
498	10.84	188.56	96.53	92.03	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
499	10.86	188.92	96.73	92.19	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
500	10.88	189.27	96.92	92.35	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
501	10.90	189.63	97.12	92.51	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
502	10.92	189.98	97.32	92.66	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
503	10.94	190.32	97.51	92.81	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
504	10.96	190.67	97.71	92.96	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
505	10.98	191.01	97.90	93.11	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
506	11.00	191.36	98.10	93.26	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
507	11.02	191.71	98.30	93.41	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
508	11.04	192.06	98.49	93.56	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
509	11.06	192.40	98.69	93.71	0.88	0.118	1.38	0.085	1.00	1.00	0.085	No
510	11.08	192.74	98.88	93.85	0.88	0.118	1.38	0.085	1.00	1.00	2.000	Yes
511	11.10	193.08	99.08	94.00	0.88	0.118	1.38	0.085	1.00	1.00	2.000	Yes
512	11.12	193.42	99.28	94.15	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
513	11.14	193.77	99.47	94.30	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
514	11.16	194.12	99.67	94.45	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
515	11.18	194.47	99.87	94.60	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
516	11.20	194.82	100.06	94.76	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
517	11.22	195.18	100.26	94.92	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
518	11.24	195.53	100.45	95.08	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
519	11.26	195.89	100.65	95.24	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
520	11.28	196.25	100.85	95.40	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
521	11.30	196.61	101.04	95.57	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
522	11.32	196.97	101.24	95.73	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
523	11.34	197.33	101.44	95.89	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
524	11.36	197.69	101.63	96.06	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
525	11.38	198.05	101.83	96.22	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
526	11.40	198.41	102.02	96.39	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
527	11.42	198.77	102.22	96.55	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
528	11.44	199.12	102.42	96.71	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
529	11.46	199.48	102.61	96.87	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
530	11.48	199.83	102.81	97.02	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
531	11.50	200.18	103.01	97.17	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
532	11.52	200.53	103.20	97.33	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
533	11.54	200.87	103.40	97.48	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
534	11.56	201.22	103.59	97.63	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
535	11.58	201.58	103.79	97.79	0.87	0.116	1.38	0.085	1.00	1.00	0.085	No
536	11.60	201.93	103.99	97.94	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
537	11.62	202.28	104.18	98.10	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
538	11.64	202.63	104.38	98.25	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
539	11.66	202.97	104.57	98.40	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
540	11.68	203.32	104.77	98.55	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
541	11.70	203.67	104.97	98.70	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
542	11.72	204.01	105.16	98.85	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
543	11.74	204.36	105.36	99.00	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
544	11.76	204.70	105.56	99.15	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
545	11.78	205.04	105.75	99.29	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
546	11.80	205.39	105.95	99.44	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
547	11.82	205.72	106.14	99.58	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
548	11.84	206.06	106.34	99.72	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
549	11.86	206.40	106.54	99.87	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
550	11.88	206.74	106.73	100.01	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
551	11.90	207.08	106.93	100.15	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
552	11.92	207.41	107.13	100.29	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
553	11.94	207.75	107.32	100.42	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
554	11.96	208.08	107.52	100.56	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
555	11.98	208.42	107.71	100.70	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
556	12.00	208.75	107.91	100.84	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
557	12.02	209.09	108.11	100.98	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
558	12.04	209.43	108.30	101.12	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
559	12.06	209.76	108.50	101.27	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
560	12.08	210.10	108.69	101.41	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
561	12.10	210.44	108.89	101.55	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
562	12.12	210.79	109.09	101.70	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
563	12.14	211.13	109.28	101.85	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
564	12.16	211.48	109.48	102.00	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
565	12.18	211.83	109.68	102.15	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
566	12.20	212.18	109.87	102.30	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
567	12.22	212.52	110.07	102.46	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
568	12.24	212.87	110.26	102.60	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
569	12.26	213.20	110.46	102.74	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
570	12.28	213.54	110.66	102.88	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
571	12.30	213.88	110.85	103.03	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
572	12.32	214.22	111.05	103.17	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
573	12.34	214.57	111.25	103.32	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
574	12.36	214.91	111.44	103.47	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
575	12.38	215.25	111.64	103.61	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
576	12.40	215.59	111.83	103.76	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
577	12.42	215.93	112.03	103.90	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
578	12.44	216.27	112.23	104.04	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
579	12.46	216.60	112.42	104.17	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
580	12.48	216.93	112.62	104.31	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
581	12.50	217.26	112.82	104.44	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
582	12.52	217.59	113.01	104.57	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
583	12.54	217.91	113.21	104.71	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
584	12.56	218.24	113.40	104.84	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
585	12.58	218.57	113.60	104.97	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
586	12.60	218.90	113.80	105.11	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
587	12.62	219.23	113.99	105.24	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
588	12.64	219.56	114.19	105.37	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
589	12.66	219.89	114.38	105.50	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
590	12.68	220.22	114.58	105.64	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
591	12.70	220.55	114.78	105.77	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
592	12.72	220.88	114.97	105.91	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
593	12.74	221.21	115.17	106.04	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
594	12.76	221.54	115.37	106.18	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
595	12.78	221.87	115.56	106.31	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
596	12.80	222.20	115.76	106.44	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
597	12.82	222.53	115.95	106.58	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
598	12.84	222.86	116.15	106.71	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
599	12.86	223.19	116.35	106.84	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
600	12.88	223.52	116.54	106.98	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
601	12.90	223.85	116.74	107.11	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
602	12.92	224.18	116.94	107.24	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
603	12.94	224.50	117.13	107.37	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
604	12.96	224.83	117.33	107.51	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
605	12.98	225.16	117.52	107.64	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
606	13.00	225.49	117.72	107.77	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
607	13.02	225.82	117.92	107.90	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
608	13.04	226.15	118.11	108.04	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
609	13.06	226.48	118.31	108.17	0.82	0.112	1.38	0.082	1.00	1.00	0.082	No
610	13.08	226.81	118.50	108.30	0.82	0.112	1.38	0.082	1.00	1.00	0.082	No
611	13.10	227.14	118.70	108.44	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
612	13.12	227.47	118.90	108.57	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
613	13.14	227.80	119.09	108.70	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
614	13.16	228.13	119.29	108.84	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
615	13.18	228.46	119.49	108.97	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
616	13.20	228.79	119.68	109.11	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
617	13.22	229.12	119.88	109.25	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
618	13.24	229.46	120.07	109.38	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
619	13.26	229.80	120.27	109.52	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
620	13.28	230.13	120.47	109.67	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
621	13.30	230.47	120.66	109.81	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
622	13.32	230.81	120.86	109.95	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
623	13.34	231.15	121.06	110.09	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
624	13.36	231.49	121.25	110.24	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
625	13.38	231.84	121.45	110.40	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
626	13.40	232.20	121.64	110.56	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
627	13.42	232.57	121.84	110.73	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
628	13.44	232.95	122.04	110.91	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
629	13.46	233.32	122.23	111.09	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
630	13.48	233.71	122.43	111.28	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
631	13.50	234.09	122.63	111.47	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
632	13.52	234.48	122.82	111.66	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
633	13.54	234.87	123.02	111.85	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
634	13.56	235.25	123.21	112.04	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
635	13.58	235.64	123.41	112.23	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
636	13.60	236.03	123.61	112.42	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
637	13.62	236.42	123.80	112.62	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
638	13.64	236.82	124.00	112.82	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
639	13.66	237.22	124.19	113.03	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
640	13.68	237.62	124.39	113.23	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
641	13.70	238.03	124.59	113.44	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
642	13.72	238.43	124.78	113.64	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
643	13.74	238.82	124.98	113.85	0.80	0.109	1.38	0.080	1.00	1.00	0.080	No
644	13.76	239.22	125.18	114.05	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
645	13.78	239.62	125.37	114.25	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
646	13.80	240.02	125.57	114.45	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
647	13.82	240.42	125.76	114.65	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
648	13.84	240.82	125.96	114.86	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
649	13.86	241.22	126.16	115.06	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
650	13.88	241.62	126.35	115.27	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
651	13.90	242.01	126.55	115.46	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
652	13.92	242.41	126.75	115.66	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
653	13.94	242.80	126.94	115.86	0.80	0.108	1.38	0.079	1.00	1.00	0.079	No
654	13.96	243.20	127.14	116.06	0.80	0.108	1.38	0.079	1.00	1.00	0.079	No
655	13.98	243.60	127.33	116.27	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
656	14.00	244.00	127.53	116.47	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
657	14.02	244.41	127.73	116.68	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
658	14.04	244.81	127.92	116.89	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
659	14.06	245.22	128.12	117.11	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
660	14.08	245.64	128.31	117.33	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
661	14.10	246.06	128.51	117.55	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
662	14.12	246.49	128.71	117.78	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
663	14.14	246.92	128.90	118.02	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
664	14.16	247.35	129.10	118.25	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
665	14.18	247.78	129.30	118.49	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
666	14.20	248.21	129.49	118.72	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
667	14.22	248.65	129.69	118.96	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
668	14.24	249.08	129.88	119.19	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
669	14.26	249.51	130.08	119.43	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.20	3.52	5.98	1.00	3.73	22.06	82.29	4.000	No	Yes	2.00
2	0.92	0.25	3.47	6.42	1.00	4.57	20.15	92.03	4.000	No	Yes	2.00
3	0.94	0.27	3.43	6.43	1.00	5.00	19.10	95.55	4.000	No	Yes	2.00
4	0.96	0.30	3.39	6.21	1.00	5.59	17.61	98.38	4.000	No	Yes	2.00
5	0.98	0.29	3.37	5.63	1.00	5.40	17.21	92.99	4.000	No	Yes	2.00
6	1.00	0.52	3.00	3.08	1.00	10.04	8.81	88.51	4.000	No	Yes	2.00
7	1.02	1.05	2.62	1.83	0.86	20.47	6.12	125.21	4.000	Yes	No	2.00
8	1.04	1.69	2.38	1.37	0.76	33.12	2.25	74.64	4.000	Yes	No	2.00
9	1.06	2.23	2.25	1.22	0.71	43.77	1.75	76.46	4.000	Yes	No	2.00
10	1.08	2.56	2.18	1.14	0.69	50.17	1.57	78.80	4.000	Yes	No	2.00
11	1.10	2.75	2.16	1.17	0.68	53.97	1.53	82.54	4.000	Yes	No	2.00
12	1.12	2.78	2.19	1.33	0.69	54.56	1.59	87.02	4.000	Yes	No	2.00
13	1.14	2.62	2.28	1.69	0.73	51.27	1.85	94.69	4.000	Yes	No	2.00
14	1.16	2.42	2.37	2.11	0.76	47.34	2.21	104.73	4.000	Yes	No	2.00
15	1.18	2.27	2.44	2.51	0.79	44.41	2.59	114.91	4.000	Yes	No	2.00
16	1.20	2.18	2.48	2.80	0.80	42.75	2.86	122.35	4.000	Yes	No	2.00
17	1.22	2.10	2.53	3.11	0.82	41.13	3.32	136.53	4.000	Yes	No	2.00
18	1.24	1.98	2.57	3.36	0.84	38.75	4.36	168.99	4.000	Yes	No	2.00
19	1.26	1.90	2.59	3.42	0.84	37.21	4.92	183.12	0.651	No	No	2.00
20	1.28	1.88	2.57	3.24	0.84	36.64	4.60	168.42	0.524	No	No	2.00
21	1.30	1.86	2.57	3.11	0.84	36.33	4.31	156.60	0.437	No	No	2.00
22	1.32	1.88	2.55	2.94	0.83	36.74	3.80	139.61	0.333	No	No	2.00
23	1.34	1.94	2.52	2.81	0.82	37.94	3.24	123.06	0.253	No	No	2.00
24	1.36	2.05	2.50	2.79	0.81	40.12	2.83	113.44	0.216	No	No	2.00
25	1.38	2.13	2.50	2.93	0.81	41.53	2.89	120.17	0.241	No	No	2.00
26	1.40	2.15	2.53	3.21	0.82	41.92	3.40	142.58	0.350	No	No	2.00
27	1.42	2.05	2.59	3.71	0.84	40.01	4.96	198.55	0.808	No	No	2.00
28	1.44	2.03	2.62	4.05	0.86	39.63	6.00	237.85	3.600	No	No	2.00
29	1.46	2.02	2.64	4.30	0.86	39.39	6.81	268.11	3.600	No	No	2.00
30	1.48	2.04	2.63	4.29	0.86	39.86	6.63	264.31	3.600	No	No	2.00
31	1.50	2.00	2.64	4.37	0.87	39.01	7.18	279.99	3.600	No	No	2.00
32	1.52	1.97	2.64	4.25	0.87	38.50	6.98	268.57	3.600	No	No	2.00
33	1.54	1.93	2.64	4.16	0.87	37.64	7.01	263.73	3.600	No	No	2.00
34	1.56	1.86	2.65	4.06	0.87	36.17	7.22	261.15	3.600	No	No	2.00
35	1.58	1.77	2.67	4.23	0.88	34.40	8.62	296.42	3.600	No	No	2.00
36	1.60	1.77	2.67	4.22	0.88	34.44	8.58	295.38	3.600	No	No	2.00
37	1.62	1.85	2.65	4.16	0.87	35.93	7.67	275.61	3.600	No	No	2.00
38	1.64	1.99	2.61	3.93	0.86	38.77	5.91	228.93	3.600	No	No	2.00
39	1.66	2.10	2.58	3.76	0.84	40.98	4.85	198.61	0.809	No	No	2.00
40	1.68	2.18	2.56	3.64	0.84	42.56	4.22	179.41	0.617	No	No	2.00
41	1.70	2.23	2.54	3.51	0.83	43.47	3.75	162.80	0.481	No	No	2.00
42	1.72	2.33	2.52	3.45	0.82	45.42	3.31	150.19	0.395	No	No	2.00
43	1.74	2.35	2.52	3.46	0.82	45.82	3.28	150.23	0.395	No	No	2.00
44	1.76	2.29	2.55	3.66	0.83	44.64	3.86	172.20	0.555	No	No	2.00
45	1.78	2.14	2.60	3.98	0.85	41.57	5.26	218.83	4.000	No	No	2.00
46	1.80	2.01	2.64	4.32	0.87	39.08	6.99	273.14	3.600	No	No	2.00
47	1.82	1.90	2.68	4.69	0.88	36.89	9.17	338.25	3.600	No	No	2.00
48	1.84	1.80	2.71	4.92	0.89	34.97	4.85	169.77	1.668	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	1.70	2.75	5.16	0.91	33.02	5.21	172.15	1.575	No	Yes	2.00
50	1.88	1.64	2.77	5.35	0.92	31.67	5.49	173.99	1.511	No	Yes	2.00
51	1.90	1.57	2.79	5.55	0.93	30.42	5.78	175.74	1.451	No	Yes	2.00
52	1.92	1.50	2.82	5.75	0.94	29.04	6.09	176.97	1.385	No	Yes	2.00
53	1.94	1.40	2.85	5.99	0.95	27.04	6.55	177.11	1.290	No	Yes	2.00
54	1.96	1.31	2.89	6.30	0.96	25.30	7.05	178.41	1.207	No	Yes	2.00
55	1.98	1.24	2.93	6.70	0.98	23.92	7.59	181.49	1.141	No	Yes	2.00
56	2.00	1.17	2.97	7.22	0.99	22.46	8.25	185.35	1.072	No	Yes	2.00
57	2.02	1.13	2.99	7.55	1.00	21.59	8.68	187.36	1.030	No	Yes	2.00
58	2.04	1.12	3.00	7.66	1.00	21.43	8.79	188.42	1.022	No	Yes	2.00
59	2.06	1.13	3.00	7.80	1.00	21.59	8.85	191.04	1.030	No	Yes	2.00
60	2.08	1.09	3.02	8.02	1.00	20.84	9.19	191.42	0.994	No	Yes	2.00
61	2.10	1.03	3.05	8.14	1.00	19.59	9.61	188.22	0.935	No	Yes	2.00
62	2.12	0.99	3.04	7.75	1.00	18.85	9.56	180.11	0.899	No	Yes	2.00
63	2.14	1.00	3.02	7.13	1.00	18.98	9.07	172.23	0.905	No	Yes	2.00
64	2.16	1.03	2.98	6.42	1.00	19.55	8.39	164.00	4.000	Yes	Yes	2.00
65	2.18	1.09	2.91	5.42	0.97	20.89	7.28	152.16	4.000	Yes	Yes	2.00
66	2.20	1.24	2.80	4.30	0.93	23.65	5.83	137.92	4.000	Yes	Yes	2.00
67	2.22	1.47	2.67	3.31	0.88	28.20	8.22	231.71	4.000	Yes	No	2.00
68	2.24	1.81	2.52	2.57	0.82	34.96	3.27	114.33	4.000	Yes	No	2.00
69	2.26	2.08	2.44	2.27	0.79	40.40	2.60	104.91	4.000	Yes	No	2.00
70	2.28	2.25	2.41	2.25	0.78	43.61	2.45	106.65	4.000	Yes	No	2.00
71	2.30	2.22	2.46	2.60	0.80	43.12	2.71	116.75	4.000	Yes	No	2.00
72	2.32	2.12	2.52	3.08	0.82	41.12	3.27	134.32	4.000	Yes	No	2.00
73	2.34	2.04	2.57	3.47	0.84	39.40	4.51	177.53	4.000	Yes	No	2.00
74	2.36	1.81	2.67	4.27	0.88	35.03	8.49	297.39	4.000	Yes	No	2.00
75	2.38	1.59	2.78	5.32	0.92	30.54	5.60	171.11	4.000	Yes	Yes	2.00
76	2.40	1.34	2.90	6.58	0.97	25.65	7.18	184.23	4.000	Yes	Yes	2.00
77	2.42	1.28	2.91	6.55	0.97	24.54	7.36	180.75	1.171	No	Yes	2.00
78	2.44	1.34	2.86	5.83	0.95	25.71	6.65	170.98	1.226	No	Yes	2.00
79	2.46	1.35	2.85	5.61	0.95	25.80	6.48	167.23	1.230	No	Yes	2.00
80	2.48	1.30	2.87	5.70	0.96	24.82	6.71	166.65	1.184	No	Yes	2.00
81	2.50	1.18	2.91	5.92	0.97	22.42	7.33	164.43	1.069	No	Yes	2.00
82	2.52	1.11	2.92	5.72	0.98	21.08	7.48	157.65	4.000	Yes	Yes	2.00
83	2.54	1.10	2.90	5.22	0.97	20.83	7.14	148.63	4.000	Yes	Yes	2.00
84	2.56	1.30	2.76	4.02	0.92	24.79	5.41	134.20	4.000	Yes	Yes	2.00
85	2.58	2.64	2.31	1.87	0.74	51.20	1.96	100.16	4.000	Yes	No	2.00
86	2.60	4.69	1.96	1.09	0.61	91.71	1.28	117.25	4.000	Yes	No	2.00
87	2.62	7.72	1.70	0.74	0.51	145.44	1.00	145.44	4.000	Yes	No	2.00
88	2.64	10.30	1.56	0.58	0.46	180.63	1.00	180.63	0.628	No	No	2.00
89	2.66	12.56	1.45	0.47	0.42	208.69	1.00	208.69	4.000	No	No	2.00
90	2.68	14.22	1.37	0.38	0.39	226.99	1.00	226.99	4.000	No	No	2.00
91	2.70	15.52	1.33	0.36	0.37	242.36	1.00	242.36	4.000	No	No	2.00
92	2.72	16.71	1.31	0.35	0.36	257.41	1.00	257.41	4.000	No	No	2.00
93	2.74	17.67	1.29	0.35	0.36	269.64	1.00	269.64	4.000	No	No	2.00
94	2.76	18.65	1.28	0.36	0.35	282.10	1.00	282.10	4.000	No	No	2.00
95	2.78	19.61	1.27	0.36	0.35	294.71	1.00	294.71	4.000	No	No	2.00
96	2.80	20.67	1.26	0.37	0.34	309.06	1.00	309.06	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	21.55	1.26	0.39	0.34	321.53	1.00	321.53	4.000	No	No	2.00
98	2.84	22.23	1.26	0.41	0.35	331.49	1.00	331.49	4.000	No	No	2.00
99	2.86	22.45	1.28	0.44	0.35	336.68	1.00	336.68	4.000	No	No	2.00
100	2.88	22.55	1.29	0.46	0.36	339.20	1.00	339.20	4.000	No	No	2.00
101	2.90	22.52	1.31	0.49	0.36	340.36	1.00	340.36	4.000	No	No	2.00
102	2.92	21.28	1.36	0.57	0.38	329.18	1.00	329.18	4.000	No	No	2.00
103	2.94	21.05	1.37	0.57	0.39	325.67	1.00	325.67	4.000	No	No	2.00
104	2.96	20.93	1.37	0.56	0.39	322.69	1.00	322.69	4.000	No	No	2.00
105	2.98	22.09	1.31	0.47	0.36	331.00	1.00	331.00	4.000	No	No	2.00
106	3.00	22.14	1.31	0.48	0.36	331.75	1.00	331.75	4.000	No	No	2.00
107	3.02	21.80	1.32	0.50	0.37	327.73	1.00	327.73	4.000	No	No	2.00
108	3.04	21.20	1.34	0.52	0.38	320.69	1.00	320.69	4.000	No	No	2.00
109	3.06	20.43	1.36	0.54	0.38	310.94	1.00	310.94	4.000	No	No	2.00
110	3.08	19.71	1.38	0.56	0.39	301.85	1.00	301.85	4.000	No	No	2.00
111	3.10	18.90	1.41	0.58	0.40	291.65	1.00	291.65	4.000	No	No	2.00
112	3.12	17.99	1.43	0.60	0.41	279.75	1.00	279.75	4.000	No	No	2.00
113	3.14	16.29	1.48	0.64	0.43	257.74	1.00	257.74	4.000	No	No	2.00
114	3.16	14.18	1.54	0.72	0.45	230.25	1.00	230.25	4.000	No	No	2.00
115	3.18	11.67	1.64	0.85	0.49	196.83	1.00	196.83	0.789	No	No	2.00
116	3.20	9.54	1.75	1.04	0.54	167.90	1.09	183.40	4.000	Yes	No	2.00
117	3.22	7.59	1.88	1.33	0.59	140.61	1.23	172.45	4.000	Yes	No	2.00
118	3.24	6.06	2.02	1.76	0.64	118.21	1.33	157.06	4.000	Yes	No	2.00
119	3.26	4.78	2.19	2.40	0.70	93.26	1.60	149.01	4.000	Yes	No	2.00
120	3.28	3.95	2.34	3.16	0.76	76.92	2.08	159.79	4.000	Yes	No	2.00
121	3.30	3.40	2.45	3.89	0.80	65.97	2.65	175.07	4.000	Yes	No	2.00
122	3.32	3.16	2.50	4.28	0.82	61.19	2.85	174.25	4.000	Yes	No	2.00
123	3.34	2.90	2.56	4.72	0.84	56.09	4.15	232.84	4.000	Yes	No	2.00
124	3.36	2.63	2.62	5.27	0.87	50.74	6.31	320.40	4.000	Yes	No	2.00
125	3.38	2.42	2.68	5.76	0.89	46.66	8.82	411.52	4.000	Yes	No	2.00
126	3.40	2.29	2.70	5.87	0.90	44.10	10.15	447.50	4.000	Yes	No	2.00
127	3.42	2.21	2.70	5.59	0.89	42.47	9.88	419.84	3.600	No	No	2.00
128	3.44	2.15	2.66	4.81	0.88	41.33	7.72	319.24	3.600	No	No	2.00
129	3.46	2.10	2.61	4.02	0.86	40.24	5.73	230.71	3.600	No	No	2.00
130	3.48	2.05	2.56	3.34	0.84	39.22	4.21	165.00	0.498	No	No	2.00
131	3.50	2.02	2.54	3.00	0.83	38.59	3.56	137.25	0.320	No	No	2.00
132	3.52	2.00	2.51	2.76	0.83	38.27	3.08	117.95	0.233	No	No	2.00
133	3.54	1.98	2.50	2.61	0.82	37.92	2.81	106.72	0.193	No	No	2.00
134	3.56	1.93	2.51	2.61	0.82	36.85	3.00	110.61	0.206	No	No	2.00
135	3.58	1.84	2.54	2.73	0.84	35.11	3.63	127.32	0.272	No	No	2.00
136	3.60	1.80	2.56	2.87	0.84	34.36	4.19	144.10	0.358	No	No	2.00
137	3.62	1.80	2.57	3.00	0.85	34.26	4.56	156.16	0.434	No	No	2.00
138	3.64	1.79	2.59	3.11	0.85	34.12	4.94	168.61	0.526	No	No	2.00
139	3.66	1.75	2.61	3.25	0.86	33.29	5.62	187.11	0.620	No	No	2.00
140	3.68	1.69	2.63	3.41	0.87	32.14	6.62	212.86	3.600	No	No	2.00
141	3.70	1.68	2.64	3.48	0.88	31.79	7.02	223.28	3.600	No	No	2.00
142	3.72	1.68	2.64	3.47	0.87	31.94	6.92	220.92	3.600	No	No	2.00
143	3.74	1.66	2.65	3.50	0.88	31.45	7.28	229.08	3.600	No	No	2.00
144	3.76	1.56	2.68	3.69	0.89	29.54	9.07	267.93	3.600	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	1.42	2.74	3.99	0.91	26.64	5.12	136.39	1.271	No	Yes	2.00
146	3.80	1.31	2.78	4.24	0.93	24.48	5.64	138.02	1.168	No	Yes	2.00
147	3.82	1.26	2.80	4.34	0.94	23.56	5.88	138.52	4.000	Yes	Yes	2.00
148	3.84	1.45	2.71	3.73	0.90	27.25	4.82	131.46	4.000	Yes	Yes	2.00
149	3.86	2.05	2.49	2.61	0.82	39.06	2.92	114.06	4.000	Yes	No	2.00
150	3.88	2.74	2.31	1.97	0.75	52.78	1.98	104.25	4.000	Yes	No	2.00
151	3.90	3.21	2.23	1.76	0.72	60.81	1.70	103.68	4.000	Yes	No	2.00
152	3.92	3.19	2.26	1.93	0.73	60.71	1.79	108.51	4.000	Yes	No	2.00
153	3.94	2.92	2.33	2.22	0.76	56.35	2.03	114.25	4.000	Yes	No	2.00
154	3.96	2.53	2.43	2.70	0.80	48.52	2.54	123.31	4.000	Yes	No	2.00
155	3.98	2.10	2.55	3.24	0.84	40.11	3.79	152.10	4.000	Yes	No	2.00
156	4.00	1.68	2.69	4.15	0.90	31.76	9.76	309.82	4.000	Yes	No	2.00
157	4.02	1.35	2.85	5.44	0.95	25.23	6.45	162.84	4.000	Yes	Yes	2.00
158	4.04	1.10	3.00	7.23	1.00	20.35	8.77	178.48	4.000	Yes	Yes	2.00
159	4.06	0.98	3.09	8.57	1.00	17.96	10.41	186.96	0.857	No	Yes	2.00
160	4.08	0.92	3.14	9.33	1.00	16.66	11.39	189.85	0.795	No	Yes	2.00
161	4.10	0.88	3.16	9.47	1.00	15.86	11.81	187.37	0.757	No	Yes	2.00
162	4.12	0.82	3.19	9.61	1.00	14.73	12.41	182.86	0.703	No	Yes	2.00
163	4.14	0.69	3.24	9.43	1.00	12.22	13.66	166.83	0.583	No	Yes	2.00
164	4.16	0.67	3.21	8.06	1.00	11.73	12.89	151.18	0.559	No	Yes	2.00
165	4.18	0.68	3.14	6.41	1.00	11.91	11.36	135.27	0.568	No	Yes	2.00
166	4.20	0.80	3.02	5.22	1.00	14.32	9.09	130.26	0.683	No	Yes	2.00
167	4.22	0.89	2.93	4.33	0.99	16.06	7.62	122.38	0.766	No	Yes	2.00
168	4.24	1.05	2.80	3.36	0.94	19.30	5.81	112.19	0.921	No	Yes	2.00
169	4.26	1.22	2.70	2.82	0.90	22.64	9.90	224.15	3.600	No	No	2.00
170	4.28	1.35	2.64	2.65	0.88	25.18	7.09	178.56	0.549	No	No	2.00
171	4.30	1.39	2.65	2.82	0.88	25.92	7.38	191.41	0.659	No	No	2.00
172	4.32	1.39	2.67	3.01	0.89	25.95	8.26	214.40	3.600	No	No	2.00
173	4.34	1.38	2.68	3.16	0.89	25.75	9.13	235.26	3.600	No	No	2.00
174	4.36	1.39	2.68	3.21	0.89	25.98	9.24	239.98	3.600	No	No	2.00
175	4.38	1.42	2.67	3.18	0.89	26.58	8.67	230.31	3.600	No	No	2.00
176	4.40	1.47	2.66	3.11	0.88	27.43	7.79	213.69	3.600	No	No	2.00
177	4.42	1.50	2.64	3.01	0.88	28.06	7.00	196.39	0.706	No	No	2.00
178	4.44	1.51	2.63	2.89	0.87	28.23	6.46	182.48	0.581	No	No	2.00
179	4.46	1.50	2.61	2.74	0.87	28.04	5.94	166.66	0.459	No	No	2.00
180	4.48	1.49	2.59	2.53	0.86	27.88	5.22	145.50	0.366	No	No	2.00
181	4.50	1.49	2.57	2.34	0.85	27.85	4.58	127.44	0.272	No	No	2.00
182	4.52	1.49	2.56	2.20	0.85	27.83	4.13	114.97	0.221	No	No	2.00
183	4.54	1.48	2.56	2.19	0.85	27.52	4.18	115.10	0.222	No	No	2.00
184	4.56	1.45	2.57	2.21	0.85	27.04	4.42	119.63	0.239	No	No	2.00
185	4.58	1.42	2.58	2.26	0.86	26.50	4.82	127.82	0.274	No	No	2.00
186	4.60	1.40	2.59	2.29	0.86	26.05	5.12	133.35	0.301	No	No	2.00
187	4.62	1.39	2.60	2.31	0.86	25.75	5.31	136.84	0.318	No	No	2.00
188	4.64	1.38	2.60	2.29	0.86	25.56	5.35	136.88	0.319	No	No	2.00
189	4.66	1.39	2.59	2.25	0.86	25.64	5.14	131.79	0.293	No	No	2.00
190	4.68	1.41	2.58	2.17	0.86	25.92	4.72	122.41	0.251	No	No	2.00
191	4.70	1.44	2.56	2.08	0.85	26.27	4.28	112.39	0.212	No	No	2.00
192	4.72	1.46	2.55	2.01	0.85	26.39	3.98	104.93	0.187	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	1.46	2.55	1.97	0.84	26.33	3.86	101.53	0.177	No	No	2.00
194	4.76	1.46	2.55	1.94	0.84	26.22	3.80	99.73	0.172	No	No	2.00
195	4.78	1.45	2.55	1.96	0.85	26.13	3.92	102.30	0.180	No	No	2.00
196	4.80	1.44	2.56	2.03	0.85	25.94	4.20	108.84	0.200	No	No	2.00
197	4.82	1.43	2.57	2.11	0.85	25.72	4.58	117.89	0.232	No	No	2.00
198	4.84	1.43	2.58	2.19	0.86	25.75	4.85	124.86	0.261	No	No	2.00
199	4.86	1.46	2.58	2.24	0.86	26.19	4.86	127.28	0.272	No	No	2.00
200	4.88	1.50	2.58	2.27	0.86	26.85	4.71	126.56	0.269	No	No	2.00
201	4.90	1.53	2.57	2.29	0.85	27.33	4.58	125.30	0.263	No	No	2.00
202	4.92	1.55	2.57	2.27	0.85	27.49	4.48	123.27	0.254	No	No	2.00
203	4.94	1.54	2.58	2.33	0.86	27.44	4.71	129.13	0.280	No	No	2.00
204	4.96	1.54	2.59	2.40	0.86	27.36	4.99	136.50	0.317	No	No	2.00
205	4.98	1.54	2.59	2.47	0.86	27.40	5.20	142.60	0.350	No	No	2.00
206	5.00	1.54	2.60	2.47	0.86	27.33	5.26	143.74	0.356	No	No	2.00
207	5.02	1.54	2.60	2.50	0.87	27.13	5.43	147.36	0.340	No	No	2.00
208	5.04	1.52	2.61	2.52	0.87	26.78	5.69	152.32	0.368	No	No	2.00
209	5.06	1.51	2.61	2.50	0.87	26.63	5.68	151.28	0.362	No	No	2.00
210	5.08	1.52	2.60	2.43	0.87	26.67	5.38	143.50	0.355	No	No	2.00
211	5.10	1.55	2.59	2.34	0.86	26.97	4.91	132.46	0.296	No	No	2.00
212	5.12	1.60	2.56	2.23	0.85	27.62	4.28	118.20	0.234	No	No	2.00
213	5.14	1.66	2.54	2.13	0.84	28.43	3.70	105.28	0.189	No	No	2.00
214	5.16	1.71	2.52	2.07	0.84	29.20	3.31	96.61	0.164	No	No	1.97
215	5.18	1.75	2.51	2.03	0.83	29.66	3.09	91.70	0.152	No	No	1.82
216	5.20	1.77	2.51	2.00	0.83	29.96	2.94	88.23	0.144	No	No	1.73
217	5.22	1.79	2.50	1.96	0.83	30.12	2.81	84.68	0.136	No	No	1.64
218	5.24	1.78	2.50	1.96	0.83	29.91	2.86	85.60	0.138	No	No	1.66
219	5.26	1.75	2.51	2.00	0.83	29.48	3.07	90.40	0.149	No	No	1.78
220	5.28	1.71	2.53	2.09	0.84	28.77	3.50	100.71	0.175	No	No	2.00
221	5.30	1.66	2.56	2.25	0.85	28.05	4.21	117.96	0.233	No	No	2.00
222	5.32	1.60	2.60	2.45	0.86	27.14	5.25	142.51	0.349	No	No	2.00
223	5.34	1.54	2.63	2.67	0.88	26.21	6.58	172.41	0.501	No	No	2.00
224	5.36	1.55	2.63	2.66	0.88	26.26	6.51	170.83	0.489	No	No	2.00
225	5.38	1.54	2.63	2.65	0.88	26.15	6.52	170.62	0.488	No	No	2.00
226	5.40	1.53	2.63	2.61	0.88	25.78	6.58	169.56	0.480	No	No	2.00
227	5.42	1.44	2.66	2.75	0.89	24.32	8.15	198.18	0.724	No	No	2.00
228	5.44	1.37	2.69	2.84	0.90	23.15	9.52	220.36	3.600	No	No	2.00
229	5.46	1.31	2.71	2.89	0.91	22.19	4.79	106.34	1.058	No	Yes	2.00
230	5.48	1.27	2.72	2.89	0.91	21.44	4.92	105.46	1.023	No	Yes	2.00
231	5.50	1.24	2.73	2.85	0.92	20.80	5.00	103.96	0.992	No	Yes	2.00
232	5.52	1.21	2.73	2.81	0.92	20.32	5.04	102.43	0.969	No	Yes	2.00
233	5.54	1.18	2.74	2.83	0.92	19.74	5.18	102.24	0.942	No	Yes	2.00
234	5.56	1.14	2.76	2.92	0.93	19.00	5.42	102.97	0.906	No	Yes	2.00
235	5.58	1.09	2.79	3.04	0.94	18.19	5.73	104.29	0.868	No	Yes	2.00
236	5.60	1.02	2.82	3.17	0.95	17.09	6.14	105.02	0.815	No	Yes	2.00
237	5.62	0.95	2.86	3.31	0.97	15.88	6.64	105.36	0.757	No	Yes	2.00
238	5.64	0.83	2.94	3.74	1.00	13.89	7.78	108.03	0.663	No	Yes	2.00
239	5.66	0.72	3.04	4.45	1.00	11.68	9.54	111.44	0.557	No	Yes	2.00
240	5.68	0.61	3.16	5.41	1.00	9.59	11.91	114.24	0.457	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.61	3.15	5.18	1.00	9.61	11.65	111.97	0.458	No	Yes	2.00
242	5.72	0.70	3.04	4.09	1.00	11.19	9.41	105.32	0.534	No	Yes	2.00
243	5.74	0.81	2.91	3.11	0.98	13.19	7.32	96.59	0.629	No	Yes	2.00
244	5.76	0.88	2.85	2.72	0.96	14.22	6.46	91.84	0.678	No	Yes	2.00
245	5.78	0.90	2.84	2.65	0.96	14.38	6.32	90.96	0.686	No	Yes	2.00
246	5.80	0.92	2.82	2.58	0.95	14.69	6.14	90.10	0.701	No	Yes	2.00
247	5.82	0.95	2.79	2.40	0.94	15.21	5.76	87.55	0.726	No	Yes	2.00
248	5.84	1.00	2.76	2.22	0.93	15.87	5.34	84.75	0.757	No	Yes	2.00
249	5.86	1.02	2.76	2.29	0.93	16.22	5.33	86.52	0.774	No	Yes	2.00
250	5.88	1.02	2.78	2.56	0.94	16.27	5.66	92.15	0.776	No	Yes	2.00
251	5.90	1.01	2.82	2.94	0.95	16.11	6.15	99.10	0.768	No	Yes	2.00
252	5.92	1.01	2.83	3.06	0.96	16.10	6.29	101.27	0.768	No	Yes	2.00
253	5.94	1.01	2.83	3.00	0.95	16.15	6.21	100.30	0.770	No	Yes	2.00
254	5.96	1.03	2.81	2.84	0.95	16.31	5.98	97.58	0.778	No	Yes	2.00
255	5.98	1.04	2.80	2.76	0.94	16.41	5.86	96.15	0.783	No	Yes	2.00
256	6.00	1.07	2.78	2.64	0.94	16.74	5.64	94.36	0.799	No	Yes	2.00
257	6.02	1.11	2.75	2.44	0.93	17.32	5.26	91.11	0.826	No	Yes	2.00
258	6.04	1.18	2.71	2.28	0.91	18.30	4.84	88.65	0.873	No	Yes	2.00
259	6.06	1.23	2.69	2.18	0.90	19.11	9.36	178.90	0.551	No	No	2.00
260	6.08	1.26	2.69	2.29	0.90	19.55	9.63	188.38	0.632	No	No	2.00
261	6.10	1.25	2.73	2.60	0.92	19.39	5.00	96.91	0.925	No	Yes	2.00
262	6.12	1.22	2.76	2.94	0.93	19.11	5.42	103.56	0.911	No	Yes	2.00
263	6.14	1.21	2.79	3.22	0.94	18.92	5.75	108.81	0.903	No	Yes	2.00
264	6.16	1.20	2.81	3.46	0.95	18.76	6.03	113.15	0.895	No	Yes	2.00
265	6.18	1.19	2.84	3.83	0.96	18.63	6.43	119.76	0.889	No	Yes	2.00
266	6.20	1.18	2.87	4.17	0.97	18.58	6.76	125.56	0.886	No	Yes	2.00
267	6.22	1.20	2.88	4.39	0.97	18.85	6.90	130.03	0.899	No	Yes	2.00
268	6.24	1.23	2.87	4.33	0.97	19.33	6.73	130.05	0.922	No	Yes	2.00
269	6.26	1.26	2.85	4.25	0.97	19.78	6.55	129.61	0.944	No	Yes	2.00
270	6.28	1.26	2.86	4.33	0.97	19.69	6.64	130.71	0.939	No	Yes	2.00
271	6.30	1.25	2.88	4.54	0.97	19.47	6.88	133.87	0.929	No	Yes	2.00
272	6.32	1.23	2.89	4.62	0.98	19.22	7.01	134.77	0.917	No	Yes	2.00
273	6.34	1.24	2.87	4.43	0.97	19.29	6.83	131.71	0.920	No	Yes	2.00
274	6.36	1.25	2.87	4.34	0.97	19.27	6.75	130.03	0.919	No	Yes	2.00
275	6.38	1.30	2.84	4.17	0.96	20.01	6.43	128.63	0.954	No	Yes	2.00
276	6.40	1.38	2.81	3.89	0.95	21.19	5.93	125.63	1.011	No	Yes	2.00
277	6.42	1.39	2.79	3.70	0.94	21.18	5.75	121.74	1.010	No	Yes	2.00
278	6.44	1.29	2.82	3.77	0.96	19.54	6.16	120.38	0.932	No	Yes	2.00
279	6.46	1.12	2.88	3.82	0.98	16.89	6.87	115.97	0.806	No	Yes	2.00
280	6.48	1.01	2.91	3.80	0.99	15.11	7.40	111.85	0.721	No	Yes	2.00
281	6.50	0.94	2.94	3.87	1.00	13.99	7.88	110.21	0.667	No	Yes	2.00
282	6.52	0.90	2.99	4.33	1.00	13.25	8.67	114.92	0.632	No	Yes	2.00
283	6.54	0.88	3.03	4.77	1.00	12.87	9.29	119.55	0.614	No	Yes	2.00
284	6.56	0.88	3.05	5.14	1.00	12.89	9.65	124.38	0.615	No	Yes	2.00
285	6.58	0.89	3.05	5.24	1.00	12.97	9.70	125.88	0.619	No	Yes	2.00
286	6.60	0.94	3.02	4.98	1.00	13.75	9.11	125.22	0.656	No	Yes	2.00
287	6.62	0.98	2.97	4.49	1.00	14.41	8.36	120.51	0.687	No	Yes	2.00
288	6.64	0.99	2.97	4.40	1.00	14.54	8.22	119.52	0.694	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	0.96	2.99	4.64	1.00	13.99	8.67	121.36	0.667	No	Yes	2.00
290	6.68	0.91	3.04	5.11	1.00	13.15	9.50	124.96	0.627	No	Yes	2.00
291	6.70	0.88	3.07	5.40	1.00	12.63	10.03	126.71	0.603	No	Yes	2.00
292	6.72	0.84	3.11	5.70	1.00	11.88	10.72	127.27	0.567	No	Yes	2.00
293	6.74	0.80	3.13	5.69	1.00	11.15	11.13	124.16	0.532	No	Yes	2.00
294	6.76	0.75	3.15	5.74	1.00	10.42	11.66	121.44	0.497	No	Yes	2.00
295	6.78	0.71	3.18	5.82	1.00	9.78	12.20	119.27	0.466	No	Yes	2.00
296	6.80	0.68	3.21	6.16	1.00	9.22	13.00	119.90	0.440	No	Yes	2.00
297	6.82	0.67	3.23	6.34	1.00	8.93	13.43	119.98	0.426	No	Yes	2.00
298	6.84	0.66	3.23	6.15	1.00	8.78	13.38	117.50	0.419	No	Yes	2.00
299	6.86	0.63	3.24	6.09	1.00	8.33	13.74	114.54	0.398	No	Yes	2.00
300	6.88	0.58	3.29	6.42	1.00	7.53	14.97	112.76	0.359	No	Yes	2.00
301	6.90	0.53	3.36	6.98	1.00	6.63	16.78	111.18	0.316	No	Yes	2.00
302	6.92	0.50	3.38	7.03	1.00	6.19	17.53	108.46	0.295	No	Yes	2.00
303	6.94	0.50	3.37	6.43	1.00	6.09	16.99	103.52	0.291	No	Yes	2.00
304	6.96	0.50	3.34	5.88	1.00	6.14	16.26	99.77	0.293	No	Yes	2.00
305	6.98	0.52	3.30	5.24	1.00	6.35	15.12	96.09	0.303	No	Yes	2.00
306	7.00	0.53	3.27	4.89	1.00	6.56	14.37	94.31	0.313	No	Yes	2.00
307	7.02	0.55	3.23	4.42	1.00	6.77	13.48	91.27	0.323	No	Yes	2.00
308	7.04	0.56	3.21	4.18	1.00	6.92	12.96	89.73	0.330	No	Yes	2.00
309	7.06	0.58	3.17	3.81	1.00	7.19	12.15	87.37	0.343	No	Yes	2.00
310	7.08	0.60	3.13	3.53	1.00	7.62	11.30	86.13	0.364	No	Yes	2.00
311	7.10	0.63	3.10	3.29	1.00	8.09	10.52	85.18	0.386	No	Yes	2.00
312	7.12	0.66	3.08	3.20	1.00	8.41	10.13	85.22	0.401	No	Yes	2.00
313	7.14	0.66	3.08	3.27	1.00	8.41	10.23	85.98	0.401	No	Yes	2.00
314	7.16	0.64	3.10	3.35	1.00	8.15	10.56	86.01	0.389	No	Yes	2.00
315	7.18	0.63	3.11	3.36	1.00	7.89	10.81	85.27	0.376	No	Yes	2.00
316	7.20	0.62	3.10	3.23	1.00	7.80	10.70	83.40	0.372	No	Yes	2.00
317	7.22	0.63	3.09	3.06	1.00	7.90	10.36	81.80	0.377	No	Yes	2.00
318	7.24	0.64	3.08	3.00	1.00	7.96	10.21	81.25	0.380	No	Yes	2.00
319	7.26	0.64	3.08	2.99	1.00	8.01	10.15	81.36	0.382	No	Yes	2.00
320	7.28	0.64	3.08	3.00	1.00	8.02	10.16	81.51	0.383	No	Yes	2.00
321	7.30	0.65	3.06	2.92	1.00	8.20	9.89	81.05	0.391	No	Yes	2.00
322	7.32	0.68	3.03	2.76	1.00	8.61	9.32	80.27	0.411	No	Yes	2.00
323	7.34	0.72	2.99	2.62	1.00	9.23	8.68	80.04	0.440	No	Yes	2.00
324	7.36	0.75	2.98	2.63	1.00	9.55	8.47	80.90	0.455	No	Yes	2.00
325	7.38	0.75	3.00	2.80	1.00	9.56	8.73	83.40	0.456	No	Yes	2.00
326	7.40	0.74	3.00	2.79	1.00	9.41	8.80	82.79	0.449	No	Yes	2.00
327	7.42	0.76	2.97	2.62	1.00	9.75	8.33	81.23	0.465	No	Yes	2.00
328	7.44	0.82	2.92	2.34	0.99	10.58	7.45	78.84	0.505	No	Yes	2.00
329	7.46	0.89	2.88	2.27	0.98	11.58	6.87	79.60	0.552	No	Yes	2.00
330	7.48	0.95	2.85	2.28	0.97	12.35	6.56	81.06	0.589	No	Yes	2.00
331	7.50	0.99	2.84	2.30	0.97	12.87	6.38	82.16	0.614	No	Yes	2.00
332	7.52	1.01	2.84	2.33	0.96	13.14	6.33	83.14	0.627	No	Yes	2.00
333	7.54	1.02	2.84	2.41	0.97	13.22	6.41	84.80	0.631	No	Yes	2.00
334	7.56	1.00	2.86	2.50	0.97	12.96	6.63	85.87	0.618	No	Yes	2.00
335	7.58	0.96	2.88	2.59	0.98	12.47	6.94	86.54	0.595	No	Yes	2.00
336	7.60	0.93	2.90	2.67	0.99	11.95	7.27	86.93	0.570	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	0.90	2.93	2.83	1.00	11.62	7.63	88.69	0.554	No	Yes	2.00
338	7.64	0.90	2.95	2.97	1.00	11.46	7.89	90.48	0.547	No	Yes	2.00
339	7.66	0.90	2.94	2.96	1.00	11.57	7.84	90.68	0.552	No	Yes	2.00
340	7.68	0.93	2.92	2.85	1.00	11.88	7.54	89.62	0.567	No	Yes	2.00
341	7.70	0.97	2.89	2.69	0.99	12.41	7.11	88.15	0.592	No	Yes	2.00
342	7.72	1.00	2.88	2.63	0.98	12.76	6.88	87.82	0.609	No	Yes	2.00
343	7.74	1.02	2.87	2.62	0.98	12.99	6.77	87.96	0.620	No	Yes	2.00
344	7.76	1.00	2.89	2.75	0.98	12.79	7.02	89.86	0.610	No	Yes	2.00
345	7.78	1.00	2.88	2.64	0.98	12.73	6.90	87.82	4.000	Yes	Yes	2.00
346	7.80	1.12	2.79	2.20	0.95	14.30	5.76	82.41	4.000	Yes	Yes	2.00
347	7.82	1.41	2.65	1.72	0.89	17.99	7.43	133.68	4.000	Yes	No	2.00
348	7.84	2.07	2.44	1.30	0.81	26.38	2.62	69.10	4.000	Yes	No	2.00
349	7.86	2.54	2.36	1.22	0.78	32.32	2.16	69.71	4.000	Yes	No	2.00
350	7.88	2.78	2.32	1.22	0.77	35.35	2.01	71.20	4.000	Yes	No	2.00
351	7.90	2.55	2.38	1.39	0.79	32.55	2.30	74.76	4.000	Yes	No	2.00
352	7.92	2.30	2.47	1.70	0.83	29.50	2.78	82.06	4.000	Yes	No	2.00
353	7.94	2.03	2.58	2.22	0.87	26.15	4.80	125.57	4.000	Yes	No	2.00
354	7.96	1.84	2.68	2.80	0.90	23.80	8.79	209.14	4.000	Yes	No	2.00
355	7.98	1.76	2.72	3.10	0.92	22.84	4.90	111.82	4.000	Yes	Yes	2.00
356	8.00	1.88	2.70	3.10	0.91	24.38	9.91	241.49	3.600	No	No	2.00
357	8.02	2.08	2.65	2.99	0.90	26.82	7.61	204.08	3.600	No	No	2.00
358	8.04	2.21	2.63	2.94	0.89	28.47	6.55	186.33	0.614	No	No	2.00
359	8.06	2.07	2.65	2.97	0.90	26.69	7.60	202.86	3.600	No	No	2.00
360	8.08	1.84	2.70	3.03	0.91	23.54	4.72	111.03	1.123	No	Yes	2.00
361	8.10	1.63	2.75	3.07	0.93	20.74	5.23	108.40	0.990	No	Yes	2.00
362	8.12	1.60	2.75	2.98	0.93	20.24	5.23	105.86	0.965	No	Yes	2.00
363	8.14	1.66	2.73	2.96	0.93	21.01	5.07	106.50	1.002	No	Yes	2.00
364	8.16	1.83	2.69	2.90	0.91	23.19	9.85	228.46	3.600	No	No	2.00
365	8.18	2.04	2.65	2.84	0.90	25.93	7.51	194.83	0.691	No	No	2.00
366	8.20	2.10	2.65	2.88	0.89	26.59	7.27	193.32	0.677	No	No	2.00
367	8.22	1.93	2.68	2.98	0.91	24.40	9.24	225.46	3.600	No	No	2.00
368	8.24	1.61	2.76	3.10	0.94	20.22	5.36	108.35	0.965	No	Yes	2.00
369	8.26	1.36	2.82	3.07	0.96	16.83	6.10	102.70	0.803	No	Yes	2.00
370	8.28	1.22	2.85	2.97	0.97	14.91	6.54	97.47	0.711	No	Yes	2.00
371	8.30	1.20	2.85	2.87	0.97	14.66	6.50	95.30	4.000	Yes	Yes	2.00
372	8.32	1.28	2.80	2.60	0.95	15.60	5.90	91.97	4.000	Yes	Yes	2.00
373	8.34	1.48	2.71	2.17	0.92	18.09	4.77	86.23	4.000	Yes	Yes	2.00
374	8.36	1.85	2.58	1.80	0.87	22.59	4.76	107.47	4.000	Yes	No	2.00
375	8.38	2.27	2.48	1.59	0.83	27.76	2.82	78.18	4.000	Yes	No	2.00
376	8.40	2.61	2.41	1.51	0.81	31.96	2.44	78.02	4.000	Yes	No	2.00
377	8.42	2.67	2.41	1.52	0.80	32.67	2.41	78.75	4.000	Yes	No	2.00
378	8.44	2.51	2.44	1.62	0.82	30.63	2.62	80.35	4.000	Yes	No	2.00
379	8.46	2.18	2.54	1.94	0.85	26.60	3.66	97.42	4.000	Yes	No	2.00
380	8.48	1.83	2.63	2.17	0.89	22.31	6.59	147.11	4.000	Yes	No	2.00
381	8.50	1.70	2.66	2.16	0.90	20.52	7.88	161.75	4.000	Yes	No	2.00
382	8.52	2.06	2.51	1.54	0.84	24.79	2.97	73.52	4.000	Yes	No	2.00
383	8.54	2.63	2.37	1.25	0.79	31.67	2.22	70.32	4.000	Yes	No	2.00
384	8.56	2.99	2.31	1.17	0.77	35.85	1.96	70.26	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	2.83	2.34	1.25	0.78	33.87	2.10	71.28	4.000	Yes	No	2.00
386	8.60	2.47	2.42	1.38	0.81	29.60	2.47	73.10	4.000	Yes	No	2.00
387	8.62	2.20	2.51	1.70	0.84	26.43	2.98	78.62	4.000	Yes	No	2.00
388	8.64	2.02	2.60	2.16	0.88	24.24	5.43	131.55	4.000	Yes	No	2.00
389	8.66	1.81	2.70	2.72	0.92	21.71	4.71	102.20	4.000	Yes	Yes	2.00
390	8.68	1.66	2.75	2.99	0.94	19.94	5.30	105.63	4.000	Yes	Yes	2.00
391	8.70	1.60	2.77	3.02	0.94	19.15	5.50	105.26	0.914	No	Yes	2.00
392	8.72	1.66	2.75	2.89	0.93	19.80	5.23	103.54	0.944	No	Yes	2.00
393	8.74	1.70	2.73	2.79	0.93	20.27	5.03	102.00	0.967	No	Yes	2.00
394	8.76	1.68	2.73	2.72	0.93	19.96	5.02	100.20	0.952	No	Yes	2.00
395	8.78	1.69	2.70	2.44	0.92	20.00	10.15	202.88	3.600	No	No	2.00
396	8.80	1.79	2.65	2.14	0.90	21.09	7.32	154.28	0.379	No	No	2.00
397	8.82	1.97	2.59	1.97	0.88	23.23	5.16	119.97	0.241	No	No	2.00
398	8.84	2.13	2.57	1.99	0.87	25.09	4.40	110.41	0.205	No	No	2.00
399	8.86	2.13	2.58	2.12	0.87	25.11	4.88	122.61	0.251	No	No	2.00
400	8.88	2.03	2.62	2.25	0.88	23.86	6.04	144.17	0.323	No	No	2.00
401	8.90	1.86	2.66	2.36	0.90	21.73	8.03	174.43	0.516	No	No	2.00
402	8.92	1.81	2.68	2.40	0.91	21.13	8.79	185.65	0.608	No	No	2.00
403	8.94	1.85	2.67	2.37	0.90	21.62	8.21	177.47	4.000	Yes	No	2.00
404	8.96	1.95	2.64	2.34	0.90	22.73	7.18	163.19	4.000	Yes	No	2.00
405	8.98	2.06	2.62	2.33	0.89	24.01	6.30	151.24	4.000	Yes	No	2.00
406	9.00	2.47	2.53	2.08	0.85	28.89	3.42	98.87	4.000	Yes	No	2.00
407	9.02	3.06	2.39	1.60	0.80	35.61	2.32	82.58	4.000	Yes	No	2.00
408	9.04	3.57	2.29	1.32	0.76	41.37	1.88	77.76	4.000	Yes	No	2.00
409	9.06	3.63	2.24	1.13	0.74	41.91	1.74	72.73	4.000	Yes	No	2.00
410	9.08	3.37	2.30	1.29	0.77	38.93	1.94	75.33	4.000	Yes	No	2.00
411	9.10	3.02	2.38	1.53	0.80	34.94	2.30	80.20	4.000	Yes	No	2.00
412	9.12	2.72	2.48	1.96	0.84	31.56	2.88	90.75	4.000	Yes	No	2.00
413	9.14	2.55	2.55	2.35	0.86	29.61	4.01	118.87	4.000	Yes	No	2.00
414	9.16	2.42	2.61	2.72	0.88	28.02	5.87	164.46	4.000	Yes	No	2.00
415	9.18	2.21	2.67	3.04	0.91	25.61	8.67	221.93	4.000	Yes	No	2.00
416	9.20	2.02	2.73	3.28	0.93	23.31	4.99	116.40	4.000	Yes	Yes	2.00
417	9.22	1.88	2.76	3.39	0.94	21.56	5.39	116.32	4.000	Yes	Yes	2.00
418	9.24	1.85	2.77	3.36	0.94	21.07	5.45	114.84	1.005	No	Yes	2.00
419	9.26	1.84	2.75	3.15	0.94	20.92	5.28	110.42	4.000	Yes	Yes	2.00
420	9.28	1.92	2.71	2.84	0.92	21.80	4.81	104.79	4.000	Yes	Yes	2.00
421	9.30	2.28	2.61	2.41	0.88	25.89	5.64	146.13	4.000	Yes	No	2.00
422	9.32	2.71	2.52	2.17	0.85	30.86	3.19	98.57	4.000	Yes	No	2.00
423	9.34	2.94	2.46	1.94	0.83	33.47	2.73	91.28	4.000	Yes	No	2.00
424	9.36	2.85	2.47	1.91	0.83	32.37	2.77	89.68	4.000	Yes	No	2.00
425	9.38	2.65	2.51	1.98	0.84	29.92	2.90	86.88	4.000	Yes	No	2.00
426	9.40	2.50	2.57	2.36	0.87	28.34	4.46	126.38	4.000	Yes	No	2.00
427	9.42	2.30	2.66	2.93	0.90	25.99	7.88	204.87	4.000	Yes	No	2.00
428	9.44	2.08	2.75	3.60	0.94	23.47	5.25	123.26	4.000	Yes	Yes	2.00
429	9.46	1.87	2.82	4.12	0.97	21.03	6.16	129.53	4.000	Yes	Yes	2.00
430	9.48	1.76	2.85	4.19	0.98	19.68	6.52	128.32	4.000	Yes	Yes	2.00
431	9.50	1.70	2.85	4.01	0.98	18.91	6.53	123.42	0.902	No	Yes	2.00
432	9.52	1.69	2.83	3.70	0.97	18.70	6.28	117.44	0.892	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	1.75	2.79	3.30	0.95	19.32	5.74	110.99	0.922	No	Yes	2.00
434	9.56	2.03	2.69	2.77	0.92	22.50	9.72	218.81	3.600	No	No	2.00
435	9.58	2.35	2.60	2.41	0.88	26.08	5.57	145.36	0.329	No	No	2.00
436	9.60	2.61	2.54	2.20	0.86	29.02	3.75	108.94	0.200	No	No	2.00
437	9.62	2.69	2.53	2.14	0.85	29.89	3.33	99.63	0.172	No	No	1.96
438	9.64	2.77	2.51	2.12	0.85	30.71	3.08	94.68	0.159	No	No	1.82
439	9.66	2.88	2.50	2.11	0.84	31.94	2.97	94.95	0.160	No	No	1.82
440	9.68	2.95	2.49	2.08	0.84	32.61	2.91	94.75	0.159	No	No	1.82
441	9.70	2.93	2.49	2.10	0.84	32.39	2.93	94.94	0.160	No	No	1.82
442	9.72	2.83	2.51	2.15	0.85	31.18	3.06	95.30	0.160	No	No	1.84
443	9.74	2.66	2.56	2.33	0.86	29.28	4.07	119.16	0.237	No	No	2.00
444	9.76	2.54	2.59	2.52	0.88	27.89	5.18	144.57	4.000	Yes	No	2.00
445	9.78	2.71	2.56	2.39	0.87	29.71	4.11	122.11	4.000	Yes	No	2.00
446	9.80	2.93	2.52	2.26	0.85	32.10	3.13	100.61	4.000	Yes	No	2.00
447	9.82	3.04	2.49	2.15	0.84	33.30	2.91	96.97	4.000	Yes	No	2.00
448	9.84	2.91	2.53	2.35	0.86	31.81	3.43	109.27	0.201	No	No	2.00
449	9.86	2.84	2.56	2.55	0.87	31.07	4.20	130.40	0.286	No	No	2.00
450	9.88	2.86	2.57	2.64	0.87	31.21	4.41	137.69	0.323	No	No	2.00
451	9.90	2.70	2.61	2.80	0.88	29.41	5.59	164.30	0.443	No	No	2.00
452	9.92	2.43	2.66	2.94	0.90	26.29	7.71	202.74	3.600	No	No	2.00
453	9.94	2.22	2.71	3.15	0.92	23.90	4.78	114.17	1.140	No	Yes	2.00
454	9.96	2.24	2.69	3.02	0.92	23.98	9.82	235.53	3.600	No	No	2.00
455	9.98	2.30	2.68	2.93	0.91	24.61	8.82	217.01	3.600	No	No	2.00
456	10.00	2.25	2.69	2.96	0.92	24.02	9.47	227.45	3.600	No	No	2.00
457	10.02	2.14	2.72	3.13	0.93	22.73	4.94	112.26	1.084	No	Yes	2.00
458	10.04	2.08	2.74	3.21	0.94	22.01	5.14	113.05	1.050	No	Yes	2.00
459	10.06	2.11	2.73	3.19	0.93	22.41	5.05	113.13	4.000	Yes	Yes	2.00
460	10.08	2.28	2.68	2.95	0.92	24.19	9.25	223.78	4.000	Yes	No	2.00
461	10.10	2.50	2.63	2.69	0.89	26.64	6.45	171.90	4.000	Yes	No	2.00
462	10.12	2.80	2.56	2.45	0.87	29.88	4.24	126.54	4.000	Yes	No	2.00
463	10.14	3.12	2.50	2.23	0.85	33.29	2.81	93.44	4.000	Yes	No	2.00
464	10.16	3.28	2.47	2.09	0.83	34.98	2.76	96.47	4.000	Yes	No	2.00
465	10.18	3.36	2.45	2.00	0.82	35.80	2.63	94.28	4.000	Yes	No	2.00
466	10.20	3.38	2.43	1.92	0.82	35.92	2.56	92.07	0.153	No	No	1.76
467	10.22	3.50	2.41	1.82	0.81	37.08	2.42	89.89	0.148	No	No	1.70
468	10.24	3.59	2.39	1.73	0.80	38.01	2.31	87.79	0.143	No	No	1.65
469	10.26	3.48	2.38	1.64	0.80	36.79	2.29	84.26	0.136	No	No	1.56
470	10.28	3.35	2.39	1.56	0.80	35.19	2.31	81.14	4.000	Yes	No	2.00
471	10.30	2.95	2.49	1.93	0.84	30.96	2.89	89.48	4.000	Yes	No	2.00
472	10.32	2.63	2.60	2.56	0.88	27.48	5.50	151.17	4.000	Yes	No	2.00
473	10.34	2.21	2.75	3.44	0.94	22.91	5.20	119.14	4.000	Yes	Yes	2.00
474	10.36	2.06	2.78	3.52	0.95	21.20	5.58	118.23	4.000	Yes	Yes	2.00
475	10.38	2.08	2.75	3.27	0.94	21.39	5.30	113.42	4.000	Yes	Yes	2.00
476	10.40	2.34	2.67	2.82	0.91	24.08	8.66	208.64	4.000	Yes	No	2.00
477	10.42	2.67	2.59	2.42	0.88	27.69	4.92	136.14	4.000	Yes	No	2.00
478	10.44	2.96	2.51	2.06	0.85	30.64	2.95	90.42	4.000	Yes	No	2.00
479	10.46	2.94	2.49	1.89	0.84	30.44	2.89	87.96	4.000	Yes	No	2.00
480	10.48	2.79	2.51	1.91	0.85	28.67	3.02	86.48	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	10.50	2.56	2.58	2.19	0.88	26.28	4.64	121.86	4.000	Yes	No	2.00
482	10.52	2.47	2.63	2.51	0.89	25.28	6.38	161.24	4.000	Yes	No	2.00
483	10.54	2.32	2.69	2.89	0.92	23.65	9.39	222.11	4.000	Yes	No	2.00
484	10.56	2.18	2.74	3.21	0.94	22.05	5.14	113.25	4.000	Yes	Yes	2.00
485	10.58	2.45	2.67	2.88	0.91	24.95	8.31	207.42	4.000	Yes	No	2.00
486	10.60	2.98	2.55	2.40	0.87	30.51	3.92	119.68	4.000	Yes	No	2.00
487	10.62	3.53	2.46	2.15	0.83	36.40	2.72	98.97	4.000	Yes	No	2.00
488	10.64	3.59	2.45	2.09	0.83	36.88	2.65	97.71	4.000	Yes	No	2.00
489	10.66	3.31	2.48	2.12	0.84	33.87	2.85	96.46	4.000	Yes	No	2.00
490	10.68	2.86	2.53	2.10	0.86	28.98	3.47	100.69	4.000	Yes	No	2.00
491	10.70	2.31	2.66	2.54	0.91	23.16	7.90	182.91	4.000	Yes	No	2.00
492	10.72	2.06	2.74	2.95	0.94	20.40	5.18	105.60	4.000	Yes	Yes	2.00
493	10.74	2.07	2.76	3.17	0.95	20.48	5.38	110.14	0.977	No	Yes	2.00
494	10.76	2.24	2.71	2.89	0.93	22.32	4.77	106.49	1.065	No	Yes	2.00
495	10.78	2.21	2.71	2.90	0.93	21.96	4.85	106.46	1.048	No	Yes	2.00
496	10.80	2.13	2.72	2.88	0.93	21.07	4.97	104.78	1.005	No	Yes	2.00
497	10.82	2.15	2.71	2.74	0.93	21.16	4.82	101.93	1.009	No	Yes	2.00
498	10.84	2.16	2.69	2.58	0.92	21.24	9.80	208.08	3.600	No	No	2.00
499	10.86	2.04	2.72	2.66	0.93	19.96	4.95	98.75	0.952	No	Yes	2.00
500	10.88	1.87	2.78	2.88	0.95	18.13	5.57	101.04	0.865	No	Yes	2.00
501	10.90	1.63	2.87	3.30	0.99	15.51	6.74	104.48	0.740	No	Yes	2.00
502	10.92	1.44	2.93	3.56	1.00	13.50	7.73	104.30	0.644	No	Yes	2.00
503	10.94	1.27	3.01	3.82	1.00	11.58	8.89	103.01	0.553	No	Yes	2.00
504	10.96	1.33	2.95	3.30	1.00	12.31	7.92	97.50	0.587	No	Yes	2.00
505	10.98	1.52	2.86	2.84	0.98	14.26	6.60	94.13	0.680	No	Yes	2.00
506	11.00	1.72	2.77	2.46	0.95	16.29	5.54	90.20	0.777	No	Yes	2.00
507	11.02	1.73	2.77	2.44	0.95	16.44	5.47	90.03	0.784	No	Yes	2.00
508	11.04	1.56	2.83	2.64	0.97	14.58	6.25	91.10	0.695	No	Yes	2.00
509	11.06	1.34	2.92	2.98	1.00	12.28	7.54	92.58	0.586	No	Yes	2.00
510	11.08	1.24	2.96	3.05	1.00	11.14	8.17	91.00	4.000	Yes	Yes	2.00
511	11.10	1.36	2.88	2.58	1.00	12.37	6.98	86.29	4.000	Yes	Yes	2.00
512	11.12	1.70	2.74	2.11	0.94	15.97	5.17	82.52	4.000	Yes	Yes	2.00
513	11.14	2.15	2.60	1.73	0.89	20.58	5.51	113.43	4.000	Yes	No	2.00
514	11.16	2.38	2.56	1.68	0.87	22.96	4.06	93.30	4.000	Yes	No	2.00
515	11.18	2.51	2.53	1.64	0.86	24.25	3.47	84.09	4.000	Yes	No	2.00
516	11.20	2.77	2.48	1.53	0.84	26.91	2.82	75.97	4.000	Yes	No	2.00
517	11.22	3.14	2.42	1.45	0.82	30.67	2.46	75.51	4.000	Yes	No	2.00
518	11.24	3.31	2.40	1.45	0.81	32.35	2.37	76.53	0.122	No	No	1.43
519	11.26	3.26	2.42	1.54	0.82	31.80	2.48	78.74	0.125	No	No	1.47
520	11.28	3.28	2.43	1.59	0.82	31.95	2.51	80.25	0.128	No	No	1.50
521	11.30	3.29	2.44	1.70	0.83	32.03	2.61	83.49	4.000	Yes	No	2.00
522	11.32	3.07	2.50	1.90	0.85	29.77	2.96	87.99	4.000	Yes	No	2.00
523	11.34	2.64	2.60	2.31	0.89	25.31	5.55	140.41	4.000	Yes	No	2.00
524	11.36	2.24	2.72	2.88	0.94	21.14	4.97	105.02	4.000	Yes	Yes	2.00
525	11.38	1.94	2.84	3.68	0.98	18.05	6.42	115.93	4.000	Yes	Yes	2.00
526	11.40	1.80	2.89	3.97	1.00	16.58	7.11	117.99	4.000	Yes	Yes	2.00
527	11.42	1.93	2.82	3.34	0.97	17.95	6.10	109.58	4.000	Yes	Yes	2.00
528	11.44	2.15	2.72	2.62	0.93	20.15	4.88	98.27	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
529	11.46	2.57	2.57	1.90	0.88	24.35	4.37	106.37	4.000	Yes	No	2.00
530	11.48	2.65	2.51	1.61	0.86	25.13	3.09	77.67	4.000	Yes	No	2.00
531	11.50	2.59	2.50	1.45	0.85	24.43	2.97	72.65	4.000	Yes	No	2.00
532	11.52	2.18	2.61	1.74	0.89	20.23	5.82	117.71	4.000	Yes	No	2.00
533	11.54	1.98	2.69	2.07	0.92	18.20	9.66	175.80	4.000	Yes	No	2.00
534	11.56	1.97	2.72	2.26	0.93	18.03	4.88	88.05	4.000	Yes	Yes	2.00
535	11.58	2.00	2.72	2.35	0.93	18.35	4.92	90.33	0.875	No	Yes	2.00
536	11.60	1.87	2.78	2.63	0.96	16.96	5.56	94.39	0.809	No	Yes	2.00
537	11.62	1.60	2.88	3.15	1.00	14.25	6.97	99.38	0.680	No	Yes	2.00
538	11.64	1.40	2.97	3.60	1.00	12.23	8.32	101.71	0.583	No	Yes	2.00
539	11.66	1.30	3.02	3.83	1.00	11.14	9.13	101.79	0.532	No	Yes	2.00
540	11.68	1.30	3.01	3.75	1.00	11.15	9.04	100.81	0.532	No	Yes	2.00
541	11.70	1.33	2.99	3.55	1.00	11.37	8.67	98.65	0.543	No	Yes	2.00
542	11.72	1.40	2.95	3.21	1.00	12.06	7.92	95.58	0.575	No	Yes	2.00
543	11.74	1.50	2.88	2.72	0.99	13.13	6.85	89.94	0.626	No	Yes	2.00
544	11.76	1.50	2.86	2.57	0.99	13.06	6.68	87.27	0.623	No	Yes	2.00
545	11.78	1.40	2.90	2.68	1.00	12.02	7.26	87.25	0.573	No	Yes	2.00
546	11.80	1.25	2.98	2.95	1.00	10.49	8.37	87.82	0.500	No	Yes	2.00
547	11.82	1.18	3.01	3.11	1.00	9.78	9.02	88.22	0.466	No	Yes	2.00
548	11.84	1.15	3.02	3.10	1.00	9.50	9.18	87.26	0.453	No	Yes	2.00
549	11.86	1.13	3.04	3.19	1.00	9.29	9.45	87.79	0.443	No	Yes	2.00
550	11.88	1.12	3.04	3.12	1.00	9.15	9.46	86.53	0.436	No	Yes	2.00
551	11.90	1.12	3.03	2.96	1.00	9.12	9.24	84.31	0.435	No	Yes	2.00
552	11.92	1.12	3.01	2.81	1.00	9.10	9.04	82.25	0.434	No	Yes	2.00
553	11.94	1.13	3.00	2.70	1.00	9.15	8.84	80.88	0.436	No	Yes	2.00
554	11.96	1.14	3.00	2.67	1.00	9.24	8.74	80.75	0.441	No	Yes	2.00
555	11.98	1.16	2.98	2.62	1.00	9.49	8.49	80.62	0.453	No	Yes	2.00
556	12.00	1.20	2.97	2.62	1.00	9.81	8.30	81.44	0.468	No	Yes	2.00
557	12.02	1.22	2.96	2.62	1.00	10.03	8.16	81.88	0.479	No	Yes	2.00
558	12.04	1.25	2.96	2.63	1.00	10.24	8.06	82.52	0.489	No	Yes	2.00
559	12.06	1.28	2.94	2.59	1.00	10.57	7.83	82.78	0.504	No	Yes	2.00
560	12.08	1.33	2.93	2.59	1.00	11.02	7.60	83.72	0.526	No	Yes	2.00
561	12.10	1.37	2.92	2.62	1.00	11.39	7.46	84.97	0.544	No	Yes	2.00
562	12.12	1.48	2.87	2.50	0.99	12.45	6.82	84.92	0.594	No	Yes	2.00
563	12.14	1.65	2.81	2.31	0.97	14.09	5.98	84.20	0.672	No	Yes	2.00
564	12.16	1.84	2.75	2.20	0.95	15.95	5.29	84.40	0.761	No	Yes	2.00
565	12.18	1.94	2.74	2.29	0.94	16.97	5.16	87.49	0.809	No	Yes	2.00
566	12.20	1.92	2.76	2.38	0.95	16.73	5.33	89.07	0.798	No	Yes	2.00
567	12.22	1.72	2.82	2.53	0.97	14.68	6.07	89.19	0.700	No	Yes	2.00
568	12.24	1.48	2.88	2.48	1.00	12.32	6.85	84.37	0.587	No	Yes	2.00
569	12.26	1.26	2.95	2.58	1.00	10.16	8.03	81.59	0.485	No	Yes	2.00
570	12.28	1.16	3.00	2.74	1.00	9.24	8.84	81.62	0.441	No	Yes	2.00
571	12.30	1.08	3.10	3.57	1.00	8.42	10.65	89.62	0.402	No	Yes	2.00
572	12.32	1.02	3.19	4.51	1.00	7.79	12.45	97.00	0.372	No	Yes	2.00
573	12.34	0.97	3.25	5.32	1.00	7.31	13.97	102.20	0.349	No	Yes	2.00
574	12.36	0.94	3.28	5.52	1.00	6.96	14.64	101.92	0.332	No	Yes	2.00
575	12.38	0.92	3.28	5.48	1.00	6.81	14.79	100.67	0.325	No	Yes	2.00
576	12.40	0.92	3.26	4.95	1.00	6.83	14.11	96.30	0.326	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
577	12.42	0.93	3.22	4.28	1.00	6.86	13.19	90.44	0.327	No	Yes	2.00
578	12.44	0.93	3.17	3.54	1.00	6.84	12.14	83.08	0.326	No	Yes	2.00
579	12.46	0.92	3.15	3.18	1.00	6.79	11.65	79.10	0.324	No	Yes	2.00
580	12.48	0.93	3.14	3.02	1.00	6.82	11.36	77.44	0.325	No	Yes	2.00
581	12.50	0.93	3.14	3.01	1.00	6.84	11.33	77.48	0.326	No	Yes	2.00
582	12.52	0.93	3.14	3.00	1.00	6.81	11.34	77.21	0.325	No	Yes	2.00
583	12.54	0.92	3.14	3.04	1.00	6.74	11.47	77.35	0.322	No	Yes	2.00
584	12.56	0.91	3.15	3.07	1.00	6.62	11.67	77.18	0.316	No	Yes	2.00
585	12.58	0.92	3.15	3.02	1.00	6.66	11.53	76.83	0.318	No	Yes	2.00
586	12.60	0.94	3.13	2.88	1.00	6.83	11.12	75.93	0.326	No	Yes	2.00
587	12.62	0.96	3.10	2.75	1.00	7.05	10.68	75.27	0.336	No	Yes	2.00
588	12.64	0.97	3.09	2.70	1.00	7.13	10.51	74.87	0.340	No	Yes	2.00
589	12.66	0.95	3.11	2.81	1.00	6.94	10.88	75.47	0.331	No	Yes	2.00
590	12.68	0.94	3.13	2.90	1.00	6.85	11.13	76.26	0.327	No	Yes	2.00
591	12.70	0.94	3.13	2.99	1.00	6.82	11.32	77.18	0.325	No	Yes	2.00
592	12.72	0.96	3.13	3.00	1.00	6.94	11.20	77.76	0.331	No	Yes	2.00
593	12.74	0.97	3.12	2.99	1.00	7.05	11.05	77.95	0.336	No	Yes	2.00
594	12.76	0.97	3.12	2.97	1.00	7.09	10.99	77.96	0.338	No	Yes	2.00
595	12.78	0.99	3.10	2.89	1.00	7.25	10.70	77.54	0.346	No	Yes	2.00
596	12.80	1.01	3.09	2.79	1.00	7.38	10.42	76.84	0.352	No	Yes	2.00
597	12.82	1.02	3.07	2.67	1.00	7.48	10.12	75.70	0.357	No	Yes	2.00
598	12.84	1.02	3.06	2.55	1.00	7.50	9.90	74.22	0.358	No	Yes	2.00
599	12.86	1.04	3.04	2.41	1.00	7.62	9.55	72.80	0.364	No	Yes	2.00
600	12.88	1.07	3.02	2.29	1.00	7.87	9.13	71.84	0.375	No	Yes	2.00
601	12.90	1.08	3.01	2.26	1.00	7.97	9.00	71.72	0.380	No	Yes	2.00
602	12.92	1.07	3.02	2.30	1.00	7.87	9.16	72.04	0.375	No	Yes	2.00
603	12.94	1.05	3.04	2.38	1.00	7.73	9.41	72.67	0.369	No	Yes	2.00
604	12.96	1.06	3.03	2.38	1.00	7.78	9.36	72.83	0.371	No	Yes	2.00
605	12.98	1.07	3.03	2.35	1.00	7.88	9.22	72.66	0.376	No	Yes	2.00
606	13.00	1.08	3.02	2.30	1.00	7.91	9.12	72.15	0.377	No	Yes	2.00
607	13.02	1.08	3.02	2.27	1.00	7.92	9.07	71.78	0.378	No	Yes	2.00
608	13.04	1.10	3.01	2.24	1.00	8.05	8.89	71.62	0.384	No	Yes	2.00
609	13.06	1.12	2.99	2.19	1.00	8.25	8.65	71.37	0.393	No	Yes	2.00
610	13.08	1.14	2.98	2.13	1.00	8.41	8.43	70.89	0.401	No	Yes	2.00
611	13.10	1.15	2.97	2.09	1.00	8.55	8.26	70.60	0.408	No	Yes	2.00
612	13.12	1.18	2.96	2.05	1.00	8.76	8.05	70.48	0.418	No	Yes	2.00
613	13.14	1.23	2.93	1.99	1.00	9.26	7.62	70.57	0.441	No	Yes	2.00
614	13.16	1.29	2.90	1.90	1.00	9.77	7.18	70.12	0.466	No	Yes	2.00
615	13.18	1.34	2.88	1.85	1.00	10.18	6.86	69.83	0.486	No	Yes	2.00
616	13.20	1.34	2.88	1.90	1.00	10.21	6.93	70.79	0.487	No	Yes	2.00
617	13.22	1.32	2.91	2.08	1.00	9.99	7.35	73.46	0.477	No	Yes	2.00
618	13.24	1.28	2.95	2.33	1.00	9.61	7.98	76.66	0.458	No	Yes	2.00
619	13.26	1.22	3.00	2.63	1.00	9.07	8.79	79.72	0.432	No	Yes	2.00
620	13.28	1.18	3.04	2.92	1.00	8.62	9.55	82.33	0.411	No	Yes	2.00
621	13.30	1.16	3.07	3.14	1.00	8.43	10.01	84.45	0.402	No	Yes	2.00
622	13.32	1.19	3.05	3.08	1.00	8.73	9.70	84.67	0.416	No	Yes	2.00
623	13.34	1.30	2.99	2.76	1.00	9.71	8.57	83.18	0.463	No	Yes	2.00
624	13.36	2.35	2.56	1.32	0.88	19.43	4.20	81.59	0.131	No	No	1.61

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
625	13.38	7.63	1.81	0.36	0.59	69.39	1.00	69.39	0.111	No	No	1.37
626	13.40	14.13	1.48	0.24	0.47	131.71	1.00	131.71	0.292	No	No	2.00
627	13.42	19.99	1.31	0.21	0.40	188.11	1.00	188.11	0.699	No	No	2.00
628	13.44	21.46	1.32	0.25	0.41	201.95	1.00	201.95	4.000	No	No	2.00
629	13.46	22.52	1.32	0.27	0.41	211.90	1.00	211.90	4.000	No	No	2.00
630	13.48	23.03	1.34	0.32	0.42	216.36	1.00	216.36	4.000	No	No	2.00
631	13.50	24.20	1.35	0.34	0.42	227.24	1.00	227.24	4.000	No	No	2.00
632	13.52	24.57	1.36	0.37	0.42	230.55	1.00	230.55	4.000	No	No	2.00
633	13.54	25.04	1.34	0.35	0.42	234.97	1.00	234.97	4.000	No	No	2.00
634	13.56	24.41	1.35	0.36	0.42	228.69	1.00	228.69	4.000	No	No	2.00
635	13.58	23.39	1.38	0.37	0.43	218.62	1.00	218.62	4.000	No	No	2.00
636	13.60	21.92	1.45	0.45	0.46	204.04	1.00	204.04	4.000	No	No	2.00
637	13.62	20.63	1.53	0.56	0.49	191.07	1.00	191.07	0.729	No	No	2.00
638	13.64	19.93	1.64	0.77	0.53	183.63	1.00	183.63	0.656	No	No	2.00
639	13.66	20.16	1.67	0.87	0.54	185.28	1.00	185.28	0.672	No	No	2.00
640	13.68	21.35	1.65	0.86	0.53	196.32	1.00	196.32	0.784	No	No	2.00
641	13.70	22.40	1.59	0.75	0.51	206.40	1.00	206.40	4.000	No	No	2.00
642	13.72	23.27	1.54	0.67	0.49	214.78	1.00	214.78	4.000	No	No	2.00
643	13.74	23.65	1.52	0.63	0.49	218.32	1.00	218.32	4.000	No	No	2.00
644	13.76	23.73	1.49	0.57	0.48	219.18	1.00	219.18	4.000	No	No	2.00
645	13.78	23.82	1.51	0.60	0.48	219.64	1.00	219.64	4.000	No	No	2.00
646	13.80	23.94	1.51	0.60	0.48	220.62	1.00	220.62	4.000	No	No	2.00
647	13.82	24.34	1.53	0.66	0.49	223.93	1.00	223.93	4.000	No	No	2.00
648	13.84	24.59	1.52	0.65	0.49	226.10	1.00	226.10	4.000	No	No	2.00
649	13.86	24.12	1.53	0.66	0.49	221.38	1.00	221.38	4.000	No	No	2.00
650	13.88	23.37	1.53	0.63	0.49	214.30	1.00	214.30	4.000	No	No	2.00
651	13.90	21.83	1.54	0.60	0.49	199.74	1.00	199.74	0.821	No	No	2.00
652	13.92	20.91	1.55	0.59	0.50	191.01	1.00	191.01	0.728	No	No	2.00
653	13.94	20.17	1.59	0.66	0.51	183.60	1.00	183.60	0.656	No	No	2.00
654	13.96	20.46	1.63	0.75	0.53	185.80	1.00	185.80	0.676	No	No	2.00
655	13.98	20.50	1.66	0.84	0.54	185.60	1.00	185.60	0.675	No	No	2.00
656	14.00	19.87	1.68	0.87	0.55	179.51	1.00	179.51	0.618	No	No	2.00
657	14.02	19.03	1.74	0.99	0.57	171.08	1.06	181.20	0.633	No	No	2.00
658	14.04	17.66	1.84	1.30	0.61	157.56	1.20	188.36	0.702	No	No	2.00
659	14.06	17.23	1.95	1.74	0.65	152.57	1.27	193.33	0.752	No	No	2.00
660	14.08	17.40	2.01	2.13	0.67	153.38	1.32	201.98	4.000	No	No	2.00
661	14.10	19.78	1.99	2.20	0.67	174.65	1.30	226.53	4.000	No	No	2.00
662	14.12	22.16	1.96	2.22	0.66	195.98	1.28	250.31	4.000	No	No	2.00
663	14.14	24.17	1.94	2.26	0.65	213.91	1.27	270.61	4.000	No	No	2.00
664	14.16	25.39	1.95	2.41	0.65	224.31	1.27	285.57	4.000	No	No	2.00
665	14.18	27.27	1.94	2.46	0.65	240.91	1.27	304.91	4.000	No	No	2.00
666	14.20	28.51	1.95	2.54	0.65	251.62	1.27	318.77	4.000	No	No	2.00
667	14.22	30.77	1.90	2.36	0.63	272.18	1.24	336.69	4.000	No	No	2.00
668	14.24	32.47	1.87	2.26	0.62	287.50	1.22	349.68	4.000	No	No	2.00
669	14.26	34.57	1.83	2.10	0.61	306.59	1.18	362.40	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	1.97	0.00	0.00	0.02	0.00
5.18	1.82	0.00	0.00	0.02	0.00	5.20	1.73	0.00	0.00	0.02	0.00
5.22	1.64	0.00	0.00	0.02	0.00	5.24	1.66	0.00	0.00	0.02	0.00
5.26	1.78	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	2.00	0.00	0.00	0.02	0.00
8.18	2.00	0.00	0.00	0.02	0.00	8.20	2.00	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	2.00	0.00	0.00	0.02	0.00
9.42	2.00	0.00	0.00	0.02	0.00	9.44	2.00	0.00	0.00	0.02	0.00
9.46	2.00	0.00	0.00	0.02	0.00	9.48	2.00	0.00	0.00	0.02	0.00
9.50	2.00	0.00	0.00	0.02	0.00	9.52	2.00	0.00	0.00	0.02	0.00
9.54	2.00	0.00	0.00	0.02	0.00	9.56	2.00	0.00	0.00	0.02	0.00
9.58	2.00	0.00	0.00	0.02	0.00	9.60	2.00	0.00	0.00	0.02	0.00
9.62	1.96	0.00	0.00	0.02	0.00	9.64	1.82	0.00	0.00	0.02	0.00
9.66	1.82	0.00	0.00	0.02	0.00	9.68	1.82	0.00	0.00	0.02	0.00
9.70	1.82	0.00	0.00	0.02	0.00	9.72	1.84	0.00	0.00	0.02	0.00
9.74	2.00	0.00	0.00	0.02	0.00	9.76	2.00	0.00	0.00	0.02	0.00
9.78	2.00	0.00	0.00	0.02	0.00	9.80	2.00	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	2.00	0.00	0.00	0.02	0.00	9.88	2.00	0.00	0.00	0.02	0.00
9.90	2.00	0.00	0.00	0.02	0.00	9.92	2.00	0.00	0.00	0.02	0.00
9.94	2.00	0.00	0.00	0.02	0.00	9.96	2.00	0.00	0.00	0.02	0.00
9.98	2.00	0.00	0.00	0.02	0.00	10.00	2.00	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	1.76	0.00	0.00	0.02	0.00
10.22	1.70	0.00	0.00	0.02	0.00	10.24	1.65	0.00	0.00	0.02	0.00
10.26	1.56	0.00	0.00	0.02	0.00	10.28	2.00	0.00	0.00	0.02	0.00
10.30	2.00	0.00	0.00	0.02	0.00	10.32	2.00	0.00	0.00	0.02	0.00
10.34	2.00	0.00	0.00	0.02	0.00	10.36	2.00	0.00	0.00	0.02	0.00
10.38	2.00	0.00	0.00	0.02	0.00	10.40	2.00	0.00	0.00	0.02	0.00
10.42	2.00	0.00	0.00	0.02	0.00	10.44	2.00	0.00	0.00	0.02	0.00
10.46	2.00	0.00	0.00	0.02	0.00	10.48	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.50	2.00	0.00	0.00	0.02	0.00	10.52	2.00	0.00	0.00	0.02	0.00
10.54	2.00	0.00	0.00	0.02	0.00	10.56	2.00	0.00	0.00	0.02	0.00
10.58	2.00	0.00	0.00	0.02	0.00	10.60	2.00	0.00	0.00	0.02	0.00
10.62	2.00	0.00	0.00	0.02	0.00	10.64	2.00	0.00	0.00	0.02	0.00
10.66	2.00	0.00	0.00	0.02	0.00	10.68	2.00	0.00	0.00	0.02	0.00
10.70	2.00	0.00	0.00	0.02	0.00	10.72	2.00	0.00	0.00	0.02	0.00
10.74	2.00	0.00	0.00	0.02	0.00	10.76	2.00	0.00	0.00	0.02	0.00
10.78	2.00	0.00	0.00	0.02	0.00	10.80	2.00	0.00	0.00	0.02	0.00
10.82	2.00	0.00	0.00	0.02	0.00	10.84	2.00	0.00	0.00	0.02	0.00
10.86	2.00	0.00	0.00	0.02	0.00	10.88	2.00	0.00	0.00	0.02	0.00
10.90	2.00	0.00	0.00	0.02	0.00	10.92	2.00	0.00	0.00	0.02	0.00
10.94	2.00	0.00	0.00	0.02	0.00	10.96	2.00	0.00	0.00	0.02	0.00
10.98	2.00	0.00	0.00	0.02	0.00	11.00	2.00	0.00	0.00	0.02	0.00
11.02	2.00	0.00	0.00	0.02	0.00	11.04	2.00	0.00	0.00	0.02	0.00
11.06	2.00	0.00	0.00	0.02	0.00	11.08	2.00	0.00	0.00	0.02	0.00
11.10	2.00	0.00	0.00	0.02	0.00	11.12	2.00	0.00	0.00	0.02	0.00
11.14	2.00	0.00	0.00	0.02	0.00	11.16	2.00	0.00	0.00	0.02	0.00
11.18	2.00	0.00	0.00	0.02	0.00	11.20	2.00	0.00	0.00	0.02	0.00
11.22	2.00	0.00	0.00	0.02	0.00	11.24	1.43	0.00	0.00	0.02	0.00
11.26	1.47	0.00	0.00	0.02	0.00	11.28	1.50	0.00	0.00	0.02	0.00
11.30	2.00	0.00	0.00	0.02	0.00	11.32	2.00	0.00	0.00	0.02	0.00
11.34	2.00	0.00	0.00	0.02	0.00	11.36	2.00	0.00	0.00	0.02	0.00
11.38	2.00	0.00	0.00	0.02	0.00	11.40	2.00	0.00	0.00	0.02	0.00
11.42	2.00	0.00	0.00	0.02	0.00	11.44	2.00	0.00	0.00	0.02	0.00
11.46	2.00	0.00	0.00	0.02	0.00	11.48	2.00	0.00	0.00	0.02	0.00
11.50	2.00	0.00	0.00	0.02	0.00	11.52	2.00	0.00	0.00	0.02	0.00
11.54	2.00	0.00	0.00	0.02	0.00	11.56	2.00	0.00	0.00	0.02	0.00
11.58	2.00	0.00	0.00	0.02	0.00	11.60	2.00	0.00	0.00	0.02	0.00
11.62	2.00	0.00	0.00	0.02	0.00	11.64	2.00	0.00	0.00	0.02	0.00
11.66	2.00	0.00	0.00	0.02	0.00	11.68	2.00	0.00	0.00	0.02	0.00
11.70	2.00	0.00	0.00	0.02	0.00	11.72	2.00	0.00	0.00	0.02	0.00
11.74	2.00	0.00	0.00	0.02	0.00	11.76	2.00	0.00	0.00	0.02	0.00
11.78	2.00	0.00	0.00	0.02	0.00	11.80	2.00	0.00	0.00	0.02	0.00
11.82	2.00	0.00	0.00	0.02	0.00	11.84	2.00	0.00	0.00	0.02	0.00
11.86	2.00	0.00	0.00	0.02	0.00	11.88	2.00	0.00	0.00	0.02	0.00
11.90	2.00	0.00	0.00	0.02	0.00	11.92	2.00	0.00	0.00	0.02	0.00
11.94	2.00	0.00	0.00	0.02	0.00	11.96	2.00	0.00	0.00	0.02	0.00
11.98	2.00	0.00	0.00	0.02	0.00	12.00	2.00	0.00	0.00	0.02	0.00
12.02	2.00	0.00	0.00	0.02	0.00	12.04	2.00	0.00	0.00	0.02	0.00
12.06	2.00	0.00	0.00	0.02	0.00	12.08	2.00	0.00	0.00	0.02	0.00
12.10	2.00	0.00	0.00	0.02	0.00	12.12	2.00	0.00	0.00	0.02	0.00
12.14	2.00	0.00	0.00	0.02	0.00	12.16	2.00	0.00	0.00	0.02	0.00
12.18	2.00	0.00	0.00	0.02	0.00	12.20	2.00	0.00	0.00	0.02	0.00
12.22	2.00	0.00	0.00	0.02	0.00	12.24	2.00	0.00	0.00	0.02	0.00
12.26	2.00	0.00	0.00	0.02	0.00	12.28	2.00	0.00	0.00	0.02	0.00
12.30	2.00	0.00	0.00	0.02	0.00	12.32	2.00	0.00	0.00	0.02	0.00
12.34	2.00	0.00	0.00	0.02	0.00	12.36	2.00	0.00	0.00	0.02	0.00
12.38	2.00	0.00	0.00	0.02	0.00	12.40	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
12.42	2.00	0.00	0.00	0.02	0.00	12.44	2.00	0.00	0.00	0.02	0.00
12.46	2.00	0.00	0.00	0.02	0.00	12.48	2.00	0.00	0.00	0.02	0.00
12.50	2.00	0.00	0.00	0.02	0.00	12.52	2.00	0.00	0.00	0.02	0.00
12.54	2.00	0.00	0.00	0.02	0.00	12.56	2.00	0.00	0.00	0.02	0.00
12.58	2.00	0.00	0.00	0.02	0.00	12.60	2.00	0.00	0.00	0.02	0.00
12.62	2.00	0.00	0.00	0.02	0.00	12.64	2.00	0.00	0.00	0.02	0.00
12.66	2.00	0.00	0.00	0.02	0.00	12.68	2.00	0.00	0.00	0.02	0.00
12.70	2.00	0.00	0.00	0.02	0.00	12.72	2.00	0.00	0.00	0.02	0.00
12.74	2.00	0.00	0.00	0.02	0.00	12.76	2.00	0.00	0.00	0.02	0.00
12.78	2.00	0.00	0.00	0.02	0.00	12.80	2.00	0.00	0.00	0.02	0.00
12.82	2.00	0.00	0.00	0.02	0.00	12.84	2.00	0.00	0.00	0.02	0.00
12.86	2.00	0.00	0.00	0.02	0.00	12.88	2.00	0.00	0.00	0.02	0.00
12.90	2.00	0.00	0.00	0.02	0.00	12.92	2.00	0.00	0.00	0.02	0.00
12.94	2.00	0.00	0.00	0.02	0.00	12.96	2.00	0.00	0.00	0.02	0.00
12.98	2.00	0.00	0.00	0.02	0.00	13.00	2.00	0.00	0.00	0.02	0.00
13.02	2.00	0.00	0.00	0.02	0.00	13.04	2.00	0.00	0.00	0.02	0.00
13.06	2.00	0.00	0.00	0.02	0.00	13.08	2.00	0.00	0.00	0.02	0.00
13.10	2.00	0.00	0.00	0.02	0.00	13.12	2.00	0.00	0.00	0.02	0.00
13.14	2.00	0.00	0.00	0.02	0.00	13.16	2.00	0.00	0.00	0.02	0.00
13.18	2.00	0.00	0.00	0.02	0.00	13.20	2.00	0.00	0.00	0.02	0.00
13.22	2.00	0.00	0.00	0.02	0.00	13.24	2.00	0.00	0.00	0.02	0.00
13.26	2.00	0.00	0.00	0.02	0.00	13.28	2.00	0.00	0.00	0.02	0.00
13.30	2.00	0.00	0.00	0.02	0.00	13.32	2.00	0.00	0.00	0.02	0.00
13.34	2.00	0.00	0.00	0.02	0.00	13.36	1.61	0.00	0.00	0.02	0.00
13.38	1.37	0.00	0.00	0.02	0.00	13.40	2.00	0.00	0.00	0.02	0.00
13.42	2.00	0.00	0.00	0.02	0.00	13.44	2.00	0.00	0.00	0.02	0.00
13.46	2.00	0.00	0.00	0.02	0.00	13.48	2.00	0.00	0.00	0.02	0.00
13.50	2.00	0.00	0.00	0.02	0.00	13.52	2.00	0.00	0.00	0.02	0.00
13.54	2.00	0.00	0.00	0.02	0.00	13.56	2.00	0.00	0.00	0.02	0.00
13.58	2.00	0.00	0.00	0.02	0.00	13.60	2.00	0.00	0.00	0.02	0.00
13.62	2.00	0.00	0.00	0.02	0.00	13.64	2.00	0.00	0.00	0.02	0.00
13.66	2.00	0.00	0.00	0.02	0.00	13.68	2.00	0.00	0.00	0.02	0.00
13.70	2.00	0.00	0.00	0.02	0.00	13.72	2.00	0.00	0.00	0.02	0.00
13.74	2.00	0.00	0.00	0.02	0.00	13.76	2.00	0.00	0.00	0.02	0.00
13.78	2.00	0.00	0.00	0.02	0.00	13.80	2.00	0.00	0.00	0.02	0.00
13.82	2.00	0.00	0.00	0.02	0.00	13.84	2.00	0.00	0.00	0.02	0.00
13.86	2.00	0.00	0.00	0.02	0.00	13.88	2.00	0.00	0.00	0.02	0.00
13.90	2.00	0.00	0.00	0.02	0.00	13.92	2.00	0.00	0.00	0.02	0.00
13.94	2.00	0.00	0.00	0.02	0.00	13.96	2.00	0.00	0.00	0.02	0.00
13.98	2.00	0.00	0.00	0.02	0.00	14.00	2.00	0.00	0.00	0.02	0.00
14.02	2.00	0.00	0.00	0.02	0.00	14.04	2.00	0.00	0.00	0.02	0.00
14.06	2.00	0.00	0.00	0.02	0.00	14.08	2.00	0.00	0.00	0.02	0.00
14.10	2.00	0.00	0.00	0.02	0.00	14.12	2.00	0.00	0.00	0.02	0.00
14.14	2.00	0.00	0.00	0.02	0.00	14.16	2.00	0.00	0.00	0.02	0.00
14.18	2.00	0.00	0.00	0.02	0.00	14.20	2.00	0.00	0.00	0.02	0.00
14.22	2.00	0.00	0.00	0.02	0.00	14.24	2.00	0.00	0.00	0.02	0.00
14.26	2.00	0.00	0.00	0.02	0.00						

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

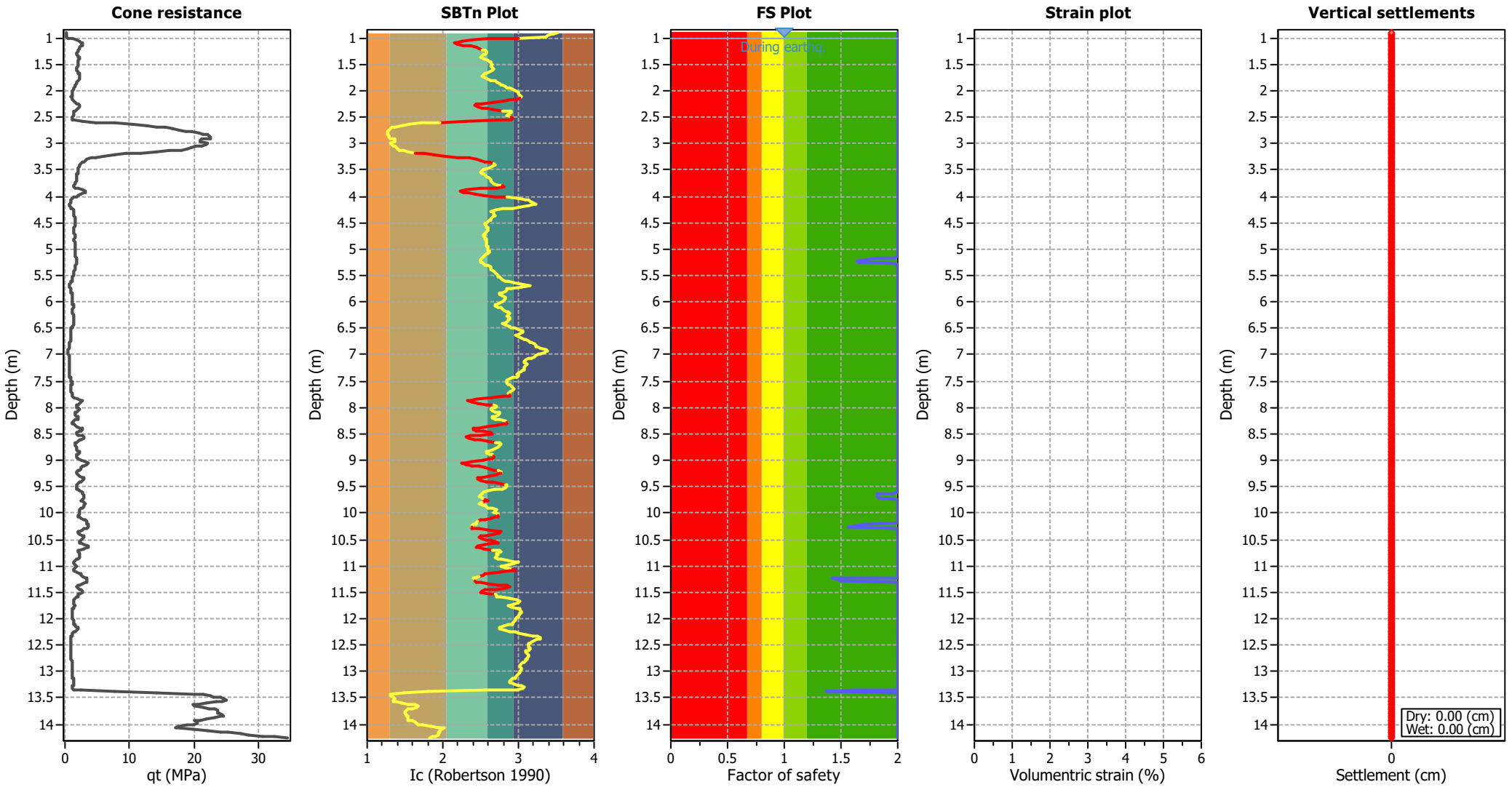
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
1.00	88.51	2.00	0.00	0.94	0.00	1.02	125.21	2.00	0.00	0.94	0.00
1.04	74.64	2.00	0.00	0.94	0.00	1.06	76.46	2.00	0.00	0.94	0.00
1.08	78.80	2.00	0.00	0.94	0.00	1.10	82.54	2.00	0.00	0.94	0.00
1.12	87.02	2.00	0.00	0.94	0.00	1.14	94.69	2.00	0.00	0.94	0.00
1.16	104.73	2.00	0.00	0.94	0.00	1.18	114.91	2.00	0.00	0.93	0.00
1.20	122.35	2.00	0.00	0.93	0.00	1.22	136.53	2.00	0.00	0.93	0.00
1.24	168.99	2.00	0.00	0.93	0.00	1.26	183.12	2.00	0.00	0.93	0.00
1.28	168.42	2.00	0.00	0.93	0.00	1.30	156.60	2.00	0.00	0.93	0.00
1.32	139.61	2.00	0.00	0.93	0.00	1.34	123.06	2.00	0.00	0.93	0.00
1.36	113.44	2.00	0.00	0.92	0.00	1.38	120.17	2.00	0.00	0.92	0.00
1.40	142.58	2.00	0.00	0.92	0.00	1.42	198.55	2.00	0.00	0.92	0.00
1.44	237.85	2.00	0.00	0.92	0.00	1.46	268.11	2.00	0.00	0.92	0.00
1.48	264.31	2.00	0.00	0.92	0.00	1.50	279.99	2.00	0.00	0.92	0.00
1.52	268.57	2.00	0.00	0.92	0.00	1.54	263.73	2.00	0.00	0.91	0.00
1.56	261.15	2.00	0.00	0.91	0.00	1.58	296.42	2.00	0.00	0.91	0.00
1.60	295.38	2.00	0.00	0.91	0.00	1.62	275.61	2.00	0.00	0.91	0.00
1.64	228.93	2.00	0.00	0.91	0.00	1.66	198.61	2.00	0.00	0.91	0.00
1.68	179.41	2.00	0.00	0.91	0.00	1.70	162.80	2.00	0.00	0.91	0.00
1.72	150.19	2.00	0.00	0.90	0.00	1.74	150.23	2.00	0.00	0.90	0.00
1.76	172.20	2.00	0.00	0.90	0.00	1.78	218.83	2.00	0.00	0.90	0.00
1.80	273.14	2.00	0.00	0.90	0.00	1.82	338.25	2.00	0.00	0.90	0.00
1.84	169.77	2.00	0.00	0.90	0.00	1.86	172.15	2.00	0.00	0.90	0.00
1.88	173.99	2.00	0.00	0.90	0.00	1.90	175.74	2.00	0.00	0.89	0.00
1.92	176.97	2.00	0.00	0.89	0.00	1.94	177.11	2.00	0.00	0.89	0.00
1.96	178.41	2.00	0.00	0.89	0.00	1.98	181.49	2.00	0.00	0.89	0.00
2.00	185.35	2.00	0.00	0.89	0.00	2.02	187.36	2.00	0.00	0.89	0.00
2.04	188.42	2.00	0.00	0.89	0.00	2.06	191.04	2.00	0.00	0.89	0.00
2.08	191.42	2.00	0.00	0.88	0.00	2.10	188.22	2.00	0.00	0.88	0.00
2.12	180.11	2.00	0.00	0.88	0.00	2.14	172.23	2.00	0.00	0.88	0.00
2.16	164.00	2.00	0.00	0.88	0.00	2.18	152.16	2.00	0.00	0.88	0.00
2.20	137.92	2.00	0.00	0.88	0.00	2.22	231.71	2.00	0.00	0.88	0.00
2.24	114.33	2.00	0.00	0.88	0.00	2.26	104.91	2.00	0.00	0.87	0.00
2.28	106.65	2.00	0.00	0.87	0.00	2.30	116.75	2.00	0.00	0.87	0.00
2.32	134.32	2.00	0.00	0.87	0.00	2.34	177.53	2.00	0.00	0.87	0.00
2.36	297.39	2.00	0.00	0.87	0.00	2.38	171.11	2.00	0.00	0.87	0.00
2.40	184.23	2.00	0.00	0.87	0.00	2.42	180.75	2.00	0.00	0.87	0.00
2.44	170.98	2.00	0.00	0.86	0.00	2.46	167.23	2.00	0.00	0.86	0.00
2.48	166.65	2.00	0.00	0.86	0.00	2.50	164.43	2.00	0.00	0.86	0.00
2.52	157.65	2.00	0.00	0.86	0.00	2.54	148.63	2.00	0.00	0.86	0.00
2.56	134.20	2.00	0.00	0.86	0.00	2.58	100.16	2.00	0.00	0.86	0.00
2.60	117.25	2.00	0.00	0.86	0.00	2.62	145.44	2.00	0.00	0.85	0.00
2.64	180.63	2.00	0.00	0.85	0.00	2.66	208.69	2.00	0.00	0.85	0.00
2.68	226.99	2.00	0.00	0.85	0.00	2.70	242.36	2.00	0.00	0.85	0.00
2.72	257.41	2.00	0.00	0.85	0.00	2.74	269.64	2.00	0.00	0.85	0.00
2.76	282.10	2.00	0.00	0.85	0.00	2.78	294.71	2.00	0.00	0.85	0.00
2.80	309.06	2.00	0.00	0.84	0.00	2.82	321.53	2.00	0.00	0.84	0.00
2.84	331.49	2.00	0.00	0.84	0.00	2.86	336.68	2.00	0.00	0.84	0.00
2.88	339.20	2.00	0.00	0.84	0.00	2.90	340.36	2.00	0.00	0.84	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.92	329.18	2.00	0.00	0.84	0.00	2.94	325.67	2.00	0.00	0.84	0.00
2.96	322.69	2.00	0.00	0.84	0.00	2.98	331.00	2.00	0.00	0.83	0.00
3.00	331.75	2.00	0.00	0.83	0.00	3.02	327.73	2.00	0.00	0.83	0.00
3.04	320.69	2.00	0.00	0.83	0.00	3.06	310.94	2.00	0.00	0.83	0.00
3.08	301.85	2.00	0.00	0.83	0.00	3.10	291.65	2.00	0.00	0.83	0.00
3.12	279.75	2.00	0.00	0.83	0.00	3.14	257.74	2.00	0.00	0.83	0.00
3.16	230.25	2.00	0.00	0.82	0.00	3.18	196.83	2.00	0.00	0.82	0.00
3.20	183.40	2.00	0.00	0.82	0.00	3.22	172.45	2.00	0.00	0.82	0.00
3.24	157.06	2.00	0.00	0.82	0.00	3.26	149.01	2.00	0.00	0.82	0.00
3.28	159.79	2.00	0.00	0.82	0.00	3.30	175.07	2.00	0.00	0.82	0.00
3.32	174.25	2.00	0.00	0.82	0.00	3.34	232.84	2.00	0.00	0.81	0.00
3.36	320.40	2.00	0.00	0.81	0.00	3.38	411.52	2.00	0.00	0.81	0.00
3.40	447.50	2.00	0.00	0.81	0.00	3.42	419.84	2.00	0.00	0.81	0.00
3.44	319.24	2.00	0.00	0.81	0.00	3.46	230.71	2.00	0.00	0.81	0.00
3.48	165.00	2.00	0.00	0.81	0.00	3.50	137.25	2.00	0.00	0.81	0.00
3.52	117.95	2.00	0.00	0.80	0.00	3.54	106.72	2.00	0.00	0.80	0.00
3.56	110.61	2.00	0.00	0.80	0.00	3.58	127.32	2.00	0.00	0.80	0.00
3.60	144.10	2.00	0.00	0.80	0.00	3.62	156.16	2.00	0.00	0.80	0.00
3.64	168.61	2.00	0.00	0.80	0.00	3.66	187.11	2.00	0.00	0.80	0.00
3.68	212.86	2.00	0.00	0.80	0.00	3.70	223.28	2.00	0.00	0.79	0.00
3.72	220.92	2.00	0.00	0.79	0.00	3.74	229.08	2.00	0.00	0.79	0.00
3.76	267.93	2.00	0.00	0.79	0.00	3.78	136.39	2.00	0.00	0.79	0.00
3.80	138.02	2.00	0.00	0.79	0.00	3.82	138.52	2.00	0.00	0.79	0.00
3.84	131.46	2.00	0.00	0.79	0.00	3.86	114.06	2.00	0.00	0.79	0.00
3.88	104.25	2.00	0.00	0.78	0.00	3.90	103.68	2.00	0.00	0.78	0.00
3.92	108.51	2.00	0.00	0.78	0.00	3.94	114.25	2.00	0.00	0.78	0.00
3.96	123.31	2.00	0.00	0.78	0.00	3.98	152.10	2.00	0.00	0.78	0.00
4.00	309.82	2.00	0.00	0.78	0.00	4.02	162.84	2.00	0.00	0.78	0.00
4.04	178.48	2.00	0.00	0.78	0.00	4.06	186.96	2.00	0.00	0.77	0.00
4.08	189.85	2.00	0.00	0.77	0.00	4.10	187.37	2.00	0.00	0.77	0.00
4.12	182.86	2.00	0.00	0.77	0.00	4.14	166.83	2.00	0.00	0.77	0.00
4.16	151.18	2.00	0.00	0.77	0.00	4.18	135.27	2.00	0.00	0.77	0.00
4.20	130.26	2.00	0.00	0.77	0.00	4.22	122.38	2.00	0.00	0.77	0.00
4.24	112.19	2.00	0.00	0.76	0.00	4.26	224.15	2.00	0.00	0.76	0.00
4.28	178.56	2.00	0.00	0.76	0.00	4.30	191.41	2.00	0.00	0.76	0.00
4.32	214.40	2.00	0.00	0.76	0.00	4.34	235.26	2.00	0.00	0.76	0.00
4.36	239.98	2.00	0.00	0.76	0.00	4.38	230.31	2.00	0.00	0.76	0.00
4.40	213.69	2.00	0.00	0.76	0.00	4.42	196.39	2.00	0.00	0.75	0.00
4.44	182.48	2.00	0.00	0.75	0.00	4.46	166.66	2.00	0.00	0.75	0.00
4.48	145.50	2.00	0.00	0.75	0.00	4.50	127.44	2.00	0.00	0.75	0.00
4.52	114.97	2.00	0.00	0.75	0.00	4.54	115.10	2.00	0.00	0.75	0.00
4.56	119.63	2.00	0.00	0.75	0.00	4.58	127.82	2.00	0.00	0.75	0.00
4.60	133.35	2.00	0.00	0.74	0.00	4.62	136.84	2.00	0.00	0.74	0.00
4.64	136.88	2.00	0.00	0.74	0.00	4.66	131.79	2.00	0.00	0.74	0.00
4.68	122.41	2.00	0.00	0.74	0.00	4.70	112.39	2.00	0.00	0.74	0.00
4.72	104.93	2.00	0.00	0.74	0.00	4.74	101.53	2.00	0.00	0.74	0.00
4.76	99.73	2.00	0.00	0.74	0.00	4.78	102.30	2.00	0.00	0.73	0.00
4.80	108.84	2.00	0.00	0.73	0.00	4.82	117.89	2.00	0.00	0.73	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.84	124.86	2.00	0.00	0.73	0.00	4.86	127.28	2.00	0.00	0.73	0.00
4.88	126.56	2.00	0.00	0.73	0.00	4.90	125.30	2.00	0.00	0.73	0.00
4.92	123.27	2.00	0.00	0.73	0.00	4.94	129.13	2.00	0.00	0.73	0.00
4.96	136.50	2.00	0.00	0.72	0.00	4.98	142.60	2.00	0.00	0.72	0.00
5.00	143.74	2.00	0.00	0.72	0.00	5.02	147.36	2.00	0.00	0.72	0.00
5.04	152.32	2.00	0.00	0.72	0.00	5.06	151.28	2.00	0.00	0.72	0.00
5.08	143.50	2.00	0.00	0.72	0.00	5.10	132.46	2.00	0.00	0.72	0.00
5.12	118.20	2.00	0.00	0.72	0.00	5.14	105.28	2.00	0.00	0.71	0.00
5.16	96.61	1.97	0.00	0.71	0.00	5.18	91.70	1.82	0.00	0.71	0.00
5.20	88.23	1.73	0.00	0.71	0.00	5.22	84.68	1.64	0.00	0.71	0.00
5.24	85.60	1.66	0.00	0.71	0.00	5.26	90.40	1.78	0.00	0.71	0.00
5.28	100.71	2.00	0.00	0.71	0.00	5.30	117.96	2.00	0.00	0.71	0.00
5.32	142.51	2.00	0.00	0.70	0.00	5.34	172.41	2.00	0.00	0.70	0.00
5.36	170.83	2.00	0.00	0.70	0.00	5.38	170.62	2.00	0.00	0.70	0.00
5.40	169.56	2.00	0.00	0.70	0.00	5.42	198.18	2.00	0.00	0.70	0.00
5.44	220.36	2.00	0.00	0.70	0.00	5.46	106.34	2.00	0.00	0.70	0.00
5.48	105.46	2.00	0.00	0.70	0.00	5.50	103.96	2.00	0.00	0.69	0.00
5.52	102.43	2.00	0.00	0.69	0.00	5.54	102.24	2.00	0.00	0.69	0.00
5.56	102.97	2.00	0.00	0.69	0.00	5.58	104.29	2.00	0.00	0.69	0.00
5.60	105.02	2.00	0.00	0.69	0.00	5.62	105.36	2.00	0.00	0.69	0.00
5.64	108.03	2.00	0.00	0.69	0.00	5.66	111.44	2.00	0.00	0.69	0.00
5.68	114.24	2.00	0.00	0.68	0.00	5.70	111.97	2.00	0.00	0.68	0.00
5.72	105.32	2.00	0.00	0.68	0.00	5.74	96.59	2.00	0.00	0.68	0.00
5.76	91.84	2.00	0.00	0.68	0.00	5.78	90.96	2.00	0.00	0.68	0.00
5.80	90.10	2.00	0.00	0.68	0.00	5.82	87.55	2.00	0.00	0.68	0.00
5.84	84.75	2.00	0.00	0.68	0.00	5.86	86.52	2.00	0.00	0.67	0.00
5.88	92.15	2.00	0.00	0.67	0.00	5.90	99.10	2.00	0.00	0.67	0.00
5.92	101.27	2.00	0.00	0.67	0.00	5.94	100.30	2.00	0.00	0.67	0.00
5.96	97.58	2.00	0.00	0.67	0.00	5.98	96.15	2.00	0.00	0.67	0.00
6.00	94.36	2.00	0.00	0.67	0.00	6.02	91.11	2.00	0.00	0.67	0.00
6.04	88.65	2.00	0.00	0.66	0.00	6.06	178.90	2.00	0.00	0.66	0.00
6.08	188.38	2.00	0.00	0.66	0.00	6.10	96.91	2.00	0.00	0.66	0.00
6.12	103.56	2.00	0.00	0.66	0.00	6.14	108.81	2.00	0.00	0.66	0.00
6.16	113.15	2.00	0.00	0.66	0.00	6.18	119.76	2.00	0.00	0.66	0.00
6.20	125.56	2.00	0.00	0.66	0.00	6.22	130.03	2.00	0.00	0.65	0.00
6.24	130.05	2.00	0.00	0.65	0.00	6.26	129.61	2.00	0.00	0.65	0.00
6.28	130.71	2.00	0.00	0.65	0.00	6.30	133.87	2.00	0.00	0.65	0.00
6.32	134.77	2.00	0.00	0.65	0.00	6.34	131.71	2.00	0.00	0.65	0.00
6.36	130.03	2.00	0.00	0.65	0.00	6.38	128.63	2.00	0.00	0.65	0.00
6.40	125.63	2.00	0.00	0.64	0.00	6.42	121.74	2.00	0.00	0.64	0.00
6.44	120.38	2.00	0.00	0.64	0.00	6.46	115.97	2.00	0.00	0.64	0.00
6.48	111.85	2.00	0.00	0.64	0.00	6.50	110.21	2.00	0.00	0.64	0.00
6.52	114.92	2.00	0.00	0.64	0.00	6.54	119.55	2.00	0.00	0.64	0.00
6.56	124.38	2.00	0.00	0.64	0.00	6.58	125.88	2.00	0.00	0.63	0.00
6.60	125.22	2.00	0.00	0.63	0.00	6.62	120.51	2.00	0.00	0.63	0.00
6.64	119.52	2.00	0.00	0.63	0.00	6.66	121.36	2.00	0.00	0.63	0.00
6.68	124.96	2.00	0.00	0.63	0.00	6.70	126.71	2.00	0.00	0.63	0.00
6.72	127.27	2.00	0.00	0.63	0.00	6.74	124.16	2.00	0.00	0.63	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.76	121.44	2.00	0.00	0.62	0.00	6.78	119.27	2.00	0.00	0.62	0.00
6.80	119.90	2.00	0.00	0.62	0.00	6.82	119.98	2.00	0.00	0.62	0.00
6.84	117.50	2.00	0.00	0.62	0.00	6.86	114.54	2.00	0.00	0.62	0.00
6.88	112.76	2.00	0.00	0.62	0.00	6.90	111.18	2.00	0.00	0.62	0.00
6.92	108.46	2.00	0.00	0.62	0.00	6.94	103.52	2.00	0.00	0.61	0.00
6.96	99.77	2.00	0.00	0.61	0.00	6.98	96.09	2.00	0.00	0.61	0.00
7.00	94.31	2.00	0.00	0.61	0.00	7.02	91.27	2.00	0.00	0.61	0.00
7.04	89.73	2.00	0.00	0.61	0.00	7.06	87.37	2.00	0.00	0.61	0.00
7.08	86.13	2.00	0.00	0.61	0.00	7.10	85.18	2.00	0.00	0.61	0.00
7.12	85.22	2.00	0.00	0.60	0.00	7.14	85.98	2.00	0.00	0.60	0.00
7.16	86.01	2.00	0.00	0.60	0.00	7.18	85.27	2.00	0.00	0.60	0.00
7.20	83.40	2.00	0.00	0.60	0.00	7.22	81.80	2.00	0.00	0.60	0.00
7.24	81.25	2.00	0.00	0.60	0.00	7.26	81.36	2.00	0.00	0.60	0.00
7.28	81.51	2.00	0.00	0.60	0.00	7.30	81.05	2.00	0.00	0.59	0.00
7.32	80.27	2.00	0.00	0.59	0.00	7.34	80.04	2.00	0.00	0.59	0.00
7.36	80.90	2.00	0.00	0.59	0.00	7.38	83.40	2.00	0.00	0.59	0.00
7.40	82.79	2.00	0.00	0.59	0.00	7.42	81.23	2.00	0.00	0.59	0.00
7.44	78.84	2.00	0.00	0.59	0.00	7.46	79.60	2.00	0.00	0.59	0.00
7.48	81.06	2.00	0.00	0.58	0.00	7.50	82.16	2.00	0.00	0.58	0.00
7.52	83.14	2.00	0.00	0.58	0.00	7.54	84.80	2.00	0.00	0.58	0.00
7.56	85.87	2.00	0.00	0.58	0.00	7.58	86.54	2.00	0.00	0.58	0.00
7.60	86.93	2.00	0.00	0.58	0.00	7.62	88.69	2.00	0.00	0.58	0.00
7.64	90.48	2.00	0.00	0.58	0.00	7.66	90.68	2.00	0.00	0.57	0.00
7.68	89.62	2.00	0.00	0.57	0.00	7.70	88.15	2.00	0.00	0.57	0.00
7.72	87.82	2.00	0.00	0.57	0.00	7.74	87.96	2.00	0.00	0.57	0.00
7.76	89.86	2.00	0.00	0.57	0.00	7.78	87.82	2.00	0.00	0.57	0.00
7.80	82.41	2.00	0.00	0.57	0.00	7.82	133.68	2.00	0.00	0.57	0.00
7.84	69.10	2.00	0.00	0.56	0.00	7.86	69.71	2.00	0.00	0.56	0.00
7.88	71.20	2.00	0.00	0.56	0.00	7.90	74.76	2.00	0.00	0.56	0.00
7.92	82.06	2.00	0.00	0.56	0.00	7.94	125.57	2.00	0.00	0.56	0.00
7.96	209.14	2.00	0.00	0.56	0.00	7.98	111.82	2.00	0.00	0.56	0.00
8.00	241.49	2.00	0.00	0.56	0.00	8.02	204.08	2.00	0.00	0.55	0.00
8.04	186.33	2.00	0.00	0.55	0.00	8.06	202.86	2.00	0.00	0.55	0.00
8.08	111.03	2.00	0.00	0.55	0.00	8.10	108.40	2.00	0.00	0.55	0.00
8.12	105.86	2.00	0.00	0.55	0.00	8.14	106.50	2.00	0.00	0.55	0.00
8.16	228.46	2.00	0.00	0.55	0.00	8.18	194.83	2.00	0.00	0.55	0.00
8.20	193.32	2.00	0.00	0.54	0.00	8.22	225.46	2.00	0.00	0.54	0.00
8.24	108.35	2.00	0.00	0.54	0.00	8.26	102.70	2.00	0.00	0.54	0.00
8.28	97.47	2.00	0.00	0.54	0.00	8.30	95.30	2.00	0.00	0.54	0.00
8.32	91.97	2.00	0.00	0.54	0.00	8.34	86.23	2.00	0.00	0.54	0.00
8.36	107.47	2.00	0.00	0.54	0.00	8.38	78.18	2.00	0.00	0.53	0.00
8.40	78.02	2.00	0.00	0.53	0.00	8.42	78.75	2.00	0.00	0.53	0.00
8.44	80.35	2.00	0.00	0.53	0.00	8.46	97.42	2.00	0.00	0.53	0.00
8.48	147.11	2.00	0.00	0.53	0.00	8.50	161.75	2.00	0.00	0.53	0.00
8.52	73.52	2.00	0.00	0.53	0.00	8.54	70.32	2.00	0.00	0.53	0.00
8.56	70.26	2.00	0.00	0.52	0.00	8.58	71.28	2.00	0.00	0.52	0.00
8.60	73.10	2.00	0.00	0.52	0.00	8.62	78.62	2.00	0.00	0.52	0.00
8.64	131.55	2.00	0.00	0.52	0.00	8.66	102.20	2.00	0.00	0.52	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.68	105.63	2.00	0.00	0.52	0.00	8.70	105.26	2.00	0.00	0.52	0.00
8.72	103.54	2.00	0.00	0.52	0.00	8.74	102.00	2.00	0.00	0.51	0.00
8.76	100.20	2.00	0.00	0.51	0.00	8.78	202.88	2.00	0.00	0.51	0.00
8.80	154.28	2.00	0.00	0.51	0.00	8.82	119.97	2.00	0.00	0.51	0.00
8.84	110.41	2.00	0.00	0.51	0.00	8.86	122.61	2.00	0.00	0.51	0.00
8.88	144.17	2.00	0.00	0.51	0.00	8.90	174.43	2.00	0.00	0.51	0.00
8.92	185.65	2.00	0.00	0.50	0.00	8.94	177.47	2.00	0.00	0.50	0.00
8.96	163.19	2.00	0.00	0.50	0.00	8.98	151.24	2.00	0.00	0.50	0.00
9.00	98.87	2.00	0.00	0.50	0.00	9.02	82.58	2.00	0.00	0.50	0.00
9.04	77.76	2.00	0.00	0.50	0.00	9.06	72.73	2.00	0.00	0.50	0.00
9.08	75.33	2.00	0.00	0.50	0.00	9.10	80.20	2.00	0.00	0.49	0.00
9.12	90.75	2.00	0.00	0.49	0.00	9.14	118.87	2.00	0.00	0.49	0.00
9.16	164.46	2.00	0.00	0.49	0.00	9.18	221.93	2.00	0.00	0.49	0.00
9.20	116.40	2.00	0.00	0.49	0.00	9.22	116.32	2.00	0.00	0.49	0.00
9.24	114.84	2.00	0.00	0.49	0.00	9.26	110.42	2.00	0.00	0.49	0.00
9.28	104.79	2.00	0.00	0.48	0.00	9.30	146.13	2.00	0.00	0.48	0.00
9.32	98.57	2.00	0.00	0.48	0.00	9.34	91.28	2.00	0.00	0.48	0.00
9.36	89.68	2.00	0.00	0.48	0.00	9.38	86.88	2.00	0.00	0.48	0.00
9.40	126.38	2.00	0.00	0.48	0.00	9.42	204.87	2.00	0.00	0.48	0.00
9.44	123.26	2.00	0.00	0.48	0.00	9.46	129.53	2.00	0.00	0.47	0.00
9.48	128.32	2.00	0.00	0.47	0.00	9.50	123.42	2.00	0.00	0.47	0.00
9.52	117.44	2.00	0.00	0.47	0.00	9.54	110.99	2.00	0.00	0.47	0.00
9.56	218.81	2.00	0.00	0.47	0.00	9.58	145.36	2.00	0.00	0.47	0.00
9.60	108.94	2.00	0.00	0.47	0.00	9.62	99.63	1.96	0.00	0.47	0.00
9.64	94.68	1.82	0.00	0.46	0.00	9.66	94.95	1.82	0.00	0.46	0.00
9.68	94.75	1.82	0.00	0.46	0.00	9.70	94.94	1.82	0.00	0.46	0.00
9.72	95.30	1.84	0.00	0.46	0.00	9.74	119.16	2.00	0.00	0.46	0.00
9.76	144.57	2.00	0.00	0.46	0.00	9.78	122.11	2.00	0.00	0.46	0.00
9.80	100.61	2.00	0.00	0.46	0.00	9.82	96.97	2.00	0.00	0.45	0.00
9.84	109.27	2.00	0.00	0.45	0.00	9.86	130.40	2.00	0.00	0.45	0.00
9.88	137.69	2.00	0.00	0.45	0.00	9.90	164.30	2.00	0.00	0.45	0.00
9.92	202.74	2.00	0.00	0.45	0.00	9.94	114.17	2.00	0.00	0.45	0.00
9.96	235.53	2.00	0.00	0.45	0.00	9.98	217.01	2.00	0.00	0.45	0.00
10.00	227.45	2.00	0.00	0.44	0.00	10.02	112.26	2.00	0.00	0.44	0.00
10.04	113.05	2.00	0.00	0.44	0.00	10.06	113.13	2.00	0.00	0.44	0.00
10.08	223.78	2.00	0.00	0.44	0.00	10.10	171.90	2.00	0.00	0.44	0.00
10.12	126.54	2.00	0.00	0.44	0.00	10.14	93.44	2.00	0.00	0.44	0.00
10.16	96.47	2.00	0.00	0.44	0.00	10.18	94.28	2.00	0.00	0.43	0.00
10.20	92.07	1.76	0.00	0.43	0.00	10.22	89.89	1.70	0.00	0.43	0.00
10.24	87.79	1.65	0.00	0.43	0.00	10.26	84.26	1.56	0.00	0.43	0.00
10.28	81.14	2.00	0.00	0.43	0.00	10.30	89.48	2.00	0.00	0.43	0.00
10.32	151.17	2.00	0.00	0.43	0.00	10.34	119.14	2.00	0.00	0.43	0.00
10.36	118.23	2.00	0.00	0.42	0.00	10.38	113.42	2.00	0.00	0.42	0.00
10.40	208.64	2.00	0.00	0.42	0.00	10.42	136.14	2.00	0.00	0.42	0.00
10.44	90.42	2.00	0.00	0.42	0.00	10.46	87.96	2.00	0.00	0.42	0.00
10.48	86.48	2.00	0.00	0.42	0.00	10.50	121.86	2.00	0.00	0.42	0.00
10.52	161.24	2.00	0.00	0.42	0.00	10.54	222.11	2.00	0.00	0.41	0.00
10.56	113.25	2.00	0.00	0.41	0.00	10.58	207.42	2.00	0.00	0.41	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.60	119.68	2.00	0.00	0.41	0.00	10.62	98.97	2.00	0.00	0.41	0.00
10.64	97.71	2.00	0.00	0.41	0.00	10.66	96.46	2.00	0.00	0.41	0.00
10.68	100.69	2.00	0.00	0.41	0.00	10.70	182.91	2.00	0.00	0.41	0.00
10.72	105.60	2.00	0.00	0.40	0.00	10.74	110.14	2.00	0.00	0.40	0.00
10.76	106.49	2.00	0.00	0.40	0.00	10.78	106.46	2.00	0.00	0.40	0.00
10.80	104.78	2.00	0.00	0.40	0.00	10.82	101.93	2.00	0.00	0.40	0.00
10.84	208.08	2.00	0.00	0.40	0.00	10.86	98.75	2.00	0.00	0.40	0.00
10.88	101.04	2.00	0.00	0.40	0.00	10.90	104.48	2.00	0.00	0.39	0.00
10.92	104.30	2.00	0.00	0.39	0.00	10.94	103.01	2.00	0.00	0.39	0.00
10.96	97.50	2.00	0.00	0.39	0.00	10.98	94.13	2.00	0.00	0.39	0.00
11.00	90.20	2.00	0.00	0.39	0.00	11.02	90.03	2.00	0.00	0.39	0.00
11.04	91.10	2.00	0.00	0.39	0.00	11.06	92.58	2.00	0.00	0.39	0.00
11.08	91.00	2.00	0.00	0.38	0.00	11.10	86.29	2.00	0.00	0.38	0.00
11.12	82.52	2.00	0.00	0.38	0.00	11.14	113.43	2.00	0.00	0.38	0.00
11.16	93.30	2.00	0.00	0.38	0.00	11.18	84.09	2.00	0.00	0.38	0.00
11.20	75.97	2.00	0.00	0.38	0.00	11.22	75.51	2.00	0.00	0.38	0.00
11.24	76.53	1.43	0.00	0.38	0.00	11.26	78.74	1.47	0.00	0.37	0.00
11.28	80.25	1.50	0.00	0.37	0.00	11.30	83.49	2.00	0.00	0.37	0.00
11.32	87.99	2.00	0.00	0.37	0.00	11.34	140.41	2.00	0.00	0.37	0.00
11.36	105.02	2.00	0.00	0.37	0.00	11.38	115.93	2.00	0.00	0.37	0.00
11.40	117.99	2.00	0.00	0.37	0.00	11.42	109.58	2.00	0.00	0.37	0.00
11.44	98.27	2.00	0.00	0.36	0.00	11.46	106.37	2.00	0.00	0.36	0.00
11.48	77.67	2.00	0.00	0.36	0.00	11.50	72.65	2.00	0.00	0.36	0.00
11.52	117.71	2.00	0.00	0.36	0.00	11.54	175.80	2.00	0.00	0.36	0.00
11.56	88.05	2.00	0.00	0.36	0.00	11.58	90.33	2.00	0.00	0.36	0.00
11.60	94.39	2.00	0.00	0.36	0.00	11.62	99.38	2.00	0.00	0.35	0.00
11.64	101.71	2.00	0.00	0.35	0.00	11.66	101.79	2.00	0.00	0.35	0.00
11.68	100.81	2.00	0.00	0.35	0.00	11.70	98.65	2.00	0.00	0.35	0.00
11.72	95.58	2.00	0.00	0.35	0.00	11.74	89.94	2.00	0.00	0.35	0.00
11.76	87.27	2.00	0.00	0.35	0.00	11.78	87.25	2.00	0.00	0.35	0.00
11.80	87.82	2.00	0.00	0.34	0.00	11.82	88.22	2.00	0.00	0.34	0.00
11.84	87.26	2.00	0.00	0.34	0.00	11.86	87.79	2.00	0.00	0.34	0.00
11.88	86.53	2.00	0.00	0.34	0.00	11.90	84.31	2.00	0.00	0.34	0.00
11.92	82.25	2.00	0.00	0.34	0.00	11.94	80.88	2.00	0.00	0.34	0.00
11.96	80.75	2.00	0.00	0.34	0.00	11.98	80.62	2.00	0.00	0.33	0.00
12.00	81.44	2.00	0.00	0.33	0.00	12.02	81.88	2.00	0.00	0.33	0.00
12.04	82.52	2.00	0.00	0.33	0.00	12.06	82.78	2.00	0.00	0.33	0.00
12.08	83.72	2.00	0.00	0.33	0.00	12.10	84.97	2.00	0.00	0.33	0.00
12.12	84.92	2.00	0.00	0.33	0.00	12.14	84.20	2.00	0.00	0.33	0.00
12.16	84.40	2.00	0.00	0.32	0.00	12.18	87.49	2.00	0.00	0.32	0.00
12.20	89.07	2.00	0.00	0.32	0.00	12.22	89.19	2.00	0.00	0.32	0.00
12.24	84.37	2.00	0.00	0.32	0.00	12.26	81.59	2.00	0.00	0.32	0.00
12.28	81.62	2.00	0.00	0.32	0.00	12.30	89.62	2.00	0.00	0.32	0.00
12.32	97.00	2.00	0.00	0.32	0.00	12.34	102.20	2.00	0.00	0.31	0.00
12.36	101.92	2.00	0.00	0.31	0.00	12.38	100.67	2.00	0.00	0.31	0.00
12.40	96.30	2.00	0.00	0.31	0.00	12.42	90.44	2.00	0.00	0.31	0.00
12.44	83.08	2.00	0.00	0.31	0.00	12.46	79.10	2.00	0.00	0.31	0.00
12.48	77.44	2.00	0.00	0.31	0.00	12.50	77.48	2.00	0.00	0.31	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
12.52	77.21	2.00	0.00	0.30	0.00	12.54	77.35	2.00	0.00	0.30	0.00
12.56	77.18	2.00	0.00	0.30	0.00	12.58	76.83	2.00	0.00	0.30	0.00
12.60	75.93	2.00	0.00	0.30	0.00	12.62	75.27	2.00	0.00	0.30	0.00
12.64	74.87	2.00	0.00	0.30	0.00	12.66	75.47	2.00	0.00	0.30	0.00
12.68	76.26	2.00	0.00	0.30	0.00	12.70	77.18	2.00	0.00	0.29	0.00
12.72	77.76	2.00	0.00	0.29	0.00	12.74	77.95	2.00	0.00	0.29	0.00
12.76	77.96	2.00	0.00	0.29	0.00	12.78	77.54	2.00	0.00	0.29	0.00
12.80	76.84	2.00	0.00	0.29	0.00	12.82	75.70	2.00	0.00	0.29	0.00
12.84	74.22	2.00	0.00	0.29	0.00	12.86	72.80	2.00	0.00	0.29	0.00
12.88	71.84	2.00	0.00	0.28	0.00	12.90	71.72	2.00	0.00	0.28	0.00
12.92	72.04	2.00	0.00	0.28	0.00	12.94	72.67	2.00	0.00	0.28	0.00
12.96	72.83	2.00	0.00	0.28	0.00	12.98	72.66	2.00	0.00	0.28	0.00
13.00	72.15	2.00	0.00	0.28	0.00	13.02	71.78	2.00	0.00	0.28	0.00
13.04	71.62	2.00	0.00	0.28	0.00	13.06	71.37	2.00	0.00	0.27	0.00
13.08	70.89	2.00	0.00	0.27	0.00	13.10	70.60	2.00	0.00	0.27	0.00
13.12	70.48	2.00	0.00	0.27	0.00	13.14	70.57	2.00	0.00	0.27	0.00
13.16	70.12	2.00	0.00	0.27	0.00	13.18	69.83	2.00	0.00	0.27	0.00
13.20	70.79	2.00	0.00	0.27	0.00	13.22	73.46	2.00	0.00	0.27	0.00
13.24	76.66	2.00	0.00	0.26	0.00	13.26	79.72	2.00	0.00	0.26	0.00
13.28	82.33	2.00	0.00	0.26	0.00	13.30	84.45	2.00	0.00	0.26	0.00
13.32	84.67	2.00	0.00	0.26	0.00	13.34	83.18	2.00	0.00	0.26	0.00
13.36	81.59	1.61	0.00	0.26	0.00	13.38	69.39	1.37	0.00	0.26	0.00
13.40	131.71	2.00	0.00	0.26	0.00	13.42	188.11	2.00	0.00	0.25	0.00
13.44	201.95	2.00	0.00	0.25	0.00	13.46	211.90	2.00	0.00	0.25	0.00
13.48	216.36	2.00	0.00	0.25	0.00	13.50	227.24	2.00	0.00	0.25	0.00
13.52	230.55	2.00	0.00	0.25	0.00	13.54	234.97	2.00	0.00	0.25	0.00
13.56	228.69	2.00	0.00	0.25	0.00	13.58	218.62	2.00	0.00	0.25	0.00
13.60	204.04	2.00	0.00	0.24	0.00	13.62	191.07	2.00	0.00	0.24	0.00
13.64	183.63	2.00	0.00	0.24	0.00	13.66	185.28	2.00	0.00	0.24	0.00
13.68	196.32	2.00	0.00	0.24	0.00	13.70	206.40	2.00	0.00	0.24	0.00
13.72	214.78	2.00	0.00	0.24	0.00	13.74	218.32	2.00	0.00	0.24	0.00
13.76	219.18	2.00	0.00	0.24	0.00	13.78	219.64	2.00	0.00	0.23	0.00
13.80	220.62	2.00	0.00	0.23	0.00	13.82	223.93	2.00	0.00	0.23	0.00
13.84	226.10	2.00	0.00	0.23	0.00	13.86	221.38	2.00	0.00	0.23	0.00
13.88	214.30	2.00	0.00	0.23	0.00	13.90	199.74	2.00	0.00	0.23	0.00
13.92	191.01	2.00	0.00	0.23	0.00	13.94	183.60	2.00	0.00	0.23	0.00
13.96	185.80	2.00	0.00	0.22	0.00	13.98	185.60	2.00	0.00	0.22	0.00
14.00	179.51	2.00	0.00	0.22	0.00	14.02	181.20	2.00	0.00	0.22	0.00
14.04	188.36	2.00	0.00	0.22	0.00	14.06	193.33	2.00	0.00	0.22	0.00
14.08	201.98	2.00	0.00	0.22	0.00	14.10	226.53	2.00	0.00	0.22	0.00
14.12	250.31	2.00	0.00	0.22	0.00	14.14	270.61	2.00	0.00	0.21	0.00
14.16	285.57	2.00	0.00	0.21	0.00	14.18	304.91	2.00	0.00	0.21	0.00
14.20	318.77	2.00	0.00	0.21	0.00	14.22	336.69	2.00	0.00	0.21	0.00
14.24	349.68	2.00	0.00	0.21	0.00	14.26	362.40	2.00	0.00	0.21	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

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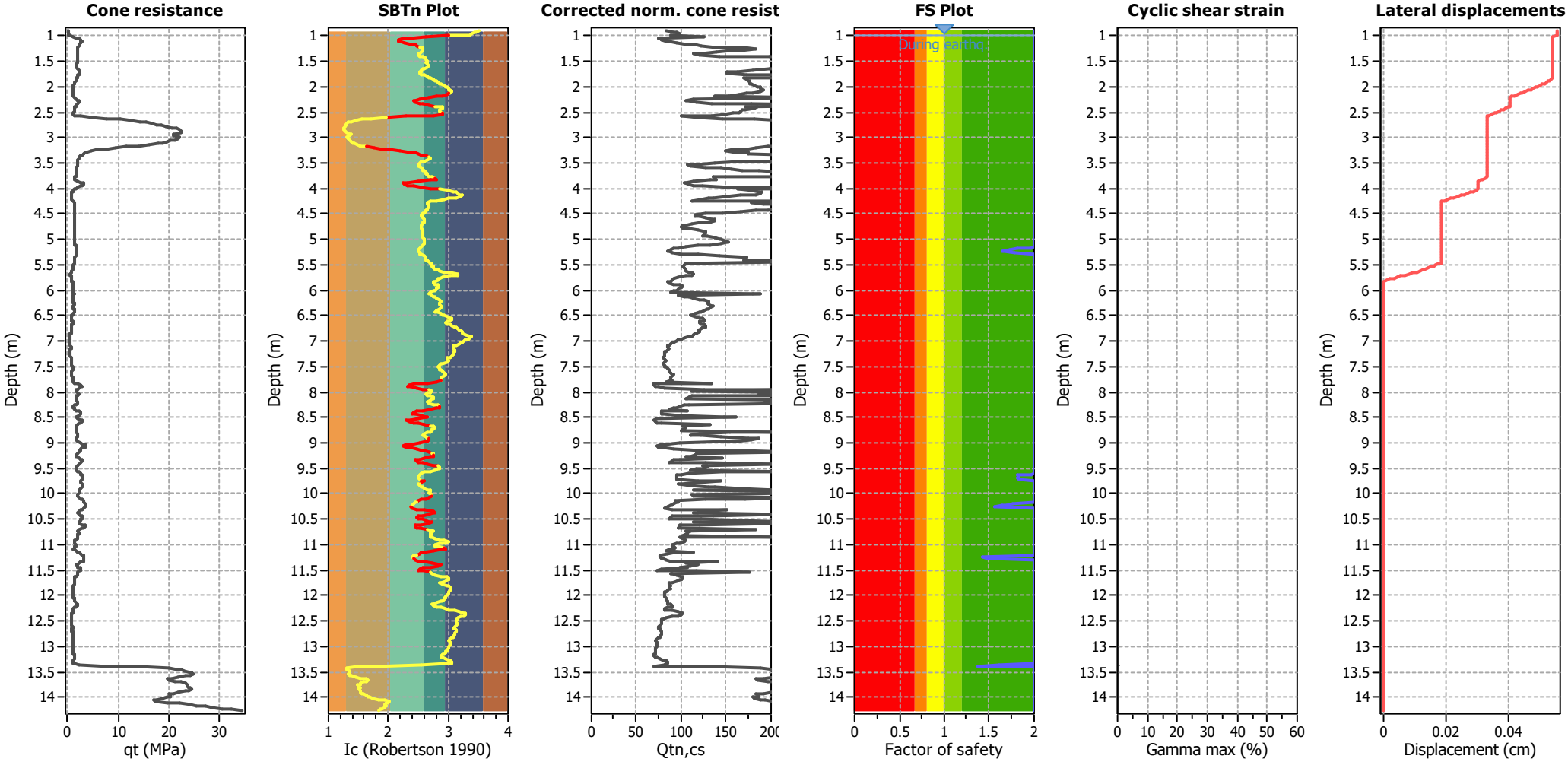
CPT name: CWLP CPT-4L

Estimation of post-earthquake lateral Displacements

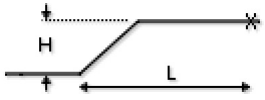
Geometric parameters: Level ground (or gently sloping) with free face (L: 41.40 m - H: 2.90 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
1.00	0.52	10.04	2.99	88.51	2.00	0.00	0.09	0.00
1.02	1.05	20.47	1.81	125.21	2.00	14.64	0.00	0.00
1.04	1.69	33.12	1.36	74.64	2.00	30.53	0.00	0.00
1.06	2.23	43.77	1.21	76.46	2.00	39.73	0.00	0.00
1.08	2.56	50.17	1.13	78.80	2.00	44.23	0.00	0.00
1.10	2.75	53.97	1.16	82.54	2.00	46.65	0.00	0.00
1.12	2.78	54.56	1.32	87.02	2.00	47.00	0.00	0.00
1.14	2.62	51.27	1.67	94.69	2.00	44.95	0.00	0.00
1.16	2.42	47.34	2.09	104.73	2.00	42.32	0.00	0.00
1.18	2.27	44.41	2.49	114.91	2.00	40.21	0.00	0.00
1.20	2.18	42.75	2.78	122.35	2.00	38.95	0.00	0.00
1.22	2.10	41.13	3.08	136.53	2.00	37.68	0.00	0.00
1.24	1.98	38.75	3.32	168.99	2.00	35.71	0.00	0.00
1.26	1.90	37.21	3.38	183.12	2.00	34.37	0.00	0.00
1.28	1.88	36.64	3.21	168.42	2.00	33.86	0.00	0.00
1.30	1.86	36.33	3.07	156.60	2.00	33.58	0.00	0.00
1.32	1.88	36.74	2.91	139.61	2.00	33.95	0.00	0.00
1.34	1.94	37.94	2.78	123.06	2.00	35.01	0.00	0.00
1.36	2.05	40.12	2.76	113.44	2.00	36.86	0.00	0.00
1.38	2.13	41.53	2.90	120.17	2.00	38.00	0.00	0.00
1.40	2.15	41.92	3.18	142.58	2.00	38.30	0.00	0.00
1.42	2.05	40.01	3.67	198.55	2.00	36.76	0.00	0.00
1.44	2.03	39.63	4.01	237.85	2.00	36.45	0.00	0.00
1.46	2.02	39.39	4.25	268.11	2.00	36.25	0.00	0.00
1.48	2.04	39.86	4.24	264.31	2.00	36.64	0.00	0.00
1.50	2.00	39.01	4.32	279.99	2.00	35.93	0.00	0.00
1.52	1.97	38.50	4.20	268.57	2.00	35.49	0.00	0.00
1.54	1.93	37.64	4.11	263.73	2.00	34.75	0.00	0.00
1.56	1.86	36.17	4.00	261.15	2.00	33.44	0.00	0.00
1.58	1.77	34.40	4.17	296.42	2.00	31.77	0.00	0.00
1.60	1.77	34.44	4.16	295.38	2.00	31.82	0.00	0.00
1.62	1.85	35.93	4.10	275.61	2.00	33.22	0.00	0.00
1.64	1.99	38.77	3.87	228.93	2.00	35.72	0.00	0.00
1.66	2.10	40.98	3.71	198.61	2.00	37.56	0.00	0.00
1.68	2.18	42.56	3.59	179.41	2.00	38.80	0.00	0.00
1.70	2.23	43.47	3.46	162.80	2.00	39.50	0.00	0.00
1.72	2.33	45.42	3.40	150.19	2.00	40.95	0.00	0.00
1.74	2.35	45.82	3.42	150.23	2.00	41.24	0.00	0.00
1.76	2.29	44.64	3.61	172.20	2.00	40.38	0.00	0.00
1.78	2.14	41.57	3.92	218.83	2.00	38.02	0.00	0.00
1.80	2.01	39.08	4.26	273.14	2.00	35.99	0.00	0.00
1.82	1.90	36.89	4.62	338.25	2.00	34.08	0.00	0.00
1.84	1.80	34.97	4.84	169.77	2.00	32.32	0.03	0.00
1.86	1.70	33.02	5.07	172.15	2.00	30.43	0.04	0.00
1.88	1.64	31.67	5.25	173.99	2.00	29.05	0.04	0.00
1.90	1.57	30.42	5.44	175.74	2.00	27.72	0.04	0.00
1.92	1.50	29.04	5.63	176.97	2.00	26.19	0.04	0.00
1.94	1.40	27.04	5.85	177.11	2.00	23.83	0.05	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
1.96	1.31	25.30	6.14	178.41	2.00	21.63	0.05	0.00
1.98	1.24	23.92	6.52	181.49	2.00	19.78	0.05	0.00
2.00	1.17	22.46	7.01	185.35	2.00	17.71	0.05	0.00
2.02	1.13	21.59	7.32	187.36	2.00	16.40	0.06	0.00
2.04	1.12	21.43	7.43	188.42	2.00	16.16	0.06	0.00
2.06	1.13	21.59	7.56	191.04	2.00	16.40	0.06	0.00
2.08	1.09	20.84	7.77	191.42	2.00	15.24	0.06	0.00
2.10	1.03	19.59	7.86	188.22	2.00	13.20	0.06	0.00
2.12	0.99	18.85	7.47	180.11	2.00	11.92	0.06	0.00
2.14	1.00	18.98	6.88	172.23	2.00	12.15	0.06	0.00
2.16	1.03	19.55	6.19	164.00	2.00	13.13	0.06	0.00
2.18	1.09	20.89	5.24	152.16	2.00	15.31	0.06	0.00
2.20	1.24	23.65	4.18	137.92	2.00	19.41	0.05	0.00
2.22	1.47	28.20	3.22	231.71	2.00	25.22	0.00	0.00
2.24	1.81	34.96	2.51	114.33	2.00	32.31	0.00	0.00
2.26	2.08	40.40	2.22	104.91	2.00	37.09	0.00	0.00
2.28	2.25	43.61	2.22	106.65	2.00	39.61	0.00	0.00
2.30	2.22	43.12	2.56	116.75	2.00	39.23	0.00	0.00
2.32	2.12	41.12	3.03	134.32	2.00	37.67	0.00	0.00
2.34	2.04	39.40	3.41	177.53	2.00	36.25	0.00	0.00
2.36	1.81	35.03	4.18	297.39	2.00	32.38	0.00	0.00
2.38	1.59	30.54	5.18	171.11	2.00	27.86	0.04	0.00
2.40	1.34	25.65	6.38	184.23	2.00	22.09	0.05	0.00
2.42	1.28	24.54	6.34	180.75	2.00	20.64	0.05	0.00
2.44	1.34	25.71	5.65	170.98	2.00	22.16	0.05	0.00
2.46	1.35	25.80	5.44	167.23	2.00	22.28	0.05	0.00
2.48	1.30	24.82	5.52	166.65	2.00	21.01	0.05	0.00
2.50	1.18	22.42	5.71	164.43	2.00	17.65	0.05	0.00
2.52	1.11	21.08	5.50	157.65	2.00	15.61	0.06	0.00
2.54	1.10	20.83	5.01	148.63	2.00	15.22	0.06	0.00
2.56	1.30	24.79	3.89	134.20	2.00	20.96	0.05	0.00
2.58	2.64	51.20	1.84	100.16	2.00	44.91	0.00	0.00
2.60	4.69	91.71	1.08	117.25	2.00	64.14	0.00	0.00
2.62	7.72	145.44	0.74	145.44	2.00	79.36	0.00	0.00
2.64	10.30	180.63	0.58	180.63	2.00	86.52	0.00	0.00
2.66	12.56	208.69	0.47	208.69	2.00	91.28	0.00	0.00
2.68	14.22	226.99	0.38	226.99	2.00	94.06	0.00	0.00
2.70	15.52	242.36	0.36	242.36	2.00	96.22	0.00	0.00
2.72	16.71	257.41	0.35	257.41	2.00	98.21	0.00	0.00
2.74	17.67	269.64	0.35	269.64	2.00	99.74	0.00	0.00
2.76	18.65	282.10	0.35	282.10	2.00	100.00	0.00	0.00
2.78	19.61	294.71	0.36	294.71	2.00	100.00	0.00	0.00
2.80	20.67	309.06	0.37	309.06	2.00	100.00	0.00	0.00
2.82	21.55	321.53	0.39	321.53	2.00	100.00	0.00	0.00
2.84	22.23	331.49	0.41	331.49	2.00	100.00	0.00	0.00
2.86	22.45	336.68	0.44	336.68	2.00	100.00	0.00	0.00
2.88	22.55	339.20	0.46	339.20	2.00	100.00	0.00	0.00
2.90	22.52	340.36	0.49	340.36	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
2.92	21.28	329.18	0.57	329.18	2.00	100.00	0.00	0.00
2.94	21.05	325.67	0.57	325.67	2.00	100.00	0.00	0.00
2.96	20.93	322.69	0.56	322.69	2.00	100.00	0.00	0.00
2.98	22.09	331.00	0.47	331.00	2.00	100.00	0.00	0.00
3.00	22.14	331.75	0.48	331.75	2.00	100.00	0.00	0.00
3.02	21.80	327.73	0.50	327.73	2.00	100.00	0.00	0.00
3.04	21.20	320.69	0.52	320.69	2.00	100.00	0.00	0.00
3.06	20.43	310.94	0.54	310.94	2.00	100.00	0.00	0.00
3.08	19.71	301.85	0.56	301.85	2.00	100.00	0.00	0.00
3.10	18.90	291.65	0.58	291.65	2.00	100.00	0.00	0.00
3.12	17.99	279.75	0.60	279.75	2.00	100.00	0.00	0.00
3.14	16.29	257.74	0.64	257.74	2.00	98.25	0.00	0.00
3.16	14.18	230.25	0.71	230.25	2.00	94.53	0.00	0.00
3.18	11.67	196.83	0.84	196.83	2.00	89.35	0.00	0.00
3.20	9.54	167.90	1.03	183.40	2.00	84.10	0.00	0.00
3.22	7.59	140.61	1.32	172.45	2.00	78.25	0.00	0.00
3.24	6.06	118.21	1.74	157.06	2.00	72.52	0.00	0.00
3.26	4.78	93.26	2.37	149.01	2.00	64.70	0.00	0.00
3.28	3.95	76.92	3.11	159.79	2.00	58.34	0.00	0.00
3.30	3.40	65.97	3.82	175.07	2.00	53.27	0.00	0.00
3.32	3.16	61.19	4.20	174.25	2.00	50.79	0.00	0.00
3.34	2.90	56.09	4.63	232.84	2.00	47.91	0.00	0.00
3.36	2.63	50.74	5.16	320.40	2.00	44.61	0.00	0.00
3.38	2.42	46.66	5.62	411.52	2.00	41.84	0.00	0.00
3.40	2.29	44.10	5.72	447.50	2.00	39.98	0.00	0.00
3.42	2.21	42.47	5.44	419.84	2.00	38.74	0.00	0.00
3.44	2.15	41.33	4.67	319.24	2.00	37.84	0.00	0.00
3.46	2.10	40.24	3.90	230.71	2.00	36.95	0.00	0.00
3.48	2.05	39.22	3.24	165.00	2.00	36.11	0.00	0.00
3.50	2.02	38.59	2.91	137.25	2.00	35.57	0.00	0.00
3.52	2.00	38.27	2.68	117.95	2.00	35.30	0.00	0.00
3.54	1.98	37.92	2.52	106.72	2.00	34.99	0.00	0.00
3.56	1.93	36.85	2.52	110.61	2.00	34.05	0.00	0.00
3.58	1.84	35.11	2.63	127.32	2.00	32.45	0.00	0.00
3.60	1.80	34.36	2.77	144.10	2.00	31.74	0.00	0.00
3.62	1.80	34.26	2.89	156.16	2.00	31.64	0.00	0.00
3.64	1.79	34.12	3.00	168.61	2.00	31.51	0.00	0.00
3.66	1.75	33.29	3.13	187.11	2.00	30.69	0.00	0.00
3.68	1.69	32.14	3.28	212.86	2.00	29.54	0.00	0.00
3.70	1.68	31.79	3.34	223.28	2.00	29.17	0.00	0.00
3.72	1.68	31.94	3.33	220.92	2.00	29.33	0.00	0.00
3.74	1.66	31.45	3.37	229.08	2.00	28.81	0.00	0.00
3.76	1.56	29.54	3.53	267.93	2.00	26.75	0.00	0.00
3.78	1.42	26.64	3.81	136.39	2.00	23.35	0.05	0.00
3.80	1.31	24.48	4.02	138.02	2.00	20.55	0.05	0.00
3.82	1.26	23.56	4.11	138.52	2.00	19.29	0.05	0.00
3.84	1.45	27.25	3.56	131.46	2.00	24.09	0.05	0.00
3.86	2.05	39.06	2.52	114.06	2.00	35.97	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
3.88	2.74	52.78	1.93	104.25	2.00	45.91	0.00	0.00
3.90	3.21	60.81	1.72	103.68	2.00	50.58	0.00	0.00
3.92	3.19	60.71	1.89	108.51	2.00	50.53	0.00	0.00
3.94	2.92	56.35	2.17	114.25	2.00	48.07	0.00	0.00
3.96	2.53	48.52	2.62	123.31	2.00	43.13	0.00	0.00
3.98	2.10	40.11	3.13	152.10	2.00	36.85	0.00	0.00
4.00	1.68	31.76	3.98	309.82	2.00	29.14	0.00	0.00
4.02	1.35	25.23	5.16	162.84	2.00	21.54	0.05	0.00
4.04	1.10	20.35	6.77	178.48	2.00	14.44	0.06	0.00
4.06	0.98	17.96	7.95	186.96	2.00	10.33	0.06	0.00
4.08	0.92	16.66	8.60	189.85	2.00	7.86	0.07	0.00
4.10	0.88	15.86	8.69	187.37	2.00	6.22	0.07	0.00
4.12	0.82	14.73	8.76	182.86	2.00	3.78	0.07	0.00
4.14	0.69	12.22	8.44	166.83	2.00	0.00	0.08	0.00
4.16	0.67	11.73	7.18	151.18	2.00	0.00	0.08	0.00
4.18	0.68	11.91	5.71	135.27	2.00	0.00	0.08	0.00
4.20	0.80	14.32	4.74	130.26	2.00	2.86	0.07	0.00
4.22	0.89	16.06	3.96	122.38	2.00	6.65	0.07	0.00
4.24	1.05	19.30	3.12	112.19	2.00	12.70	0.06	0.00
4.26	1.22	22.64	2.65	224.15	2.00	17.97	0.00	0.00
4.28	1.35	25.18	2.50	178.56	2.00	21.48	0.00	0.00
4.30	1.39	25.92	2.66	191.41	2.00	22.44	0.00	0.00
4.32	1.39	25.95	2.84	214.40	2.00	22.47	0.00	0.00
4.34	1.38	25.75	2.98	235.26	2.00	22.23	0.00	0.00
4.36	1.39	25.98	3.03	239.98	2.00	22.51	0.00	0.00
4.38	1.42	26.58	3.01	230.31	2.00	23.27	0.00	0.00
4.40	1.47	27.43	2.95	213.69	2.00	24.31	0.00	0.00
4.42	1.50	28.06	2.85	196.39	2.00	25.06	0.00	0.00
4.44	1.51	28.23	2.75	182.48	2.00	25.25	0.00	0.00
4.46	1.50	28.04	2.60	166.66	2.00	25.03	0.00	0.00
4.48	1.49	27.88	2.39	145.50	2.00	24.84	0.00	0.00
4.50	1.49	27.85	2.22	127.44	2.00	24.80	0.00	0.00
4.52	1.49	27.83	2.09	114.97	2.00	24.78	0.00	0.00
4.54	1.48	27.52	2.07	115.10	2.00	24.41	0.00	0.00
4.56	1.45	27.04	2.09	119.63	2.00	23.84	0.00	0.00
4.58	1.42	26.50	2.13	127.82	2.00	23.17	0.00	0.00
4.60	1.40	26.05	2.16	133.35	2.00	22.61	0.00	0.00
4.62	1.39	25.75	2.17	136.84	2.00	22.22	0.00	0.00
4.64	1.38	25.56	2.16	136.88	2.00	21.98	0.00	0.00
4.66	1.39	25.64	2.12	131.79	2.00	22.08	0.00	0.00
4.68	1.41	25.92	2.04	122.41	2.00	22.43	0.00	0.00
4.70	1.44	26.27	1.97	112.39	2.00	22.87	0.00	0.00
4.72	1.46	26.39	1.90	104.93	2.00	23.03	0.00	0.00
4.74	1.46	26.33	1.86	101.53	2.00	22.95	0.00	0.00
4.76	1.46	26.22	1.83	99.73	2.00	22.82	0.00	0.00
4.78	1.45	26.13	1.85	102.30	2.00	22.70	0.00	0.00
4.80	1.44	25.94	1.91	108.84	2.00	22.46	0.00	0.00
4.82	1.43	25.72	1.99	117.89	2.00	22.18	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
4.84	1.43	25.75	2.06	124.86	2.00	22.21	0.00	0.00
4.86	1.46	26.19	2.11	127.28	2.00	22.78	0.00	0.00
4.88	1.50	26.85	2.14	126.56	2.00	23.60	0.00	0.00
4.90	1.53	27.33	2.16	125.30	2.00	24.19	0.00	0.00
4.92	1.55	27.49	2.15	123.27	2.00	24.38	0.00	0.00
4.94	1.54	27.44	2.20	129.13	2.00	24.31	0.00	0.00
4.96	1.54	27.36	2.27	136.50	2.00	24.22	0.00	0.00
4.98	1.54	27.40	2.33	142.60	2.00	24.27	0.00	0.00
5.00	1.54	27.33	2.33	143.74	2.00	24.19	0.00	0.00
5.02	1.54	27.13	2.35	147.36	2.00	23.94	0.00	0.00
5.04	1.52	26.78	2.38	152.32	2.00	23.52	0.00	0.00
5.06	1.51	26.63	2.36	151.28	2.00	23.33	0.00	0.00
5.08	1.52	26.67	2.29	143.50	2.00	23.38	0.00	0.00
5.10	1.55	26.97	2.20	132.46	2.00	23.74	0.00	0.00
5.12	1.60	27.62	2.10	118.20	2.00	24.53	0.00	0.00
5.14	1.66	28.43	2.01	105.28	2.00	25.49	0.00	0.00
5.16	1.71	29.20	1.96	96.61	1.97	26.36	0.00	0.00
5.18	1.75	29.66	1.92	91.70	1.82	26.89	0.00	0.00
5.20	1.77	29.96	1.90	88.23	1.73	27.22	0.00	0.00
5.22	1.79	30.12	1.86	84.68	1.64	27.39	0.00	0.00
5.24	1.78	29.91	1.86	85.60	1.66	27.16	0.00	0.00
5.26	1.75	29.48	1.90	90.40	1.78	26.68	0.00	0.00
5.28	1.71	28.77	1.98	100.71	2.00	25.88	0.00	0.00
5.30	1.66	28.05	2.12	117.96	2.00	25.04	0.00	0.00
5.32	1.60	27.14	2.31	142.51	2.00	23.96	0.00	0.00
5.34	1.54	26.21	2.51	172.41	2.00	22.80	0.00	0.00
5.36	1.55	26.26	2.50	170.83	2.00	22.86	0.00	0.00
5.38	1.54	26.15	2.49	170.62	2.00	22.73	0.00	0.00
5.40	1.53	25.78	2.45	169.56	2.00	22.25	0.00	0.00
5.42	1.44	24.32	2.57	198.18	2.00	20.33	0.00	0.00
5.44	1.37	23.15	2.64	220.36	2.00	18.71	0.00	0.00
5.46	1.31	22.19	2.68	106.34	2.00	17.31	0.05	0.00
5.48	1.27	21.44	2.67	105.46	2.00	16.17	0.06	0.00
5.50	1.24	20.80	2.63	103.96	2.00	15.18	0.06	0.00
5.52	1.21	20.32	2.59	102.43	2.00	14.40	0.06	0.00
5.54	1.18	19.74	2.60	102.24	2.00	13.45	0.06	0.00
5.56	1.14	19.00	2.67	102.97	2.00	12.18	0.06	0.00
5.58	1.09	18.19	2.77	104.29	2.00	10.75	0.06	0.00
5.60	1.02	17.09	2.87	105.02	2.00	8.69	0.07	0.00
5.62	0.95	15.88	2.97	105.36	2.00	6.26	0.07	0.00
5.64	0.83	13.89	3.30	108.03	2.00	1.85	0.08	0.00
5.66	0.72	11.68	3.83	111.44	2.00	0.00	0.08	0.00
5.68	0.61	9.59	4.53	114.24	2.00	0.00	0.09	0.00
5.70	0.61	9.61	4.34	111.97	2.00	0.00	0.09	0.00
5.72	0.70	11.19	3.51	105.32	2.00	0.00	0.09	0.00
5.74	0.81	13.19	2.73	96.59	2.00	0.14	0.08	0.00
5.76	0.88	14.22	2.41	91.84	2.00	2.62	0.08	0.00
5.78	0.90	14.38	2.35	90.96	2.00	3.00	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
5.80	0.92	14.69	2.29	90.10	2.00	3.68	0.07	0.00
5.82	0.95	15.21	2.15	87.55	2.00	4.84	0.07	0.00
5.84	1.00	15.87	1.99	84.75	2.00	6.25	0.07	0.00
5.86	1.02	16.22	2.06	86.52	2.00	6.97	0.07	0.00
5.88	1.02	16.27	2.31	92.15	2.00	7.06	0.07	0.00
5.90	1.01	16.11	2.64	99.10	2.00	6.73	0.07	0.00
5.92	1.01	16.10	2.75	101.27	2.00	6.71	0.07	0.00
5.94	1.01	16.15	2.70	100.30	2.00	6.83	0.07	0.00
5.96	1.03	16.31	2.56	97.58	2.00	7.15	0.07	0.00
5.98	1.04	16.41	2.48	96.15	2.00	7.35	0.07	0.00
6.00	1.07	16.74	2.38	94.36	2.00	8.01	0.07	0.00
6.02	1.11	17.32	2.21	91.11	2.00	9.13	0.07	0.00
6.04	1.18	18.30	2.07	88.65	2.00	10.95	0.06	0.00
6.06	1.23	19.11	1.99	178.90	2.00	12.37	0.00	0.00
6.08	1.26	19.55	2.10	188.38	2.00	13.13	0.00	0.00
6.10	1.25	19.39	2.38	96.91	2.00	12.85	0.06	0.00
6.12	1.22	19.11	2.68	103.56	2.00	12.37	0.06	0.00
6.14	1.21	18.92	2.93	108.81	2.00	12.05	0.06	0.00
6.16	1.20	18.76	3.15	113.15	2.00	11.77	0.06	0.00
6.18	1.19	18.63	3.48	119.76	2.00	11.54	0.06	0.00
6.20	1.18	18.58	3.79	125.56	2.00	11.45	0.06	0.00
6.22	1.20	18.85	4.00	130.03	2.00	11.93	0.06	0.00
6.24	1.23	19.33	3.95	130.05	2.00	12.75	0.06	0.00
6.26	1.26	19.78	3.89	129.61	2.00	13.52	0.06	0.00
6.28	1.26	19.69	3.95	130.71	2.00	13.36	0.06	0.00
6.30	1.25	19.47	4.14	133.87	2.00	12.99	0.06	0.00
6.32	1.23	19.22	4.21	134.77	2.00	12.56	0.06	0.00
6.34	1.24	19.29	4.04	131.71	2.00	12.68	0.06	0.00
6.36	1.25	19.27	3.95	130.03	2.00	12.65	0.06	0.00
6.38	1.30	20.01	3.82	128.63	2.00	13.89	0.06	0.00
6.40	1.38	21.19	3.58	125.63	2.00	15.78	0.06	0.00
6.42	1.39	21.18	3.40	121.74	2.00	15.77	0.06	0.00
6.44	1.29	19.54	3.44	120.38	2.00	13.11	0.06	0.00
6.46	1.12	16.89	3.43	115.97	2.00	8.30	0.07	0.00
6.48	1.01	15.11	3.38	111.85	2.00	4.63	0.07	0.00
6.50	0.94	13.99	3.40	110.21	2.00	2.09	0.08	0.00
6.52	0.90	13.25	3.79	114.92	2.00	0.30	0.08	0.00
6.54	0.88	12.87	4.15	119.55	2.00	0.00	0.08	0.00
6.56	0.88	12.89	4.47	124.38	2.00	0.00	0.08	0.00
6.58	0.89	12.97	4.56	125.88	2.00	0.00	0.08	0.00
6.60	0.94	13.75	4.37	125.22	2.00	1.52	0.08	0.00
6.62	0.98	14.41	3.97	120.51	2.00	3.06	0.07	0.00
6.64	0.99	14.54	3.89	119.52	2.00	3.36	0.07	0.00
6.66	0.96	13.99	4.08	121.36	2.00	2.09	0.08	0.00
6.68	0.91	13.15	4.46	124.96	2.00	0.05	0.08	0.00
6.70	0.88	12.63	4.69	126.71	2.00	0.00	0.08	0.00
6.72	0.84	11.88	4.91	127.27	2.00	0.00	0.08	0.00
6.74	0.80	11.15	4.86	124.16	2.00	0.00	0.09	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.76	0.75	10.42	4.84	121.44	2.00	0.00	0.09	0.00
6.78	0.71	9.78	4.86	119.27	2.00	0.00	0.09	0.00
6.80	0.68	9.22	5.10	119.90	2.00	0.00	0.09	0.00
6.82	0.67	8.93	5.21	119.98	2.00	0.00	0.10	0.00
6.84	0.66	8.78	5.04	117.50	2.00	0.00	0.10	0.00
6.86	0.63	8.33	4.95	114.54	2.00	0.00	0.10	0.00
6.88	0.58	7.53	5.11	112.76	2.00	0.00	0.10	0.00
6.90	0.53	6.63	5.40	111.18	2.00	0.00	0.11	0.00
6.92	0.50	6.19	5.36	108.46	2.00	0.00	0.11	0.00
6.94	0.50	6.09	4.88	103.52	2.00	0.00	0.11	0.00
6.96	0.50	6.14	4.47	99.77	2.00	0.00	0.11	0.00
6.98	0.52	6.35	4.02	96.09	2.00	0.00	0.11	0.00
7.00	0.53	6.56	3.77	94.31	2.00	0.00	0.11	0.00
7.02	0.55	6.77	3.43	91.27	2.00	0.00	0.11	0.00
7.04	0.56	6.92	3.26	89.73	2.00	0.00	0.11	0.00
7.06	0.58	7.19	3.00	87.37	2.00	0.00	0.11	0.00
7.08	0.60	7.62	2.81	86.13	2.00	0.00	0.10	0.00
7.10	0.63	8.09	2.65	85.18	2.00	0.00	0.10	0.00
7.12	0.66	8.41	2.60	85.22	2.00	0.00	0.10	0.00
7.14	0.66	8.41	2.65	85.98	2.00	0.00	0.10	0.00
7.16	0.64	8.15	2.70	86.01	2.00	0.00	0.10	0.00
7.18	0.63	7.89	2.70	85.27	2.00	0.00	0.10	0.00
7.20	0.62	7.80	2.58	83.40	2.00	0.00	0.10	0.00
7.22	0.63	7.90	2.46	81.80	2.00	0.00	0.10	0.00
7.24	0.64	7.96	2.41	81.25	2.00	0.00	0.10	0.00
7.26	0.64	8.01	2.41	81.36	2.00	0.00	0.10	0.00
7.28	0.64	8.02	2.41	81.51	2.00	0.00	0.10	0.00
7.30	0.65	8.20	2.36	81.05	2.00	0.00	0.10	0.00
7.32	0.68	8.61	2.25	80.27	2.00	0.00	0.10	0.00
7.34	0.72	9.23	2.16	80.04	2.00	0.00	0.09	0.00
7.36	0.75	9.55	2.18	80.90	2.00	0.00	0.09	0.00
7.38	0.75	9.56	2.33	83.40	2.00	0.00	0.09	0.00
7.40	0.74	9.41	2.31	82.79	2.00	0.00	0.09	0.00
7.42	0.76	9.75	2.18	81.23	2.00	0.00	0.09	0.00
7.44	0.82	10.58	1.97	78.84	2.00	0.00	0.09	0.00
7.46	0.89	11.58	1.95	79.60	2.00	0.00	0.08	0.00
7.48	0.95	12.35	1.97	81.06	2.00	0.00	0.08	0.00
7.50	0.99	12.87	2.00	82.16	2.00	0.00	0.08	0.00
7.52	1.01	13.14	2.03	83.14	2.00	0.01	0.08	0.00
7.54	1.02	13.22	2.10	84.80	2.00	0.22	0.08	0.00
7.56	1.00	12.96	2.17	85.87	2.00	0.00	0.08	0.00
7.58	0.96	12.47	2.24	86.54	2.00	0.00	0.08	0.00
7.60	0.93	11.95	2.29	86.93	2.00	0.00	0.08	0.00
7.62	0.90	11.62	2.42	88.69	2.00	0.00	0.08	0.00
7.64	0.90	11.46	2.53	90.48	2.00	0.00	0.08	0.00
7.66	0.90	11.57	2.53	90.68	2.00	0.00	0.08	0.00
7.68	0.93	11.88	2.44	89.62	2.00	0.00	0.08	0.00
7.70	0.97	12.41	2.32	88.15	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.72	1.00	12.76	2.28	87.82	2.00	0.00	0.08	0.00
7.74	1.02	12.99	2.27	87.96	2.00	0.00	0.08	0.00
7.76	1.00	12.79	2.38	89.86	2.00	0.00	0.08	0.00
7.78	1.00	12.73	2.28	87.82	2.00	0.00	0.08	0.00
7.80	1.12	14.30	1.94	82.41	2.00	2.79	0.07	0.00
7.82	1.41	17.99	1.55	133.68	2.00	10.39	0.00	0.00
7.84	2.07	26.38	1.21	69.10	2.00	23.02	0.00	0.00
7.86	2.54	32.32	1.15	69.71	2.00	29.72	0.00	0.00
7.88	2.78	35.35	1.16	71.20	2.00	32.68	0.00	0.00
7.90	2.55	32.55	1.31	74.76	2.00	29.96	0.00	0.00
7.92	2.30	29.50	1.60	82.06	2.00	26.71	0.00	0.00
7.94	2.03	26.15	2.07	125.57	2.00	22.73	0.00	0.00
7.96	1.84	23.80	2.59	209.14	2.00	19.62	0.00	0.00
7.98	1.76	22.84	2.86	111.82	2.00	18.25	0.05	0.00
8.00	1.88	24.38	2.87	241.49	2.00	20.41	0.00	0.00
8.02	2.08	26.82	2.79	204.08	2.00	23.57	0.00	0.00
8.04	2.21	28.47	2.76	186.33	2.00	25.53	0.00	0.00
8.06	2.07	26.69	2.77	202.86	2.00	23.40	0.00	0.00
8.08	1.84	23.54	2.80	111.03	2.00	19.26	0.05	0.00
8.10	1.63	20.74	2.80	108.40	2.00	15.09	0.06	0.00
8.12	1.60	20.24	2.72	105.86	2.00	14.27	0.06	0.00
8.14	1.66	21.01	2.71	106.50	2.00	15.50	0.06	0.00
8.16	1.83	23.19	2.68	228.46	2.00	18.76	0.00	0.00
8.18	2.04	25.93	2.65	194.83	2.00	22.45	0.00	0.00
8.20	2.10	26.59	2.68	193.32	2.00	23.28	0.00	0.00
8.22	1.93	24.40	2.76	225.46	2.00	20.45	0.00	0.00
8.24	1.61	20.22	2.83	108.35	2.00	14.24	0.06	0.00
8.26	1.36	16.83	2.75	102.70	2.00	8.18	0.07	0.00
8.28	1.22	14.91	2.62	97.47	2.00	4.18	0.07	0.00
8.30	1.20	14.66	2.53	95.30	2.00	3.63	0.07	0.00
8.32	1.28	15.60	2.31	91.97	2.00	5.67	0.07	0.00
8.34	1.48	18.09	1.96	86.23	2.00	10.56	0.06	0.00
8.36	1.85	22.59	1.66	107.47	2.00	17.90	0.00	0.00
8.38	2.27	27.76	1.49	78.18	2.00	24.70	0.00	0.00
8.40	2.61	31.96	1.43	78.02	2.00	29.35	0.00	0.00
8.42	2.67	32.67	1.44	78.75	2.00	30.07	0.00	0.00
8.44	2.51	30.63	1.52	80.35	2.00	27.94	0.00	0.00
8.46	2.18	26.60	1.81	97.42	2.00	23.30	0.00	0.00
8.48	1.83	22.31	1.99	147.11	2.00	17.49	0.00	0.00
8.50	1.70	20.52	1.97	161.75	2.00	14.72	0.00	0.00
8.52	2.06	24.79	1.43	73.52	2.00	20.97	0.00	0.00
8.54	2.63	31.67	1.18	70.32	2.00	29.04	0.00	0.00
8.56	2.99	35.85	1.12	70.26	2.00	33.14	0.00	0.00
8.58	2.83	33.87	1.18	71.28	2.00	31.26	0.00	0.00
8.60	2.47	29.60	1.30	73.10	2.00	26.82	0.00	0.00
8.62	2.20	26.43	1.58	78.62	2.00	23.07	0.00	0.00
8.64	2.02	24.24	2.00	131.55	2.00	20.23	0.00	0.00
8.66	1.81	21.71	2.50	102.20	2.00	16.59	0.06	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.68	1.66	19.94	2.72	105.63	2.00	13.77	0.06	0.00
8.70	1.60	19.15	2.74	105.26	2.00	12.45	0.06	0.00
8.72	1.66	19.80	2.63	103.54	2.00	13.55	0.06	0.00
8.74	1.70	20.27	2.54	102.00	2.00	14.32	0.06	0.00
8.76	1.68	19.96	2.48	100.20	2.00	13.81	0.06	0.00
8.78	1.69	20.00	2.22	202.88	2.00	13.87	0.00	0.00
8.80	1.79	21.09	1.96	154.28	2.00	15.63	0.00	0.00
8.82	1.97	23.23	1.82	119.97	2.00	18.82	0.00	0.00
8.84	2.13	25.09	1.85	110.41	2.00	21.36	0.00	0.00
8.86	2.13	25.11	1.97	122.61	2.00	21.39	0.00	0.00
8.88	2.03	23.86	2.08	144.17	2.00	19.70	0.00	0.00
8.90	1.86	21.73	2.16	174.43	2.00	16.61	0.00	0.00
8.92	1.81	21.13	2.20	185.65	2.00	15.69	0.00	0.00
8.94	1.85	21.62	2.18	177.47	2.00	16.45	0.00	0.00
8.96	1.95	22.73	2.15	163.19	2.00	18.10	0.00	0.00
8.98	2.06	24.01	2.15	151.24	2.00	19.91	0.00	0.00
9.00	2.47	28.89	1.95	98.87	2.00	26.01	0.00	0.00
9.02	3.06	35.61	1.52	82.58	2.00	32.92	0.00	0.00
9.04	3.57	41.37	1.26	77.76	2.00	37.87	0.00	0.00
9.06	3.63	41.91	1.08	72.73	2.00	38.29	0.00	0.00
9.08	3.37	38.93	1.23	75.33	2.00	35.86	0.00	0.00
9.10	3.02	34.94	1.45	80.20	2.00	32.29	0.00	0.00
9.12	2.72	31.56	1.85	90.75	2.00	28.93	0.00	0.00
9.14	2.55	29.61	2.20	118.87	2.00	26.83	0.00	0.00
9.16	2.42	28.02	2.54	164.46	2.00	25.01	0.00	0.00
9.18	2.21	25.61	2.82	221.93	2.00	22.04	0.00	0.00
9.20	2.02	23.31	3.03	116.40	2.00	18.94	0.05	0.00
9.22	1.88	21.56	3.11	116.32	2.00	16.36	0.06	0.00
9.24	1.85	21.07	3.07	114.84	2.00	15.60	0.06	0.00
9.26	1.84	20.92	2.88	110.42	2.00	15.37	0.06	0.00
9.28	1.92	21.80	2.60	104.79	2.00	16.72	0.06	0.00
9.30	2.28	25.89	2.24	146.13	2.00	22.40	0.00	0.00
9.32	2.71	30.86	2.04	98.57	2.00	28.19	0.00	0.00
9.34	2.94	33.47	1.84	91.28	2.00	30.88	0.00	0.00
9.36	2.85	32.37	1.80	89.68	2.00	29.77	0.00	0.00
9.38	2.65	29.92	1.86	86.88	2.00	27.17	0.00	0.00
9.40	2.50	28.34	2.20	126.38	2.00	25.38	0.00	0.00
9.42	2.30	25.99	2.72	204.87	2.00	22.52	0.00	0.00
9.44	2.08	23.47	3.31	123.26	2.00	19.16	0.05	0.00
9.46	1.87	21.03	3.76	129.53	2.00	15.54	0.06	0.00
9.48	1.76	19.68	3.80	128.32	2.00	13.35	0.06	0.00
9.50	1.70	18.91	3.62	123.42	2.00	12.03	0.06	0.00
9.52	1.69	18.70	3.34	117.44	2.00	11.67	0.06	0.00
9.54	1.75	19.32	2.99	110.99	2.00	12.74	0.06	0.00
9.56	2.03	22.50	2.55	218.81	2.00	17.77	0.00	0.00
9.58	2.35	26.08	2.24	145.36	2.00	22.64	0.00	0.00
9.60	2.61	29.02	2.06	108.94	2.00	26.17	0.00	0.00
9.62	2.69	29.89	2.01	99.63	1.96	27.14	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.64	2.77	30.71	1.99	94.68	1.82	28.03	0.00	0.00
9.66	2.88	31.94	1.98	94.95	1.82	29.32	0.00	0.00
9.68	2.95	32.61	1.97	94.75	1.82	30.01	0.00	0.00
9.70	2.93	32.39	1.98	94.94	1.82	29.79	0.00	0.00
9.72	2.83	31.18	2.02	95.30	1.84	28.53	0.00	0.00
9.74	2.66	29.28	2.18	119.16	2.00	26.46	0.00	0.00
9.76	2.54	27.89	2.35	144.57	2.00	24.85	0.00	0.00
9.78	2.71	29.71	2.24	122.11	2.00	26.95	0.00	0.00
9.80	2.93	32.10	2.13	100.61	2.00	29.49	0.00	0.00
9.82	3.04	33.30	2.03	96.97	2.00	30.70	0.00	0.00
9.84	2.91	31.81	2.21	109.27	2.00	29.20	0.00	0.00
9.86	2.84	31.07	2.40	130.40	2.00	28.42	0.00	0.00
9.88	2.86	31.21	2.48	137.69	2.00	28.57	0.00	0.00
9.90	2.70	29.41	2.62	164.30	2.00	26.61	0.00	0.00
9.92	2.43	26.29	2.73	202.74	2.00	22.91	0.00	0.00
9.94	2.22	23.90	2.90	114.17	2.00	19.76	0.05	0.00
9.96	2.24	23.98	2.79	235.53	2.00	19.87	0.00	0.00
9.98	2.30	24.61	2.71	217.01	2.00	20.73	0.00	0.00
10.00	2.25	24.02	2.73	227.45	2.00	19.92	0.00	0.00
10.02	2.14	22.73	2.87	112.26	2.00	18.10	0.05	0.00
10.04	2.08	22.01	2.94	113.05	2.00	17.04	0.06	0.00
10.06	2.11	22.41	2.92	113.13	2.00	17.63	0.05	0.00
10.08	2.28	24.19	2.72	223.78	2.00	20.16	0.00	0.00
10.10	2.50	26.64	2.51	171.90	2.00	23.34	0.00	0.00
10.12	2.80	29.88	2.29	126.54	2.00	27.13	0.00	0.00
10.14	3.12	33.29	2.10	93.44	2.00	30.70	0.00	0.00
10.16	3.28	34.98	1.98	96.47	2.00	32.33	0.00	0.00
10.18	3.36	35.80	1.89	94.28	2.00	33.10	0.00	0.00
10.20	3.38	35.92	1.82	92.07	1.76	33.20	0.00	0.00
10.22	3.50	37.08	1.73	89.89	1.70	34.25	0.00	0.00
10.24	3.59	38.01	1.65	87.79	1.65	35.07	0.00	0.00
10.26	3.48	36.79	1.55	84.26	1.56	33.99	0.00	0.00
10.28	3.35	35.19	1.48	81.14	2.00	32.53	0.00	0.00
10.30	2.95	30.96	1.81	89.48	2.00	28.30	0.00	0.00
10.32	2.63	27.48	2.38	151.17	2.00	24.37	0.00	0.00
10.34	2.21	22.91	3.16	119.14	2.00	18.36	0.05	0.00
10.36	2.06	21.20	3.21	118.23	2.00	15.79	0.06	0.00
10.38	2.08	21.39	2.98	113.42	2.00	16.09	0.06	0.00
10.40	2.34	24.08	2.60	208.64	2.00	20.01	0.00	0.00
10.42	2.67	27.69	2.26	136.14	2.00	24.62	0.00	0.00
10.44	2.96	30.64	1.93	90.42	2.00	27.96	0.00	0.00
10.46	2.94	30.44	1.77	87.96	2.00	27.74	0.00	0.00
10.48	2.79	28.67	1.79	86.48	2.00	25.76	0.00	0.00
10.50	2.56	26.28	2.03	121.86	2.00	22.89	0.00	0.00
10.52	2.47	25.28	2.32	161.24	2.00	21.61	0.00	0.00
10.54	2.32	23.65	2.66	222.11	2.00	19.41	0.00	0.00
10.56	2.18	22.05	2.94	113.25	2.00	17.10	0.06	0.00
10.58	2.45	24.95	2.66	207.42	2.00	21.18	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.60	2.98	30.51	2.26	119.68	2.00	27.82	0.00	0.00
10.62	3.53	36.40	2.04	98.97	2.00	33.65	0.00	0.00
10.64	3.59	36.88	1.99	97.71	2.00	34.08	0.00	0.00
10.66	3.31	33.87	2.00	96.46	2.00	31.27	0.00	0.00
10.68	2.86	28.98	1.97	100.69	2.00	26.12	0.00	0.00
10.70	2.31	23.16	2.34	182.91	2.00	18.73	0.00	0.00
10.72	2.06	20.40	2.69	105.60	2.00	14.53	0.06	0.00
10.74	2.07	20.48	2.88	110.14	2.00	14.66	0.06	0.00
10.76	2.24	22.32	2.64	106.49	2.00	17.50	0.05	0.00
10.78	2.21	21.96	2.66	106.46	2.00	16.97	0.06	0.00
10.80	2.13	21.07	2.62	104.78	2.00	15.59	0.06	0.00
10.82	2.15	21.16	2.50	101.93	2.00	15.74	0.06	0.00
10.84	2.16	21.24	2.36	208.08	2.00	15.86	0.00	0.00
10.86	2.04	19.96	2.41	98.75	2.00	13.81	0.06	0.00
10.88	1.87	18.13	2.59	101.04	2.00	10.65	0.06	0.00
10.90	1.63	15.51	2.92	104.48	2.00	5.49	0.07	0.00
10.92	1.44	13.50	3.09	104.30	2.00	0.90	0.08	0.00
10.94	1.27	11.58	3.25	103.01	2.00	0.00	0.08	0.00
10.96	1.33	12.31	2.83	97.50	2.00	0.00	0.08	0.00
10.98	1.52	14.26	2.48	94.13	2.00	2.70	0.07	0.00
11.00	1.72	16.29	2.19	90.20	2.00	7.11	0.07	0.00
11.02	1.73	16.44	2.17	90.03	2.00	7.42	0.07	0.00
11.04	1.56	14.58	2.32	91.10	2.00	3.45	0.07	0.00
11.06	1.34	12.28	2.56	92.58	2.00	0.00	0.08	0.00
11.08	1.24	11.14	2.58	91.00	2.00	0.00	0.09	0.00
11.10	1.36	12.37	2.22	86.29	2.00	0.00	0.08	0.00
11.12	1.70	15.97	1.87	82.52	2.00	6.45	0.07	0.00
11.14	2.15	20.58	1.57	113.43	2.00	14.82	0.00	0.00
11.16	2.38	22.96	1.54	93.30	2.00	18.44	0.00	0.00
11.18	2.51	24.25	1.52	84.09	2.00	20.24	0.00	0.00
11.20	2.77	26.91	1.42	75.97	2.00	23.67	0.00	0.00
11.22	3.14	30.67	1.36	75.51	2.00	27.99	0.00	0.00
11.24	3.31	32.35	1.37	76.53	1.43	29.75	0.00	0.00
11.26	3.26	31.80	1.45	78.74	1.47	29.18	0.00	0.00
11.28	3.28	31.95	1.49	80.25	1.50	29.34	0.00	0.00
11.30	3.29	32.03	1.60	83.49	2.00	29.42	0.00	0.00
11.32	3.07	29.77	1.78	87.99	2.00	27.00	0.00	0.00
11.34	2.64	25.31	2.14	140.41	2.00	21.65	0.00	0.00
11.36	2.24	21.14	2.63	105.02	2.00	15.70	0.06	0.00
11.38	1.94	18.05	3.30	115.93	2.00	10.48	0.06	0.00
11.40	1.80	16.58	3.54	117.99	2.00	7.69	0.07	0.00
11.42	1.93	17.95	3.00	109.58	2.00	10.32	0.06	0.00
11.44	2.15	20.15	2.38	98.27	2.00	14.12	0.06	0.00
11.46	2.57	24.35	1.76	106.37	2.00	20.38	0.00	0.00
11.48	2.65	25.13	1.49	77.67	2.00	21.41	0.00	0.00
11.50	2.59	24.43	1.34	72.65	2.00	20.48	0.00	0.00
11.52	2.18	20.23	1.58	117.71	2.00	14.26	0.00	0.00
11.54	1.98	18.20	1.86	175.80	2.00	10.76	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
11.56	1.97	18.03	2.03	88.05	2.00	10.46	0.06	0.00
11.58	2.00	18.35	2.11	90.33	2.00	11.03	0.06	0.00
11.60	1.87	16.96	2.34	94.39	2.00	8.44	0.07	0.00
11.62	1.60	14.25	2.75	99.38	2.00	2.69	0.07	0.00
11.64	1.40	12.23	3.08	101.71	2.00	0.00	0.08	0.00
11.66	1.30	11.14	3.23	101.79	2.00	0.00	0.09	0.00
11.68	1.30	11.15	3.17	100.81	2.00	0.00	0.09	0.00
11.70	1.33	11.37	3.00	98.65	2.00	0.00	0.09	0.00
11.72	1.40	12.06	2.74	95.58	2.00	0.00	0.08	0.00
11.74	1.50	13.13	2.35	89.94	2.00	0.00	0.08	0.00
11.76	1.50	13.06	2.22	87.27	2.00	0.00	0.08	0.00
11.78	1.40	12.02	2.29	87.25	2.00	0.00	0.08	0.00
11.80	1.25	10.49	2.46	87.82	2.00	0.00	0.09	0.00
11.82	1.18	9.78	2.57	88.22	2.00	0.00	0.09	0.00
11.84	1.15	9.50	2.55	87.26	2.00	0.00	0.09	0.00
11.86	1.13	9.29	2.61	87.79	2.00	0.00	0.09	0.00
11.88	1.12	9.15	2.55	86.53	2.00	0.00	0.10	0.00
11.90	1.12	9.12	2.41	84.31	2.00	0.00	0.10	0.00
11.92	1.12	9.10	2.29	82.25	2.00	0.00	0.10	0.00
11.94	1.13	9.15	2.20	80.88	2.00	0.00	0.10	0.00
11.96	1.14	9.24	2.18	80.75	2.00	0.00	0.09	0.00
11.98	1.16	9.49	2.15	80.62	2.00	0.00	0.09	0.00
12.00	1.20	9.81	2.16	81.44	2.00	0.00	0.09	0.00
12.02	1.22	10.03	2.17	81.88	2.00	0.00	0.09	0.00
12.04	1.25	10.24	2.18	82.52	2.00	0.00	0.09	0.00
12.06	1.28	10.57	2.17	82.78	2.00	0.00	0.09	0.00
12.08	1.33	11.02	2.18	83.72	2.00	0.00	0.09	0.00
12.10	1.37	11.39	2.22	84.97	2.00	0.00	0.09	0.00
12.12	1.48	12.45	2.14	84.92	2.00	0.00	0.08	0.00
12.14	1.65	14.09	2.01	84.20	2.00	2.31	0.08	0.00
12.16	1.84	15.95	1.94	84.40	2.00	6.40	0.07	0.00
12.18	1.94	16.97	2.04	87.49	2.00	8.45	0.07	0.00
12.20	1.92	16.73	2.12	89.07	2.00	7.98	0.07	0.00
12.22	1.72	14.68	2.22	89.19	2.00	3.68	0.07	0.00
12.24	1.48	12.32	2.12	84.37	2.00	0.00	0.08	0.00
12.26	1.26	10.16	2.14	81.59	2.00	0.00	0.09	0.00
12.28	1.16	9.24	2.23	81.62	2.00	0.00	0.09	0.00
12.30	1.08	8.42	2.87	89.62	2.00	0.00	0.10	0.00
12.32	1.02	7.79	3.56	97.00	2.00	0.00	0.10	0.00
12.34	0.97	7.31	4.15	102.20	2.00	0.00	0.11	0.00
12.36	0.94	6.96	4.25	101.92	2.00	0.00	0.11	0.00
12.38	0.92	6.81	4.20	100.67	2.00	0.00	0.11	0.00
12.40	0.92	6.83	3.80	96.30	2.00	0.00	0.11	0.00
12.42	0.93	6.86	3.29	90.44	2.00	0.00	0.11	0.00
12.44	0.93	6.84	2.71	83.08	2.00	0.00	0.11	0.00
12.46	0.92	6.79	2.44	79.10	2.00	0.00	0.11	0.00
12.48	0.93	6.82	2.31	77.44	2.00	0.00	0.11	0.00
12.50	0.93	6.84	2.31	77.48	2.00	0.00	0.11	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
12.52	0.93	6.81	2.30	77.21	2.00	0.00	0.11	0.00
12.54	0.92	6.74	2.32	77.35	2.00	0.00	0.11	0.00
12.56	0.91	6.62	2.33	77.18	2.00	0.00	0.11	0.00
12.58	0.92	6.66	2.30	76.83	2.00	0.00	0.11	0.00
12.60	0.94	6.83	2.21	75.93	2.00	0.00	0.11	0.00
12.62	0.96	7.05	2.13	75.27	2.00	0.00	0.11	0.00
12.64	0.97	7.13	2.09	74.87	2.00	0.00	0.11	0.00
12.66	0.95	6.94	2.16	75.47	2.00	0.00	0.11	0.00
12.68	0.94	6.85	2.22	76.26	2.00	0.00	0.11	0.00
12.70	0.94	6.82	2.29	77.18	2.00	0.00	0.11	0.00
12.72	0.96	6.94	2.31	77.76	2.00	0.00	0.11	0.00
12.74	0.97	7.05	2.30	77.95	2.00	0.00	0.11	0.00
12.76	0.97	7.09	2.30	77.96	2.00	0.00	0.11	0.00
12.78	0.99	7.25	2.24	77.54	2.00	0.00	0.11	0.00
12.80	1.01	7.38	2.18	76.84	2.00	0.00	0.10	0.00
12.82	1.02	7.48	2.09	75.70	2.00	0.00	0.10	0.00
12.84	1.02	7.50	1.99	74.22	2.00	0.00	0.10	0.00
12.86	1.04	7.62	1.89	72.80	2.00	0.00	0.10	0.00
12.88	1.07	7.87	1.81	71.84	2.00	0.00	0.10	0.00
12.90	1.08	7.97	1.79	71.72	2.00	0.00	0.10	0.00
12.92	1.07	7.87	1.82	72.04	2.00	0.00	0.10	0.00
12.94	1.05	7.73	1.87	72.67	2.00	0.00	0.10	0.00
12.96	1.06	7.78	1.88	72.83	2.00	0.00	0.10	0.00
12.98	1.07	7.88	1.85	72.66	2.00	0.00	0.10	0.00
13.00	1.08	7.91	1.82	72.15	2.00	0.00	0.10	0.00
13.02	1.08	7.92	1.80	71.78	2.00	0.00	0.10	0.00
13.04	1.10	8.05	1.78	71.62	2.00	0.00	0.10	0.00
13.06	1.12	8.25	1.74	71.37	2.00	0.00	0.10	0.00
13.08	1.14	8.41	1.70	70.89	2.00	0.00	0.10	0.00
13.10	1.15	8.55	1.68	70.60	2.00	0.00	0.10	0.00
13.12	1.18	8.76	1.65	70.48	2.00	0.00	0.10	0.00
13.14	1.23	9.26	1.62	70.57	2.00	0.00	0.09	0.00
13.16	1.29	9.77	1.57	70.12	2.00	0.00	0.09	0.00
13.18	1.34	10.18	1.53	69.83	2.00	0.00	0.09	0.00
13.20	1.34	10.21	1.57	70.79	2.00	0.00	0.09	0.00
13.22	1.32	9.99	1.72	73.46	2.00	0.00	0.09	0.00
13.24	1.28	9.61	1.91	76.66	2.00	0.00	0.09	0.00
13.26	1.22	9.07	2.14	79.72	2.00	0.00	0.10	0.00
13.28	1.18	8.62	2.35	82.33	2.00	0.00	0.10	0.00
13.30	1.16	8.43	2.51	84.45	2.00	0.00	0.10	0.00
13.32	1.19	8.73	2.48	84.67	2.00	0.00	0.10	0.00
13.34	1.30	9.71	2.27	83.18	2.00	0.00	0.09	0.00
13.36	2.35	19.43	1.19	81.59	1.61	12.93	0.00	0.00
13.38	7.63	69.39	0.35	69.39	1.37	54.94	0.55	0.00
13.40	14.13	131.71	0.23	131.71	2.00	76.09	0.00	0.00
13.42	19.99	188.11	0.20	188.11	2.00	87.86	0.00	0.00
13.44	21.46	201.95	0.24	201.95	2.00	90.20	0.00	0.00
13.46	22.52	211.90	0.27	211.90	2.00	91.79	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
13.48	23.03	216.36	0.31	216.36	2.00	92.47	0.00	0.00
13.50	24.20	227.24	0.34	227.24	2.00	94.09	0.00	0.00
13.52	24.57	230.55	0.36	230.55	2.00	94.57	0.00	0.00
13.54	25.04	234.97	0.35	234.97	2.00	95.20	0.00	0.00
13.56	24.41	228.69	0.36	228.69	2.00	94.30	0.00	0.00
13.58	23.39	218.62	0.37	218.62	2.00	92.82	0.00	0.00
13.60	21.92	204.04	0.45	204.04	2.00	90.54	0.00	0.00
13.62	20.63	191.07	0.56	191.07	2.00	88.37	0.00	0.00
13.64	19.93	183.63	0.76	183.63	2.00	87.06	0.00	0.00
13.66	20.16	185.28	0.86	185.28	2.00	87.36	0.00	0.00
13.68	21.35	196.32	0.85	196.32	2.00	89.26	0.00	0.00
13.70	22.40	206.40	0.74	206.40	2.00	90.92	0.00	0.00
13.72	23.27	214.78	0.66	214.78	2.00	92.23	0.00	0.00
13.74	23.65	218.32	0.63	218.32	2.00	92.77	0.00	0.00
13.76	23.73	219.18	0.57	219.18	2.00	92.90	0.00	0.00
13.78	23.82	219.64	0.59	219.64	2.00	92.97	0.00	0.00
13.80	23.94	220.62	0.60	220.62	2.00	93.12	0.00	0.00
13.82	24.34	223.93	0.65	223.93	2.00	93.61	0.00	0.00
13.84	24.59	226.10	0.64	226.10	2.00	93.93	0.00	0.00
13.86	24.12	221.38	0.65	221.38	2.00	93.23	0.00	0.00
13.88	23.37	214.30	0.63	214.30	2.00	92.16	0.00	0.00
13.90	21.83	199.74	0.59	199.74	2.00	89.84	0.00	0.00
13.92	20.91	191.01	0.58	191.01	2.00	88.36	0.00	0.00
13.94	20.17	183.60	0.65	183.60	2.00	87.05	0.00	0.00
13.96	20.46	185.80	0.74	185.80	2.00	87.45	0.00	0.00
13.98	20.50	185.60	0.83	185.60	2.00	87.41	0.00	0.00
14.00	19.87	179.51	0.86	179.51	2.00	86.31	0.00	0.00
14.02	19.03	171.08	0.98	181.20	2.00	84.72	0.00	0.00
14.04	17.66	157.56	1.28	188.36	2.00	82.01	0.00	0.00
14.06	17.23	152.57	1.71	193.33	2.00	80.94	0.00	0.00
14.08	17.40	153.38	2.10	201.98	2.00	81.12	0.00	0.00
14.10	19.78	174.65	2.17	226.53	2.00	85.41	0.00	0.00
14.12	22.16	195.98	2.20	250.31	2.00	89.21	0.00	0.00
14.14	24.17	213.91	2.23	270.61	2.00	92.10	0.00	0.00
14.16	25.39	224.31	2.39	285.57	2.00	93.66	0.00	0.00
14.18	27.27	240.91	2.43	304.91	2.00	96.02	0.00	0.00
14.20	28.51	251.62	2.52	318.77	2.00	97.46	0.00	0.00
14.22	30.77	272.18	2.34	336.69	2.00	100.00	0.00	0.00
14.24	32.47	287.50	2.24	349.68	2.00	100.00	0.00	0.00
14.26	34.57	306.59	2.08	362.40	2.00	100.00	0.00	0.00

Total estimated displacement: 0.06

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.20	3.73	22.06	82.29	3.52	0.83	13.84
0.92	0.25	4.57	20.15	92.03	3.47	0.81	16.58
0.94	0.27	5.00	19.10	95.55	3.43	1.54	17.76
0.96	0.30	5.59	17.61	98.38	3.39	1.07	19.40
0.98	0.29	5.40	17.21	92.99	3.37	1.01	18.37
1.00	0.52	10.04	8.81	88.51	3.00	1.02	33.43
1.02	1.05	20.47	3.92	80.26	2.62	0.79	0.79
1.04	1.69	33.12	2.25	74.64	2.38	0.37	0.69
1.06	2.23	43.77	1.75	76.46	2.25	0.43	0.70
1.08	2.56	50.17	1.57	78.80	2.18	0.53	0.70
1.10	2.75	53.97	1.53	82.54	2.16	0.71	0.71
1.12	2.78	54.56	1.59	87.02	2.19	0.72	0.72
1.14	2.62	51.27	1.85	94.69	2.28	0.74	0.74
1.16	2.42	47.34	2.21	104.73	2.37	0.76	0.76
1.18	2.27	44.41	2.59	114.91	2.44	0.77	0.77
1.20	2.18	42.75	2.86	122.35	2.48	0.79	0.79
1.22	2.10	41.13	3.16	129.91	2.53	0.81	0.81
1.24	1.98	38.75	3.48	134.70	2.57	0.85	0.85
1.26	1.90	37.21	3.63	135.00	2.59	0.87	0.87
1.28	1.88	36.64	3.54	129.76	2.57	0.85	0.85
1.30	1.86	36.33	3.46	125.77	2.57	0.84	0.84
1.32	1.88	36.74	3.31	121.66	2.55	0.81	0.81
1.34	1.94	37.94	3.13	118.86	2.52	0.79	0.79
1.36	2.05	40.12	2.99	119.87	2.50	0.77	0.77
1.38	2.13	41.53	3.01	125.06	2.50	0.78	0.78
1.40	2.15	41.92	3.19	133.52	2.53	0.82	0.82
1.42	2.05	40.01	3.64	145.59	2.59	0.89	0.89
1.44	2.03	39.63	3.89	154.32	2.62	0.92	0.92
1.46	2.02	39.39	4.07	160.46	2.64	0.95	0.95
1.48	2.04	39.86	4.04	160.87	2.63	0.95	0.95
1.50	2.00	39.01	4.15	161.96	2.64	0.96	0.96
1.52	1.97	38.50	4.11	158.21	2.64	0.95	0.95
1.54	1.93	37.64	4.12	154.94	2.64	0.95	0.95
1.56	1.86	36.17	4.16	150.50	2.65	0.95	0.95
1.58	1.77	34.40	4.43	152.48	2.67	0.98	0.98
1.60	1.77	34.44	4.43	152.41	2.67	0.97	0.97
1.62	1.85	35.93	4.25	152.78	2.65	0.96	0.96
1.64	1.99	38.77	3.87	150.10	2.61	0.92	0.92
1.66	2.10	40.98	3.61	147.89	2.58	0.89	0.89
1.68	2.18	42.56	3.43	146.18	2.56	0.86	0.86
1.70	2.23	43.47	3.29	143.21	2.54	0.84	0.84
1.72	2.33	45.42	3.15	143.25	2.52	0.83	0.83
1.74	2.35	45.82	3.14	144.10	2.52	0.83	0.83
1.76	2.29	44.64	3.33	148.61	2.55	0.86	0.86
1.78	2.14	41.57	3.72	154.48	2.60	0.91	0.91
1.80	2.01	39.08	4.11	160.71	2.64	0.96	0.96
1.82	1.90	36.89	4.53	167.21	2.68	1.01	1.01
1.84	1.80	34.97	4.85	169.77	2.71	0.85	0.85

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.70	33.02	5.21	172.15	2.75	0.86	0.86
1.88	1.64	31.67	5.49	173.99	2.77	0.86	0.86
1.90	1.57	30.42	5.78	175.74	2.79	0.86	0.86
1.92	1.50	29.04	6.09	176.97	2.82	0.86	0.86
1.94	1.40	27.04	6.55	177.11	2.85	0.86	0.86
1.96	1.31	25.30	7.05	178.41	2.89	0.86	0.86
1.98	1.24	23.92	7.59	181.49	2.93	0.87	0.87
2.00	1.17	22.46	8.25	185.35	2.97	0.87	0.87
2.02	1.13	21.59	8.68	187.36	2.99	0.87	0.87
2.04	1.12	21.43	8.79	188.42	3.00	3.45	45.66
2.06	1.13	21.59	8.85	191.04	3.00	3.55	45.66
2.08	1.09	20.84	9.19	191.42	3.02	3.68	43.78
2.10	1.03	19.59	9.61	188.22	3.05	3.30	40.88
2.12	0.99	18.85	9.56	180.11	3.04	3.00	39.07
2.14	1.00	18.98	9.07	172.23	3.02	2.78	39.08
2.16	1.03	19.55	8.39	164.00	2.98	0.85	0.85
2.18	1.09	20.89	7.28	152.16	2.91	0.83	0.83
2.20	1.24	23.65	5.83	137.92	2.80	0.81	0.81
2.22	1.47	28.20	4.36	122.89	2.67	0.92	0.92
2.24	1.81	34.96	3.14	109.85	2.52	0.77	0.77
2.26	2.08	40.40	2.60	104.91	2.44	0.76	0.76
2.28	2.25	43.61	2.45	106.65	2.41	0.76	0.76
2.30	2.22	43.12	2.71	116.75	2.46	0.78	0.78
2.32	2.12	41.12	3.14	129.15	2.52	0.80	0.80
2.34	2.04	39.40	3.52	138.54	2.57	0.86	0.86
2.36	1.81	35.03	4.41	154.47	2.67	0.98	0.98
2.38	1.59	30.54	5.60	171.11	2.78	0.85	0.85
2.40	1.34	25.65	7.18	184.23	2.90	0.87	0.87
2.42	1.28	24.54	7.36	180.75	2.91	0.87	0.87
2.44	1.34	25.71	6.65	170.98	2.86	0.85	0.85
2.46	1.35	25.80	6.48	167.23	2.85	0.85	0.85
2.48	1.30	24.82	6.71	166.65	2.87	0.85	0.85
2.50	1.18	22.42	7.33	164.43	2.91	0.85	0.85
2.52	1.11	21.08	7.48	157.65	2.92	0.84	0.84
2.54	1.10	20.83	7.14	148.63	2.90	0.83	0.83
2.56	1.30	24.79	5.41	134.20	2.76	0.80	0.80
2.58	2.64	51.20	1.96	100.16	2.31	0.75	0.75
2.60	4.69	91.71	1.28	117.25	1.96	0.78	0.78
2.62	7.72	145.44	1.00	145.44	1.70	0.82	0.82
2.64	10.30	180.63	1.00	180.63	1.56	0.87	0.87
2.66	12.56	208.69	1.00	208.69	1.45	0.90	0.90
2.68	14.22	226.99	1.00	226.99	1.37	0.91	0.91
2.70	15.52	242.36	1.00	242.36	1.33	0.93	0.93
2.72	16.71	257.41	1.00	257.41	1.31	0.94	0.94
2.74	17.67	269.64	1.00	269.64	1.29	0.95	0.95
2.76	18.65	282.10	1.00	282.10	1.28	0.96	0.96
2.78	19.61	294.71	1.00	294.71	1.27	0.97	0.97
2.80	20.67	309.06	1.00	309.06	1.26	0.98	0.98

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	21.55	321.53	1.00	321.53	1.26	0.99	0.99
2.84	22.23	331.49	1.00	331.49	1.26	1.00	1.00
2.86	22.45	336.68	1.00	336.68	1.28	1.01	1.01
2.88	22.55	339.20	1.00	339.20	1.29	1.01	1.01
2.90	22.52	340.36	1.00	340.36	1.31	1.01	1.01
2.92	21.28	329.18	1.00	329.18	1.36	1.00	1.00
2.94	21.05	325.67	1.00	325.67	1.37	1.00	1.00
2.96	20.93	322.69	1.00	322.69	1.37	1.00	1.00
2.98	22.09	331.00	1.00	331.00	1.31	1.00	1.00
3.00	22.14	331.75	1.00	331.75	1.31	1.00	1.00
3.02	21.80	327.73	1.00	327.73	1.32	1.00	1.00
3.04	21.20	320.69	1.00	320.69	1.34	0.99	0.99
3.06	20.43	310.94	1.00	310.94	1.36	0.99	0.99
3.08	19.71	301.85	1.00	301.85	1.38	0.98	0.98
3.10	18.90	291.65	1.00	291.65	1.41	0.97	0.97
3.12	17.99	279.75	1.00	279.75	1.43	0.96	0.96
3.14	16.29	257.74	1.00	257.74	1.48	0.94	0.94
3.16	14.18	230.25	1.00	230.25	1.54	0.92	0.92
3.18	11.67	196.83	1.00	196.83	1.64	0.88	0.88
3.20	9.54	167.90	1.09	183.40	1.75	0.87	0.87
3.22	7.59	140.61	1.23	172.45	1.88	0.86	0.86
3.24	6.06	118.21	1.33	157.06	2.02	0.84	0.84
3.26	4.78	93.26	1.60	149.01	2.19	0.83	0.83
3.28	3.95	76.92	2.08	159.79	2.34	0.84	0.84
3.30	3.40	65.97	2.65	175.07	2.45	0.86	0.86
3.32	3.16	61.19	2.99	183.25	2.50	0.86	0.86
3.34	2.90	56.09	3.42	191.60	2.56	0.92	0.92
3.36	2.63	50.74	3.97	201.23	2.62	0.99	0.99
3.38	2.42	46.66	4.47	208.59	2.68	1.05	1.05
3.40	2.29	44.10	4.70	207.31	2.70	1.08	1.08
3.42	2.21	42.47	4.66	197.79	2.70	1.06	1.06
3.44	2.15	41.33	4.26	176.17	2.66	0.99	0.99
3.46	2.10	40.24	3.83	154.16	2.61	0.92	0.92
3.48	2.05	39.22	3.43	134.62	2.56	0.85	0.85
3.50	2.02	38.59	3.24	124.85	2.54	0.81	0.81
3.52	2.00	38.27	3.08	117.80	2.51	0.78	0.78
3.54	1.98	37.92	2.98	113.10	2.50	0.76	0.76
3.56	1.93	36.85	3.05	112.39	2.51	0.77	0.77
3.58	1.84	35.11	3.26	114.37	2.54	0.79	0.79
3.60	1.80	34.36	3.43	117.79	2.56	0.82	0.82
3.62	1.80	34.26	3.53	120.97	2.57	0.84	0.84
3.64	1.79	34.12	3.63	123.98	2.59	0.85	0.85
3.66	1.75	33.29	3.80	126.63	2.61	0.87	0.87
3.68	1.69	32.14	4.03	129.66	2.63	0.90	0.90
3.70	1.68	31.79	4.12	130.95	2.64	0.91	0.91
3.72	1.68	31.94	4.10	130.86	2.64	0.91	0.91
3.74	1.66	31.45	4.17	131.25	2.65	0.92	0.92
3.76	1.56	29.54	4.52	133.38	2.68	0.95	0.95

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	1.42	26.64	5.12	136.39	2.74	0.81	0.81
3.80	1.31	24.48	5.64	138.02	2.78	0.81	0.81
3.82	1.26	23.56	5.88	138.52	2.80	0.81	0.81
3.84	1.45	27.25	4.82	131.46	2.71	0.80	0.80
3.86	2.05	39.06	2.92	114.06	2.49	0.77	0.77
3.88	2.74	52.78	1.98	104.25	2.31	0.76	0.76
3.90	3.21	60.81	1.70	103.68	2.23	0.75	0.75
3.92	3.19	60.71	1.79	108.51	2.26	0.76	0.76
3.94	2.92	56.35	2.03	114.25	2.33	0.77	0.77
3.96	2.53	48.52	2.54	123.31	2.43	0.79	0.79
3.98	2.10	40.11	3.31	132.72	2.55	0.83	0.83
4.00	1.68	31.76	4.64	147.19	2.69	0.99	0.99
4.02	1.35	25.23	6.45	162.84	2.85	0.84	0.84
4.04	1.10	20.35	8.77	178.48	3.00	0.86	0.86
4.06	0.98	17.96	10.41	186.96	3.09	1.95	22.09
4.08	0.92	16.66	11.39	189.85	3.14	1.89	20.42
4.10	0.88	15.86	11.81	187.37	3.16	1.87	19.36
4.12	0.82	14.73	12.41	182.86	3.19	1.74	17.91
4.14	0.69	12.22	13.66	166.83	3.24	1.56	14.80
4.16	0.67	11.73	12.89	151.18	3.21	0.89	14.15
4.18	0.68	11.91	11.36	135.27	3.14	0.98	14.32
4.20	0.80	14.32	9.09	130.26	3.02	0.89	17.17
4.22	0.89	16.06	7.62	122.38	2.93	0.79	0.79
4.24	1.05	19.30	5.81	112.19	2.80	0.77	0.77
4.26	1.22	22.64	4.66	105.50	2.70	0.91	0.91
4.28	1.35	25.18	4.13	104.09	2.64	0.86	0.86
4.30	1.39	25.92	4.19	108.72	2.65	0.88	0.88
4.32	1.39	25.95	4.37	113.31	2.67	0.90	0.90
4.34	1.38	25.75	4.53	116.59	2.68	0.92	0.92
4.36	1.39	25.98	4.54	118.08	2.68	0.93	0.93
4.38	1.42	26.58	4.44	118.06	2.67	0.92	0.92
4.40	1.47	27.43	4.28	117.28	2.66	0.90	0.90
4.42	1.50	28.06	4.11	115.46	2.64	0.88	0.88
4.44	1.51	28.23	4.00	112.89	2.63	0.87	0.87
4.46	1.50	28.04	3.88	108.82	2.61	0.85	0.85
4.48	1.49	27.88	3.70	103.29	2.59	0.82	0.82
4.50	1.49	27.85	3.54	98.47	2.57	0.79	0.79
4.52	1.49	27.83	3.41	94.90	2.56	0.77	0.77
4.54	1.48	27.52	3.43	94.25	2.56	0.77	0.77
4.56	1.45	27.04	3.49	94.48	2.57	0.78	0.78
4.58	1.42	26.50	3.60	95.47	2.58	0.80	0.80
4.60	1.40	26.05	3.68	95.86	2.59	0.80	0.80
4.62	1.39	25.75	3.73	96.01	2.60	0.81	0.81
4.64	1.38	25.56	3.74	95.58	2.60	0.81	0.81
4.66	1.39	25.64	3.68	94.48	2.59	0.80	0.80
4.68	1.41	25.92	3.58	92.68	2.58	0.79	0.79
4.70	1.44	26.27	3.45	90.69	2.56	0.77	0.77
4.72	1.46	26.39	3.36	88.79	2.55	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	1.46	26.33	3.33	87.64	2.55	0.75	0.75
4.76	1.46	26.22	3.31	86.85	2.55	0.75	0.75
4.78	1.45	26.13	3.35	87.43	2.55	0.75	0.75
4.80	1.44	25.94	3.43	88.94	2.56	0.76	0.76
4.82	1.43	25.72	3.54	91.00	2.57	0.78	0.78
4.84	1.43	25.75	3.61	92.93	2.58	0.79	0.79
4.86	1.46	26.19	3.61	94.60	2.58	0.79	0.79
4.88	1.50	26.85	3.57	95.94	2.58	0.79	0.79
4.90	1.53	27.33	3.54	96.71	2.57	0.79	0.79
4.92	1.55	27.49	3.51	96.51	2.57	0.79	0.79
4.94	1.54	27.44	3.57	97.99	2.58	0.80	0.80
4.96	1.54	27.36	3.65	99.75	2.59	0.81	0.81
4.98	1.54	27.40	3.70	101.41	2.59	0.82	0.82
5.00	1.54	27.33	3.71	101.54	2.60	0.82	0.82
5.02	1.54	27.13	3.76	101.95	2.60	0.82	0.82
5.04	1.52	26.78	3.82	102.32	2.61	0.83	0.83
5.06	1.51	26.63	3.82	101.69	2.61	0.83	0.83
5.08	1.52	26.67	3.75	99.90	2.60	0.82	0.82
5.10	1.55	26.97	3.63	97.78	2.59	0.80	0.80
5.12	1.60	27.62	3.45	95.37	2.56	0.78	0.78
5.14	1.66	28.43	3.28	93.30	2.54	0.76	0.76
5.16	1.71	29.20	3.15	92.11	2.52	0.74	0.74
5.18	1.75	29.66	3.08	91.39	2.51	0.73	0.73
5.20	1.77	29.96	3.03	90.77	2.51	0.72	0.72
5.22	1.79	30.12	2.98	89.80	2.50	0.72	0.72
5.24	1.78	29.91	3.00	89.74	2.50	0.72	0.72
5.26	1.75	29.48	3.07	90.57	2.51	0.73	0.73
5.28	1.71	28.77	3.22	92.57	2.53	0.75	0.75
5.30	1.66	28.05	3.43	96.25	2.56	0.78	0.78
5.32	1.60	27.14	3.71	100.78	2.60	0.82	0.82
5.34	1.54	26.21	4.02	105.47	2.63	0.86	0.86
5.36	1.55	26.26	4.01	105.25	2.63	0.85	0.85
5.38	1.54	26.15	4.01	104.92	2.63	0.85	0.85
5.40	1.53	25.78	4.02	103.73	2.63	0.85	0.85
5.42	1.44	24.32	4.35	105.67	2.66	0.88	0.88
5.44	1.37	23.15	4.59	106.36	2.69	0.91	0.91
5.46	1.31	22.19	4.79	106.34	2.71	0.76	0.76
5.48	1.27	21.44	4.92	105.46	2.72	0.76	0.76
5.50	1.24	20.80	5.00	103.96	2.73	0.76	0.76
5.52	1.21	20.32	5.04	102.43	2.73	0.75	0.75
5.54	1.18	19.74	5.18	102.24	2.74	0.75	0.75
5.56	1.14	19.00	5.42	102.97	2.76	0.75	0.75
5.58	1.09	18.19	5.73	104.29	2.79	0.76	0.76
5.60	1.02	17.09	6.14	105.02	2.82	0.76	0.76
5.62	0.95	15.88	6.64	105.36	2.86	0.76	0.76
5.64	0.83	13.89	7.78	108.03	2.94	0.76	0.76
5.66	0.72	11.68	9.54	111.44	3.04	0.51	11.68
5.68	0.61	9.59	11.91	114.24	3.16	0.53	9.59

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.61	9.61	11.65	111.97	3.15	0.51	9.61
5.72	0.70	11.19	9.41	105.32	3.04	0.45	11.19
5.74	0.81	13.19	7.32	96.59	2.91	0.74	0.74
5.76	0.88	14.22	6.46	91.84	2.85	0.73	0.73
5.78	0.90	14.38	6.32	90.96	2.84	0.73	0.73
5.80	0.92	14.69	6.14	90.10	2.82	0.73	0.73
5.82	0.95	15.21	5.76	87.55	2.79	0.72	0.72
5.84	1.00	15.87	5.34	84.75	2.76	0.72	0.72
5.86	1.02	16.22	5.33	86.52	2.76	0.72	0.72
5.88	1.02	16.27	5.66	92.15	2.78	0.73	0.73
5.90	1.01	16.11	6.15	99.10	2.82	0.75	0.75
5.92	1.01	16.10	6.29	101.27	2.83	0.75	0.75
5.94	1.01	16.15	6.21	100.30	2.83	0.75	0.75
5.96	1.03	16.31	5.98	97.58	2.81	0.74	0.74
5.98	1.04	16.41	5.86	96.15	2.80	0.74	0.74
6.00	1.07	16.74	5.64	94.36	2.78	0.74	0.74
6.02	1.11	17.32	5.26	91.11	2.75	0.73	0.73
6.04	1.18	18.30	4.84	88.65	2.71	0.73	0.73
6.06	1.23	19.11	4.57	87.26	2.69	0.86	0.86
6.08	1.26	19.55	4.61	90.22	2.69	0.87	0.87
6.10	1.25	19.39	5.00	96.91	2.73	0.74	0.74
6.12	1.22	19.11	5.42	103.56	2.76	0.75	0.75
6.14	1.21	18.92	5.75	108.81	2.79	0.76	0.76
6.16	1.20	18.76	6.03	113.15	2.81	0.77	0.77
6.18	1.19	18.63	6.43	119.76	2.84	0.78	0.78
6.20	1.18	18.58	6.76	125.56	2.87	0.79	0.79
6.22	1.20	18.85	6.90	130.03	2.88	0.80	0.80
6.24	1.23	19.33	6.73	130.05	2.87	0.80	0.80
6.26	1.26	19.78	6.55	129.61	2.85	0.80	0.80
6.28	1.26	19.69	6.64	130.71	2.86	0.80	0.80
6.30	1.25	19.47	6.88	133.87	2.88	0.80	0.80
6.32	1.23	19.22	7.01	134.77	2.89	0.81	0.81
6.34	1.24	19.29	6.83	131.71	2.87	0.80	0.80
6.36	1.25	19.27	6.75	130.03	2.87	0.80	0.80
6.38	1.30	20.01	6.43	128.63	2.84	0.80	0.80
6.40	1.38	21.19	5.93	125.63	2.81	0.79	0.79
6.42	1.39	21.18	5.75	121.74	2.79	0.79	0.79
6.44	1.29	19.54	6.16	120.38	2.82	0.78	0.78
6.46	1.12	16.89	6.87	115.97	2.88	0.78	0.78
6.48	1.01	15.11	7.40	111.85	2.91	0.77	0.77
6.50	0.94	13.99	7.88	110.21	2.94	0.77	0.77
6.52	0.90	13.25	8.67	114.92	2.99	0.77	0.77
6.54	0.88	12.87	9.29	119.55	3.03	0.61	12.87
6.56	0.88	12.89	9.65	124.38	3.05	0.64	12.89
6.58	0.89	12.97	9.70	125.88	3.05	0.74	12.97
6.60	0.94	13.75	9.11	125.22	3.02	0.66	13.75
6.62	0.98	14.41	8.36	120.51	2.97	0.78	0.78
6.64	0.99	14.54	8.22	119.52	2.97	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	0.96	13.99	8.67	121.36	2.99	0.78	0.78
6.68	0.91	13.15	9.50	124.96	3.04	0.68	13.15
6.70	0.88	12.63	10.03	126.71	3.07	0.70	12.63
6.72	0.84	11.88	10.72	127.27	3.11	0.66	11.88
6.74	0.80	11.15	11.13	124.16	3.13	0.67	11.15
6.76	0.75	10.42	11.66	121.44	3.15	0.57	10.42
6.78	0.71	9.78	12.20	119.27	3.18	0.55	9.78
6.80	0.68	9.22	13.00	119.90	3.21	0.58	9.22
6.82	0.67	8.93	13.43	119.98	3.23	0.57	8.93
6.84	0.66	8.78	13.38	117.50	3.23	0.55	8.78
6.86	0.63	8.33	13.74	114.54	3.24	0.50	8.33
6.88	0.58	7.53	14.97	112.76	3.29	0.48	7.53
6.90	0.53	6.63	16.78	111.18	3.36	0.47	6.63
6.92	0.50	6.19	17.53	108.46	3.38	0.44	6.19
6.94	0.50	6.09	16.99	103.52	3.37	0.39	6.09
6.96	0.50	6.14	16.26	99.77	3.34	0.35	6.14
6.98	0.52	6.35	15.12	96.09	3.30	0.34	6.35
7.00	0.53	6.56	14.37	94.31	3.27	0.31	6.56
7.02	0.55	6.77	13.48	91.27	3.23	0.31	6.77
7.04	0.56	6.92	12.96	89.73	3.21	0.28	6.92
7.06	0.58	7.19	12.15	87.37	3.17	0.28	7.19
7.08	0.60	7.62	11.30	86.13	3.13	0.26	7.62
7.10	0.63	8.09	10.52	85.18	3.10	0.26	8.09
7.12	0.66	8.41	10.13	85.22	3.08	0.27	8.41
7.14	0.66	8.41	10.23	85.98	3.08	0.27	8.41
7.16	0.64	8.15	10.56	86.01	3.10	0.28	8.15
7.18	0.63	7.89	10.81	85.27	3.11	0.27	7.89
7.20	0.62	7.80	10.70	83.40	3.10	0.25	7.80
7.22	0.63	7.90	10.36	81.80	3.09	0.24	7.90
7.24	0.64	7.96	10.21	81.25	3.08	0.24	7.96
7.26	0.64	8.01	10.15	81.36	3.08	0.24	8.01
7.28	0.64	8.02	10.16	81.51	3.08	0.24	8.02
7.30	0.65	8.20	9.89	81.05	3.06	0.24	8.20
7.32	0.68	8.61	9.32	80.27	3.03	0.24	8.61
7.34	0.72	9.23	8.68	80.04	2.99	0.59	0.71
7.36	0.75	9.55	8.47	80.90	2.98	0.63	0.71
7.38	0.75	9.56	8.73	83.40	3.00	0.71	0.71
7.40	0.74	9.41	8.80	82.79	3.00	0.29	9.41
7.42	0.76	9.75	8.33	81.23	2.97	0.65	0.71
7.44	0.82	10.58	7.45	78.84	2.92	0.53	0.70
7.46	0.89	11.58	6.87	79.60	2.88	0.56	0.71
7.48	0.95	12.35	6.56	81.06	2.85	0.64	0.71
7.50	0.99	12.87	6.38	82.16	2.84	0.70	0.71
7.52	1.01	13.14	6.33	83.14	2.84	0.71	0.71
7.54	1.02	13.22	6.41	84.80	2.84	0.72	0.72
7.56	1.00	12.96	6.63	85.87	2.86	0.72	0.72
7.58	0.96	12.47	6.94	86.54	2.88	0.72	0.72
7.60	0.93	11.95	7.27	86.93	2.90	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	0.90	11.62	7.63	88.69	2.93	0.73	0.73
7.64	0.90	11.46	7.89	90.48	2.95	0.73	0.73
7.66	0.90	11.57	7.84	90.68	2.94	0.73	0.73
7.68	0.93	11.88	7.54	89.62	2.92	0.73	0.73
7.70	0.97	12.41	7.11	88.15	2.89	0.72	0.72
7.72	1.00	12.76	6.88	87.82	2.88	0.72	0.72
7.74	1.02	12.99	6.77	87.96	2.87	0.72	0.72
7.76	1.00	12.79	7.02	89.86	2.89	0.73	0.73
7.78	1.00	12.73	6.90	87.82	2.88	0.72	0.72
7.80	1.12	14.30	5.76	82.41	2.79	0.71	0.71
7.82	1.41	17.99	4.20	75.64	2.65	0.80	0.80
7.84	2.07	26.38	2.62	69.10	2.44	0.24	0.68
7.86	2.54	32.32	2.16	69.71	2.36	0.25	0.68
7.88	2.78	35.35	2.01	71.20	2.32	0.28	0.69
7.90	2.55	32.55	2.30	74.76	2.38	0.38	0.69
7.92	2.30	29.50	2.78	82.06	2.47	0.69	0.71
7.94	2.03	26.15	3.60	94.06	2.58	0.79	0.79
7.96	1.84	23.80	4.46	106.25	2.68	0.90	0.90
7.98	1.76	22.84	4.90	111.82	2.72	0.77	0.77
8.00	1.88	24.38	4.66	113.61	2.70	0.93	0.93
8.02	2.08	26.82	4.24	113.72	2.65	0.89	0.89
8.04	2.21	28.47	4.02	114.36	2.63	0.87	0.87
8.06	2.07	26.69	4.24	113.11	2.65	0.89	0.89
8.08	1.84	23.54	4.72	111.03	2.70	0.77	0.77
8.10	1.63	20.74	5.23	108.40	2.75	0.76	0.76
8.12	1.60	20.24	5.23	105.86	2.75	0.76	0.76
8.14	1.66	21.01	5.07	106.50	2.73	0.76	0.76
8.16	1.83	23.19	4.65	107.86	2.69	0.92	0.92
8.18	2.04	25.93	4.22	109.43	2.65	0.88	0.88
8.20	2.10	26.59	4.17	110.91	2.65	0.88	0.88
8.22	1.93	24.40	4.55	110.92	2.68	0.91	0.91
8.24	1.61	20.22	5.36	108.35	2.76	0.76	0.76
8.26	1.36	16.83	6.10	102.70	2.82	0.75	0.75
8.28	1.22	14.91	6.54	97.47	2.85	0.74	0.74
8.30	1.20	14.66	6.50	95.30	2.85	0.74	0.74
8.32	1.28	15.60	5.90	91.97	2.80	0.73	0.73
8.34	1.48	18.09	4.77	86.23	2.71	0.72	0.72
8.36	1.85	22.59	3.59	80.98	2.58	0.76	0.76
8.38	2.27	27.76	2.82	78.18	2.48	0.50	0.70
8.40	2.61	31.96	2.44	78.02	2.41	0.50	0.70
8.42	2.67	32.67	2.41	78.75	2.41	0.53	0.70
8.44	2.51	30.63	2.62	80.35	2.44	0.60	0.71
8.46	2.18	26.60	3.27	86.96	2.54	0.74	0.74
8.48	1.83	22.31	4.03	89.87	2.63	0.82	0.82
8.50	1.70	20.52	4.29	88.10	2.66	0.84	0.84
8.52	2.06	24.79	3.04	75.30	2.51	0.34	0.69
8.54	2.63	31.67	2.22	70.32	2.37	0.26	0.68
8.56	2.99	35.85	1.96	70.26	2.31	0.26	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	2.83	33.87	2.10	71.28	2.34	0.28	0.69
8.60	2.47	29.60	2.47	73.10	2.42	0.33	0.69
8.62	2.20	26.43	3.04	80.35	2.51	0.52	0.70
8.64	2.02	24.24	3.76	91.08	2.60	0.80	0.80
8.66	1.81	21.71	4.71	102.20	2.70	0.75	0.75
8.68	1.66	19.94	5.30	105.63	2.75	0.76	0.76
8.70	1.60	19.15	5.50	105.26	2.77	0.76	0.76
8.72	1.66	19.80	5.23	103.54	2.75	0.75	0.75
8.74	1.70	20.27	5.03	102.00	2.73	0.75	0.75
8.76	1.68	19.96	5.02	100.20	2.73	0.75	0.75
8.78	1.69	20.00	4.70	94.00	2.70	0.89	0.89
8.80	1.79	21.09	4.18	88.16	2.65	0.83	0.83
8.82	1.97	23.23	3.69	85.75	2.59	0.78	0.78
8.84	2.13	25.09	3.49	87.48	2.57	0.77	0.77
8.86	2.13	25.11	3.62	90.85	2.58	0.79	0.79
8.88	2.03	23.86	3.90	93.13	2.62	0.82	0.82
8.90	1.86	21.73	4.32	93.91	2.66	0.86	0.86
8.92	1.81	21.13	4.46	94.32	2.68	0.87	0.87
8.94	1.85	21.62	4.36	94.18	2.67	0.86	0.86
8.96	1.95	22.73	4.15	94.38	2.64	0.84	0.84
8.98	2.06	24.01	3.96	95.13	2.62	0.83	0.83
9.00	2.47	28.89	3.19	92.22	2.53	0.75	0.75
9.02	3.06	35.61	2.32	82.58	2.39	0.71	0.71
9.04	3.57	41.37	1.88	77.76	2.29	0.48	0.70
9.06	3.63	41.91	1.74	72.73	2.24	0.32	0.69
9.08	3.37	38.93	1.94	75.33	2.30	0.40	0.70
9.10	3.02	34.94	2.30	80.20	2.38	0.59	0.71
9.12	2.72	31.56	2.88	90.75	2.48	0.73	0.73
9.14	2.55	29.61	3.38	99.97	2.55	0.78	0.78
9.16	2.42	28.02	3.86	108.25	2.61	0.85	0.85
9.18	2.21	25.61	4.44	113.76	2.67	0.91	0.91
9.20	2.02	23.31	4.99	116.40	2.73	0.78	0.78
9.22	1.88	21.56	5.39	116.32	2.76	0.78	0.78
9.24	1.85	21.07	5.45	114.84	2.77	0.77	0.77
9.26	1.84	20.92	5.28	110.42	2.75	0.77	0.77
9.28	1.92	21.80	4.81	104.79	2.71	0.76	0.76
9.30	2.28	25.89	3.81	98.65	2.61	0.82	0.82
9.32	2.71	30.86	3.12	96.17	2.52	0.75	0.75
9.34	2.94	33.47	2.73	91.28	2.46	0.73	0.73
9.36	2.85	32.37	2.77	89.68	2.47	0.73	0.73
9.38	2.65	29.92	3.01	90.21	2.51	0.72	0.72
9.40	2.50	28.34	3.50	99.29	2.57	0.79	0.79
9.42	2.30	25.99	4.29	111.58	2.66	0.89	0.89
9.44	2.08	23.47	5.25	123.26	2.75	0.79	0.79
9.46	1.87	21.03	6.16	129.53	2.82	0.80	0.80
9.48	1.76	19.68	6.52	128.32	2.85	0.80	0.80
9.50	1.70	18.91	6.53	123.42	2.85	0.79	0.79
9.52	1.69	18.70	6.28	117.44	2.83	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	1.75	19.32	5.74	110.99	2.79	0.77	0.77
9.56	2.03	22.50	4.63	104.18	2.69	0.91	0.91
9.58	2.35	26.08	3.79	98.92	2.60	0.82	0.82
9.60	2.61	29.02	3.30	95.69	2.54	0.76	0.76
9.62	2.69	29.89	3.16	94.54	2.53	0.75	0.75
9.64	2.77	30.71	3.08	94.52	2.51	0.74	0.74
9.66	2.88	31.94	2.97	94.95	2.50	0.74	0.74
9.68	2.95	32.61	2.91	94.75	2.49	0.74	0.74
9.70	2.93	32.39	2.93	94.94	2.49	0.74	0.74
9.72	2.83	31.18	3.07	95.69	2.51	0.74	0.74
9.74	2.66	29.28	3.39	99.32	2.56	0.78	0.78
9.76	2.54	27.89	3.70	103.08	2.59	0.82	0.82
9.78	2.71	29.71	3.40	101.15	2.56	0.79	0.79
9.80	2.93	32.10	3.10	99.37	2.52	0.75	0.75
9.82	3.04	33.30	2.91	96.97	2.49	0.74	0.74
9.84	2.91	31.81	3.20	101.68	2.53	0.76	0.76
9.86	2.84	31.07	3.43	106.55	2.56	0.80	0.80
9.88	2.86	31.21	3.49	108.94	2.57	0.81	0.81
9.90	2.70	29.41	3.80	111.64	2.61	0.85	0.85
9.92	2.43	26.29	4.26	112.01	2.66	0.89	0.89
9.94	2.22	23.90	4.78	114.17	2.71	0.77	0.77
9.96	2.24	23.98	4.65	111.42	2.69	0.92	0.92
9.98	2.30	24.61	4.47	110.02	2.68	0.90	0.90
10.00	2.25	24.02	4.59	110.14	2.69	0.91	0.91
10.02	2.14	22.73	4.94	112.26	2.72	0.77	0.77
10.04	2.08	22.01	5.14	113.05	2.74	0.77	0.77
10.06	2.11	22.41	5.05	113.13	2.73	0.77	0.77
10.08	2.28	24.19	4.55	110.02	2.68	0.91	0.91
10.10	2.50	26.64	4.00	106.47	2.63	0.85	0.85
10.12	2.80	29.88	3.44	102.79	2.56	0.79	0.79
10.14	3.12	33.29	2.98	99.21	2.50	0.74	0.74
10.16	3.28	34.98	2.76	96.47	2.47	0.74	0.74
10.18	3.36	35.80	2.63	94.28	2.45	0.74	0.74
10.20	3.38	35.92	2.56	92.07	2.43	0.73	0.73
10.22	3.50	37.08	2.42	89.89	2.41	0.73	0.73
10.24	3.59	38.01	2.31	87.79	2.39	0.72	0.72
10.26	3.48	36.79	2.29	84.26	2.38	0.72	0.72
10.28	3.35	35.19	2.31	81.14	2.39	0.64	0.71
10.30	2.95	30.96	2.89	89.48	2.49	0.73	0.73
10.32	2.63	27.48	3.78	103.75	2.60	0.83	0.83
10.34	2.21	22.91	5.20	119.14	2.75	0.78	0.78
10.36	2.06	21.20	5.58	118.23	2.78	0.78	0.78
10.38	2.08	21.39	5.30	113.42	2.75	0.77	0.77
10.40	2.34	24.08	4.44	106.96	2.67	0.90	0.90
10.42	2.67	27.69	3.63	100.44	2.59	0.81	0.81
10.44	2.96	30.64	3.03	92.90	2.51	0.73	0.73
10.46	2.94	30.44	2.89	87.96	2.49	0.72	0.72
10.48	2.79	28.67	3.06	87.58	2.51	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	2.56	26.28	3.55	93.36	2.58	0.79	0.79
10.52	2.47	25.28	3.98	100.60	2.63	0.84	0.84
10.54	2.32	23.65	4.57	108.13	2.69	0.91	0.91
10.56	2.18	22.05	5.14	113.25	2.74	0.77	0.77
10.58	2.45	24.95	4.38	109.20	2.67	0.89	0.89
10.60	2.98	30.51	3.35	102.17	2.55	0.78	0.78
10.62	3.53	36.40	2.72	98.97	2.46	0.75	0.75
10.64	3.59	36.88	2.65	97.71	2.45	0.74	0.74
10.66	3.31	33.87	2.85	96.46	2.48	0.74	0.74
10.68	2.86	28.98	3.21	93.00	2.53	0.75	0.75
10.70	2.31	23.16	4.30	99.52	2.66	0.87	0.87
10.72	2.06	20.40	5.18	105.60	2.74	0.76	0.76
10.74	2.07	20.48	5.38	110.14	2.76	0.77	0.77
10.76	2.24	22.32	4.77	106.49	2.71	0.76	0.76
10.78	2.21	21.96	4.85	106.46	2.71	0.76	0.76
10.80	2.13	21.07	4.97	104.78	2.72	0.76	0.76
10.82	2.15	21.16	4.82	101.93	2.71	0.75	0.75
10.84	2.16	21.24	4.64	98.59	2.69	0.90	0.90
10.86	2.04	19.96	4.95	98.75	2.72	0.75	0.75
10.88	1.87	18.13	5.57	101.04	2.78	0.75	0.75
10.90	1.63	15.51	6.74	104.48	2.87	0.76	0.76
10.92	1.44	13.50	7.73	104.30	2.93	0.76	0.76
10.94	1.27	11.58	8.89	103.01	3.01	0.42	11.58
10.96	1.33	12.31	7.92	97.50	2.95	0.74	0.74
10.98	1.52	14.26	6.60	94.13	2.86	0.74	0.74
11.00	1.72	16.29	5.54	90.20	2.77	0.73	0.73
11.02	1.73	16.44	5.47	90.03	2.77	0.73	0.73
11.04	1.56	14.58	6.25	91.10	2.83	0.73	0.73
11.06	1.34	12.28	7.54	92.58	2.92	0.73	0.73
11.08	1.24	11.14	8.17	91.00	2.96	0.73	0.73
11.10	1.36	12.37	6.98	86.29	2.88	0.72	0.72
11.12	1.70	15.97	5.17	82.52	2.74	0.71	0.71
11.14	2.15	20.58	3.78	77.74	2.60	0.77	0.77
11.16	2.38	22.96	3.39	77.85	2.56	0.74	0.74
11.18	2.51	24.25	3.21	77.77	2.53	0.72	0.72
11.20	2.77	26.91	2.82	75.97	2.48	0.42	0.70
11.22	3.14	30.67	2.46	75.51	2.42	0.40	0.70
11.24	3.31	32.35	2.37	76.53	2.40	0.44	0.70
11.26	3.26	31.80	2.48	78.74	2.42	0.53	0.70
11.28	3.28	31.95	2.51	80.25	2.43	0.60	0.71
11.30	3.29	32.03	2.61	83.49	2.44	0.71	0.71
11.32	3.07	29.77	2.96	87.99	2.50	0.72	0.72
11.34	2.64	25.31	3.79	95.84	2.60	0.81	0.81
11.36	2.24	21.14	4.97	105.02	2.72	0.76	0.76
11.38	1.94	18.05	6.42	115.93	2.84	0.78	0.78
11.40	1.80	16.58	7.11	117.99	2.89	0.78	0.78
11.42	1.93	17.95	6.10	109.58	2.82	0.77	0.77
11.44	2.15	20.15	4.88	98.27	2.72	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.46	2.57	24.35	3.48	84.70	2.57	0.76	0.76
11.48	2.65	25.13	3.08	77.42	2.51	0.48	0.70
11.50	2.59	24.43	2.97	72.65	2.50	0.32	0.69
11.52	2.18	20.23	3.85	77.92	2.61	0.78	0.78
11.54	1.98	18.20	4.62	84.05	2.69	0.86	0.86
11.56	1.97	18.03	4.88	88.05	2.72	0.72	0.72
11.58	2.00	18.35	4.92	90.33	2.72	0.73	0.73
11.60	1.87	16.96	5.56	94.39	2.78	0.74	0.74
11.62	1.60	14.25	6.97	99.38	2.88	0.75	0.75
11.64	1.40	12.23	8.32	101.71	2.97	0.75	0.75
11.66	1.30	11.14	9.13	101.79	3.02	0.43	11.14
11.68	1.30	11.15	9.04	100.81	3.01	0.41	11.15
11.70	1.33	11.37	8.67	98.65	2.99	0.75	0.75
11.72	1.40	12.06	7.92	95.58	2.95	0.74	0.74
11.74	1.50	13.13	6.85	89.94	2.88	0.73	0.73
11.76	1.50	13.06	6.68	87.27	2.86	0.72	0.72
11.78	1.40	12.02	7.26	87.25	2.90	0.72	0.72
11.80	1.25	10.49	8.37	87.82	2.98	0.72	0.72
11.82	1.18	9.78	9.02	88.22	3.01	0.28	9.78
11.84	1.15	9.50	9.18	87.26	3.02	0.30	9.50
11.86	1.13	9.29	9.45	87.79	3.04	0.30	9.29
11.88	1.12	9.15	9.46	86.53	3.04	0.29	9.15
11.90	1.12	9.12	9.24	84.31	3.03	0.27	9.12
11.92	1.12	9.10	9.04	82.25	3.01	0.25	9.10
11.94	1.13	9.15	8.84	80.88	3.00	0.25	9.15
11.96	1.14	9.24	8.74	80.75	3.00	0.62	0.71
11.98	1.16	9.49	8.49	80.62	2.98	0.62	0.71
12.00	1.20	9.81	8.30	81.44	2.97	0.66	0.71
12.02	1.22	10.03	8.16	81.88	2.96	0.68	0.71
12.04	1.25	10.24	8.06	82.52	2.96	0.71	0.71
12.06	1.28	10.57	7.83	82.78	2.94	0.71	0.71
12.08	1.33	11.02	7.60	83.72	2.93	0.72	0.72
12.10	1.37	11.39	7.46	84.97	2.92	0.72	0.72
12.12	1.48	12.45	6.82	84.92	2.87	0.72	0.72
12.14	1.65	14.09	5.98	84.20	2.81	0.72	0.72
12.16	1.84	15.95	5.29	84.40	2.75	0.72	0.72
12.18	1.94	16.97	5.16	87.49	2.74	0.72	0.72
12.20	1.92	16.73	5.33	89.07	2.76	0.73	0.73
12.22	1.72	14.68	6.07	89.19	2.82	0.73	0.73
12.24	1.48	12.32	6.85	84.37	2.88	0.72	0.72
12.26	1.26	10.16	8.03	81.59	2.95	0.67	0.71
12.28	1.16	9.24	8.84	81.62	3.00	0.24	9.24
12.30	1.08	8.42	10.65	89.62	3.10	0.28	8.42
12.32	1.02	7.79	12.45	97.00	3.19	0.38	7.79
12.34	0.97	7.31	13.97	102.20	3.25	0.39	7.31
12.36	0.94	6.96	14.64	101.92	3.28	0.39	6.96
12.38	0.92	6.81	14.79	100.67	3.28	0.37	6.81
12.40	0.92	6.83	14.11	96.30	3.26	0.36	6.83

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.42	0.93	6.86	13.19	90.44	3.22	0.29	6.86
12.44	0.93	6.84	12.14	83.08	3.17	0.23	6.84
12.46	0.92	6.79	11.65	79.10	3.15	0.20	6.79
12.48	0.93	6.82	11.36	77.44	3.14	0.21	6.82
12.50	0.93	6.84	11.33	77.48	3.14	0.20	6.84
12.52	0.93	6.81	11.34	77.21	3.14	0.21	6.81
12.54	0.92	6.74	11.47	77.35	3.14	0.20	6.74
12.56	0.91	6.62	11.67	77.18	3.15	0.21	6.62
12.58	0.92	6.66	11.53	76.83	3.15	0.20	6.66
12.60	0.94	6.83	11.12	75.93	3.13	0.20	6.83
12.62	0.96	7.05	10.68	75.27	3.10	0.19	7.05
12.64	0.97	7.13	10.51	74.87	3.09	0.19	7.13
12.66	0.95	6.94	10.88	75.47	3.11	0.19	6.94
12.68	0.94	6.85	11.13	76.26	3.13	0.20	6.85
12.70	0.94	6.82	11.32	77.18	3.13	0.21	6.82
12.72	0.96	6.94	11.20	77.76	3.13	0.21	6.94
12.74	0.97	7.05	11.05	77.95	3.12	0.21	7.05
12.76	0.97	7.09	10.99	77.96	3.12	0.21	7.09
12.78	0.99	7.25	10.70	77.54	3.10	0.21	7.25
12.80	1.01	7.38	10.42	76.84	3.09	0.21	7.38
12.82	1.02	7.48	10.12	75.70	3.07	0.20	7.48
12.84	1.02	7.50	9.90	74.22	3.06	0.19	7.50
12.86	1.04	7.62	9.55	72.80	3.04	0.18	7.62
12.88	1.07	7.87	9.13	71.84	3.02	0.18	7.87
12.90	1.08	7.97	9.00	71.72	3.01	0.18	7.97
12.92	1.07	7.87	9.16	72.04	3.02	0.18	7.87
12.94	1.05	7.73	9.41	72.67	3.04	0.18	7.73
12.96	1.06	7.78	9.36	72.83	3.03	0.19	7.78
12.98	1.07	7.88	9.22	72.66	3.03	0.19	7.88
13.00	1.08	7.91	9.12	72.15	3.02	0.18	7.91
13.02	1.08	7.92	9.07	71.78	3.02	0.18	7.92
13.04	1.10	8.05	8.89	71.62	3.01	0.18	8.05
13.06	1.12	8.25	8.65	71.37	2.99	0.29	0.69
13.08	1.14	8.41	8.43	70.89	2.98	0.27	0.69
13.10	1.15	8.55	8.26	70.60	2.97	0.27	0.68
13.12	1.18	8.76	8.05	70.48	2.96	0.27	0.68
13.14	1.23	9.26	7.62	70.57	2.93	0.27	0.68
13.16	1.29	9.77	7.18	70.12	2.90	0.26	0.68
13.18	1.34	10.18	6.86	69.83	2.88	0.25	0.68
13.20	1.34	10.21	6.93	70.79	2.88	0.27	0.69
13.22	1.32	9.99	7.35	73.46	2.91	0.34	0.69
13.24	1.28	9.61	7.98	76.66	2.95	0.44	0.70
13.26	1.22	9.07	8.79	79.72	3.00	0.24	9.07
13.28	1.18	8.62	9.55	82.33	3.04	0.25	8.62
13.30	1.16	8.43	10.01	84.45	3.07	0.27	8.43
13.32	1.19	8.73	9.70	84.67	3.05	0.28	8.73
13.34	1.30	9.71	8.57	83.18	2.99	0.71	0.71
13.36	2.35	19.43	3.43	66.65	2.56	0.67	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.38	7.63	69.39	1.00	69.39	1.81	0.24	0.68
13.40	14.13	131.71	1.00	131.71	1.48	0.80	0.80
13.42	19.99	188.11	1.00	188.11	1.31	0.87	0.87
13.44	21.46	201.95	1.00	201.95	1.32	0.89	0.89
13.46	22.52	211.90	1.00	211.90	1.32	0.90	0.90
13.48	23.03	216.36	1.00	216.36	1.34	0.90	0.90
13.50	24.20	227.24	1.00	227.24	1.35	0.91	0.91
13.52	24.57	230.55	1.00	230.55	1.36	0.92	0.92
13.54	25.04	234.97	1.00	234.97	1.34	0.92	0.92
13.56	24.41	228.69	1.00	228.69	1.35	0.92	0.92
13.58	23.39	218.62	1.00	218.62	1.38	0.91	0.91
13.60	21.92	204.04	1.00	204.04	1.45	0.89	0.89
13.62	20.63	191.07	1.00	191.07	1.53	0.88	0.88
13.64	19.93	183.63	1.00	183.63	1.64	0.87	0.87
13.66	20.16	185.28	1.00	185.28	1.67	0.87	0.87
13.68	21.35	196.32	1.00	196.32	1.65	0.88	0.88
13.70	22.40	206.40	1.00	206.40	1.59	0.89	0.89
13.72	23.27	214.78	1.00	214.78	1.54	0.90	0.90
13.74	23.65	218.32	1.00	218.32	1.52	0.91	0.91
13.76	23.73	219.18	1.00	219.18	1.49	0.91	0.91
13.78	23.82	219.64	1.00	219.64	1.51	0.91	0.91
13.80	23.94	220.62	1.00	220.62	1.51	0.91	0.91
13.82	24.34	223.93	1.00	223.93	1.53	0.91	0.91
13.84	24.59	226.10	1.00	226.10	1.52	0.91	0.91
13.86	24.12	221.38	1.00	221.38	1.53	0.91	0.91
13.88	23.37	214.30	1.00	214.30	1.53	0.90	0.90
13.90	21.83	199.74	1.00	199.74	1.54	0.89	0.89
13.92	20.91	191.01	1.00	191.01	1.55	0.88	0.88
13.94	20.17	183.60	1.00	183.60	1.59	0.87	0.87
13.96	20.46	185.80	1.00	185.80	1.63	0.87	0.87
13.98	20.50	185.60	1.00	185.60	1.66	0.87	0.87
14.00	19.87	179.51	1.00	179.51	1.68	0.86	0.86
14.02	19.03	171.08	1.06	181.20	1.74	0.87	0.87
14.04	17.66	157.56	1.20	188.36	1.84	0.87	0.87
14.06	17.23	152.57	1.27	193.33	1.95	0.88	0.88
14.08	17.40	153.38	1.32	201.98	2.01	0.89	0.89
14.10	19.78	174.65	1.30	226.53	1.99	0.91	0.91
14.12	22.16	195.98	1.28	250.31	1.96	0.94	0.94
14.14	24.17	213.91	1.27	270.61	1.94	0.95	0.95
14.16	25.39	224.31	1.27	285.57	1.95	0.97	0.97
14.18	27.27	240.91	1.27	304.91	1.94	0.98	0.98
14.20	28.51	251.62	1.27	318.77	1.95	0.99	0.99
14.22	30.77	272.18	1.24	336.69	1.90	1.01	1.01
14.24	32.47	287.50	1.22	349.68	1.87	1.01	1.01
14.26	34.57	306.59	1.18	362.40	1.83	1.02	1.02

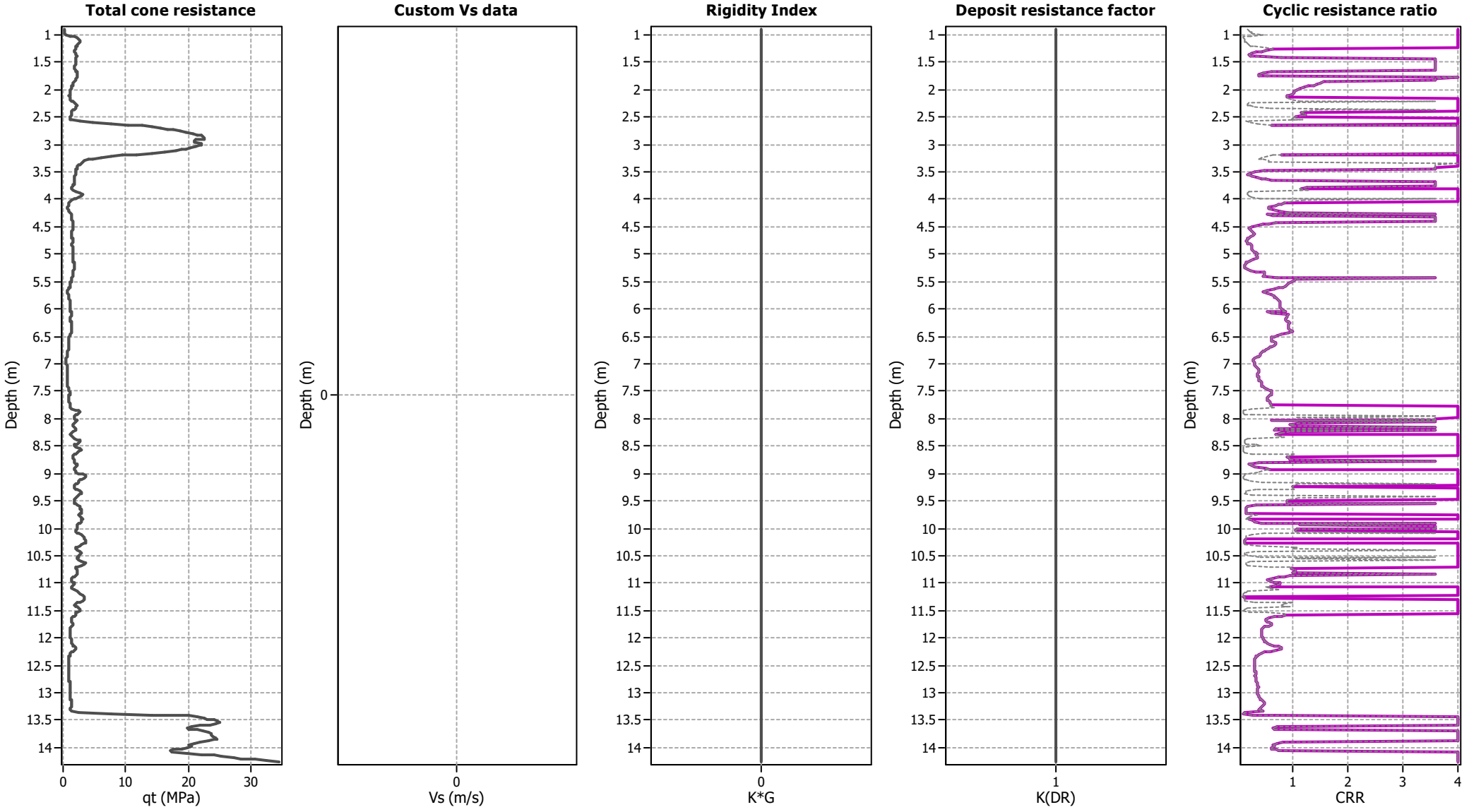
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



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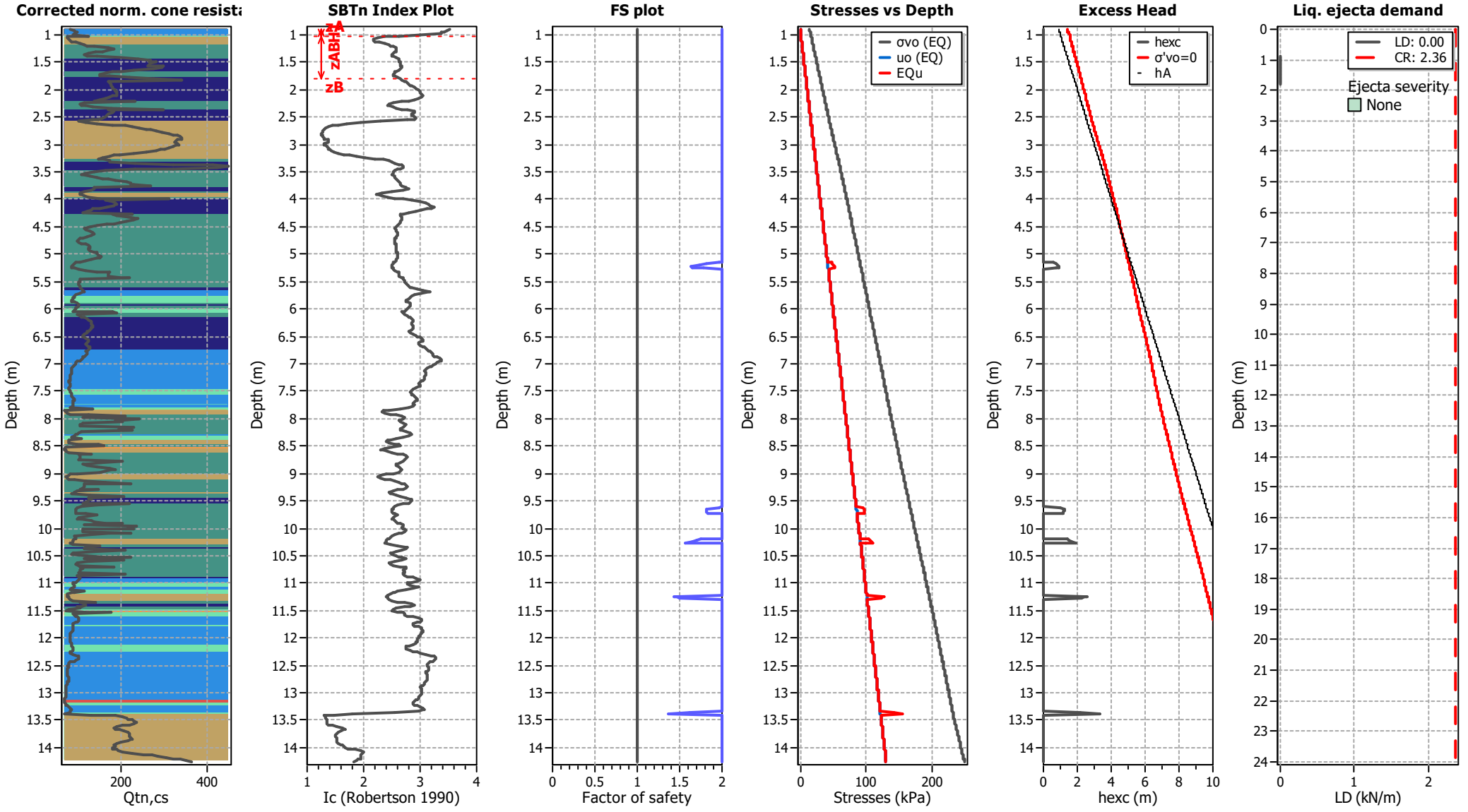
CPT name: CWLP CPT-4L

Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

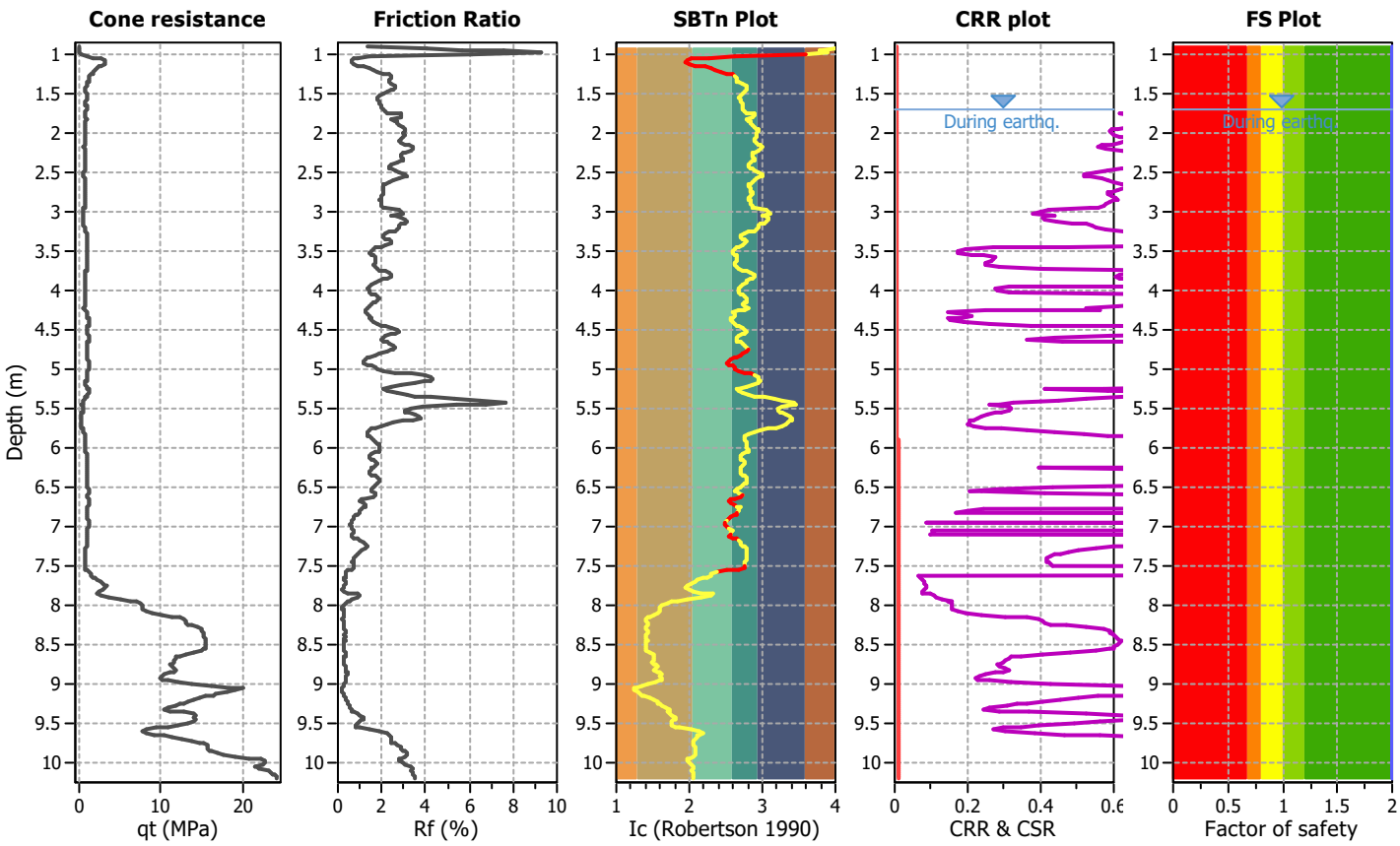
LIQUEFACTION ANALYSIS REPORT

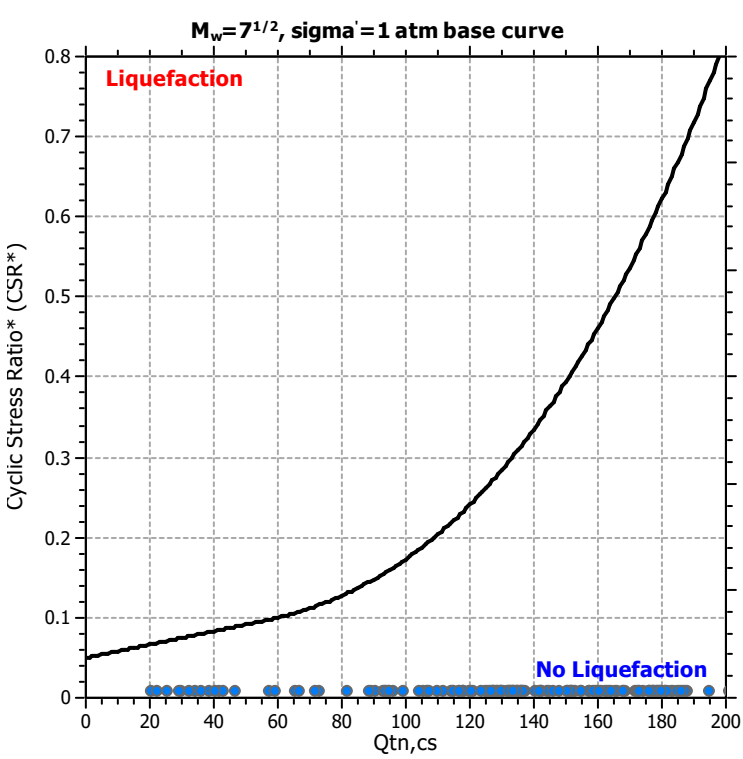
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

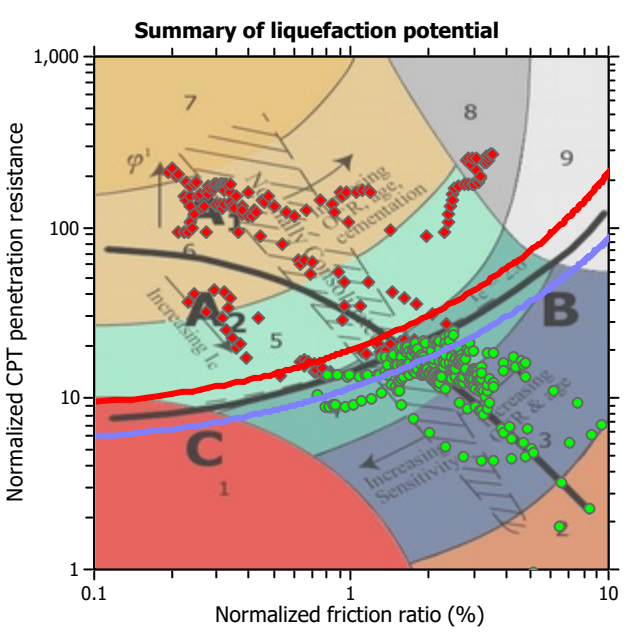
CPT file : CWLP CPT-6L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.01	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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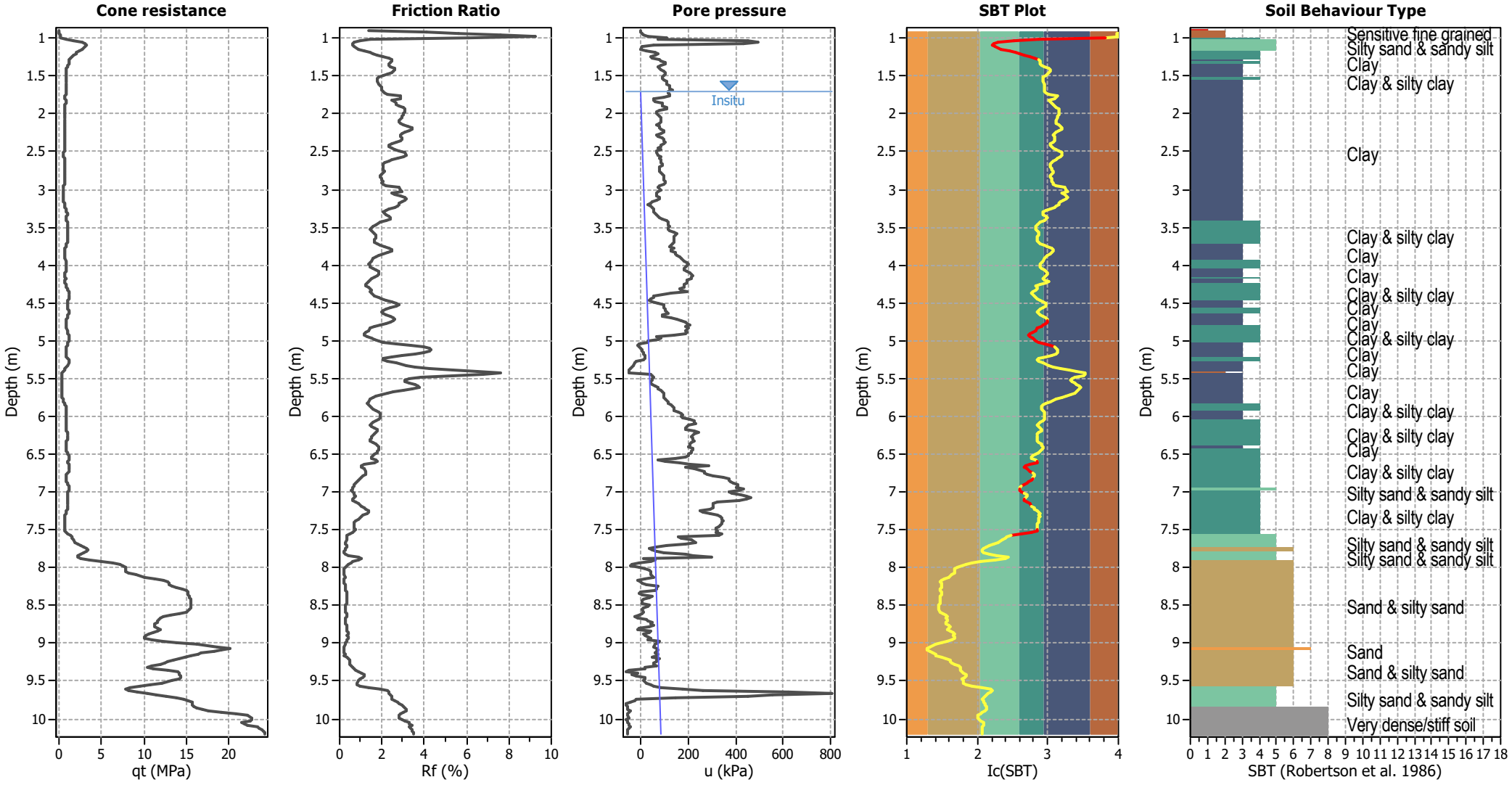
CPT name: CWLP CPT-6L

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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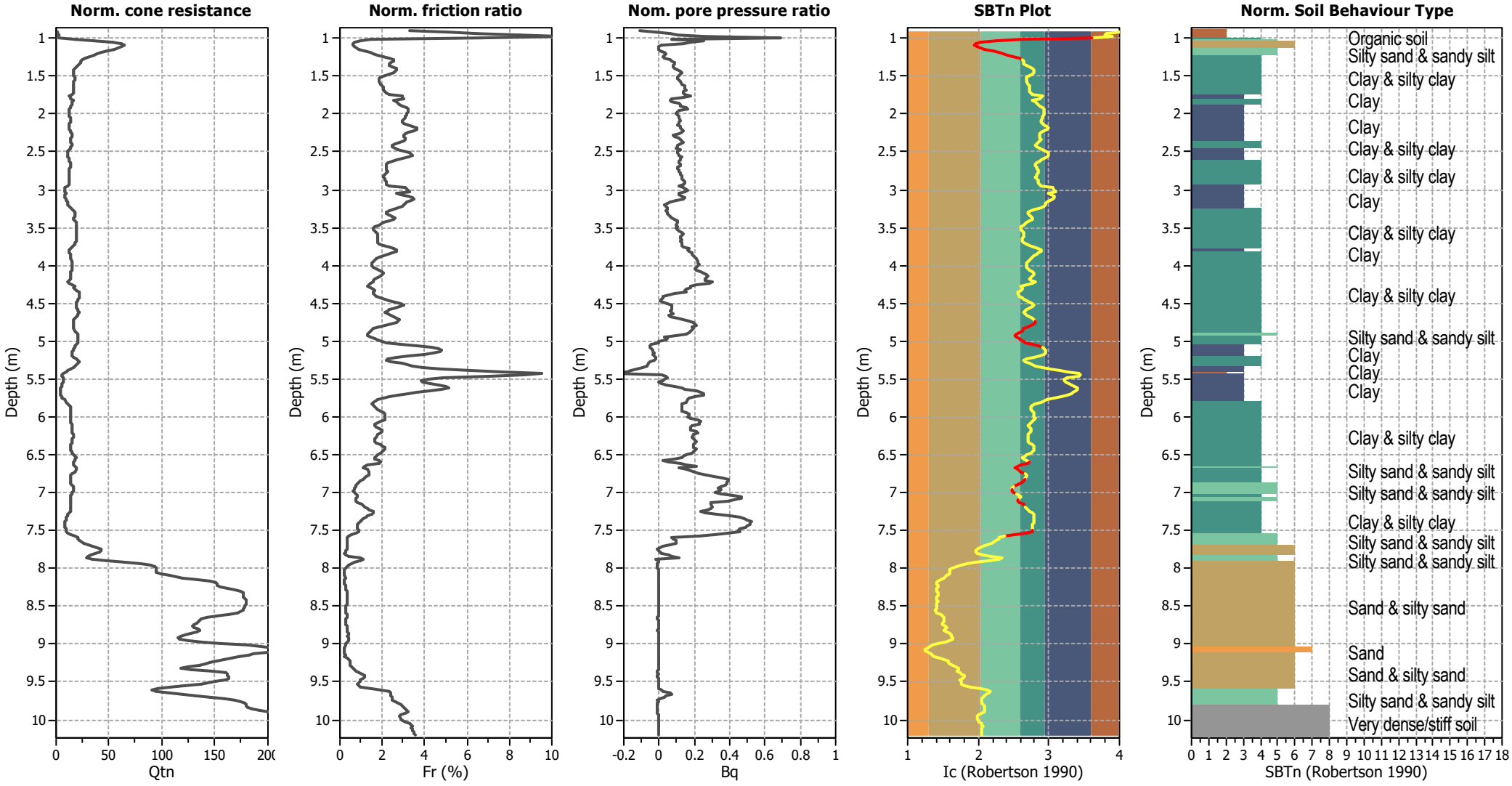
CPT name: CWLP CPT-6L

CPT basic interpretation plots (normalized)



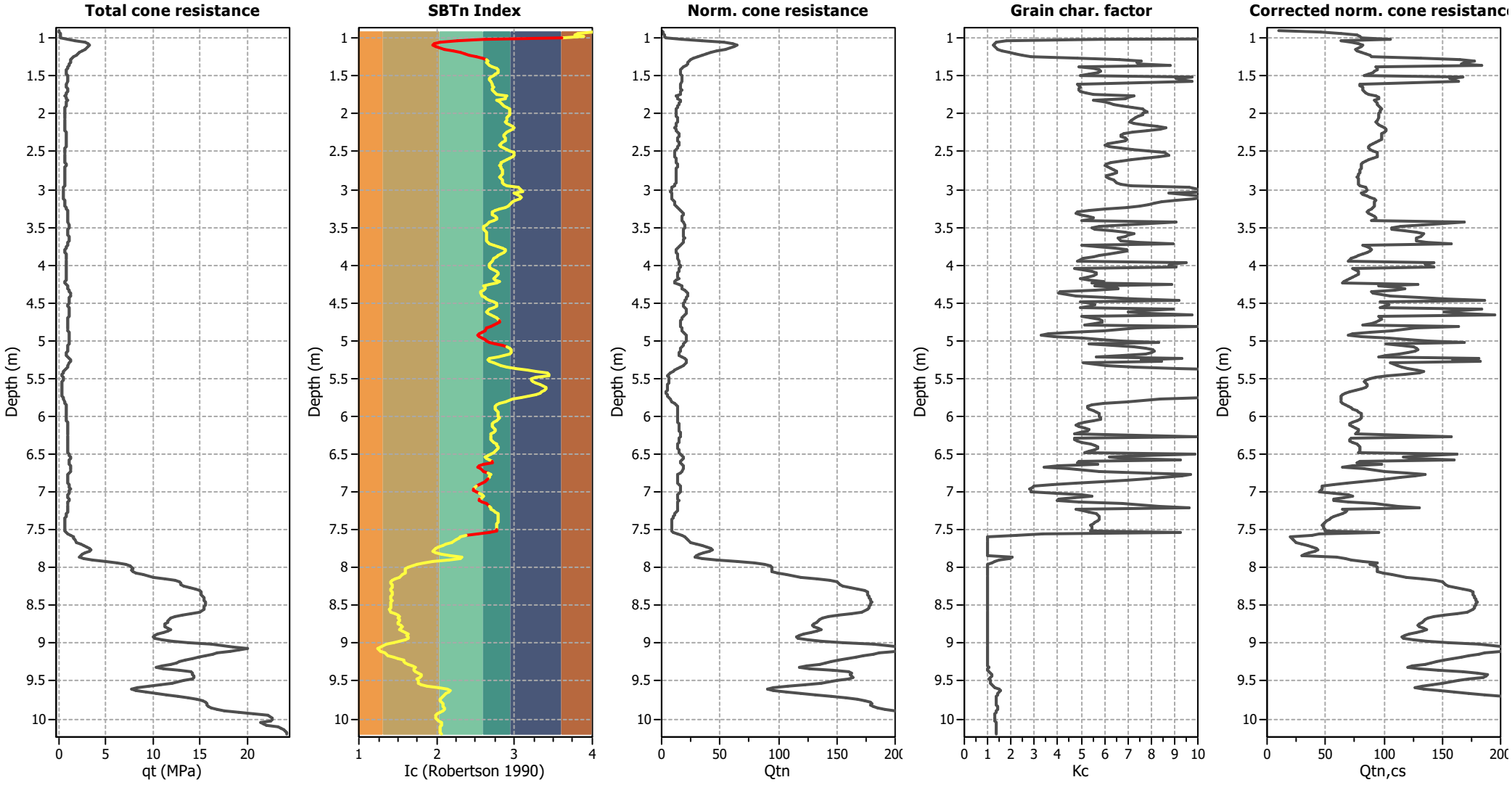
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

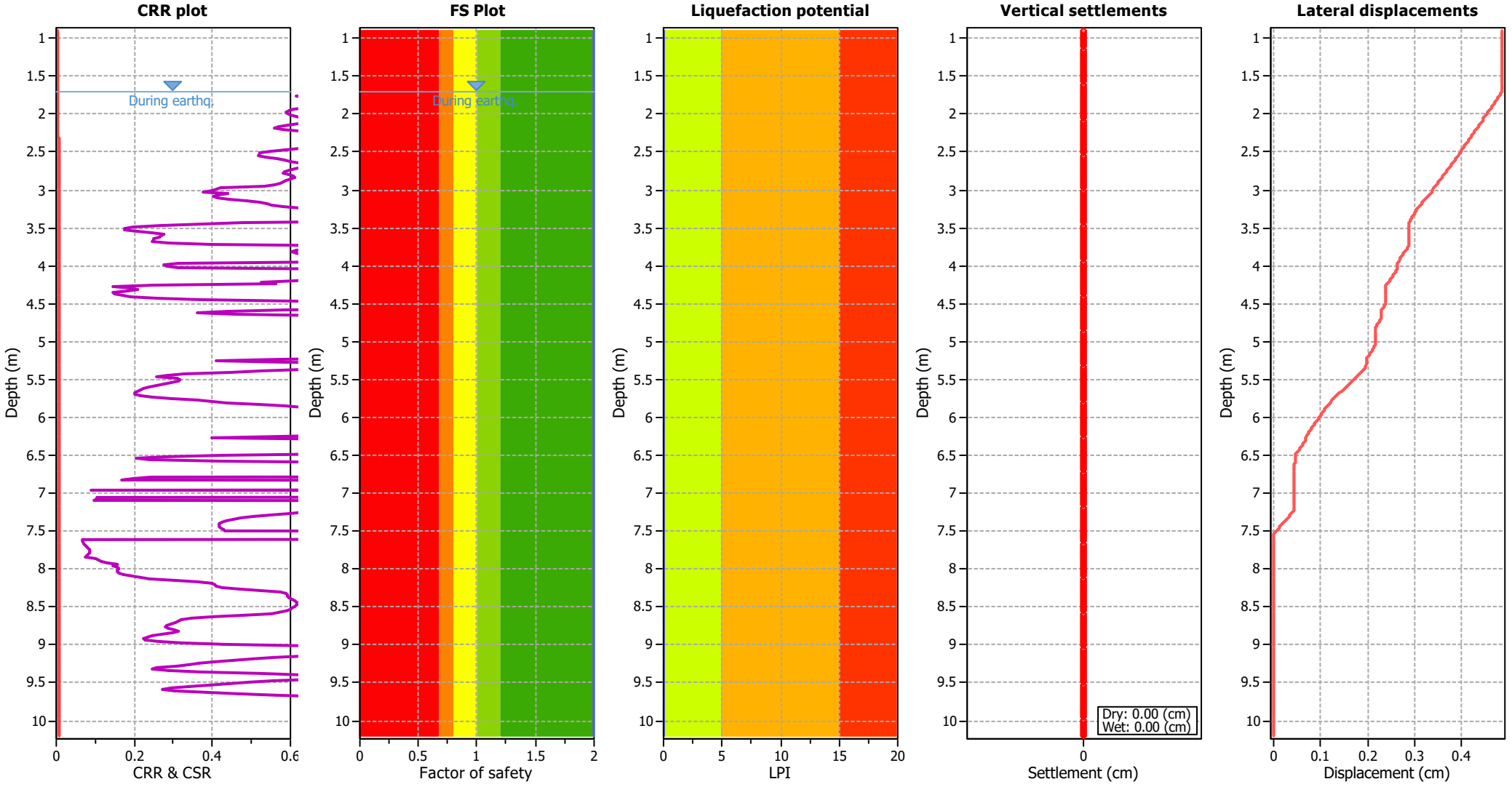
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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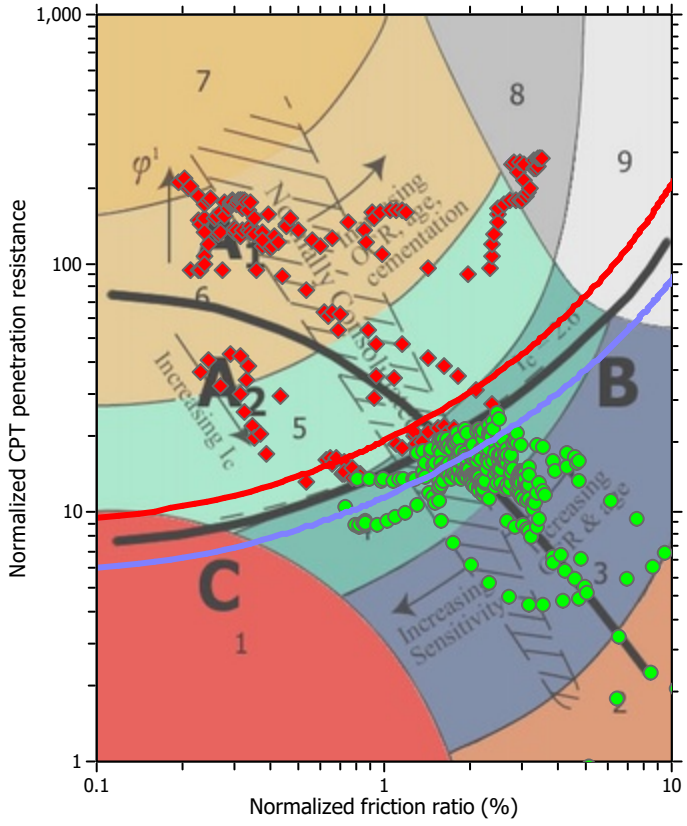
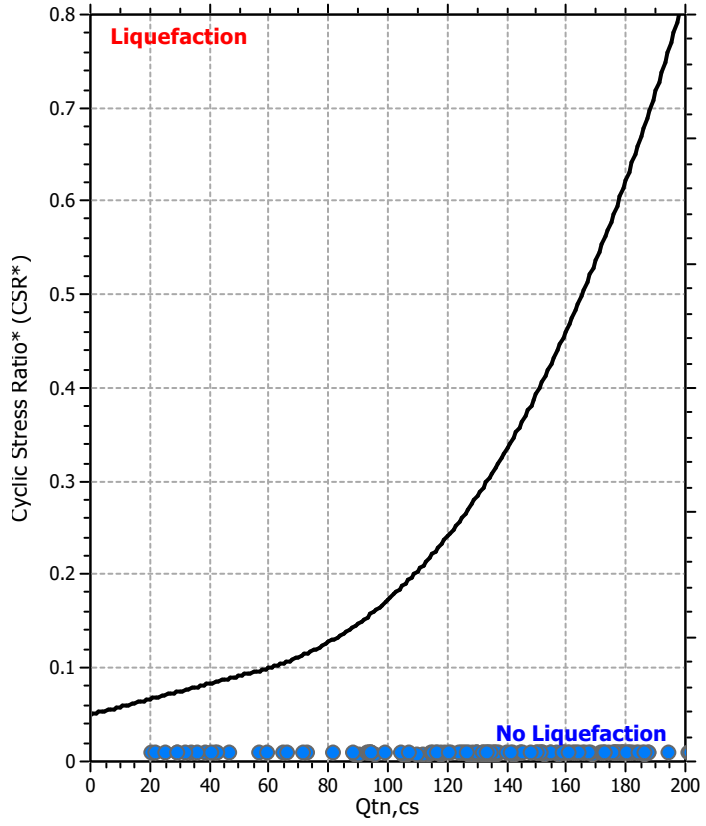
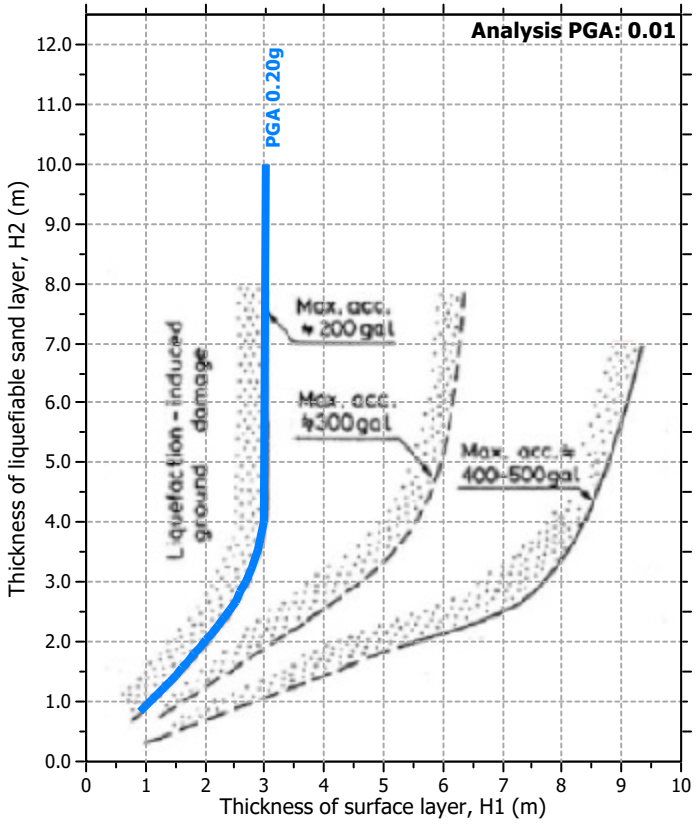
Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

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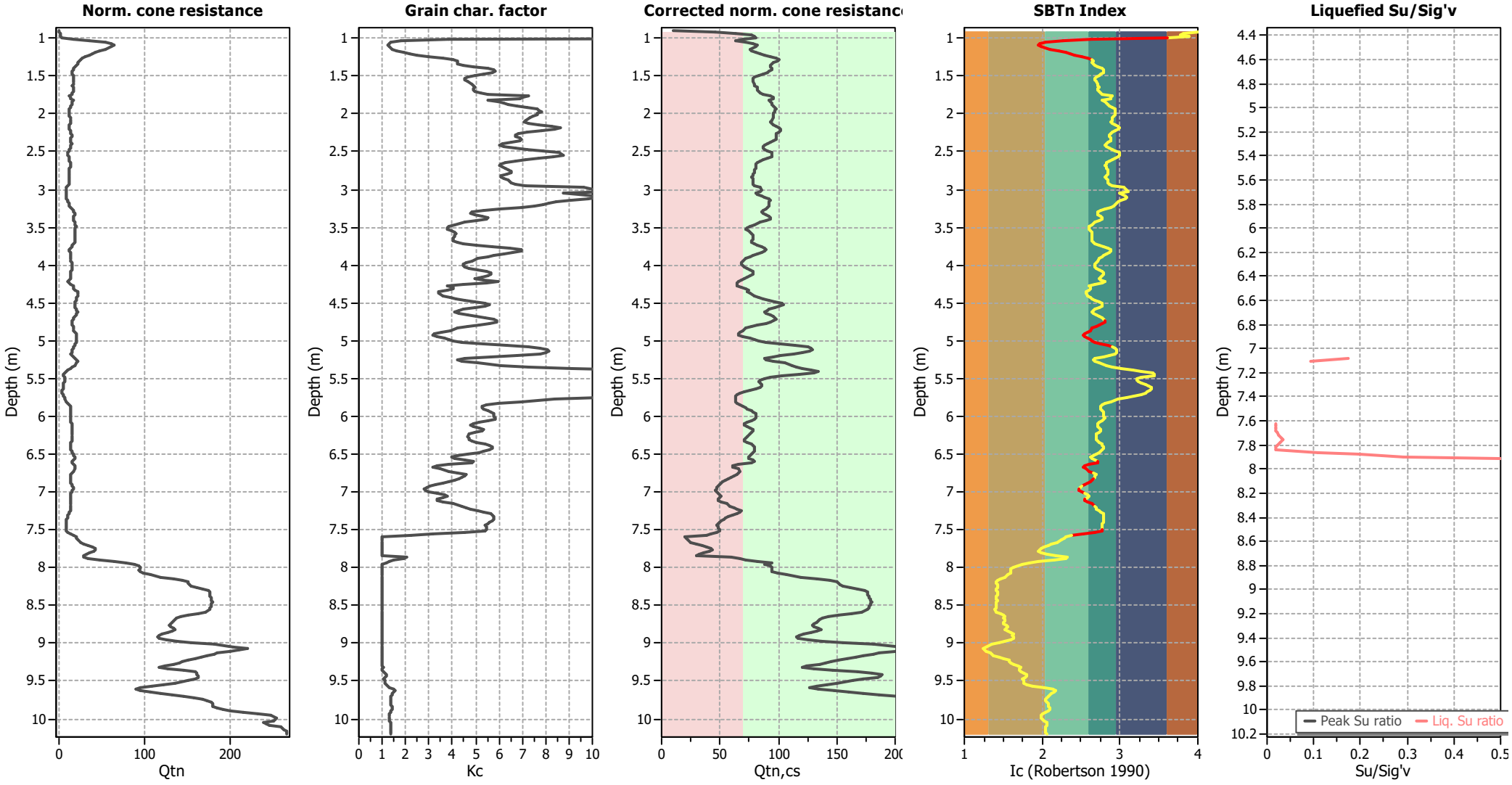
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

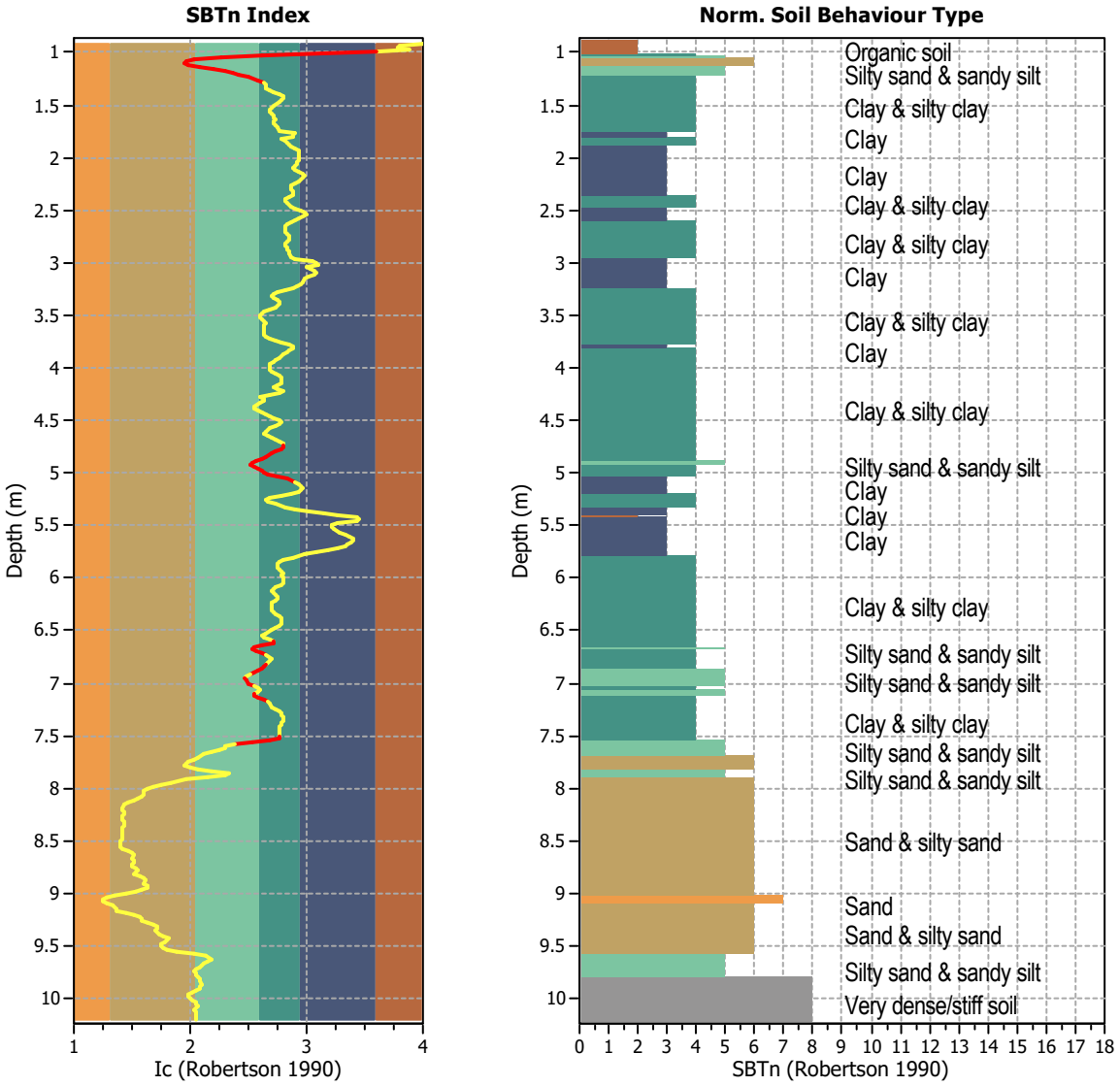
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	466
I_c maximum check value:	3.00	Total points excluded:	63
I_c change ratio value:	0.0100	Exclusion percentage:	13.52%
Minimum number of points in layer:	4	Number of layers detected:	10

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 1.02 (m)	4	Clay & silty clay
		End depth: 1.10 (m)	6	Sand & silty sand
Transition layer 2	11	Start depth: 1.10 (m)	6	Sand & silty sand
		End depth: 1.30 (m)	4	Clay & silty clay
Transition layer 3	8	Start depth: 4.76 (m)	4	Clay & silty clay
		End depth: 4.90 (m)	5	Silty sand & sandy silt
Transition layer 4	10	Start depth: 4.92 (m)	5	Silty sand & sandy silt
		End depth: 5.10 (m)	3	Clay
Transition layer 5	4	Start depth: 6.62 (m)	4	Clay & silty clay
		End depth: 6.68 (m)	5	Silty sand & sandy silt
Transition layer 6	5	Start depth: 6.68 (m)	5	Silty sand & sandy silt
		End depth: 6.76 (m)	4	Clay & silty clay
Transition layer 7	6	Start depth: 6.84 (m)	4	Clay & silty clay
		End depth: 6.94 (m)	5	Silty sand & sandy silt
Transition layer 8	4	Start depth: 6.98 (m)	5	Silty sand & sandy silt
		End depth: 7.04 (m)	4	Clay & silty clay
Transition layer 9	5	Start depth: 7.12 (m)	5	Silty sand & sandy silt
		End depth: 7.20 (m)	4	Clay & silty clay
Transition layer 10	5	Start depth: 7.52 (m)	4	Clay & silty clay
		End depth: 7.60 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.02	0.30	-1.00	100.00	13.73
2	0.92	0.02	0.30	-1.00	100.00	13.73
3	0.94	0.14	6.80	5.60	100.00	14.14
4	0.96	0.15	10.30	11.80	100.00	14.81
5	0.98	0.09	11.90	25.50	100.00	14.84
6	1.00	0.07	8.90	109.60	100.00	15.03
7	1.02	0.32	10.90	68.20	35.95	15.93
8	1.04	2.27	20.00	448.60	21.18	16.44
9	1.06	2.61	18.90	490.60	13.98	16.76
10	1.08	3.12	18.20	433.00	12.18	16.85
11	1.10	3.43	22.10	51.80	11.52	16.90
12	1.12	3.19	20.30	1.70	12.60	16.99
13	1.14	2.86	23.80	-3.20	15.53	17.05
14	1.16	2.25	28.90	21.80	19.17	17.15
15	1.18	2.14	30.60	57.40	22.68	17.21
16	1.20	2.00	31.60	72.60	24.79	17.22
17	1.22	1.79	32.50	60.30	27.38	17.21
18	1.24	1.59	32.40	40.00	30.83	17.19
19	1.26	1.39	33.70	44.70	34.49	17.13
20	1.28	1.21	32.00	76.90	36.95	17.05
21	1.30	1.19	28.70	82.50	37.99	16.96
22	1.32	1.17	28.50	98.90	37.79	16.88
23	1.34	1.13	26.60	99.80	37.86	16.81
24	1.36	1.11	24.30	81.30	39.24	16.71
25	1.38	0.94	23.70	73.50	41.51	16.62
26	1.40	0.86	23.20	77.50	44.42	16.55
27	1.42	0.83	22.10	83.60	45.67	16.49
28	1.44	0.80	21.00	96.90	45.79	16.41
29	1.46	0.80	19.70	100.40	45.35	16.37
30	1.48	0.82	19.70	100.40	43.68	16.31
31	1.50	0.86	17.70	96.60	41.79	16.26
32	1.52	0.88	16.40	91.70	40.11	16.18
33	1.54	0.88	15.90	91.50	39.50	16.14
34	1.56	0.88	16.00	94.90	39.71	16.15
35	1.58	0.87	16.70	105.90	40.09	16.11
36	1.60	0.82	14.50	105.90	41.04	16.13
37	1.62	0.83	17.20	118.00	41.47	16.13
38	1.64	0.84	16.90	117.80	41.84	16.19
39	1.66	0.84	17.10	122.90	41.43	16.21
40	1.68	0.87	17.70	129.60	41.42	16.23
41	1.70	0.85	17.60	115.00	41.87	16.24
42	1.72	0.83	17.90	115.70	43.06	16.25
43	1.74	0.80	18.70	118.30	44.36	16.27
44	1.76	0.78	19.00	119.50	52.25	16.25
45	1.78	0.39	20.40	97.70	51.10	16.33
46	1.80	0.92	21.90	54.30	50.58	16.38
47	1.82	0.86	21.20	51.40	44.61	16.47
48	1.84	0.81	21.60	60.40	46.50	16.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.77	21.30	86.90	47.73	16.41
50	1.88	0.76	20.50	88.80	48.53	16.39
51	1.90	0.74	20.90	89.10	50.17	16.38
52	1.92	0.68	21.90	106.60	52.10	16.37
53	1.94	0.66	21.00	107.30	53.88	16.33
54	1.96	0.64	19.80	74.20	54.18	16.29
55	1.98	0.65	20.00	66.60	54.53	16.28
56	2.00	0.64	20.60	64.90	53.92	16.26
57	2.02	0.66	18.80	72.10	53.87	16.29
58	2.04	0.67	21.30	77.30	53.02	16.30
59	2.06	0.69	20.70	80.90	52.55	16.33
60	2.08	0.69	19.80	84.00	51.63	16.30
61	2.10	0.69	19.50	81.90	51.44	16.28
62	2.12	0.68	19.50	77.40	52.35	16.27
63	2.14	0.65	20.00	67.60	54.20	16.28
64	2.16	0.62	20.80	78.30	56.32	16.30
65	2.18	0.60	21.30	78.40	57.79	16.34
66	2.20	0.61	22.40	85.80	56.81	16.39
67	2.22	0.69	23.20	95.10	54.54	16.45
68	2.24	0.73	22.90	97.50	51.93	16.47
69	2.26	0.75	22.40	86.10	50.35	16.46
70	2.28	0.77	22.00	66.60	49.77	16.47
71	2.30	0.77	22.70	73.20	49.93	16.47
72	2.32	0.75	22.90	86.70	50.74	16.46
73	2.34	0.71	21.80	93.50	51.04	16.43
74	2.36	0.73	21.30	97.40	50.57	16.39
75	2.38	0.75	20.60	103.80	48.97	16.35
76	2.40	0.77	19.10	94.30	47.30	16.29
77	2.42	0.78	18.00	82.90	46.88	16.23
78	2.44	0.73	17.50	83.80	47.61	16.16
79	2.46	0.69	16.70	72.30	49.78	16.11
80	2.48	0.64	16.90	82.50	52.06	16.09
81	2.50	0.61	17.50	66.40	54.99	16.10
82	2.52	0.58	18.30	65.50	57.72	16.13
83	2.54	0.55	18.90	70.20	58.41	16.15
84	2.56	0.60	18.70	82.00	56.74	16.15
85	2.58	0.64	17.60	80.20	53.99	16.12
86	2.60	0.65	16.80	85.10	51.65	16.06
87	2.62	0.66	15.20	80.40	49.93	16.01
88	2.64	0.69	15.20	84.80	47.88	15.96
89	2.66	0.72	14.40	90.10	46.98	15.97
90	2.68	0.71	15.00	91.60	46.79	15.96
91	2.70	0.69	14.90	77.10	47.44	15.95
92	2.72	0.68	14.20	75.70	47.85	15.91
93	2.74	0.66	13.80	80.20	48.51	15.87
94	2.76	0.64	14.00	79.10	49.12	15.85
95	2.78	0.64	13.80	84.80	49.06	15.84
96	2.80	0.66	13.30	89.60	48.08	15.84

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.68	13.60	96.60	47.17	15.82
98	2.84	0.67	13.10	94.10	46.96	15.83
99	2.86	0.67	13.30	95.30	47.68	15.82
100	2.88	0.65	13.60	96.40	48.38	15.82
101	2.90	0.64	13.40	99.20	48.81	15.81
102	2.92	0.64	13.10	100.00	49.06	15.79
103	2.94	0.62	13.00	94.50	49.98	15.77
104	2.96	0.60	13.20	78.20	51.83	15.78
105	2.98	0.57	13.70	73.80	61.72	15.74
106	3.00	0.27	14.50	81.10	63.93	15.70
107	3.02	0.53	12.70	69.70	65.62	15.64
108	3.04	0.51	12.20	64.60	58.48	15.63
109	3.06	0.47	12.50	62.40	60.98	15.63
110	3.08	0.45	13.30	67.60	63.49	15.71
111	3.10	0.47	15.10	76.80	64.22	15.83
112	3.12	0.50	16.70	79.00	62.59	15.96
113	3.14	0.56	17.60	65.30	59.59	16.05
114	3.16	0.61	17.60	47.90	57.04	16.09
115	3.18	0.62	17.60	41.60	55.78	16.11
116	3.20	0.62	17.70	30.50	54.99	16.13
117	3.22	0.65	18.10	39.30	53.35	16.16
118	3.24	0.70	18.30	45.60	50.80	16.21
119	3.26	0.77	18.90	50.00	46.74	16.28
120	3.28	0.91	19.30	50.20	43.52	16.35
121	3.30	0.95	19.70	55.00	41.00	16.40
122	3.32	0.99	20.20	59.50	40.81	16.45
123	3.34	0.97	21.50	62.70	41.63	16.49
124	3.36	0.92	21.90	72.10	43.33	16.50
125	3.38	0.87	21.50	78.80	44.51	16.50
126	3.40	0.88	22.20	90.00	44.24	16.50
127	3.42	0.93	21.80	106.60	42.09	16.46
128	3.44	0.98	18.60	112.60	39.46	16.40
129	3.46	1.03	18.10	114.60	37.16	16.32
130	3.48	1.04	17.10	119.20	35.87	16.25
131	3.50	1.03	15.10	116.40	35.43	16.18
132	3.52	1.00	15.10	116.90	35.62	16.11
133	3.54	0.97	14.90	120.90	36.56	16.13
134	3.56	0.96	16.20	139.20	37.24	16.17
135	3.58	0.97	16.80	147.60	37.64	16.23
136	3.60	0.98	17.10	144.90	37.37	16.27
137	3.62	1.02	17.70	139.60	37.21	16.29
138	3.64	1.01	17.70	138.10	36.90	16.30
139	3.66	1.02	17.30	141.20	36.98	16.28
140	3.68	1.00	16.80	137.80	37.01	16.25
141	3.70	0.99	16.70	138.80	37.85	16.22
142	3.72	0.92	16.40	134.50	39.37	16.21
143	3.74	0.87	17.00	125.70	42.17	16.20
144	3.76	0.79	17.50	121.50	45.38	16.20

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.72	17.90	139.50	48.63	16.18
146	3.80	0.68	17.60	124.90	50.81	16.16
147	3.82	0.66	17.30	128.20	51.03	16.12
148	3.84	0.69	16.50	143.20	49.40	16.06
149	3.86	0.72	14.70	146.30	47.58	16.00
150	3.88	0.71	14.40	152.40	45.65	15.90
151	3.90	0.72	12.40	160.20	44.43	15.83
152	3.92	0.74	12.10	170.80	42.47	15.76
153	3.94	0.77	11.80	180.70	41.04	15.74
154	3.96	0.79	11.40	190.70	39.89	15.72
155	3.98	0.80	11.40	196.60	39.23	15.74
156	4.00	0.83	12.00	192.90	39.18	15.79
157	4.02	0.83	12.70	189.90	39.49	15.84
158	4.04	0.82	13.10	182.30	40.68	15.89
159	4.06	0.79	13.90	182.80	42.35	15.93
160	4.08	0.75	14.50	193.80	44.18	15.96
161	4.10	0.73	14.80	203.00	45.15	15.95
162	4.12	0.72	13.90	211.30	45.16	15.92
163	4.14	0.73	13.40	217.50	44.61	15.86
164	4.16	0.72	12.60	213.80	43.31	15.81
165	4.18	0.76	12.00	210.90	41.77	15.76
166	4.20	0.79	11.50	196.10	43.45	15.54
167	4.22	0.49	7.30	193.10	46.45	15.30
168	4.24	0.49	7.30	193.10	44.18	15.31
169	4.26	0.90	11.40	182.20	39.32	15.55
170	4.28	0.90	11.40	182.20	35.63	15.76
171	4.30	0.90	11.40	182.20	36.82	15.88
172	4.32	0.90	15.10	163.80	36.86	16.04
173	4.34	1.03	16.40	169.70	35.60	16.22
174	4.36	1.16	17.10	194.50	33.33	16.31
175	4.38	1.22	17.60	126.80	33.26	16.39
176	4.40	1.14	19.60	51.10	34.47	16.46
177	4.42	1.14	21.00	53.70	36.30	16.54
178	4.44	1.14	22.20	42.90	37.72	16.61
179	4.46	1.09	24.00	35.90	39.60	16.68
180	4.48	1.04	25.70	48.40	41.79	16.76
181	4.50	1.03	28.30	71.30	43.94	16.82
182	4.52	0.97	29.40	95.00	44.82	16.83
183	4.54	0.98	26.80	96.70	43.85	16.78
184	4.56	1.05	24.60	94.90	41.90	16.74
185	4.58	1.08	25.60	102.20	39.34	16.70
186	4.60	1.15	22.90	99.40	38.15	16.69
187	4.62	1.15	23.30	104.80	37.39	16.67
188	4.64	1.13	23.70	115.10	38.40	16.67
189	4.66	1.07	23.70	87.30	40.08	16.68
190	4.68	1.02	24.90	91.40	42.20	16.68
191	4.70	0.96	25.20	124.30	43.96	16.66
192	4.72	0.91	23.60	147.60	45.52	16.62

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.86	23.30	166.80	46.21	16.55
194	4.76	0.84	21.60	188.40	46.08	16.46
195	4.78	0.84	19.30	193.40	44.81	16.35
196	4.80	0.85	17.50	205.00	42.61	16.21
197	4.82	0.88	14.60	187.60	40.27	16.08
198	4.84	0.90	13.40	196.60	37.79	15.98
199	4.86	0.95	13.10	190.20	36.11	15.95
200	4.88	0.99	13.20	196.50	34.14	15.99
201	4.90	1.13	13.80	188.30	32.41	16.02
202	4.92	1.18	13.10	141.00	31.81	16.09
203	4.94	1.16	15.30	66.40	32.91	16.19
204	4.96	1.12	17.80	82.10	34.87	16.32
205	4.98	1.10	18.90	71.80	35.95	16.43
206	5.00	1.16	20.40	30.10	37.03	16.52
207	5.02	1.12	22.60	30.70	38.79	16.62
208	5.04	1.04	24.90	-8.70	43.62	16.83
209	5.06	0.98	35.90	-17.50	48.32	17.01
210	5.08	0.96	38.30	-9.80	52.28	17.14
211	5.10	0.92	38.80	-4.20	54.31	17.16
212	5.12	0.88	39.10	3.90	55.60	17.14
213	5.14	0.87	37.60	3.00	55.97	17.09
214	5.16	0.85	34.90	10.20	55.38	16.95
215	5.18	0.80	27.30	10.80	54.40	16.78
216	5.20	0.79	24.40	13.70	50.19	16.61
217	5.22	0.95	22.40	17.00	45.20	16.57
218	5.24	1.07	22.50	17.10	39.71	16.60
219	5.26	1.26	22.60	7.60	37.98	16.72
220	5.28	1.25	27.50	-19.30	38.91	16.87
221	5.30	1.14	31.90	-27.90	42.36	16.99
222	5.32	1.07	33.70	-30.50	46.98	16.98
223	5.34	0.86	30.20	-36.90	52.19	16.92
224	5.36	0.77	31.00	-46.20	59.91	16.86
225	5.38	0.65	34.10	-52.60	69.44	16.88
226	5.40	0.53	37.50	-52.40	78.30	16.90
227	5.42	0.53	37.50	-52.40	92.53	16.69
228	5.44	0.25	23.80	40.00	94.06	16.40
229	5.46	0.39	18.30	47.90	92.66	16.00
230	5.48	0.41	15.90	52.60	78.48	15.84
231	5.50	0.42	13.80	48.40	74.78	15.70
232	5.52	0.42	12.60	44.70	73.94	15.59
233	5.54	0.39	12.00	37.60	75.79	15.52
234	5.56	0.37	12.20	42.80	79.47	15.51
235	5.58	0.35	13.00	49.50	83.47	15.52
236	5.60	0.33	13.00	60.80	87.08	15.51
237	5.62	0.31	12.40	68.40	89.51	15.45
238	5.64	0.30	11.50	72.10	89.51	15.30
239	5.66	0.30	8.80	85.00	87.99	15.11
240	5.68	0.29	7.80	89.80	85.47	14.90

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.29	6.90	94.70	83.22	14.77
242	5.72	0.30	6.20	97.40	78.18	14.68
243	5.74	0.34	6.00	93.70	71.55	14.68
244	5.76	0.38	6.20	94.80	64.36	14.78
245	5.78	0.45	7.00	103.00	56.97	14.92
246	5.80	0.55	7.30	114.40	51.01	15.11
247	5.82	0.65	8.60	114.50	46.46	15.34
248	5.84	0.76	10.60	126.40	44.22	15.56
249	5.86	0.79	11.70	131.50	43.14	15.73
250	5.88	0.82	12.50	136.90	43.18	15.85
251	5.90	0.83	14.00	139.10	43.47	15.93
252	5.92	0.83	14.30	137.30	44.37	16.02
253	5.94	0.82	15.80	155.50	45.05	16.08
254	5.96	0.83	16.50	168.10	45.67	16.14
255	5.98	0.83	16.50	173.90	45.51	16.14
256	6.00	0.84	15.90	168.50	45.72	16.15
257	6.02	0.83	16.90	175.50	45.98	16.14
258	6.04	0.80	16.10	207.60	45.85	16.11
259	6.06	0.82	14.80	221.20	44.61	16.04
260	6.08	0.86	13.90	223.20	42.69	15.98
261	6.10	0.89	13.40	228.60	41.32	15.96
262	6.12	0.91	13.40	200.70	40.78	15.97
263	6.14	0.91	14.00	191.70	41.31	16.03
264	6.16	0.91	15.60	189.90	42.58	16.09
265	6.18	0.86	15.90	189.10	43.54	16.16
266	6.20	0.90	17.10	221.60	43.36	16.20
267	6.22	0.94	17.00	241.30	41.81	16.23
268	6.24	1.00	16.20	225.50	40.67	16.21
269	6.26	0.98	15.80	211.30	40.27	16.15
270	6.28	0.94	14.60	216.20	40.56	16.08
271	6.30	0.92	13.80	220.40	40.64	16.01
272	6.32	0.92	13.60	223.40	41.17	16.00
273	6.34	0.90	14.60	211.80	42.20	16.04
274	6.36	0.88	15.50	206.90	43.79	16.11
275	6.38	0.86	16.50	203.50	44.80	16.15
276	6.40	0.86	16.50	202.60	45.45	16.19
277	6.42	0.87	17.20	216.70	45.25	16.20
278	6.44	0.89	16.90	216.90	44.71	16.23
279	6.46	0.92	17.30	212.50	43.67	16.24
280	6.48	0.96	17.20	209.70	42.67	16.27
281	6.50	0.99	17.50	198.00	40.18	16.32
282	6.52	1.18	18.20	196.60	38.10	16.38
283	6.54	1.22	18.90	190.20	36.44	16.42
284	6.56	1.21	18.00	144.70	37.23	16.41
285	6.58	1.11	18.30	68.40	39.67	16.43
286	6.60	1.02	21.00	99.00	41.52	16.38
287	6.62	1.00	16.60	165.60	41.09	16.30
288	6.64	1.06	14.90	204.70	35.78	16.06

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.27	9.80	287.40	33.20	16.01
290	6.68	1.24	14.00	185.70	32.06	16.04
291	6.70	1.24	15.50	225.10	33.92	16.19
292	6.72	1.20	15.50	266.70	35.87	16.14
293	6.74	0.96	13.10	264.10	38.09	15.99
294	6.76	0.88	11.50	279.10	40.02	15.79
295	6.78	0.87	10.10	302.50	39.72	15.66
296	6.80	0.89	9.70	347.40	38.96	15.57
297	6.82	0.86	9.10	369.30	38.25	15.47
298	6.84	0.85	7.70	372.50	37.33	15.36
299	6.86	0.89	7.40	378.00	36.06	15.29
300	6.88	0.93	7.50	391.80	34.39	15.30
301	6.90	1.00	7.40	407.90	32.75	15.31
302	6.92	1.07	7.30	409.30	31.10	15.34
303	6.94	1.13	7.50	404.20	30.12	15.34
304	6.96	1.12	7.10	432.80	29.52	15.30
305	6.98	1.11	6.50	415.50	29.69	15.22
306	7.00	1.05	6.30	369.80	30.81	15.20
307	7.02	0.98	7.00	381.20	32.95	15.21
308	7.04	0.89	7.10	417.80	34.84	15.21
309	7.06	0.87	6.80	447.40	35.41	15.21
310	7.08	0.91	7.00	461.80	34.37	15.18
311	7.10	0.97	6.50	445.70	33.18	15.17
312	7.12	0.98	6.30	415.30	33.10	15.20
313	7.14	0.97	7.40	319.20	34.67	15.31
314	7.16	0.92	8.80	303.40	37.11	15.45
315	7.18	0.88	9.60	306.30	38.79	15.59
316	7.20	0.92	10.70	302.80	39.97	15.73
317	7.22	0.94	12.70	292.60	40.70	15.84
318	7.24	0.92	12.80	249.40	42.39	15.92
319	7.26	0.86	13.60	258.60	43.69	15.83
320	7.28	0.79	10.40	291.70	45.07	15.66
321	7.30	0.70	8.40	321.80	45.26	15.37
322	7.32	0.68	7.20	336.20	45.65	15.18
323	7.34	0.65	6.70	341.10	45.66	15.03
324	7.36	0.63	5.90	342.90	45.75	14.89
325	7.38	0.61	5.20	345.70	45.45	14.76
326	7.40	0.61	4.80	342.10	44.82	14.64
327	7.42	0.61	4.40	340.80	44.39	14.58
328	7.44	0.61	4.50	332.50	43.99	14.55
329	7.46	0.62	4.40	331.00	44.17	14.61
330	7.48	0.64	5.10	315.90	44.08	14.67
331	7.50	0.65	5.10	313.70	44.21	14.70
332	7.52	0.63	4.80	322.00	43.94	14.71
333	7.54	0.66	5.20	318.40	39.67	14.74
334	7.56	0.91	4.90	341.70	31.90	14.79
335	7.58	1.30	4.20	325.60	25.47	14.84
336	7.60	1.55	4.70	156.60	5.00	14.98

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.57	5.90	170.90	5.00	15.10
338	7.64	1.52	5.50	213.60	5.00	15.15
339	7.66	1.92	5.10	231.80	5.00	15.28
340	7.68	2.26	7.10	187.80	5.00	15.52
341	7.70	2.59	8.40	109.60	5.00	15.80
342	7.72	2.98	9.50	63.70	5.00	16.01
343	7.74	3.35	11.00	31.40	5.00	16.10
344	7.76	3.47	9.60	43.50	5.00	16.03
345	7.78	3.21	7.70	65.10	5.00	15.76
346	7.80	2.84	5.30	93.20	5.00	15.51
347	7.82	2.45	5.90	189.70	5.00	15.50
348	7.84	2.18	8.30	217.00	5.00	15.86
349	7.86	2.05	13.60	297.40	23.72	16.68
350	7.88	2.23	35.40	6.80	22.54	17.13
351	7.90	3.45	30.70	55.90	17.51	17.49
352	7.92	5.09	31.70	40.40	11.88	17.59
353	7.94	6.44	33.60	-9.40	8.92	17.71
354	7.96	7.24	33.10	-41.30	5.00	17.69
355	7.98	7.70	26.60	-48.20	5.00	17.56
356	8.00	7.86	21.30	-7.60	4.88	17.27
357	8.02	7.82	14.90	18.80	4.38	17.06
358	8.04	7.73	15.70	34.20	4.26	16.99
359	8.06	7.80	18.30	38.60	4.41	17.09
360	8.08	8.01	19.40	40.30	4.21	17.21
361	8.10	8.86	20.40	40.30	3.67	17.33
362	8.12	10.00	22.90	55.50	3.12	17.55
363	8.14	11.29	30.10	14.70	2.44	17.69
364	8.16	12.59	26.90	-13.10	1.93	17.79
365	8.18	13.07	27.10	-4.50	1.69	17.83
366	8.20	12.93	31.90	3.10	1.74	17.90
367	8.22	12.98	32.00	19.70	1.91	17.99
368	8.24	13.17	34.80	68.80	1.89	18.04
369	8.26	13.52	35.60	62.90	1.78	18.15
370	8.28	14.71	40.70	63.40	1.71	18.28
371	8.30	15.03	46.00	58.50	1.75	18.42
372	8.32	15.17	50.60	-3.80	1.92	18.53
373	8.34	15.10	53.30	-10.60	1.97	18.56
374	8.36	15.18	49.70	4.10	1.88	18.52
375	8.38	15.23	45.70	45.80	1.70	18.47
376	8.40	15.43	46.30	33.60	1.75	18.50
377	8.42	15.40	53.80	11.80	1.68	18.49
378	8.44	15.56	44.30	2.60	1.79	18.55
379	8.46	15.48	52.80	1.10	1.65	18.51
380	8.48	15.70	48.40	5.80	1.65	18.49
381	8.50	15.41	42.50	33.00	1.55	18.44
382	8.52	15.45	46.50	25.30	1.57	18.43
383	8.54	15.52	48.10	7.40	1.54	18.42
384	8.56	15.39	40.50	2.40	1.44	18.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	15.21	38.70	7.90	1.67	18.36
386	8.60	14.30	50.20	4.60	2.36	18.44
387	8.62	12.83	53.40	-10.70	2.86	18.38
388	8.64	12.16	34.40	-24.30	3.07	18.23
389	8.66	11.87	36.20	-12.70	2.89	18.04
390	8.68	11.66	35.50	23.20	3.02	18.05
391	8.70	11.77	35.70	30.10	3.02	18.01
392	8.72	11.49	32.60	49.00	2.80	17.87
393	8.74	11.29	23.90	39.90	2.84	17.82
394	8.76	11.20	32.30	54.50	3.37	17.99
395	8.78	11.09	47.90	32.50	3.68	18.15
396	8.80	11.62	38.20	-7.30	3.43	18.15
397	8.82	12.20	31.90	-11.70	3.13	18.11
398	8.84	11.77	42.40	39.30	3.79	18.25
399	8.86	10.60	54.20	35.50	4.39	18.30
400	8.88	10.76	39.90	11.40	4.77	18.24
401	8.90	10.12	38.00	18.50	4.49	18.06
402	8.92	9.83	35.60	27.40	4.87	18.09
403	8.94	9.99	44.20	38.60	4.86	18.15
404	8.96	10.62	43.00	25.90	4.16	18.16
405	8.98	12.05	34.50	77.90	3.26	18.19
406	9.00	13.40	43.10	69.40	2.05	18.17
407	9.02	15.80	36.10	58.70	1.00	18.27
408	9.04	19.44	38.10	55.20	0.21	18.31
409	9.06	20.22	41.90	62.80	0.00	18.38
410	9.08	20.40	39.80	68.80	0.00	18.26
411	9.10	16.69	28.20	67.70	0.26	18.28
412	9.12	17.62	45.90	58.30	0.74	18.25
413	9.14	16.02	39.50	73.00	1.04	18.32
414	9.16	15.52	36.80	64.20	1.16	18.18
415	9.18	15.07	33.20	48.80	2.12	18.46
416	9.20	13.90	72.40	76.00	2.99	18.63
417	9.22	13.39	61.30	63.80	3.85	18.74
418	9.24	12.93	53.90	65.00	3.97	18.63
419	9.26	12.17	57.80	54.60	4.20	18.59
420	9.28	12.17	57.80	54.60	4.81	18.64
421	9.30	11.38	62.70	63.80	5.81	18.62
422	9.32	9.14	60.40	13.30	6.47	18.62
423	9.34	10.48	60.40	13.30	6.44	18.85
424	9.36	13.90	98.30	-54.20	6.23	19.21
425	9.38	14.13	128.50	-60.90	6.72	19.57
426	9.40	14.04	153.20	-11.80	7.45	19.74
427	9.42	14.40	158.90	-40.90	8.30	19.89
428	9.44	13.96	188.10	-23.70	8.07	19.87
429	9.46	14.49	145.00	15.70	7.70	19.82
430	9.48	14.63	135.80	15.00	7.01	19.64
431	9.50	13.29	123.20	10.80	7.18	19.51
432	9.52	11.98	107.00	25.00	7.28	19.25

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	11.02	72.80	42.80	8.16	19.11
434	9.56	9.47	97.10	54.00	9.87	19.05
435	9.58	8.08	105.90	82.30	13.68	19.27
436	9.60	7.31	144.90	172.90	17.02	19.53
437	9.62	7.85	194.80	259.30	18.21	19.81
438	9.64	9.24	218.90	624.10	17.30	20.02
439	9.66	10.37	232.10	805.90	16.41	20.20
440	9.68	11.07	278.50	552.20	15.69	20.38
441	9.70	12.61	309.70	449.70	15.09	20.56
442	9.72	14.16	341.00	147.40	14.43	20.69
443	9.74	14.54	360.60	-21.80	14.09	20.80
444	9.76	15.29	385.30	-23.90	14.28	20.91
445	9.78	15.84	436.20	-47.50	14.52	21.00
446	9.80	15.82	448.30	-63.00	14.98	21.07
447	9.82	15.61	458.10	-63.70	15.29	21.10
448	9.84	15.81	474.90	-60.00	15.45	21.14
449	9.86	16.24	490.30	-58.00	15.59	21.20
450	9.88	16.72	532.90	-57.50	15.51	21.28
451	9.90	17.70	562.40	-46.40	15.31	21.36
452	9.92	18.51	578.50	-52.50	14.30	21.44
453	9.94	21.17	594.50	-54.70	13.28	21.50
454	9.96	22.50	616.50	-54.60	12.52	21.56
455	9.98	22.82	636.40	-52.50	12.53	21.58
456	10.00	22.88	673.10	-60.70	12.96	21.58
457	10.02	22.24	690.00	-56.40	13.39	21.58
458	10.04	22.33	697.50	-54.90	14.46	21.58
459	10.06	19.74	727.00	-49.20	14.47	21.58
460	10.08	23.21	741.90	-54.10	14.61	21.58
461	10.10	23.40	783.80	-47.60	14.02	21.58
462	10.12	23.48	798.60	-54.20	14.16	21.58
463	10.14	23.89	808.00	-57.30	14.19	21.58
464	10.16	24.11	825.30	-56.70	14.23	21.58
465	10.18	24.21	846.40	-58.20	14.35	21.58
466	10.20	24.21	851.00	-57.40	14.44	21.58

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.006	1.38	0.005	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
3	0.94	12.92	0.00	12.92	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
4	0.96	13.21	0.00	13.21	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
5	0.98	13.51	0.00	13.51	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
6	1.00	13.81	0.00	13.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
7	1.02	14.13	0.00	14.13	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
8	1.04	14.46	0.00	14.46	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
9	1.06	14.79	0.00	14.79	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
10	1.08	15.13	0.00	15.13	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
11	1.10	15.47	0.00	15.47	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
12	1.12	15.81	0.00	15.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
13	1.14	16.15	0.00	16.15	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
14	1.16	16.49	0.00	16.49	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
15	1.18	16.84	0.00	16.84	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
16	1.20	17.18	0.00	17.18	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
17	1.22	17.53	0.00	17.53	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
18	1.24	17.87	0.00	17.87	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
19	1.26	18.21	0.00	18.21	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
20	1.28	18.55	0.00	18.55	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
21	1.30	18.89	0.00	18.89	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
22	1.32	19.23	0.00	19.23	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
23	1.34	19.57	0.00	19.57	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
24	1.36	19.90	0.00	19.90	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
25	1.38	20.23	0.00	20.23	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
26	1.40	20.56	0.00	20.56	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
27	1.42	20.89	0.00	20.89	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
28	1.44	21.22	0.00	21.22	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
29	1.46	21.55	0.00	21.55	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
30	1.48	21.88	0.00	21.88	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
31	1.50	22.20	0.00	22.20	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
32	1.52	22.52	0.00	22.52	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
33	1.54	22.85	0.00	22.85	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
34	1.56	23.17	0.00	23.17	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
35	1.58	23.49	0.00	23.49	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
36	1.60	23.81	0.00	23.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
37	1.62	24.14	0.00	24.14	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
38	1.64	24.46	0.00	24.46	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
39	1.66	24.79	0.00	24.79	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
40	1.68	25.11	0.00	25.11	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
41	1.70	25.43	0.00	25.43	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
42	1.72	25.76	0.20	25.56	0.99	0.006	1.38	0.005	1.00	1.00	0.005	No
43	1.74	26.09	0.39	25.69	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
44	1.76	26.41	0.59	25.82	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
45	1.78	26.74	0.78	25.95	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
46	1.80	27.06	0.98	26.08	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
47	1.82	27.39	1.18	26.22	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
48	1.84	27.72	1.37	26.35	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	28.05	1.57	26.48	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
50	1.88	28.38	1.77	26.61	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
51	1.90	28.71	1.96	26.74	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
52	1.92	29.03	2.16	26.88	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
53	1.94	29.36	2.35	27.01	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
54	1.96	29.69	2.55	27.14	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
55	1.98	30.01	2.75	27.26	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
56	2.00	30.34	2.94	27.39	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
57	2.02	30.66	3.14	27.52	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
58	2.04	30.99	3.34	27.65	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
59	2.06	31.32	3.53	27.78	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
60	2.08	31.64	3.73	27.91	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
61	2.10	31.97	3.92	28.04	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
62	2.12	32.29	4.12	28.17	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
63	2.14	32.62	4.32	28.30	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
64	2.16	32.94	4.51	28.43	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
65	2.18	33.27	4.71	28.56	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
66	2.20	33.60	4.91	28.69	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
67	2.22	33.93	5.10	28.83	0.99	0.008	1.38	0.005	1.00	1.00	0.005	No
68	2.24	34.26	5.30	28.96	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
69	2.26	34.59	5.49	29.09	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
70	2.28	34.92	5.69	29.23	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
71	2.30	35.24	5.89	29.36	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
72	2.32	35.57	6.08	29.49	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
73	2.34	35.90	6.28	29.62	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
74	2.36	36.23	6.47	29.76	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
75	2.38	36.56	6.67	29.89	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
76	2.40	36.88	6.87	30.02	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
77	2.42	37.21	7.06	30.14	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
78	2.44	37.53	7.26	30.27	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
79	2.46	37.85	7.46	30.40	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
80	2.48	38.18	7.65	30.52	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
81	2.50	38.50	7.85	30.65	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
82	2.52	38.82	8.04	30.78	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
83	2.54	39.14	8.24	30.90	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
84	2.56	39.47	8.44	31.03	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
85	2.58	39.79	8.63	31.16	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
86	2.60	40.11	8.83	31.28	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
87	2.62	40.43	9.03	31.40	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
88	2.64	40.75	9.22	31.53	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
89	2.66	41.07	9.42	31.65	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
90	2.68	41.39	9.61	31.77	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
91	2.70	41.71	9.81	31.90	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
92	2.72	42.02	10.01	32.02	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
93	2.74	42.34	10.20	32.14	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
94	2.76	42.66	10.40	32.26	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
95	2.78	42.98	10.59	32.38	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
96	2.80	43.29	10.79	32.50	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	43.61	10.99	32.62	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
98	2.84	43.93	11.18	32.74	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
99	2.86	44.24	11.38	32.86	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
100	2.88	44.56	11.58	32.98	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
101	2.90	44.87	11.77	33.10	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
102	2.92	45.19	11.97	33.22	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
103	2.94	45.51	12.16	33.34	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
104	2.96	45.82	12.36	33.46	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
105	2.98	46.14	12.56	33.58	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
106	3.00	46.45	12.75	33.70	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
107	3.02	46.76	12.95	33.81	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
108	3.04	47.08	13.15	33.93	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
109	3.06	47.39	13.34	34.05	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
110	3.08	47.70	13.54	34.16	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
111	3.10	48.02	13.73	34.29	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
112	3.12	48.34	13.93	34.41	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
113	3.14	48.66	14.13	34.53	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
114	3.16	48.98	14.32	34.66	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
115	3.18	49.30	14.52	34.78	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
116	3.20	49.63	14.72	34.91	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
117	3.22	49.95	14.91	35.04	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
118	3.24	50.27	15.11	35.17	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
119	3.26	50.60	15.30	35.30	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
120	3.28	50.93	15.50	35.43	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
121	3.30	51.25	15.70	35.56	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
122	3.32	51.58	15.89	35.69	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
123	3.34	51.91	16.09	35.82	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
124	3.36	52.24	16.28	35.96	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
125	3.38	52.57	16.48	36.09	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
126	3.40	52.90	16.68	36.23	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
127	3.42	53.23	16.87	36.36	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
128	3.44	53.56	17.07	36.49	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
129	3.46	53.89	17.27	36.62	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
130	3.48	54.21	17.46	36.75	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
131	3.50	54.53	17.66	36.88	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
132	3.52	54.86	17.85	37.00	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
133	3.54	55.18	18.05	37.13	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
134	3.56	55.50	18.25	37.26	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
135	3.58	55.83	18.44	37.38	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
136	3.60	56.15	18.64	37.51	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
137	3.62	56.48	18.84	37.64	0.98	0.010	1.38	0.007	1.00	1.00	0.007	No
138	3.64	56.80	19.03	37.77	0.98	0.010	1.38	0.007	1.00	1.00	0.007	No
139	3.66	57.13	19.23	37.90	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
140	3.68	57.46	19.42	38.03	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
141	3.70	57.78	19.62	38.16	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
142	3.72	58.10	19.82	38.29	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
143	3.74	58.43	20.01	38.42	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
144	3.76	58.75	20.21	38.54	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	59.08	20.40	38.67	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
146	3.80	59.40	20.60	38.80	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
147	3.82	59.72	20.80	38.92	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
148	3.84	60.04	20.99	39.05	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
149	3.86	60.36	21.19	39.17	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
150	3.88	60.68	21.39	39.29	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
151	3.90	61.00	21.58	39.41	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
152	3.92	61.31	21.78	39.53	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
153	3.94	61.63	21.97	39.65	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
154	3.96	61.94	22.17	39.77	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
155	3.98	62.26	22.37	39.89	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
156	4.00	62.57	22.56	40.01	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
157	4.02	62.89	22.76	40.13	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
158	4.04	63.21	22.96	40.25	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
159	4.06	63.52	23.15	40.37	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
160	4.08	63.84	23.35	40.50	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
161	4.10	64.16	23.54	40.62	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
162	4.12	64.48	23.74	40.74	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
163	4.14	64.80	23.94	40.86	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
164	4.16	65.12	24.13	40.98	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
165	4.18	65.43	24.33	41.10	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
166	4.20	65.74	24.53	41.22	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
167	4.22	66.05	24.72	41.33	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
168	4.24	66.35	24.92	41.44	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
169	4.26	66.66	25.11	41.55	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
170	4.28	66.98	25.31	41.67	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
171	4.30	67.30	25.51	41.79	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
172	4.32	67.62	25.70	41.92	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
173	4.34	67.94	25.90	42.04	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
174	4.36	68.27	26.09	42.17	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
175	4.38	68.60	26.29	42.31	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
176	4.40	68.93	26.49	42.44	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
177	4.42	69.26	26.68	42.57	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
178	4.44	69.59	26.88	42.71	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
179	4.46	69.92	27.08	42.85	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
180	4.48	70.26	27.27	42.99	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
181	4.50	70.59	27.47	43.13	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
182	4.52	70.93	27.66	43.27	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
183	4.54	71.27	27.86	43.41	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
184	4.56	71.60	28.06	43.54	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
185	4.58	71.93	28.25	43.68	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
186	4.60	72.27	28.45	43.82	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
187	4.62	72.60	28.65	43.96	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
188	4.64	72.94	28.84	44.09	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
189	4.66	73.27	29.04	44.23	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
190	4.68	73.60	29.23	44.37	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
191	4.70	73.94	29.43	44.51	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
192	4.72	74.27	29.63	44.64	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	74.60	29.82	44.78	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
194	4.76	74.93	30.02	44.91	0.97	0.010	1.38	0.008	1.00	1.00	2.000	Yes
195	4.78	75.26	30.21	45.04	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
196	4.80	75.58	30.41	45.17	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
197	4.82	75.90	30.61	45.29	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
198	4.84	76.22	30.80	45.42	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
199	4.86	76.54	31.00	45.54	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
200	4.88	76.86	31.20	45.66	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
201	4.90	77.18	31.39	45.79	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
202	4.92	77.50	31.59	45.91	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
203	4.94	77.83	31.78	46.04	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
204	4.96	78.15	31.98	46.17	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
205	4.98	78.48	32.18	46.30	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
206	5.00	78.81	32.37	46.44	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
207	5.02	79.14	32.57	46.57	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
208	5.04	79.48	32.77	46.71	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
209	5.06	79.82	32.96	46.86	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
210	5.08	80.16	33.16	47.01	0.96	0.011	1.38	0.008	1.00	1.00	2.000	Yes
211	5.10	80.51	33.35	47.15	0.96	0.011	1.38	0.008	1.00	1.00	2.000	Yes
212	5.12	80.85	33.55	47.30	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
213	5.14	81.19	33.75	47.44	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
214	5.16	81.53	33.94	47.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
215	5.18	81.87	34.14	47.73	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
216	5.20	82.20	34.34	47.86	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
217	5.22	82.53	34.53	48.00	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
218	5.24	82.86	34.73	48.13	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
219	5.26	83.20	34.92	48.27	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
220	5.28	83.53	35.12	48.41	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
221	5.30	83.87	35.32	48.56	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
222	5.32	84.21	35.51	48.70	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
223	5.34	84.55	35.71	48.84	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
224	5.36	84.89	35.90	48.98	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
225	5.38	85.23	36.10	49.12	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
226	5.40	85.56	36.30	49.27	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
227	5.42	85.90	36.49	49.40	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
228	5.44	86.23	36.69	49.54	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
229	5.46	86.55	36.89	49.66	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
230	5.48	86.86	37.08	49.78	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
231	5.50	87.18	37.28	49.90	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
232	5.52	87.49	37.47	50.01	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
233	5.54	87.80	37.67	50.13	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
234	5.56	88.11	37.87	50.24	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
235	5.58	88.42	38.06	50.36	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
236	5.60	88.73	38.26	50.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
237	5.62	89.04	38.46	50.58	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
238	5.64	89.34	38.65	50.69	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
239	5.66	89.65	38.85	50.80	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
240	5.68	89.94	39.04	50.90	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	90.24	39.24	51.00	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
242	5.72	90.53	39.44	51.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
243	5.74	90.83	39.63	51.19	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
244	5.76	91.12	39.83	51.29	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
245	5.78	91.42	40.02	51.40	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
246	5.80	91.72	40.22	51.50	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
247	5.82	92.03	40.42	51.61	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
248	5.84	92.34	40.61	51.73	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
249	5.86	92.66	40.81	51.85	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
250	5.88	92.97	41.01	51.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
251	5.90	93.29	41.20	52.09	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
252	5.92	93.61	41.40	52.21	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
253	5.94	93.93	41.59	52.34	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
254	5.96	94.26	41.79	52.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
255	5.98	94.58	41.99	52.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
256	6.00	94.90	42.18	52.72	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
257	6.02	95.22	42.38	52.85	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
258	6.04	95.55	42.58	52.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
259	6.06	95.87	42.77	53.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
260	6.08	96.19	42.97	53.22	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
261	6.10	96.51	43.16	53.34	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
262	6.12	96.83	43.36	53.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
263	6.14	97.15	43.56	53.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
264	6.16	97.47	43.75	53.72	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
265	6.18	97.79	43.95	53.84	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
266	6.20	98.12	44.15	53.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
267	6.22	98.44	44.34	54.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
268	6.24	98.76	44.54	54.23	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
269	6.26	99.09	44.73	54.35	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
270	6.28	99.41	44.93	54.48	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
271	6.30	99.73	45.13	54.60	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
272	6.32	100.05	45.32	54.73	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
273	6.34	100.37	45.52	54.85	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
274	6.36	100.69	45.71	54.98	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
275	6.38	101.01	45.91	55.10	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
276	6.40	101.34	46.11	55.23	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
277	6.42	101.66	46.30	55.36	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
278	6.44	101.99	46.50	55.49	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
279	6.46	102.31	46.70	55.62	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
280	6.48	102.64	46.89	55.75	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
281	6.50	102.96	47.09	55.88	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
282	6.52	103.29	47.28	56.01	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
283	6.54	103.62	47.48	56.14	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
284	6.56	103.95	47.68	56.27	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
285	6.58	104.28	47.87	56.40	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
286	6.60	104.60	48.07	56.53	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
287	6.62	104.93	48.27	56.66	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
288	6.64	105.25	48.46	56.79	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
289	6.66	105.57	48.66	56.91	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
290	6.68	105.89	48.85	57.04	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
291	6.70	106.22	49.05	57.17	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
292	6.72	106.54	49.25	57.29	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
293	6.74	106.86	49.44	57.42	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
294	6.76	107.17	49.64	57.54	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
295	6.78	107.49	49.83	57.65	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
296	6.80	107.80	50.03	57.77	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
297	6.82	108.11	50.23	57.88	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
298	6.84	108.42	50.42	57.99	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
299	6.86	108.72	50.62	58.10	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
300	6.88	109.03	50.82	58.21	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
301	6.90	109.33	51.01	58.32	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
302	6.92	109.64	51.21	58.43	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
303	6.94	109.95	51.40	58.54	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
304	6.96	110.25	51.60	58.65	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
305	6.98	110.56	51.80	58.76	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
306	7.00	110.86	51.99	58.87	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
307	7.02	111.17	52.19	58.98	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
308	7.04	111.47	52.39	59.08	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
309	7.06	111.77	52.58	59.19	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
310	7.08	112.08	52.78	59.30	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
311	7.10	112.38	52.97	59.41	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
312	7.12	112.69	53.17	59.51	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
313	7.14	112.99	53.37	59.62	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
314	7.16	113.30	53.56	59.74	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
315	7.18	113.61	53.76	59.85	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
316	7.20	113.93	53.96	59.97	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
317	7.22	114.24	54.15	60.09	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
318	7.24	114.56	54.35	60.21	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
319	7.26	114.88	54.54	60.34	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
320	7.28	115.19	54.74	60.45	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
321	7.30	115.50	54.94	60.56	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
322	7.32	115.80	55.13	60.67	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
323	7.34	116.10	55.33	60.78	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
324	7.36	116.40	55.52	60.88	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
325	7.38	116.70	55.72	60.98	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
326	7.40	116.99	55.92	61.07	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
327	7.42	117.28	56.11	61.17	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
328	7.44	117.57	56.31	61.26	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
329	7.46	117.86	56.51	61.36	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
330	7.48	118.16	56.70	61.46	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
331	7.50	118.45	56.90	61.55	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
332	7.52	118.75	57.09	61.65	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
333	7.54	119.04	57.29	61.75	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
334	7.56	119.34	57.49	61.85	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
335	7.58	119.63	57.68	61.95	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
336	7.60	119.93	57.88	62.05	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	120.23	58.08	62.16	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
338	7.64	120.54	58.27	62.27	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
339	7.66	120.84	58.47	62.38	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
340	7.68	121.15	58.66	62.49	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
341	7.70	121.47	58.86	62.61	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
342	7.72	121.79	59.06	62.73	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
343	7.74	122.11	59.25	62.86	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
344	7.76	122.43	59.45	62.98	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
345	7.78	122.75	59.64	63.10	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
346	7.80	123.06	59.84	63.22	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
347	7.82	123.37	60.04	63.33	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
348	7.84	123.69	60.23	63.45	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
349	7.86	124.02	60.43	63.59	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
350	7.88	124.36	60.63	63.74	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
351	7.90	124.71	60.82	63.89	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
352	7.92	125.06	61.02	64.04	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
353	7.94	125.42	61.21	64.20	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
354	7.96	125.77	61.41	64.36	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
355	7.98	126.12	61.61	64.52	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
356	8.00	126.47	61.80	64.66	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
357	8.02	126.81	62.00	64.81	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
358	8.04	127.15	62.20	64.95	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
359	8.06	127.49	62.39	65.10	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
360	8.08	127.83	62.59	65.25	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
361	8.10	128.18	62.78	65.40	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
362	8.12	128.53	62.98	65.55	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
363	8.14	128.89	63.18	65.71	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
364	8.16	129.24	63.37	65.87	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
365	8.18	129.60	63.57	66.03	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
366	8.20	129.96	63.77	66.19	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
367	8.22	130.32	63.96	66.35	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
368	8.24	130.68	64.16	66.52	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
369	8.26	131.04	64.35	66.69	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
370	8.28	131.40	64.55	66.85	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
371	8.30	131.77	64.75	67.03	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
372	8.32	132.14	64.94	67.20	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
373	8.34	132.51	65.14	67.38	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
374	8.36	132.89	65.33	67.55	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
375	8.38	133.25	65.53	67.72	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
376	8.40	133.62	65.73	67.90	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
377	8.42	133.99	65.92	68.07	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
378	8.44	134.37	66.12	68.25	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
379	8.46	134.74	66.32	68.42	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
380	8.48	135.11	66.51	68.59	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
381	8.50	135.47	66.71	68.77	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
382	8.52	135.84	66.90	68.94	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
383	8.54	136.21	67.10	69.11	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
384	8.56	136.58	67.30	69.28	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	136.95	67.49	69.45	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
386	8.60	137.31	67.69	69.63	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
387	8.62	137.68	67.89	69.80	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
388	8.64	138.05	68.08	69.96	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
389	8.66	138.41	68.28	70.13	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
390	8.68	138.77	68.47	70.29	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
391	8.70	139.13	68.67	70.46	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
392	8.72	139.49	68.87	70.62	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
393	8.74	139.84	69.06	70.78	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
394	8.76	140.20	69.26	70.94	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
395	8.78	140.56	69.45	71.11	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
396	8.80	140.93	69.65	71.28	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
397	8.82	141.29	69.85	71.44	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
398	8.84	141.65	70.04	71.61	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
399	8.86	142.02	70.24	71.78	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
400	8.88	142.39	70.44	71.95	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
401	8.90	142.75	70.63	72.11	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
402	8.92	143.11	70.83	72.28	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
403	8.94	143.47	71.02	72.45	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
404	8.96	143.83	71.22	72.61	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
405	8.98	144.20	71.42	72.78	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
406	9.00	144.56	71.61	72.95	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
407	9.02	144.93	71.81	73.12	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
408	9.04	145.29	72.01	73.29	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
409	9.06	145.66	72.20	73.46	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
410	9.08	146.03	72.40	73.63	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
411	9.10	146.39	72.59	73.80	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
412	9.12	146.76	72.79	73.97	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
413	9.14	147.12	72.99	74.14	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
414	9.16	147.49	73.18	74.30	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
415	9.18	147.86	73.38	74.48	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
416	9.20	148.23	73.58	74.65	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
417	9.22	148.60	73.77	74.83	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
418	9.24	148.98	73.97	75.01	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
419	9.26	149.35	74.16	75.18	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
420	9.28	149.72	74.36	75.36	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
421	9.30	150.09	74.56	75.54	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
422	9.32	150.47	74.75	75.71	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
423	9.34	150.84	74.95	75.89	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
424	9.36	151.23	75.14	76.08	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
425	9.38	151.62	75.34	76.28	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
426	9.40	152.01	75.54	76.48	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
427	9.42	152.41	75.73	76.68	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
428	9.44	152.81	75.93	76.88	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
429	9.46	153.21	76.13	77.08	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
430	9.48	153.60	76.32	77.28	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
431	9.50	153.99	76.52	77.47	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
432	9.52	154.37	76.71	77.66	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
433	9.54	154.76	76.91	77.84	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
434	9.56	155.14	77.11	78.03	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
435	9.58	155.52	77.30	78.22	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
436	9.60	155.91	77.50	78.41	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
437	9.62	156.31	77.70	78.61	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
438	9.64	156.71	77.89	78.82	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
439	9.66	157.11	78.09	79.03	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
440	9.68	157.52	78.28	79.24	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
441	9.70	157.93	78.48	79.45	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
442	9.72	158.35	78.68	79.67	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
443	9.74	158.76	78.87	79.89	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
444	9.76	159.18	79.07	80.11	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
445	9.78	159.60	79.26	80.33	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
446	9.80	160.02	79.46	80.56	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
447	9.82	160.44	79.66	80.79	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
448	9.84	160.87	79.85	81.01	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
449	9.86	161.29	80.05	81.24	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
450	9.88	161.72	80.25	81.47	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
451	9.90	162.14	80.44	81.70	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
452	9.92	162.57	80.64	81.93	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
453	9.94	163.00	80.83	82.17	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
454	9.96	163.43	81.03	82.40	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
455	9.98	163.86	81.23	82.64	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
456	10.00	164.30	81.42	82.87	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
457	10.02	164.73	81.62	83.11	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
458	10.04	165.16	81.82	83.34	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
459	10.06	165.59	82.01	83.58	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
460	10.08	166.02	82.21	83.81	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
461	10.10	166.45	82.40	84.05	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
462	10.12	166.89	82.60	84.29	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
463	10.14	167.32	82.80	84.52	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
464	10.16	167.75	82.99	84.76	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
465	10.18	168.18	83.19	84.99	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
466	10.20	168.61	83.39	85.23	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.02	4.06	3.27	1.00	0.18	54.25	9.82	4.000	No	Yes	2.00
2	0.92	0.06	3.99	5.17	1.00	0.94	48.66	45.85	4.000	No	Yes	2.00
3	0.94	0.10	3.81	6.46	1.00	1.77	35.64	63.18	4.000	No	Yes	2.00
4	0.96	0.13	3.79	8.47	1.00	2.25	34.35	77.39	4.000	No	Yes	2.00
5	0.98	0.11	3.89	10.51	1.00	1.95	40.95	79.72	4.000	No	Yes	2.00
6	1.00	0.17	3.61	6.64	1.00	3.14	25.54	80.17	4.000	No	Yes	2.00
7	1.02	0.92	2.61	1.46	0.85	17.97	5.85	105.04	4.000	Yes	No	2.00
8	1.04	1.79	2.26	0.93	0.72	35.09	1.79	62.98	4.000	Yes	No	2.00
9	1.06	2.75	2.04	0.70	0.63	53.93	1.34	72.36	4.000	Yes	No	2.00
10	1.08	3.11	1.97	0.64	0.61	61.10	1.28	78.50	4.000	Yes	No	2.00
11	1.10	3.27	1.95	0.62	0.60	64.33	1.27	81.51	4.000	Yes	No	2.00
12	1.12	3.16	1.99	0.70	0.61	62.10	1.30	80.53	4.000	Yes	No	2.00
13	1.14	2.77	2.09	0.88	0.65	54.31	1.41	76.34	4.000	Yes	No	2.00
14	1.16	2.42	2.21	1.16	0.70	47.44	1.63	77.20	4.000	Yes	No	2.00
15	1.18	2.14	2.30	1.43	0.74	41.85	1.94	81.22	4.000	Yes	No	2.00
16	1.20	1.99	2.36	1.60	0.76	38.86	2.17	84.47	4.000	Yes	No	2.00
17	1.22	1.80	2.42	1.80	0.78	35.27	2.50	88.21	4.000	Yes	No	2.00
18	1.24	1.60	2.50	2.08	0.81	31.22	2.87	89.53	4.000	Yes	No	2.00
19	1.26	1.41	2.58	2.36	0.84	27.38	4.82	131.86	4.000	Yes	No	2.00
20	1.28	1.27	2.63	2.50	0.86	24.80	6.65	164.85	4.000	Yes	No	2.00
21	1.30	1.20	2.65	2.51	0.87	23.39	7.57	177.10	4.000	Yes	No	2.00
22	1.32	1.18	2.65	2.41	0.87	22.91	7.39	169.24	4.000	No	No	2.00
23	1.34	1.15	2.65	2.34	0.87	22.34	7.45	166.37	4.000	No	No	2.00
24	1.36	1.07	2.68	2.36	0.88	20.82	8.81	183.48	4.000	No	No	2.00
25	1.38	0.98	2.72	2.46	0.90	19.01	4.92	93.51	4.000	No	Yes	2.00
26	1.40	0.89	2.77	2.64	0.92	17.21	5.52	94.91	4.000	No	Yes	2.00
27	1.42	0.85	2.79	2.67	0.92	16.32	5.78	94.35	4.000	No	Yes	2.00
28	1.44	0.83	2.80	2.60	0.93	15.89	5.81	92.33	4.000	No	Yes	2.00
29	1.46	0.82	2.79	2.51	0.92	15.84	5.71	90.50	4.000	No	Yes	2.00
30	1.48	0.85	2.76	2.31	0.91	16.25	5.36	87.10	4.000	No	Yes	2.00
31	1.50	0.87	2.72	2.11	0.90	16.78	4.97	83.46	4.000	No	Yes	2.00
32	1.52	0.89	2.69	1.92	0.89	17.16	9.78	167.82	4.000	No	No	2.00
33	1.54	0.90	2.68	1.84	0.88	17.26	9.09	156.91	4.000	No	No	2.00
34	1.56	0.89	2.69	1.86	0.88	17.18	9.33	160.32	4.000	No	No	2.00
35	1.58	0.87	2.69	1.85	0.89	16.78	9.76	163.76	4.000	No	No	2.00
36	1.60	0.86	2.71	1.94	0.89	16.46	4.82	79.36	4.000	No	Yes	2.00
37	1.62	0.85	2.72	1.97	0.90	16.26	4.91	79.85	4.000	No	Yes	2.00
38	1.64	0.86	2.73	2.05	0.90	16.42	4.98	81.84	4.000	No	Yes	2.00
39	1.66	0.87	2.72	2.04	0.90	16.70	4.90	81.82	4.000	No	Yes	2.00
40	1.68	0.88	2.72	2.05	0.90	16.79	4.90	82.26	4.000	No	Yes	2.00
41	1.70	0.87	2.73	2.10	0.90	16.66	4.99	83.15	4.000	No	Yes	2.00
42	1.72	0.85	2.75	2.20	0.91	16.20	5.23	84.77	0.773	No	Yes	2.00
43	1.74	0.82	2.77	2.32	0.92	15.75	5.50	86.69	0.751	No	Yes	2.00
44	1.76	0.68	2.90	2.97	0.97	12.88	7.26	93.59	0.615	No	Yes	2.00
45	1.78	0.71	2.89	2.97	0.96	13.58	7.00	95.04	0.648	No	Yes	2.00
46	1.80	0.74	2.88	2.99	0.96	13.98	6.88	96.14	0.667	No	Yes	2.00
47	1.82	0.87	2.78	2.56	0.92	16.65	5.56	92.53	0.794	No	Yes	2.00
48	1.84	0.82	2.81	2.68	0.93	15.71	5.96	93.67	0.749	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	0.79	2.83	2.76	0.94	15.10	6.23	94.15	0.720	No	Yes	2.00
50	1.88	0.77	2.84	2.81	0.95	14.71	6.41	94.27	0.702	No	Yes	2.00
51	1.90	0.74	2.87	2.95	0.96	14.12	6.78	95.75	0.673	No	Yes	2.00
52	1.92	0.71	2.90	3.12	0.97	13.45	7.23	97.26	0.642	No	Yes	2.00
53	1.94	0.68	2.93	3.24	0.98	12.75	7.65	97.54	0.608	No	Yes	2.00
54	1.96	0.66	2.93	3.20	0.98	12.49	7.72	96.45	0.596	No	Yes	2.00
55	1.98	0.66	2.94	3.22	0.98	12.34	7.81	96.36	0.589	No	Yes	2.00
56	2.00	0.66	2.93	3.14	0.98	12.45	7.66	95.37	0.594	No	Yes	2.00
57	2.02	0.67	2.93	3.17	0.98	12.58	7.65	96.22	0.600	No	Yes	2.00
58	2.04	0.68	2.92	3.11	0.97	12.87	7.45	95.82	0.614	No	Yes	2.00
59	2.06	0.70	2.91	3.10	0.97	13.12	7.34	96.22	0.626	No	Yes	2.00
60	2.08	0.70	2.89	2.97	0.97	13.27	7.12	94.50	0.633	No	Yes	2.00
61	2.10	0.70	2.89	2.92	0.97	13.23	7.07	93.59	0.631	No	Yes	2.00
62	2.12	0.69	2.91	3.00	0.97	12.93	7.29	94.25	0.617	No	Yes	2.00
63	2.14	0.66	2.93	3.19	0.98	12.44	7.73	96.12	0.593	No	Yes	2.00
64	2.16	0.64	2.97	3.42	0.99	11.93	8.24	98.38	0.569	No	Yes	2.00
65	2.18	0.63	2.99	3.63	1.00	11.69	8.61	100.66	0.558	No	Yes	2.00
66	2.20	0.65	2.97	3.62	1.00	12.17	8.37	101.78	0.580	No	Yes	2.00
67	2.22	0.69	2.94	3.46	0.98	13.01	7.81	101.65	0.621	No	Yes	2.00
68	2.24	0.74	2.90	3.24	0.97	13.93	7.19	100.14	0.664	No	Yes	2.00
69	2.26	0.77	2.87	3.07	0.96	14.42	6.82	98.38	0.688	No	Yes	2.00
70	2.28	0.78	2.86	3.02	0.96	14.63	6.69	97.87	0.698	No	Yes	2.00
71	2.30	0.78	2.87	3.04	0.96	14.61	6.73	98.29	0.697	No	Yes	2.00
72	2.32	0.76	2.88	3.11	0.96	14.28	6.91	98.70	0.681	No	Yes	2.00
73	2.34	0.75	2.88	3.09	0.96	14.04	6.98	98.01	0.670	No	Yes	2.00
74	2.36	0.75	2.88	2.99	0.96	14.00	6.87	96.26	0.668	No	Yes	2.00
75	2.38	0.76	2.85	2.79	0.95	14.36	6.51	93.49	0.685	No	Yes	2.00
76	2.40	0.78	2.82	2.58	0.94	14.70	6.14	90.22	0.701	No	Yes	2.00
77	2.42	0.77	2.82	2.47	0.94	14.54	6.04	87.89	0.694	No	Yes	2.00
78	2.44	0.75	2.83	2.46	0.94	13.98	6.21	86.77	0.667	No	Yes	2.00
79	2.46	0.70	2.86	2.58	0.96	13.05	6.69	87.37	0.623	No	Yes	2.00
80	2.48	0.66	2.90	2.74	0.97	12.28	7.22	88.65	0.586	No	Yes	2.00
81	2.50	0.62	2.95	3.01	0.99	11.52	7.92	91.25	0.550	No	Yes	2.00
82	2.52	0.59	2.99	3.29	1.00	10.93	8.59	93.88	0.521	No	Yes	2.00
83	2.54	0.59	3.00	3.39	1.00	10.84	8.77	95.02	0.517	No	Yes	2.00
84	2.56	0.61	2.97	3.23	1.00	11.24	8.35	93.82	0.536	No	Yes	2.00
85	2.58	0.64	2.93	2.95	0.98	11.86	7.68	91.06	0.566	No	Yes	2.00
86	2.60	0.66	2.89	2.66	0.97	12.26	7.12	87.35	0.585	No	Yes	2.00
87	2.62	0.68	2.87	2.47	0.96	12.59	6.73	84.68	0.600	No	Yes	2.00
88	2.64	0.70	2.83	2.26	0.94	13.04	6.27	81.73	0.622	No	Yes	2.00
89	2.66	0.72	2.82	2.20	0.94	13.36	6.07	81.03	0.637	No	Yes	2.00
90	2.68	0.72	2.81	2.18	0.94	13.39	6.03	80.69	0.639	No	Yes	2.00
91	2.70	0.71	2.82	2.21	0.94	13.12	6.17	80.95	0.626	No	Yes	2.00
92	2.72	0.69	2.83	2.20	0.94	12.83	6.26	80.31	0.612	No	Yes	2.00
93	2.74	0.68	2.84	2.21	0.95	12.49	6.41	80.02	0.596	No	Yes	2.00
94	2.76	0.66	2.85	2.24	0.95	12.23	6.54	80.06	0.584	No	Yes	2.00
95	2.78	0.66	2.85	2.22	0.95	12.20	6.53	79.64	0.582	No	Yes	2.00
96	2.80	0.68	2.84	2.14	0.95	12.48	6.31	78.78	0.596	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.69	2.82	2.07	0.94	12.72	6.11	77.72	0.607	No	Yes	2.00
98	2.84	0.69	2.82	2.06	0.94	12.80	6.06	77.60	0.610	No	Yes	2.00
99	2.86	0.68	2.83	2.10	0.94	12.54	6.22	78.02	0.598	No	Yes	2.00
100	2.88	0.67	2.84	2.15	0.95	12.33	6.38	78.64	0.588	No	Yes	2.00
101	2.90	0.66	2.85	2.17	0.95	12.16	6.47	78.73	0.580	No	Yes	2.00
102	2.92	0.65	2.85	2.16	0.95	12.00	6.53	78.40	0.573	No	Yes	2.00
103	2.94	0.64	2.87	2.21	0.96	11.68	6.74	78.72	0.557	No	Yes	2.00
104	2.96	0.61	2.90	2.35	0.97	11.18	7.17	80.12	0.533	No	Yes	2.00
105	2.98	0.49	3.05	3.08	1.00	8.85	9.61	85.05	0.422	No	Yes	2.00
106	3.00	0.47	3.08	3.22	1.00	8.36	10.20	85.23	0.399	No	Yes	2.00
107	3.02	0.45	3.10	3.27	1.00	7.92	10.65	84.36	0.378	No	Yes	2.00
108	3.04	0.51	3.00	2.68	1.00	9.19	8.78	80.69	0.438	No	Yes	2.00
109	3.06	0.49	3.04	2.87	1.00	8.70	9.42	81.97	0.415	No	Yes	2.00
110	3.08	0.48	3.07	3.19	1.00	8.44	10.08	85.12	0.403	No	Yes	2.00
111	3.10	0.49	3.08	3.43	1.00	8.64	10.27	88.76	0.412	No	Yes	2.00
112	3.12	0.52	3.06	3.49	1.00	9.32	9.84	91.69	0.444	No	Yes	2.00
113	3.14	0.57	3.02	3.34	1.00	10.21	9.06	92.57	0.487	No	Yes	2.00
114	3.16	0.60	2.98	3.17	1.00	10.95	8.42	92.23	0.522	No	Yes	2.00
115	3.18	0.62	2.96	3.08	0.99	11.31	8.11	91.75	0.540	No	Yes	2.00
116	3.20	0.64	2.95	3.03	0.99	11.59	7.92	91.75	0.553	No	Yes	2.00
117	3.22	0.67	2.92	2.93	0.98	12.15	7.53	91.44	0.580	No	Yes	2.00
118	3.24	0.71	2.88	2.77	0.96	13.12	6.93	90.87	0.626	No	Yes	2.00
119	3.26	0.80	2.81	2.51	0.94	14.80	6.02	89.04	0.706	No	Yes	2.00
120	3.28	0.88	2.76	2.32	0.92	16.42	5.33	87.48	0.783	No	Yes	2.00
121	3.30	0.96	2.71	2.18	0.90	17.88	4.81	86.10	0.853	No	Yes	2.00
122	3.32	0.98	2.71	2.21	0.90	18.26	4.78	87.23	0.871	No	Yes	2.00
123	3.34	0.97	2.72	2.32	0.90	18.07	4.94	89.28	0.862	No	Yes	2.00
124	3.36	0.93	2.75	2.47	0.92	17.31	5.29	91.57	0.826	No	Yes	2.00
125	3.38	0.90	2.77	2.57	0.92	16.80	5.54	92.99	0.801	No	Yes	2.00
126	3.40	0.91	2.77	2.55	0.92	16.92	5.48	92.70	0.807	No	Yes	2.00
127	3.42	0.95	2.73	2.33	0.91	17.70	5.03	89.11	0.844	No	Yes	2.00
128	3.44	1.00	2.68	2.06	0.89	18.67	9.05	169.05	0.476	No	No	2.00
129	3.46	1.04	2.64	1.82	0.87	19.43	6.83	132.70	0.268	No	No	2.00
130	3.48	1.05	2.61	1.68	0.86	19.74	5.79	114.28	0.197	No	No	2.00
131	3.50	1.05	2.60	1.59	0.86	19.56	5.46	106.76	0.174	No	No	2.00
132	3.52	1.02	2.61	1.56	0.86	19.07	5.60	106.79	0.174	No	No	2.00
133	3.54	1.00	2.62	1.63	0.87	18.65	6.33	118.02	0.210	No	No	2.00
134	3.56	0.99	2.64	1.70	0.87	18.50	6.89	127.53	0.246	No	No	2.00
135	3.58	1.00	2.65	1.77	0.88	18.59	7.25	134.72	0.277	No	No	2.00
136	3.60	1.02	2.64	1.79	0.87	18.98	7.01	132.97	0.269	No	No	2.00
137	3.62	1.03	2.64	1.80	0.87	19.21	6.87	131.91	0.264	No	No	2.00
138	3.64	1.04	2.63	1.78	0.87	19.44	6.61	128.40	0.249	No	No	2.00
139	3.66	1.03	2.63	1.77	0.87	19.25	6.67	128.48	0.250	No	No	2.00
140	3.68	1.02	2.63	1.75	0.87	19.09	6.69	127.77	0.247	No	No	2.00
141	3.70	0.99	2.65	1.78	0.88	18.43	7.44	137.16	0.288	No	No	2.00
142	3.72	0.95	2.68	1.88	0.89	17.58	8.96	157.51	0.399	No	No	2.00
143	3.74	0.88	2.73	2.06	0.91	16.22	5.05	81.92	0.774	No	Yes	2.00
144	3.76	0.81	2.79	2.31	0.93	14.92	5.72	85.37	0.712	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.75	2.84	2.55	0.95	13.68	6.43	87.98	0.652	No	Yes	2.00
146	3.80	0.71	2.88	2.70	0.97	12.87	6.93	89.15	0.614	No	Yes	2.00
147	3.82	0.70	2.88	2.67	0.97	12.65	6.98	88.30	0.603	No	Yes	2.00
148	3.84	0.71	2.86	2.47	0.96	12.91	6.61	85.31	0.616	No	Yes	2.00
149	3.86	0.73	2.83	2.26	0.95	13.25	6.20	82.13	0.632	No	Yes	2.00
150	3.88	0.74	2.79	2.03	0.93	13.48	5.78	77.92	0.643	No	Yes	2.00
151	3.90	0.75	2.77	1.88	0.93	13.62	5.52	75.18	0.650	No	Yes	2.00
152	3.92	0.77	2.74	1.70	0.91	14.06	5.11	71.90	0.671	No	Yes	2.00
153	3.94	0.80	2.71	1.60	0.90	14.54	4.82	70.14	0.694	No	Yes	2.00
154	3.96	0.82	2.69	1.52	0.89	14.97	9.53	142.63	0.315	No	No	2.00
155	3.98	0.84	2.68	1.49	0.89	15.32	8.80	134.87	0.277	No	No	2.00
156	4.00	0.85	2.68	1.53	0.89	15.56	8.75	136.20	0.283	No	No	2.00
157	4.02	0.86	2.68	1.59	0.89	15.68	9.08	142.44	0.314	No	No	2.00
158	4.04	0.84	2.70	1.70	0.90	15.39	4.75	73.12	0.734	No	Yes	2.00
159	4.06	0.82	2.74	1.84	0.91	14.87	5.09	75.65	0.709	No	Yes	2.00
160	4.08	0.79	2.77	1.99	0.92	14.30	5.47	78.17	0.682	No	Yes	2.00
161	4.10	0.77	2.79	2.04	0.93	13.90	5.67	78.83	0.663	No	Yes	2.00
162	4.12	0.76	2.79	2.01	0.93	13.75	5.67	78.04	0.656	No	Yes	2.00
163	4.14	0.76	2.78	1.92	0.93	13.69	5.56	76.05	0.653	No	Yes	2.00
164	4.16	0.77	2.75	1.79	0.92	13.96	5.28	73.76	0.666	No	Yes	2.00
165	4.18	0.79	2.72	1.66	0.91	14.34	4.97	71.27	0.684	No	Yes	2.00
166	4.20	0.72	2.76	1.58	0.92	12.83	5.31	68.17	0.612	No	Yes	2.00
167	4.22	0.63	2.81	1.56	0.94	11.04	5.95	65.70	0.526	No	Yes	2.00
168	4.24	0.66	2.77	1.45	0.93	11.79	5.47	64.43	0.562	No	Yes	2.00
169	4.26	0.80	2.68	1.37	0.89	14.47	8.90	128.77	0.251	No	No	2.00
170	4.28	0.94	2.61	1.31	0.86	17.15	5.61	96.13	0.146	No	No	2.00
171	4.30	0.93	2.63	1.46	0.87	17.12	6.54	112.01	0.190	No	No	2.00
172	4.32	0.98	2.63	1.57	0.87	17.94	6.57	117.88	0.209	No	No	2.00
173	4.34	1.06	2.61	1.63	0.86	19.65	5.59	109.81	0.183	No	No	2.00
174	4.36	1.17	2.56	1.55	0.85	21.69	4.11	89.14	0.146	No	No	2.00
175	4.38	1.20	2.56	1.60	0.84	22.28	4.07	90.64	0.149	No	No	2.00
176	4.40	1.18	2.58	1.74	0.85	21.96	4.81	105.58	0.189	No	No	2.00
177	4.42	1.15	2.62	1.94	0.87	21.30	6.11	130.23	0.257	No	No	2.00
178	4.44	1.13	2.65	2.11	0.88	20.91	7.32	153.12	0.372	No	No	2.00
179	4.46	1.10	2.68	2.34	0.89	20.26	9.21	186.57	0.616	No	No	2.00
180	4.48	1.06	2.72	2.62	0.91	19.60	4.97	97.50	0.935	No	Yes	2.00
181	4.50	1.03	2.76	2.90	0.92	18.93	5.42	102.50	0.903	No	Yes	2.00
182	4.52	1.01	2.78	3.00	0.93	18.56	5.60	103.92	0.885	No	Yes	2.00
183	4.54	1.02	2.76	2.84	0.92	18.72	5.40	101.02	0.893	No	Yes	2.00
184	4.56	1.06	2.73	2.61	0.91	19.43	4.99	97.06	0.927	No	Yes	2.00
185	4.58	1.11	2.68	2.34	0.89	20.57	8.93	183.65	0.590	No	No	2.00
186	4.60	1.15	2.66	2.23	0.88	21.20	7.73	163.82	0.440	No	No	2.00
187	4.62	1.16	2.64	2.14	0.88	21.49	7.03	150.97	0.360	No	No	2.00
188	4.64	1.13	2.66	2.23	0.89	20.90	7.97	166.44	0.458	No	No	2.00
189	4.66	1.09	2.69	2.38	0.90	20.01	9.74	194.88	0.691	No	No	2.00
190	4.68	1.03	2.73	2.57	0.91	18.91	5.06	95.62	0.902	No	Yes	2.00
191	4.70	0.98	2.76	2.70	0.93	17.94	5.42	97.20	0.856	No	Yes	2.00
192	4.72	0.93	2.79	2.79	0.94	16.98	5.75	97.65	0.810	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.90	2.80	2.77	0.94	16.29	5.90	96.10	0.777	No	Yes	2.00
194	4.76	0.88	2.80	2.66	0.94	15.91	5.87	93.41	4.000	Yes	Yes	2.00
195	4.78	0.88	2.78	2.42	0.93	15.86	5.60	88.82	4.000	Yes	Yes	2.00
196	4.80	0.89	2.74	2.10	0.92	16.07	5.14	82.60	4.000	Yes	Yes	2.00
197	4.82	0.91	2.70	1.82	0.90	16.44	9.97	163.93	4.000	Yes	No	2.00
198	4.84	0.94	2.65	1.58	0.88	17.11	7.38	126.36	4.000	Yes	No	2.00
199	4.86	0.98	2.62	1.46	0.87	17.85	5.97	106.58	4.000	Yes	No	2.00
200	4.88	1.06	2.57	1.36	0.85	19.09	4.59	87.65	4.000	Yes	No	2.00
201	4.90	1.13	2.54	1.27	0.84	20.19	3.61	72.89	4.000	Yes	No	2.00
202	4.92	1.18	2.52	1.28	0.84	21.00	3.31	69.51	4.000	Yes	No	2.00
203	4.94	1.17	2.55	1.41	0.84	20.93	3.88	81.14	4.000	Yes	No	2.00
204	4.96	1.14	2.59	1.64	0.86	20.56	5.07	104.26	4.000	Yes	No	2.00
205	4.98	1.14	2.61	1.80	0.87	20.61	5.85	120.54	4.000	Yes	No	2.00
206	5.00	1.13	2.63	1.96	0.88	20.59	6.71	138.20	4.000	Yes	No	2.00
207	5.02	1.11	2.67	2.20	0.89	20.28	8.35	169.31	4.000	Yes	No	2.00
208	5.04	1.05	2.76	2.87	0.92	19.10	5.35	102.19	4.000	Yes	Yes	2.00
209	5.06	0.99	2.84	3.62	0.96	18.03	6.36	114.75	4.000	Yes	Yes	2.00
210	5.08	0.95	2.90	4.32	0.98	17.20	7.27	125.09	4.000	Yes	Yes	2.00
211	5.10	0.92	2.94	4.62	0.99	16.53	7.76	128.21	4.000	Yes	Yes	2.00
212	5.12	0.89	2.96	4.76	1.00	15.96	8.07	128.75	0.761	No	Yes	2.00
213	5.14	0.87	2.96	4.72	1.00	15.57	8.16	127.00	0.743	No	Yes	2.00
214	5.16	0.84	2.95	4.37	1.00	15.02	8.01	120.39	0.716	No	Yes	2.00
215	5.18	0.81	2.94	3.94	0.99	14.46	7.78	112.45	0.690	No	Yes	2.00
216	5.20	0.85	2.87	3.23	0.97	15.09	6.79	102.40	0.720	No	Yes	2.00
217	5.22	0.94	2.79	2.71	0.94	16.85	5.68	95.75	0.804	No	Yes	2.00
218	5.24	1.09	2.69	2.23	0.90	19.45	9.33	181.51	0.573	No	No	2.00
219	5.26	1.19	2.65	2.18	0.88	21.09	7.56	159.43	0.411	No	No	2.00
220	5.28	1.22	2.67	2.42	0.89	21.58	8.47	182.87	0.584	No	No	2.00
221	5.30	1.15	2.74	2.91	0.92	20.64	5.09	105.02	0.984	No	Yes	2.00
222	5.32	1.02	2.82	3.42	0.95	18.43	6.07	111.85	0.879	No	Yes	2.00
223	5.34	0.89	2.90	3.92	0.98	15.94	7.25	115.59	0.760	No	Yes	2.00
224	5.36	0.75	3.02	4.76	1.00	13.17	9.15	120.43	0.628	No	Yes	2.00
225	5.38	0.64	3.15	6.16	1.00	10.96	11.71	128.32	0.523	No	Yes	2.00
226	5.40	0.56	3.27	7.66	1.00	9.37	14.32	134.18	0.447	No	Yes	2.00
227	5.42	0.43	3.43	9.50	1.00	6.84	19.02	130.07	0.326	No	Yes	2.00
228	5.44	0.39	3.45	8.67	1.00	6.04	19.56	118.13	0.288	No	Yes	2.00
229	5.46	0.36	3.43	7.08	1.00	5.39	19.07	102.76	0.257	No	Yes	2.00
230	5.48	0.42	3.27	4.85	1.00	6.52	14.38	93.71	0.311	No	Yes	2.00
231	5.50	0.43	3.22	4.17	1.00	6.67	13.26	88.47	0.318	No	Yes	2.00
232	5.52	0.42	3.21	3.87	1.00	6.53	13.01	84.94	0.311	No	Yes	2.00
233	5.54	0.40	3.24	3.92	1.00	6.17	13.56	83.72	0.295	No	Yes	2.00
234	5.56	0.38	3.28	4.26	1.00	5.75	14.69	84.47	0.274	No	Yes	2.00
235	5.58	0.36	3.33	4.68	1.00	5.37	15.96	85.71	0.256	No	Yes	2.00
236	5.60	0.34	3.37	5.03	1.00	5.02	17.14	86.12	0.240	No	Yes	2.00
237	5.62	0.33	3.40	5.14	1.00	4.72	17.97	84.85	0.225	No	Yes	2.00
238	5.64	0.32	3.40	4.78	1.00	4.50	17.97	80.77	0.214	No	Yes	2.00
239	5.66	0.31	3.38	4.24	1.00	4.35	17.45	75.91	0.208	No	Yes	2.00
240	5.68	0.31	3.35	3.62	1.00	4.25	16.61	70.66	0.203	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.31	3.33	3.22	1.00	4.25	15.87	67.43	0.203	No	Yes	2.00
242	5.72	0.32	3.26	2.74	1.00	4.54	14.28	64.90	0.217	No	Yes	2.00
243	5.74	0.35	3.18	2.32	1.00	5.16	12.31	63.48	0.246	No	Yes	2.00
244	5.76	0.41	3.08	2.03	1.00	6.16	10.31	63.54	0.294	No	Yes	2.00
245	5.78	0.48	2.98	1.76	1.00	7.56	8.40	63.51	0.360	No	Yes	2.00
246	5.80	0.57	2.88	1.59	0.97	9.14	6.98	63.77	0.436	No	Yes	2.00
247	5.82	0.67	2.81	1.52	0.95	10.88	5.95	64.75	0.519	No	Yes	2.00
248	5.84	0.76	2.77	1.55	0.93	12.24	5.47	67.00	0.584	No	Yes	2.00
249	5.86	0.81	2.75	1.61	0.92	13.19	5.25	69.21	0.629	No	Yes	2.00
250	5.88	0.84	2.75	1.71	0.92	13.63	5.26	71.69	0.650	No	Yes	2.00
251	5.90	0.85	2.76	1.79	0.93	13.86	5.32	73.70	0.661	No	Yes	2.00
252	5.92	0.85	2.77	1.93	0.93	13.92	5.51	76.64	0.664	No	Yes	2.00
253	5.94	0.86	2.78	2.04	0.94	13.95	5.65	78.81	0.665	No	Yes	2.00
254	5.96	0.86	2.79	2.14	0.94	13.96	5.78	80.71	0.666	No	Yes	2.00
255	5.98	0.86	2.79	2.13	0.94	14.02	5.75	80.57	0.669	No	Yes	2.00
256	6.00	0.86	2.80	2.15	0.94	13.97	5.79	80.93	0.666	No	Yes	2.00
257	6.02	0.85	2.80	2.15	0.94	13.81	5.85	80.81	0.659	No	Yes	2.00
258	6.04	0.85	2.80	2.11	0.94	13.73	5.82	79.91	0.655	No	Yes	2.00
259	6.06	0.86	2.78	1.95	0.93	13.83	5.56	76.85	0.660	No	Yes	2.00
260	6.08	0.89	2.74	1.76	0.92	14.24	5.16	73.41	0.679	No	Yes	2.00
261	6.10	0.92	2.72	1.65	0.91	14.61	4.88	71.27	0.697	No	Yes	2.00
262	6.12	0.94	2.71	1.62	0.91	14.85	4.77	70.82	0.708	No	Yes	2.00
263	6.14	0.94	2.72	1.70	0.91	14.90	4.88	72.67	0.711	No	Yes	2.00
264	6.16	0.93	2.74	1.83	0.92	14.67	5.13	75.32	0.700	No	Yes	2.00
265	6.18	0.92	2.76	1.96	0.93	14.64	5.33	78.06	0.698	No	Yes	2.00
266	6.20	0.94	2.75	1.98	0.93	14.87	5.29	78.72	0.709	No	Yes	2.00
267	6.22	0.99	2.73	1.89	0.92	15.57	4.98	77.47	0.742	No	Yes	2.00
268	6.24	1.01	2.70	1.79	0.91	15.91	4.75	75.57	0.759	No	Yes	2.00
269	6.26	1.01	2.70	1.71	0.90	15.78	9.96	157.20	0.397	No	No	2.00
270	6.28	0.98	2.70	1.67	0.91	15.31	4.73	72.38	0.730	No	Yes	2.00
271	6.30	0.96	2.70	1.62	0.91	14.96	4.74	70.99	0.714	No	Yes	2.00
272	6.32	0.95	2.71	1.65	0.91	14.72	4.85	71.37	0.702	No	Yes	2.00
273	6.34	0.94	2.73	1.74	0.92	14.49	5.06	73.29	0.691	No	Yes	2.00
274	6.36	0.92	2.76	1.91	0.93	14.19	5.38	76.41	0.677	No	Yes	2.00
275	6.38	0.90	2.78	2.02	0.94	14.00	5.60	78.38	0.668	No	Yes	2.00
276	6.40	0.90	2.79	2.10	0.94	13.93	5.74	79.92	0.665	No	Yes	2.00
277	6.42	0.91	2.79	2.09	0.94	14.04	5.69	79.94	0.670	No	Yes	2.00
278	6.44	0.93	2.78	2.07	0.94	14.33	5.58	79.93	0.684	No	Yes	2.00
279	6.46	0.96	2.76	2.00	0.93	14.74	5.36	79.00	0.703	No	Yes	2.00
280	6.48	0.99	2.74	1.95	0.92	15.22	5.15	78.43	0.726	No	Yes	2.00
281	6.50	1.08	2.69	1.81	0.90	16.47	9.86	162.33	0.430	No	No	2.00
282	6.52	1.16	2.65	1.72	0.89	17.74	7.67	136.16	0.283	No	No	2.00
283	6.54	1.24	2.62	1.62	0.88	18.74	6.22	116.62	0.205	No	No	2.00
284	6.56	1.21	2.64	1.67	0.88	18.27	6.88	125.79	0.239	No	No	2.00
285	6.58	1.13	2.69	1.86	0.90	17.20	9.28	159.70	0.413	No	No	2.00
286	6.60	1.06	2.72	1.95	0.91	16.12	4.92	79.26	0.769	No	Yes	2.00
287	6.62	1.05	2.71	1.85	0.91	15.90	4.83	76.85	4.000	Yes	Yes	2.00
288	6.64	1.15	2.61	1.32	0.87	17.06	5.72	97.56	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	1.23	2.55	1.15	0.85	18.14	4.03	73.17	4.000	Yes	No	2.00
290	6.68	1.29	2.53	1.11	0.84	18.96	3.43	65.10	4.000	Yes	No	2.00
291	6.70	1.27	2.57	1.29	0.86	18.70	4.46	83.31	4.000	Yes	No	2.00
292	6.72	1.18	2.61	1.37	0.87	17.39	5.78	100.58	4.000	Yes	No	2.00
293	6.74	1.06	2.65	1.40	0.89	15.63	7.66	119.75	4.000	Yes	No	2.00
294	6.76	0.95	2.69	1.37	0.90	13.94	9.68	134.93	4.000	Yes	No	2.00
295	6.78	0.93	2.69	1.26	0.90	13.55	9.33	126.43	0.241	No	No	2.00
296	6.80	0.93	2.67	1.17	0.90	13.47	8.52	114.77	0.199	No	No	2.00
297	6.82	0.93	2.66	1.08	0.89	13.35	7.82	104.40	0.167	No	No	2.00
298	6.84	0.93	2.64	0.98	0.88	13.32	6.98	92.89	4.000	Yes	No	2.00
299	6.86	0.95	2.61	0.89	0.87	13.56	5.93	80.37	4.000	Yes	No	2.00
300	6.88	1.01	2.58	0.83	0.86	14.27	4.76	67.88	4.000	Yes	No	2.00
301	6.90	1.07	2.55	0.77	0.85	15.09	3.79	57.13	4.000	Yes	No	2.00
302	6.92	1.13	2.51	0.72	0.83	16.01	2.98	47.76	4.000	Yes	No	2.00
303	6.94	1.17	2.49	0.69	0.83	16.53	2.89	47.80	4.000	Yes	No	2.00
304	6.96	1.19	2.47	0.65	0.82	16.70	2.80	46.81	0.089	No	No	2.00
305	6.98	1.16	2.48	0.63	0.82	16.28	2.83	46.05	4.000	Yes	No	2.00
306	7.00	1.11	2.50	0.66	0.83	15.57	2.86	44.52	4.000	Yes	No	2.00
307	7.02	1.04	2.55	0.73	0.85	14.53	3.90	56.64	4.000	Yes	No	2.00
308	7.04	0.98	2.59	0.80	0.87	13.71	5.05	69.18	4.000	Yes	No	2.00
309	7.06	0.96	2.60	0.82	0.87	13.44	5.44	73.16	0.105	No	No	2.00
310	7.08	0.99	2.58	0.77	0.86	13.79	4.74	65.35	0.106	No	No	2.00
311	7.10	1.03	2.55	0.72	0.85	14.25	4.02	57.33	0.098	No	No	2.00
312	7.12	1.04	2.55	0.73	0.85	14.38	3.98	57.22	4.000	Yes	No	2.00
313	7.14	1.02	2.59	0.83	0.86	14.09	4.93	69.51	4.000	Yes	No	2.00
314	7.16	0.98	2.64	1.00	0.88	13.59	6.78	92.15	4.000	Yes	No	2.00
315	7.18	0.96	2.67	1.14	0.90	13.42	8.35	112.07	4.000	Yes	No	2.00
316	7.20	0.97	2.69	1.29	0.91	13.53	9.61	130.06	4.000	Yes	No	2.00
317	7.22	0.98	2.70	1.40	0.91	13.68	4.75	65.03	0.652	No	Yes	2.00
318	7.24	0.95	2.74	1.55	0.92	13.37	5.10	68.16	0.638	No	Yes	2.00
319	7.26	0.90	2.76	1.56	0.93	12.58	5.36	67.49	0.600	No	Yes	2.00
320	7.28	0.83	2.78	1.50	0.94	11.53	5.65	65.21	0.550	No	Yes	2.00
321	7.30	0.78	2.79	1.31	0.94	10.59	5.70	60.31	0.505	No	Yes	2.00
322	7.32	0.73	2.79	1.20	0.94	9.92	5.78	57.32	0.473	No	Yes	2.00
323	7.34	0.71	2.79	1.11	0.94	9.52	5.78	55.03	0.454	No	Yes	2.00
324	7.36	0.69	2.80	1.04	0.95	9.16	5.80	53.12	0.437	No	Yes	2.00
325	7.38	0.68	2.79	0.95	0.94	8.90	5.74	51.04	0.425	No	Yes	2.00
326	7.40	0.67	2.78	0.87	0.94	8.78	5.60	49.18	0.419	No	Yes	2.00
327	7.42	0.67	2.77	0.83	0.94	8.75	5.51	48.22	0.417	No	Yes	2.00
328	7.44	0.67	2.76	0.80	0.93	8.77	5.43	47.60	0.418	No	Yes	2.00
329	7.46	0.68	2.77	0.83	0.94	8.86	5.46	48.42	0.423	No	Yes	2.00
330	7.48	0.69	2.77	0.85	0.93	9.00	5.45	49.00	0.429	No	Yes	2.00
331	7.50	0.69	2.77	0.87	0.94	9.03	5.47	49.45	0.431	No	Yes	2.00
332	7.52	0.70	2.76	0.87	0.93	9.12	5.42	49.41	4.000	Yes	Yes	2.00
333	7.54	0.79	2.69	0.74	0.90	10.37	9.28	96.22	4.000	Yes	No	2.00
334	7.56	1.01	2.53	0.53	0.84	13.39	3.36	44.95	4.000	Yes	No	2.00
335	7.58	1.30	2.38	0.39	0.79	17.20	2.26	38.79	4.000	Yes	No	2.00
336	7.60	1.51	2.30	0.35	0.76	19.91	1.00	19.91	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	1.58	2.29	0.37	0.75	20.76	1.00	20.76	0.067	No	No	2.00
338	7.64	1.70	2.25	0.35	0.74	22.39	1.00	22.39	0.069	No	No	2.00
339	7.66	1.94	2.19	0.32	0.72	25.37	1.00	25.37	0.071	No	No	2.00
340	7.68	2.29	2.12	0.32	0.69	29.86	1.00	29.86	0.075	No	No	2.00
341	7.70	2.63	2.07	0.33	0.67	34.23	1.00	34.23	0.079	No	No	2.00
342	7.72	2.99	2.03	0.34	0.65	38.67	1.00	38.67	0.082	No	No	2.00
343	7.74	3.28	1.98	0.32	0.64	42.19	1.00	42.19	0.085	No	No	2.00
344	7.76	3.35	1.96	0.29	0.63	42.98	1.00	42.98	0.086	No	No	2.00
345	7.78	3.19	1.96	0.25	0.63	40.69	1.00	40.69	0.084	No	No	2.00
346	7.80	2.85	2.00	0.23	0.64	36.48	1.00	36.48	0.080	No	No	2.00
347	7.82	2.52	2.07	0.27	0.67	32.39	1.00	32.39	0.077	No	No	2.00
348	7.84	2.27	2.18	0.43	0.71	29.50	1.00	29.50	0.075	No	No	2.00
349	7.86	2.18	2.33	0.93	0.77	29.06	2.05	59.62	0.100	No	No	2.00
350	7.88	2.59	2.30	1.08	0.76	34.65	1.93	66.75	0.108	No	No	2.00
351	7.90	3.60	2.15	0.94	0.70	47.36	1.51	71.67	0.114	No	No	2.00
352	7.92	5.00	1.96	0.66	0.63	64.18	1.28	81.93	0.131	No	No	2.00
353	7.94	6.26	1.84	0.53	0.58	78.89	1.19	93.84	0.157	No	No	2.00
354	7.96	7.12	1.75	0.44	0.55	88.58	1.00	88.58	0.145	No	No	2.00
355	7.98	7.59	1.69	0.36	0.53	93.43	1.00	93.43	0.156	No	No	2.00
356	8.00	7.79	1.63	0.27	0.50	94.83	1.00	94.83	0.159	No	No	2.00
357	8.02	7.81	1.60	0.23	0.49	94.43	1.00	94.43	0.158	No	No	2.00
358	8.04	7.79	1.59	0.21	0.49	93.98	1.00	93.98	0.157	No	No	2.00
359	8.06	7.85	1.60	0.23	0.49	94.82	1.00	94.82	0.159	No	No	2.00
360	8.08	8.23	1.59	0.24	0.49	99.15	1.00	99.15	0.171	No	No	2.00
361	8.10	8.97	1.56	0.24	0.48	107.40	1.00	107.40	0.195	No	No	2.00
362	8.12	10.06	1.52	0.25	0.46	119.80	1.00	119.80	0.240	No	No	2.00
363	8.14	11.30	1.47	0.24	0.44	133.53	1.00	133.53	0.301	No	No	2.00
364	8.16	12.32	1.43	0.23	0.43	144.66	1.00	144.66	0.362	No	No	2.00
365	8.18	12.87	1.41	0.22	0.42	150.52	1.00	150.52	0.397	No	No	2.00
366	8.20	13.00	1.42	0.24	0.42	152.02	1.00	152.02	0.407	No	No	2.00
367	8.22	13.03	1.43	0.25	0.43	152.64	1.00	152.64	0.411	No	No	2.00
368	8.24	13.23	1.43	0.26	0.43	154.80	1.00	154.80	0.425	No	No	2.00
369	8.26	13.81	1.42	0.27	0.42	161.27	1.00	161.27	0.470	No	No	2.00
370	8.28	14.43	1.42	0.29	0.42	168.24	1.00	168.24	0.523	No	No	2.00
371	8.30	14.98	1.42	0.31	0.42	174.51	1.00	174.51	0.574	No	No	2.00
372	8.32	15.10	1.43	0.33	0.43	176.20	1.00	176.20	0.589	No	No	2.00
373	8.34	15.15	1.44	0.34	0.43	176.64	1.00	176.64	0.593	No	No	2.00
374	8.36	15.17	1.43	0.33	0.43	176.52	1.00	176.52	0.592	No	No	2.00
375	8.38	15.28	1.41	0.31	0.42	177.25	1.00	177.25	0.598	No	No	2.00
376	8.40	15.36	1.42	0.32	0.42	178.01	1.00	178.01	0.605	No	No	2.00
377	8.42	15.47	1.41	0.31	0.42	178.95	1.00	178.95	0.613	No	No	2.00
378	8.44	15.48	1.42	0.33	0.43	179.20	1.00	179.20	0.615	No	No	2.00
379	8.46	15.58	1.41	0.31	0.42	179.88	1.00	179.88	0.621	No	No	2.00
380	8.48	15.53	1.41	0.31	0.42	179.09	1.00	179.09	0.614	No	No	2.00
381	8.50	15.52	1.40	0.30	0.42	178.56	1.00	178.56	0.609	No	No	2.00
382	8.52	15.46	1.40	0.30	0.42	177.72	1.00	177.72	0.602	No	No	2.00
383	8.54	15.45	1.40	0.29	0.42	177.38	1.00	177.38	0.599	No	No	2.00
384	8.56	15.37	1.39	0.28	0.41	176.05	1.00	176.05	0.587	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	14.97	1.41	0.29	0.42	171.64	1.00	171.64	0.550	No	No	2.00
386	8.60	14.11	1.47	0.34	0.44	162.84	1.00	162.84	0.482	No	No	2.00
387	8.62	13.10	1.50	0.35	0.46	151.63	1.00	151.63	0.404	No	No	2.00
388	8.64	12.29	1.52	0.34	0.46	142.29	1.00	142.29	0.348	No	No	2.00
389	8.66	11.90	1.50	0.30	0.46	137.35	1.00	137.35	0.321	No	No	2.00
390	8.68	11.77	1.51	0.31	0.46	135.87	1.00	135.87	0.313	No	No	2.00
391	8.70	11.65	1.51	0.30	0.46	134.28	1.00	134.28	0.305	No	No	2.00
392	8.72	11.52	1.50	0.27	0.46	132.43	1.00	132.43	0.296	No	No	2.00
393	8.74	11.34	1.50	0.26	0.46	130.14	1.00	130.14	0.285	No	No	2.00
394	8.76	11.20	1.54	0.31	0.47	129.06	1.00	129.06	0.280	No	No	2.00
395	8.78	11.30	1.56	0.35	0.48	130.51	1.00	130.51	0.287	No	No	2.00
396	8.80	11.64	1.54	0.34	0.47	133.93	1.00	133.93	0.303	No	No	2.00
397	8.82	11.86	1.52	0.32	0.46	136.09	1.00	136.09	0.314	No	No	2.00
398	8.84	11.53	1.56	0.38	0.48	132.82	1.00	132.82	0.298	No	No	2.00
399	8.86	11.05	1.60	0.42	0.50	127.72	1.00	127.72	0.274	No	No	2.00
400	8.88	10.50	1.62	0.43	0.50	121.49	1.00	121.49	0.247	No	No	2.00
401	8.90	10.24	1.61	0.37	0.50	118.05	1.00	118.05	0.233	No	No	2.00
402	8.92	9.98	1.63	0.40	0.51	115.26	1.00	115.26	0.222	No	No	2.00
403	8.94	10.15	1.63	0.41	0.51	117.05	1.00	117.05	0.229	No	No	2.00
404	8.96	10.89	1.59	0.38	0.49	124.93	1.00	124.93	0.261	No	No	2.00
405	8.98	12.03	1.53	0.34	0.47	137.00	1.00	137.00	0.319	No	No	2.00
406	9.00	13.76	1.44	0.28	0.44	155.07	1.00	155.07	0.427	No	No	2.00
407	9.02	16.23	1.36	0.24	0.40	180.99	1.00	180.99	0.631	No	No	2.00
408	9.04	18.50	1.28	0.21	0.37	204.49	1.00	204.49	4.000	No	No	2.00
409	9.06	20.03	1.24	0.20	0.36	220.34	1.00	220.34	4.000	No	No	2.00
410	9.08	19.12	1.25	0.19	0.36	210.30	1.00	210.30	4.000	No	No	2.00
411	9.10	18.25	1.29	0.21	0.38	201.28	1.00	201.28	4.000	No	No	2.00
412	9.12	16.79	1.33	0.23	0.39	185.92	1.00	185.92	0.678	No	No	2.00
413	9.14	16.40	1.36	0.25	0.40	181.97	1.00	181.97	0.640	No	No	2.00
414	9.16	15.55	1.37	0.24	0.41	172.48	1.00	172.48	0.557	No	No	2.00
415	9.18	14.84	1.45	0.32	0.44	165.91	1.00	165.91	0.505	No	No	2.00
416	9.20	14.13	1.51	0.40	0.46	158.91	1.00	158.91	0.453	No	No	2.00
417	9.22	13.42	1.57	0.47	0.48	151.67	1.00	151.67	0.404	No	No	2.00
418	9.24	12.84	1.58	0.45	0.49	145.03	1.00	145.03	0.364	No	No	2.00
419	9.26	12.43	1.59	0.46	0.49	140.45	1.00	140.45	0.338	No	No	2.00
420	9.28	11.92	1.63	0.51	0.51	134.96	1.00	134.96	0.309	No	No	2.00
421	9.30	10.91	1.68	0.56	0.53	123.97	1.00	123.97	0.257	No	No	2.00
422	9.32	10.34	1.72	0.60	0.54	117.76	1.03	120.91	0.244	No	No	2.00
423	9.34	11.17	1.72	0.66	0.54	127.20	1.02	130.21	0.285	No	No	2.00
424	9.36	12.83	1.71	0.76	0.54	145.97	1.00	145.97	0.369	No	No	2.00
425	9.38	14.02	1.73	0.91	0.55	159.84	1.05	168.11	0.522	No	No	2.00
426	9.40	14.18	1.77	1.05	0.56	162.16	1.11	180.29	0.625	No	No	2.00
427	9.42	14.13	1.81	1.19	0.58	161.99	1.16	188.25	0.700	No	No	2.00
428	9.44	14.28	1.80	1.16	0.57	163.32	1.15	187.81	0.696	No	No	2.00
429	9.46	14.36	1.78	1.10	0.57	163.70	1.13	184.77	0.667	No	No	2.00
430	9.48	14.14	1.75	0.96	0.55	160.34	1.08	172.85	0.560	No	No	2.00
431	9.50	13.30	1.75	0.93	0.56	150.68	1.09	164.58	0.495	No	No	2.00
432	9.52	12.10	1.76	0.85	0.56	136.78	1.10	150.37	0.396	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	10.83	1.80	0.86	0.57	122.60	1.16	141.61	0.344	No	No	2.00
434	9.56	9.53	1.88	0.98	0.60	108.38	1.22	132.42	0.296	No	No	2.00
435	9.58	8.30	2.03	1.42	0.66	95.42	1.33	126.99	0.270	No	No	2.00
436	9.60	7.78	2.14	1.95	0.70	90.08	1.48	133.62	0.302	No	No	2.00
437	9.62	8.19	2.18	2.32	0.72	95.19	1.56	148.33	0.383	No	No	2.00
438	9.64	9.25	2.15	2.37	0.71	107.22	1.50	160.83	0.467	No	No	2.00
439	9.66	10.34	2.12	2.39	0.70	119.52	1.45	173.22	0.563	No	No	2.00
440	9.68	11.45	2.10	2.42	0.69	132.03	1.41	186.56	0.684	No	No	2.00
441	9.70	12.68	2.08	2.47	0.68	145.80	1.39	202.02	4.000	No	No	2.00
442	9.72	13.80	2.05	2.47	0.67	158.26	1.36	215.00	4.000	No	No	2.00
443	9.74	14.67	2.04	2.50	0.67	167.84	1.35	225.81	4.000	No	No	2.00
444	9.76	15.22	2.05	2.62	0.67	173.97	1.35	235.31	4.000	No	No	2.00
445	9.78	15.64	2.06	2.73	0.67	178.66	1.36	243.32	4.000	No	No	2.00
446	9.80	15.75	2.07	2.87	0.68	179.75	1.38	248.18	4.000	No	No	2.00
447	9.82	15.74	2.08	2.96	0.68	179.47	1.39	250.25	4.000	No	No	2.00
448	9.84	15.88	2.09	3.02	0.69	180.83	1.40	253.49	4.000	No	No	2.00
449	9.86	16.25	2.09	3.10	0.69	184.79	1.41	260.20	4.000	No	No	2.00
450	9.88	16.88	2.09	3.16	0.69	191.60	1.40	269.15	4.000	No	No	2.00
451	9.90	17.63	2.08	3.19	0.68	199.78	1.40	278.80	4.000	No	No	2.00
452	9.92	19.12	2.05	3.05	0.67	215.70	1.35	291.92	4.000	No	No	2.00
453	9.94	20.71	2.01	2.90	0.66	232.78	1.32	306.70	4.000	No	No	2.00
454	9.96	22.15	1.98	2.80	0.65	248.06	1.29	321.10	4.000	No	No	2.00
455	9.98	22.73	1.98	2.85	0.65	254.05	1.29	328.91	4.000	No	No	2.00
456	10.00	22.64	2.00	2.97	0.65	252.94	1.31	330.73	4.000	No	No	2.00
457	10.02	22.48	2.02	3.08	0.66	250.93	1.32	331.49	4.000	No	No	2.00
458	10.04	21.43	2.05	3.31	0.67	239.37	1.36	325.42	4.000	No	No	2.00
459	10.06	21.75	2.05	3.35	0.67	242.55	1.36	329.84	4.000	No	No	2.00
460	10.08	22.11	2.06	3.42	0.68	246.16	1.37	336.17	4.000	No	No	2.00
461	10.10	23.35	2.04	3.34	0.67	259.28	1.34	348.23	4.000	No	No	2.00
462	10.12	23.58	2.04	3.40	0.67	261.42	1.35	352.46	4.000	No	No	2.00
463	10.14	23.82	2.04	3.43	0.67	263.59	1.35	355.62	4.000	No	No	2.00
464	10.16	24.06	2.05	3.46	0.67	265.84	1.35	359.10	4.000	No	No	2.00
465	10.18	24.17	2.05	3.50	0.67	266.62	1.36	361.33	4.000	No	No	2.00
466	10.20	24.20	2.05	3.53	0.67	266.55	1.36	362.23	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	2.00	0.00	0.00	0.02	0.00
8.18	2.00	0.00	0.00	0.02	0.00	8.20	2.00	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	2.00	0.00	0.00	0.02	0.00
9.42	2.00	0.00	0.00	0.02	0.00	9.44	2.00	0.00	0.00	0.02	0.00
9.46	2.00	0.00	0.00	0.02	0.00	9.48	2.00	0.00	0.00	0.02	0.00
9.50	2.00	0.00	0.00	0.02	0.00	9.52	2.00	0.00	0.00	0.02	0.00
9.54	2.00	0.00	0.00	0.02	0.00	9.56	2.00	0.00	0.00	0.02	0.00
9.58	2.00	0.00	0.00	0.02	0.00	9.60	2.00	0.00	0.00	0.02	0.00
9.62	2.00	0.00	0.00	0.02	0.00	9.64	2.00	0.00	0.00	0.02	0.00
9.66	2.00	0.00	0.00	0.02	0.00	9.68	2.00	0.00	0.00	0.02	0.00
9.70	2.00	0.00	0.00	0.02	0.00	9.72	2.00	0.00	0.00	0.02	0.00
9.74	2.00	0.00	0.00	0.02	0.00	9.76	2.00	0.00	0.00	0.02	0.00
9.78	2.00	0.00	0.00	0.02	0.00	9.80	2.00	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	2.00	0.00	0.00	0.02	0.00	9.88	2.00	0.00	0.00	0.02	0.00
9.90	2.00	0.00	0.00	0.02	0.00	9.92	2.00	0.00	0.00	0.02	0.00
9.94	2.00	0.00	0.00	0.02	0.00	9.96	2.00	0.00	0.00	0.02	0.00
9.98	2.00	0.00	0.00	0.02	0.00	10.00	2.00	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

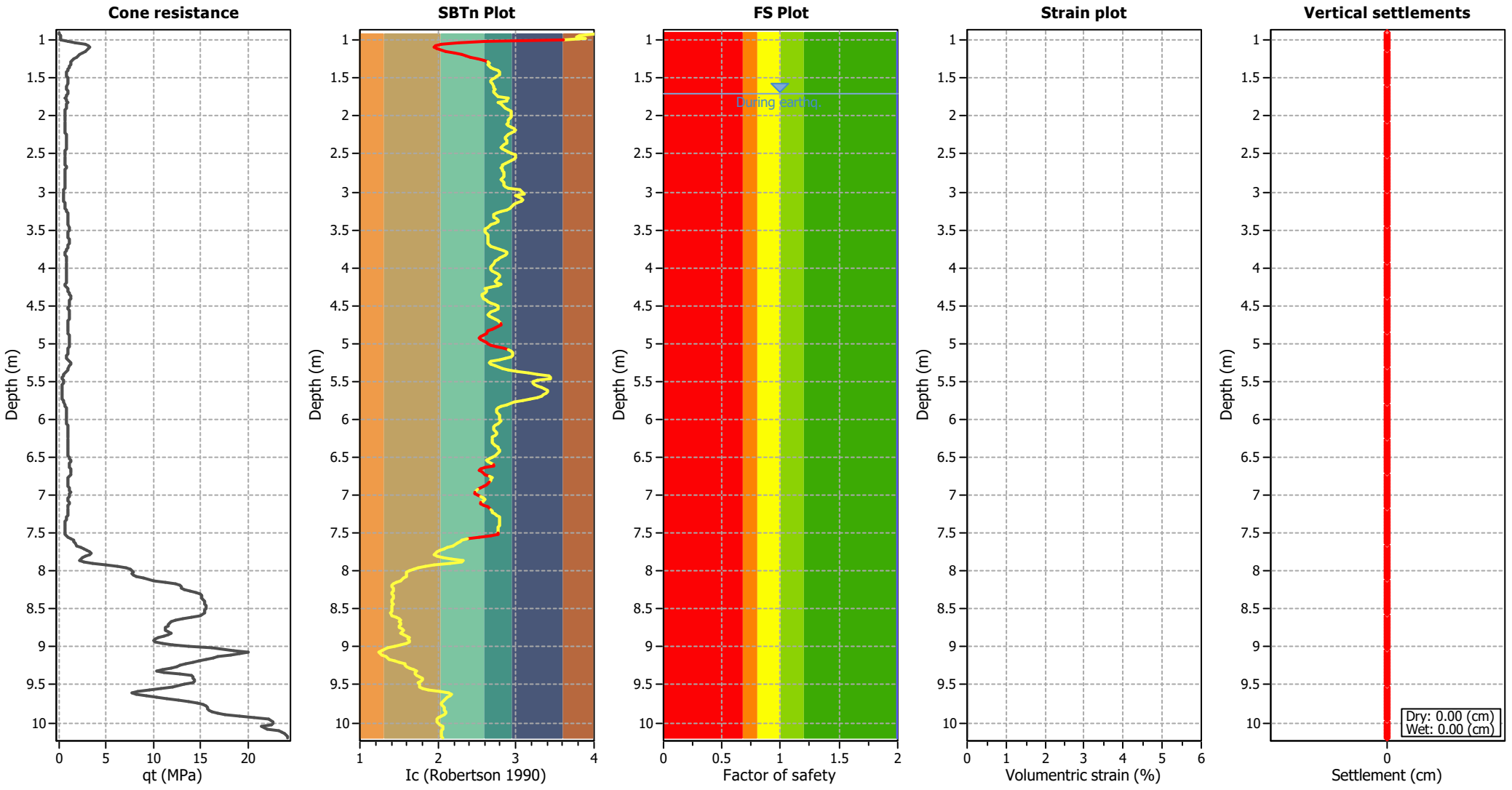
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
1.70	83.15	2.00	0.00	0.91	0.00	1.72	84.77	2.00	0.00	0.90	0.00
1.74	86.69	2.00	0.00	0.90	0.00	1.76	93.59	2.00	0.00	0.90	0.00
1.78	95.04	2.00	0.00	0.90	0.00	1.80	96.14	2.00	0.00	0.90	0.00
1.82	92.53	2.00	0.00	0.90	0.00	1.84	93.67	2.00	0.00	0.90	0.00
1.86	94.15	2.00	0.00	0.90	0.00	1.88	94.27	2.00	0.00	0.90	0.00
1.90	95.75	2.00	0.00	0.89	0.00	1.92	97.26	2.00	0.00	0.89	0.00
1.94	97.54	2.00	0.00	0.89	0.00	1.96	96.45	2.00	0.00	0.89	0.00
1.98	96.36	2.00	0.00	0.89	0.00	2.00	95.37	2.00	0.00	0.89	0.00
2.02	96.22	2.00	0.00	0.89	0.00	2.04	95.82	2.00	0.00	0.89	0.00
2.06	96.22	2.00	0.00	0.89	0.00	2.08	94.50	2.00	0.00	0.88	0.00
2.10	93.59	2.00	0.00	0.88	0.00	2.12	94.25	2.00	0.00	0.88	0.00
2.14	96.12	2.00	0.00	0.88	0.00	2.16	98.38	2.00	0.00	0.88	0.00
2.18	100.66	2.00	0.00	0.88	0.00	2.20	101.78	2.00	0.00	0.88	0.00
2.22	101.65	2.00	0.00	0.88	0.00	2.24	100.14	2.00	0.00	0.88	0.00
2.26	98.38	2.00	0.00	0.87	0.00	2.28	97.87	2.00	0.00	0.87	0.00
2.30	98.29	2.00	0.00	0.87	0.00	2.32	98.70	2.00	0.00	0.87	0.00
2.34	98.01	2.00	0.00	0.87	0.00	2.36	96.26	2.00	0.00	0.87	0.00
2.38	93.49	2.00	0.00	0.87	0.00	2.40	90.22	2.00	0.00	0.87	0.00
2.42	87.89	2.00	0.00	0.87	0.00	2.44	86.77	2.00	0.00	0.86	0.00
2.46	87.37	2.00	0.00	0.86	0.00	2.48	88.65	2.00	0.00	0.86	0.00
2.50	91.25	2.00	0.00	0.86	0.00	2.52	93.88	2.00	0.00	0.86	0.00
2.54	95.02	2.00	0.00	0.86	0.00	2.56	93.82	2.00	0.00	0.86	0.00
2.58	91.06	2.00	0.00	0.86	0.00	2.60	87.35	2.00	0.00	0.86	0.00
2.62	84.68	2.00	0.00	0.85	0.00	2.64	81.73	2.00	0.00	0.85	0.00
2.66	81.03	2.00	0.00	0.85	0.00	2.68	80.69	2.00	0.00	0.85	0.00
2.70	80.95	2.00	0.00	0.85	0.00	2.72	80.31	2.00	0.00	0.85	0.00
2.74	80.02	2.00	0.00	0.85	0.00	2.76	80.06	2.00	0.00	0.85	0.00
2.78	79.64	2.00	0.00	0.85	0.00	2.80	78.78	2.00	0.00	0.84	0.00
2.82	77.72	2.00	0.00	0.84	0.00	2.84	77.60	2.00	0.00	0.84	0.00
2.86	78.02	2.00	0.00	0.84	0.00	2.88	78.64	2.00	0.00	0.84	0.00
2.90	78.73	2.00	0.00	0.84	0.00	2.92	78.40	2.00	0.00	0.84	0.00
2.94	78.72	2.00	0.00	0.84	0.00	2.96	80.12	2.00	0.00	0.84	0.00
2.98	85.05	2.00	0.00	0.83	0.00	3.00	85.23	2.00	0.00	0.83	0.00
3.02	84.36	2.00	0.00	0.83	0.00	3.04	80.69	2.00	0.00	0.83	0.00
3.06	81.97	2.00	0.00	0.83	0.00	3.08	85.12	2.00	0.00	0.83	0.00
3.10	88.76	2.00	0.00	0.83	0.00	3.12	91.69	2.00	0.00	0.83	0.00
3.14	92.57	2.00	0.00	0.83	0.00	3.16	92.23	2.00	0.00	0.82	0.00
3.18	91.75	2.00	0.00	0.82	0.00	3.20	91.75	2.00	0.00	0.82	0.00
3.22	91.44	2.00	0.00	0.82	0.00	3.24	90.87	2.00	0.00	0.82	0.00
3.26	89.04	2.00	0.00	0.82	0.00	3.28	87.48	2.00	0.00	0.82	0.00
3.30	86.10	2.00	0.00	0.82	0.00	3.32	87.23	2.00	0.00	0.82	0.00
3.34	89.28	2.00	0.00	0.81	0.00	3.36	91.57	2.00	0.00	0.81	0.00
3.38	92.99	2.00	0.00	0.81	0.00	3.40	92.70	2.00	0.00	0.81	0.00
3.42	89.11	2.00	0.00	0.81	0.00	3.44	169.05	2.00	0.00	0.81	0.00
3.46	132.70	2.00	0.00	0.81	0.00	3.48	114.28	2.00	0.00	0.81	0.00
3.50	106.76	2.00	0.00	0.81	0.00	3.52	106.79	2.00	0.00	0.80	0.00
3.54	118.02	2.00	0.00	0.80	0.00	3.56	127.53	2.00	0.00	0.80	0.00
3.58	134.72	2.00	0.00	0.80	0.00	3.60	132.97	2.00	0.00	0.80	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
3.62	131.91	2.00	0.00	0.80	0.00	3.64	128.40	2.00	0.00	0.80	0.00
3.66	128.48	2.00	0.00	0.80	0.00	3.68	127.77	2.00	0.00	0.80	0.00
3.70	137.16	2.00	0.00	0.79	0.00	3.72	157.51	2.00	0.00	0.79	0.00
3.74	81.92	2.00	0.00	0.79	0.00	3.76	85.37	2.00	0.00	0.79	0.00
3.78	87.98	2.00	0.00	0.79	0.00	3.80	89.15	2.00	0.00	0.79	0.00
3.82	88.30	2.00	0.00	0.79	0.00	3.84	85.31	2.00	0.00	0.79	0.00
3.86	82.13	2.00	0.00	0.79	0.00	3.88	77.92	2.00	0.00	0.78	0.00
3.90	75.18	2.00	0.00	0.78	0.00	3.92	71.90	2.00	0.00	0.78	0.00
3.94	70.14	2.00	0.00	0.78	0.00	3.96	142.63	2.00	0.00	0.78	0.00
3.98	134.87	2.00	0.00	0.78	0.00	4.00	136.20	2.00	0.00	0.78	0.00
4.02	142.44	2.00	0.00	0.78	0.00	4.04	73.12	2.00	0.00	0.78	0.00
4.06	75.65	2.00	0.00	0.77	0.00	4.08	78.17	2.00	0.00	0.77	0.00
4.10	78.83	2.00	0.00	0.77	0.00	4.12	78.04	2.00	0.00	0.77	0.00
4.14	76.05	2.00	0.00	0.77	0.00	4.16	73.76	2.00	0.00	0.77	0.00
4.18	71.27	2.00	0.00	0.77	0.00	4.20	68.17	2.00	0.00	0.77	0.00
4.22	65.70	2.00	0.00	0.77	0.00	4.24	64.43	2.00	0.00	0.76	0.00
4.26	128.77	2.00	0.00	0.76	0.00	4.28	96.13	2.00	0.00	0.76	0.00
4.30	112.01	2.00	0.00	0.76	0.00	4.32	117.88	2.00	0.00	0.76	0.00
4.34	109.81	2.00	0.00	0.76	0.00	4.36	89.14	2.00	0.00	0.76	0.00
4.38	90.64	2.00	0.00	0.76	0.00	4.40	105.58	2.00	0.00	0.76	0.00
4.42	130.23	2.00	0.00	0.75	0.00	4.44	153.12	2.00	0.00	0.75	0.00
4.46	186.57	2.00	0.00	0.75	0.00	4.48	97.50	2.00	0.00	0.75	0.00
4.50	102.50	2.00	0.00	0.75	0.00	4.52	103.92	2.00	0.00	0.75	0.00
4.54	101.02	2.00	0.00	0.75	0.00	4.56	97.06	2.00	0.00	0.75	0.00
4.58	183.65	2.00	0.00	0.75	0.00	4.60	163.82	2.00	0.00	0.74	0.00
4.62	150.97	2.00	0.00	0.74	0.00	4.64	166.44	2.00	0.00	0.74	0.00
4.66	194.88	2.00	0.00	0.74	0.00	4.68	95.62	2.00	0.00	0.74	0.00
4.70	97.20	2.00	0.00	0.74	0.00	4.72	97.65	2.00	0.00	0.74	0.00
4.74	96.10	2.00	0.00	0.74	0.00	4.76	93.41	2.00	0.00	0.74	0.00
4.78	88.82	2.00	0.00	0.73	0.00	4.80	82.60	2.00	0.00	0.73	0.00
4.82	163.93	2.00	0.00	0.73	0.00	4.84	126.36	2.00	0.00	0.73	0.00
4.86	106.58	2.00	0.00	0.73	0.00	4.88	87.65	2.00	0.00	0.73	0.00
4.90	72.89	2.00	0.00	0.73	0.00	4.92	69.51	2.00	0.00	0.73	0.00
4.94	81.14	2.00	0.00	0.73	0.00	4.96	104.26	2.00	0.00	0.72	0.00
4.98	120.54	2.00	0.00	0.72	0.00	5.00	138.20	2.00	0.00	0.72	0.00
5.02	169.31	2.00	0.00	0.72	0.00	5.04	102.19	2.00	0.00	0.72	0.00
5.06	114.75	2.00	0.00	0.72	0.00	5.08	125.09	2.00	0.00	0.72	0.00
5.10	128.21	2.00	0.00	0.72	0.00	5.12	128.75	2.00	0.00	0.72	0.00
5.14	127.00	2.00	0.00	0.71	0.00	5.16	120.39	2.00	0.00	0.71	0.00
5.18	112.45	2.00	0.00	0.71	0.00	5.20	102.40	2.00	0.00	0.71	0.00
5.22	95.75	2.00	0.00	0.71	0.00	5.24	181.51	2.00	0.00	0.71	0.00
5.26	159.43	2.00	0.00	0.71	0.00	5.28	182.87	2.00	0.00	0.71	0.00
5.30	105.02	2.00	0.00	0.71	0.00	5.32	111.85	2.00	0.00	0.70	0.00
5.34	115.59	2.00	0.00	0.70	0.00	5.36	120.43	2.00	0.00	0.70	0.00
5.38	128.32	2.00	0.00	0.70	0.00	5.40	134.18	2.00	0.00	0.70	0.00
5.42	130.07	2.00	0.00	0.70	0.00	5.44	118.13	2.00	0.00	0.70	0.00
5.46	102.76	2.00	0.00	0.70	0.00	5.48	93.71	2.00	0.00	0.70	0.00
5.50	88.47	2.00	0.00	0.69	0.00	5.52	84.94	2.00	0.00	0.69	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.54	83.72	2.00	0.00	0.69	0.00	5.56	84.47	2.00	0.00	0.69	0.00
5.58	85.71	2.00	0.00	0.69	0.00	5.60	86.12	2.00	0.00	0.69	0.00
5.62	84.85	2.00	0.00	0.69	0.00	5.64	80.77	2.00	0.00	0.69	0.00
5.66	75.91	2.00	0.00	0.69	0.00	5.68	70.66	2.00	0.00	0.68	0.00
5.70	67.43	2.00	0.00	0.68	0.00	5.72	64.90	2.00	0.00	0.68	0.00
5.74	63.48	2.00	0.00	0.68	0.00	5.76	63.54	2.00	0.00	0.68	0.00
5.78	63.51	2.00	0.00	0.68	0.00	5.80	63.77	2.00	0.00	0.68	0.00
5.82	64.75	2.00	0.00	0.68	0.00	5.84	67.00	2.00	0.00	0.68	0.00
5.86	69.21	2.00	0.00	0.67	0.00	5.88	71.69	2.00	0.00	0.67	0.00
5.90	73.70	2.00	0.00	0.67	0.00	5.92	76.64	2.00	0.00	0.67	0.00
5.94	78.81	2.00	0.00	0.67	0.00	5.96	80.71	2.00	0.00	0.67	0.00
5.98	80.57	2.00	0.00	0.67	0.00	6.00	80.93	2.00	0.00	0.67	0.00
6.02	80.81	2.00	0.00	0.67	0.00	6.04	79.91	2.00	0.00	0.66	0.00
6.06	76.85	2.00	0.00	0.66	0.00	6.08	73.41	2.00	0.00	0.66	0.00
6.10	71.27	2.00	0.00	0.66	0.00	6.12	70.82	2.00	0.00	0.66	0.00
6.14	72.67	2.00	0.00	0.66	0.00	6.16	75.32	2.00	0.00	0.66	0.00
6.18	78.06	2.00	0.00	0.66	0.00	6.20	78.72	2.00	0.00	0.66	0.00
6.22	77.47	2.00	0.00	0.65	0.00	6.24	75.57	2.00	0.00	0.65	0.00
6.26	157.20	2.00	0.00	0.65	0.00	6.28	72.38	2.00	0.00	0.65	0.00
6.30	70.99	2.00	0.00	0.65	0.00	6.32	71.37	2.00	0.00	0.65	0.00
6.34	73.29	2.00	0.00	0.65	0.00	6.36	76.41	2.00	0.00	0.65	0.00
6.38	78.38	2.00	0.00	0.65	0.00	6.40	79.92	2.00	0.00	0.64	0.00
6.42	79.94	2.00	0.00	0.64	0.00	6.44	79.93	2.00	0.00	0.64	0.00
6.46	79.00	2.00	0.00	0.64	0.00	6.48	78.43	2.00	0.00	0.64	0.00
6.50	162.33	2.00	0.00	0.64	0.00	6.52	136.16	2.00	0.00	0.64	0.00
6.54	116.62	2.00	0.00	0.64	0.00	6.56	125.79	2.00	0.00	0.64	0.00
6.58	159.70	2.00	0.00	0.63	0.00	6.60	79.26	2.00	0.00	0.63	0.00
6.62	76.85	2.00	0.00	0.63	0.00	6.64	97.56	2.00	0.00	0.63	0.00
6.66	73.17	2.00	0.00	0.63	0.00	6.68	65.10	2.00	0.00	0.63	0.00
6.70	83.31	2.00	0.00	0.63	0.00	6.72	100.58	2.00	0.00	0.63	0.00
6.74	119.75	2.00	0.00	0.63	0.00	6.76	134.93	2.00	0.00	0.62	0.00
6.78	126.43	2.00	0.00	0.62	0.00	6.80	114.77	2.00	0.00	0.62	0.00
6.82	104.40	2.00	0.00	0.62	0.00	6.84	92.89	2.00	0.00	0.62	0.00
6.86	80.37	2.00	0.00	0.62	0.00	6.88	67.88	2.00	0.00	0.62	0.00
6.90	57.13	2.00	0.00	0.62	0.00	6.92	47.76	2.00	0.00	0.62	0.00
6.94	47.80	2.00	0.00	0.61	0.00	6.96	46.81	2.00	0.00	0.61	0.00
6.98	46.05	2.00	0.00	0.61	0.00	7.00	44.52	2.00	0.00	0.61	0.00
7.02	56.64	2.00	0.00	0.61	0.00	7.04	69.18	2.00	0.00	0.61	0.00
7.06	73.16	2.00	0.00	0.61	0.00	7.08	65.35	2.00	0.00	0.61	0.00
7.10	57.33	2.00	0.00	0.61	0.00	7.12	57.22	2.00	0.00	0.60	0.00
7.14	69.51	2.00	0.00	0.60	0.00	7.16	92.15	2.00	0.00	0.60	0.00
7.18	112.07	2.00	0.00	0.60	0.00	7.20	130.06	2.00	0.00	0.60	0.00
7.22	65.03	2.00	0.00	0.60	0.00	7.24	68.16	2.00	0.00	0.60	0.00
7.26	67.49	2.00	0.00	0.60	0.00	7.28	65.21	2.00	0.00	0.60	0.00
7.30	60.31	2.00	0.00	0.59	0.00	7.32	57.32	2.00	0.00	0.59	0.00
7.34	55.03	2.00	0.00	0.59	0.00	7.36	53.12	2.00	0.00	0.59	0.00
7.38	51.04	2.00	0.00	0.59	0.00	7.40	49.18	2.00	0.00	0.59	0.00
7.42	48.22	2.00	0.00	0.59	0.00	7.44	47.60	2.00	0.00	0.59	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
7.46	48.42	2.00	0.00	0.59	0.00	7.48	49.00	2.00	0.00	0.58	0.00
7.50	49.45	2.00	0.00	0.58	0.00	7.52	49.41	2.00	0.00	0.58	0.00
7.54	96.22	2.00	0.00	0.58	0.00	7.56	44.95	2.00	0.00	0.58	0.00
7.58	38.79	2.00	0.00	0.58	0.00	7.60	19.91	2.00	0.00	0.58	0.00
7.62	20.76	2.00	0.00	0.58	0.00	7.64	22.39	2.00	0.00	0.58	0.00
7.66	25.37	2.00	0.00	0.57	0.00	7.68	29.86	2.00	0.00	0.57	0.00
7.70	34.23	2.00	0.00	0.57	0.00	7.72	38.67	2.00	0.00	0.57	0.00
7.74	42.19	2.00	0.00	0.57	0.00	7.76	42.98	2.00	0.00	0.57	0.00
7.78	40.69	2.00	0.00	0.57	0.00	7.80	36.48	2.00	0.00	0.57	0.00
7.82	32.39	2.00	0.00	0.57	0.00	7.84	29.50	2.00	0.00	0.56	0.00
7.86	59.62	2.00	0.00	0.56	0.00	7.88	66.75	2.00	0.00	0.56	0.00
7.90	71.67	2.00	0.00	0.56	0.00	7.92	81.93	2.00	0.00	0.56	0.00
7.94	93.84	2.00	0.00	0.56	0.00	7.96	88.58	2.00	0.00	0.56	0.00
7.98	93.43	2.00	0.00	0.56	0.00	8.00	94.83	2.00	0.00	0.56	0.00
8.02	94.43	2.00	0.00	0.55	0.00	8.04	93.98	2.00	0.00	0.55	0.00
8.06	94.82	2.00	0.00	0.55	0.00	8.08	99.15	2.00	0.00	0.55	0.00
8.10	107.40	2.00	0.00	0.55	0.00	8.12	119.80	2.00	0.00	0.55	0.00
8.14	133.53	2.00	0.00	0.55	0.00	8.16	144.66	2.00	0.00	0.55	0.00
8.18	150.52	2.00	0.00	0.55	0.00	8.20	152.02	2.00	0.00	0.54	0.00
8.22	152.64	2.00	0.00	0.54	0.00	8.24	154.80	2.00	0.00	0.54	0.00
8.26	161.27	2.00	0.00	0.54	0.00	8.28	168.24	2.00	0.00	0.54	0.00
8.30	174.51	2.00	0.00	0.54	0.00	8.32	176.20	2.00	0.00	0.54	0.00
8.34	176.64	2.00	0.00	0.54	0.00	8.36	176.52	2.00	0.00	0.54	0.00
8.38	177.25	2.00	0.00	0.53	0.00	8.40	178.01	2.00	0.00	0.53	0.00
8.42	178.95	2.00	0.00	0.53	0.00	8.44	179.20	2.00	0.00	0.53	0.00
8.46	179.88	2.00	0.00	0.53	0.00	8.48	179.09	2.00	0.00	0.53	0.00
8.50	178.56	2.00	0.00	0.53	0.00	8.52	177.72	2.00	0.00	0.53	0.00
8.54	177.38	2.00	0.00	0.53	0.00	8.56	176.05	2.00	0.00	0.52	0.00
8.58	171.64	2.00	0.00	0.52	0.00	8.60	162.84	2.00	0.00	0.52	0.00
8.62	151.63	2.00	0.00	0.52	0.00	8.64	142.29	2.00	0.00	0.52	0.00
8.66	137.35	2.00	0.00	0.52	0.00	8.68	135.87	2.00	0.00	0.52	0.00
8.70	134.28	2.00	0.00	0.52	0.00	8.72	132.43	2.00	0.00	0.52	0.00
8.74	130.14	2.00	0.00	0.51	0.00	8.76	129.06	2.00	0.00	0.51	0.00
8.78	130.51	2.00	0.00	0.51	0.00	8.80	133.93	2.00	0.00	0.51	0.00
8.82	136.09	2.00	0.00	0.51	0.00	8.84	132.82	2.00	0.00	0.51	0.00
8.86	127.72	2.00	0.00	0.51	0.00	8.88	121.49	2.00	0.00	0.51	0.00
8.90	118.05	2.00	0.00	0.51	0.00	8.92	115.26	2.00	0.00	0.50	0.00
8.94	117.05	2.00	0.00	0.50	0.00	8.96	124.93	2.00	0.00	0.50	0.00
8.98	137.00	2.00	0.00	0.50	0.00	9.00	155.07	2.00	0.00	0.50	0.00
9.02	180.99	2.00	0.00	0.50	0.00	9.04	204.49	2.00	0.00	0.50	0.00
9.06	220.34	2.00	0.00	0.50	0.00	9.08	210.30	2.00	0.00	0.50	0.00
9.10	201.28	2.00	0.00	0.49	0.00	9.12	185.92	2.00	0.00	0.49	0.00
9.14	181.97	2.00	0.00	0.49	0.00	9.16	172.48	2.00	0.00	0.49	0.00
9.18	165.91	2.00	0.00	0.49	0.00	9.20	158.91	2.00	0.00	0.49	0.00
9.22	151.67	2.00	0.00	0.49	0.00	9.24	145.03	2.00	0.00	0.49	0.00
9.26	140.45	2.00	0.00	0.49	0.00	9.28	134.96	2.00	0.00	0.48	0.00
9.30	123.97	2.00	0.00	0.48	0.00	9.32	120.91	2.00	0.00	0.48	0.00
9.34	130.21	2.00	0.00	0.48	0.00	9.36	145.97	2.00	0.00	0.48	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
9.38	168.11	2.00	0.00	0.48	0.00	9.40	180.29	2.00	0.00	0.48	0.00
9.42	188.25	2.00	0.00	0.48	0.00	9.44	187.81	2.00	0.00	0.48	0.00
9.46	184.77	2.00	0.00	0.47	0.00	9.48	172.85	2.00	0.00	0.47	0.00
9.50	164.58	2.00	0.00	0.47	0.00	9.52	150.37	2.00	0.00	0.47	0.00
9.54	141.61	2.00	0.00	0.47	0.00	9.56	132.42	2.00	0.00	0.47	0.00
9.58	126.99	2.00	0.00	0.47	0.00	9.60	133.62	2.00	0.00	0.47	0.00
9.62	148.33	2.00	0.00	0.47	0.00	9.64	160.83	2.00	0.00	0.46	0.00
9.66	173.22	2.00	0.00	0.46	0.00	9.68	186.56	2.00	0.00	0.46	0.00
9.70	202.02	2.00	0.00	0.46	0.00	9.72	215.00	2.00	0.00	0.46	0.00
9.74	225.81	2.00	0.00	0.46	0.00	9.76	235.31	2.00	0.00	0.46	0.00
9.78	243.32	2.00	0.00	0.46	0.00	9.80	248.18	2.00	0.00	0.46	0.00
9.82	250.25	2.00	0.00	0.45	0.00	9.84	253.49	2.00	0.00	0.45	0.00
9.86	260.20	2.00	0.00	0.45	0.00	9.88	269.15	2.00	0.00	0.45	0.00
9.90	278.80	2.00	0.00	0.45	0.00	9.92	291.92	2.00	0.00	0.45	0.00
9.94	306.70	2.00	0.00	0.45	0.00	9.96	321.10	2.00	0.00	0.45	0.00
9.98	328.91	2.00	0.00	0.45	0.00	10.00	330.73	2.00	0.00	0.44	0.00
10.02	331.49	2.00	0.00	0.44	0.00	10.04	325.42	2.00	0.00	0.44	0.00
10.06	329.84	2.00	0.00	0.44	0.00	10.08	336.17	2.00	0.00	0.44	0.00
10.10	348.23	2.00	0.00	0.44	0.00	10.12	352.46	2.00	0.00	0.44	0.00
10.14	355.62	2.00	0.00	0.44	0.00	10.16	359.10	2.00	0.00	0.44	0.00
10.18	361.33	2.00	0.00	0.43	0.00	10.20	362.23	2.00	0.00	0.43	0.00

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

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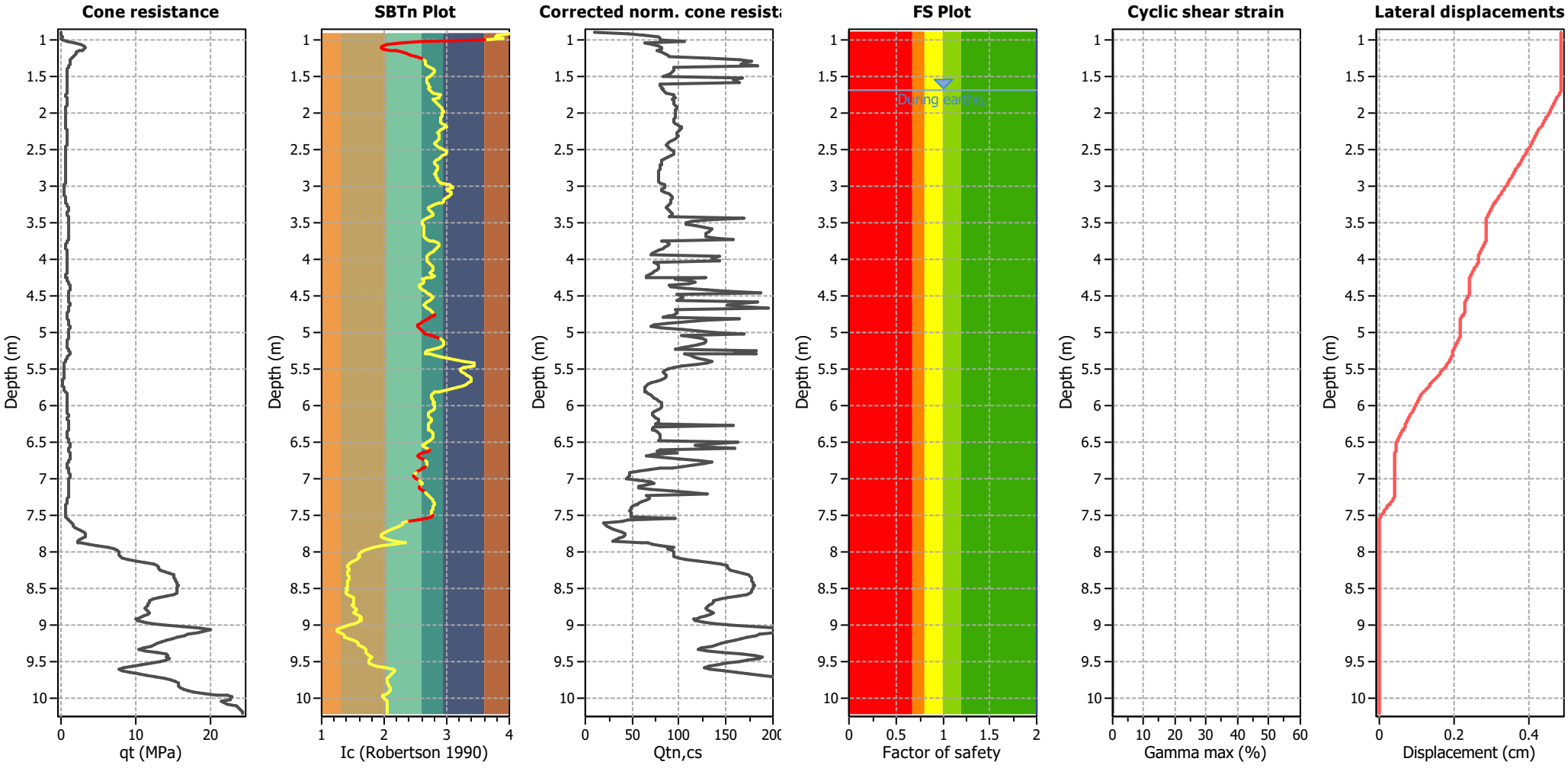
CPT name: CWLP CPT-6L

Estimation of post-earthquake lateral Displacements

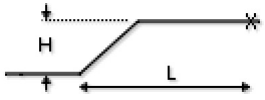
Geometric parameters: Level ground (or gently sloping) with free face (L: 16.75 m - H: 2.80 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
1.70	0.87	16.66	2.04	83.15	2.00	7.85	0.07	0.00
1.72	0.85	16.20	2.13	84.77	2.00	6.92	0.07	0.00
1.74	0.82	15.75	2.25	86.69	2.00	6.00	0.07	0.00
1.76	0.68	12.88	2.85	93.59	2.00	0.00	0.08	0.00
1.78	0.71	13.58	2.86	95.04	2.00	1.11	0.08	0.00
1.80	0.74	13.98	2.88	96.14	2.00	2.06	0.08	0.00
1.82	0.87	16.65	2.48	92.53	2.00	7.83	0.07	0.00
1.84	0.82	15.71	2.59	93.67	2.00	5.91	0.07	0.00
1.86	0.79	15.10	2.66	94.15	2.00	4.61	0.07	0.00
1.88	0.77	14.71	2.70	94.27	2.00	3.73	0.07	0.00
1.90	0.74	14.12	2.84	95.75	2.00	2.38	0.08	0.00
1.92	0.71	13.45	2.99	97.26	2.00	0.79	0.08	0.00
1.94	0.68	12.75	3.09	97.54	2.00	0.00	0.08	0.00
1.96	0.66	12.49	3.06	96.45	2.00	0.00	0.08	0.00
1.98	0.66	12.34	3.07	96.36	2.00	0.00	0.08	0.00
2.00	0.66	12.45	3.00	95.37	2.00	0.00	0.08	0.00
2.02	0.67	12.58	3.03	96.22	2.00	0.00	0.08	0.00
2.04	0.68	12.87	2.97	95.82	2.00	0.00	0.08	0.00
2.06	0.70	13.12	2.96	96.22	2.00	0.00	0.08	0.00
2.08	0.70	13.27	2.84	94.50	2.00	0.35	0.08	0.00
2.10	0.70	13.23	2.79	93.59	2.00	0.24	0.08	0.00
2.12	0.69	12.93	2.86	94.25	2.00	0.00	0.08	0.00
2.14	0.66	12.44	3.03	96.12	2.00	0.00	0.08	0.00
2.16	0.64	11.93	3.25	98.38	2.00	0.00	0.08	0.00
2.18	0.63	11.69	3.44	100.66	2.00	0.00	0.08	0.00
2.20	0.65	12.17	3.43	101.78	2.00	0.00	0.08	0.00
2.22	0.69	13.01	3.29	101.65	2.00	0.00	0.08	0.00
2.24	0.74	13.93	3.09	100.14	2.00	1.93	0.08	0.00
2.26	0.77	14.42	2.93	98.38	2.00	3.08	0.07	0.00
2.28	0.78	14.63	2.88	97.87	2.00	3.55	0.07	0.00
2.30	0.78	14.61	2.91	98.29	2.00	3.51	0.07	0.00
2.32	0.76	14.28	2.96	98.70	2.00	2.75	0.07	0.00
2.34	0.75	14.04	2.95	98.01	2.00	2.19	0.08	0.00
2.36	0.75	14.00	2.85	96.26	2.00	2.11	0.08	0.00
2.38	0.76	14.36	2.66	93.49	2.00	2.95	0.07	0.00
2.40	0.78	14.70	2.46	90.22	2.00	3.72	0.07	0.00
2.42	0.77	14.54	2.35	87.89	2.00	3.35	0.07	0.00
2.44	0.75	13.98	2.33	86.77	2.00	2.07	0.08	0.00
2.46	0.70	13.05	2.44	87.37	2.00	0.00	0.08	0.00
2.48	0.66	12.28	2.58	88.65	2.00	0.00	0.08	0.00
2.50	0.62	11.52	2.82	91.25	2.00	0.00	0.08	0.00
2.52	0.59	10.93	3.08	93.88	2.00	0.00	0.09	0.00
2.54	0.59	10.84	3.17	95.02	2.00	0.00	0.09	0.00
2.56	0.61	11.24	3.02	93.82	2.00	0.00	0.09	0.00
2.58	0.64	11.86	2.76	91.06	2.00	0.00	0.08	0.00
2.60	0.66	12.26	2.50	87.35	2.00	0.00	0.08	0.00
2.62	0.68	12.59	2.32	84.68	2.00	0.00	0.08	0.00
2.64	0.70	13.04	2.13	81.73	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
2.66	0.72	13.36	2.07	81.03	2.00	0.55	0.08	0.00
2.68	0.72	13.39	2.05	80.69	2.00	0.64	0.08	0.00
2.70	0.71	13.12	2.08	80.95	2.00	0.00	0.08	0.00
2.72	0.69	12.83	2.07	80.31	2.00	0.00	0.08	0.00
2.74	0.68	12.49	2.07	80.02	2.00	0.00	0.08	0.00
2.76	0.66	12.23	2.09	80.06	2.00	0.00	0.08	0.00
2.78	0.66	12.20	2.07	79.64	2.00	0.00	0.08	0.00
2.80	0.68	12.48	2.01	78.78	2.00	0.00	0.08	0.00
2.82	0.69	12.72	1.94	77.72	2.00	0.00	0.08	0.00
2.84	0.69	12.80	1.93	77.60	2.00	0.00	0.08	0.00
2.86	0.68	12.54	1.96	78.02	2.00	0.00	0.08	0.00
2.88	0.67	12.33	2.01	78.64	2.00	0.00	0.08	0.00
2.90	0.66	12.16	2.02	78.73	2.00	0.00	0.08	0.00
2.92	0.65	12.00	2.02	78.40	2.00	0.00	0.08	0.00
2.94	0.64	11.68	2.06	78.72	2.00	0.00	0.08	0.00
2.96	0.61	11.18	2.17	80.12	2.00	0.00	0.09	0.00
2.98	0.49	8.85	2.79	85.05	2.00	0.00	0.10	0.00
3.00	0.47	8.36	2.90	85.23	2.00	0.00	0.10	0.00
3.02	0.45	7.92	2.93	84.36	2.00	0.00	0.10	0.00
3.04	0.51	9.19	2.43	80.69	2.00	0.00	0.09	0.00
3.06	0.49	8.70	2.59	81.97	2.00	0.00	0.10	0.00
3.08	0.48	8.44	2.87	85.12	2.00	0.00	0.10	0.00
3.10	0.49	8.64	3.10	88.76	2.00	0.00	0.10	0.00
3.12	0.52	9.32	3.17	91.69	2.00	0.00	0.09	0.00
3.14	0.57	10.21	3.06	92.57	2.00	0.00	0.09	0.00
3.16	0.60	10.95	2.91	92.23	2.00	0.00	0.09	0.00
3.18	0.62	11.31	2.83	91.75	2.00	0.00	0.09	0.00
3.20	0.64	11.59	2.80	91.75	2.00	0.00	0.08	0.00
3.22	0.67	12.15	2.71	91.44	2.00	0.00	0.08	0.00
3.24	0.71	13.12	2.58	90.87	2.00	0.00	0.08	0.00
3.26	0.80	14.80	2.35	89.04	2.00	3.95	0.07	0.00
3.28	0.88	16.42	2.19	87.48	2.00	7.36	0.07	0.00
3.30	0.96	17.88	2.06	86.10	2.00	10.18	0.06	0.00
3.32	0.98	18.26	2.10	87.23	2.00	10.88	0.06	0.00
3.34	0.97	18.07	2.19	89.28	2.00	10.52	0.06	0.00
3.36	0.93	17.31	2.33	91.57	2.00	9.12	0.07	0.00
3.38	0.90	16.80	2.42	92.99	2.00	8.12	0.07	0.00
3.40	0.91	16.92	2.40	92.70	2.00	8.36	0.07	0.00
3.42	0.95	17.70	2.20	89.11	2.00	9.85	0.07	0.00
3.44	1.00	18.67	1.95	169.05	2.00	11.61	0.00	0.00
3.46	1.04	19.43	1.73	132.70	2.00	12.93	0.00	0.00
3.48	1.05	19.74	1.59	114.28	2.00	13.45	0.00	0.00
3.50	1.05	19.56	1.51	106.76	2.00	13.15	0.00	0.00
3.52	1.02	19.07	1.47	106.79	2.00	12.31	0.00	0.00
3.54	1.00	18.65	1.54	118.02	2.00	11.57	0.00	0.00
3.56	0.99	18.50	1.61	127.53	2.00	11.31	0.00	0.00
3.58	1.00	18.59	1.67	134.72	2.00	11.47	0.00	0.00
3.60	1.02	18.98	1.69	132.97	2.00	12.15	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
3.62	1.03	19.21	1.70	131.91	2.00	12.56	0.00	0.00
3.64	1.04	19.44	1.69	128.40	2.00	12.94	0.00	0.00
3.66	1.03	19.25	1.67	128.48	2.00	12.62	0.00	0.00
3.68	1.02	19.09	1.65	127.77	2.00	12.34	0.00	0.00
3.70	0.99	18.43	1.68	137.16	2.00	11.19	0.00	0.00
3.72	0.95	17.58	1.76	157.51	2.00	9.62	0.00	0.00
3.74	0.88	16.22	1.93	81.92	2.00	6.96	0.07	0.00
3.76	0.81	14.92	2.14	85.37	2.00	4.21	0.07	0.00
3.78	0.75	13.68	2.35	87.98	2.00	1.33	0.08	0.00
3.80	0.71	12.87	2.47	89.15	2.00	0.00	0.08	0.00
3.82	0.70	12.65	2.45	88.30	2.00	0.00	0.08	0.00
3.84	0.71	12.91	2.26	85.31	2.00	0.00	0.08	0.00
3.86	0.73	13.25	2.08	82.13	2.00	0.28	0.08	0.00
3.88	0.74	13.48	1.86	77.92	2.00	0.86	0.08	0.00
3.90	0.75	13.62	1.73	75.18	2.00	1.20	0.08	0.00
3.92	0.77	14.06	1.56	71.90	2.00	2.26	0.08	0.00
3.94	0.80	14.54	1.47	70.14	2.00	3.36	0.07	0.00
3.96	0.82	14.97	1.41	142.63	2.00	4.31	0.00	0.00
3.98	0.84	15.32	1.38	134.87	2.00	5.08	0.00	0.00
4.00	0.85	15.56	1.41	136.20	2.00	5.59	0.00	0.00
4.02	0.86	15.68	1.47	142.44	2.00	5.85	0.00	0.00
4.04	0.84	15.39	1.57	73.12	2.00	5.23	0.07	0.00
4.06	0.82	14.87	1.69	75.65	2.00	4.10	0.07	0.00
4.08	0.79	14.30	1.83	78.17	2.00	2.81	0.07	0.00
4.10	0.77	13.90	1.87	78.83	2.00	1.87	0.08	0.00
4.12	0.76	13.75	1.84	78.04	2.00	1.52	0.08	0.00
4.14	0.76	13.69	1.75	76.05	2.00	1.36	0.08	0.00
4.16	0.77	13.96	1.64	73.76	2.00	2.01	0.08	0.00
4.18	0.79	14.34	1.52	71.27	2.00	2.90	0.07	0.00
4.20	0.72	12.83	1.43	68.17	2.00	0.00	0.08	0.00
4.22	0.63	11.04	1.39	65.70	2.00	0.00	0.09	0.00
4.24	0.66	11.79	1.31	64.43	2.00	0.00	0.08	0.00
4.26	0.80	14.47	1.25	128.77	2.00	3.19	0.00	0.00
4.28	0.94	17.15	1.22	96.13	2.00	8.80	0.00	0.00
4.30	0.93	17.12	1.35	112.01	2.00	8.75	0.00	0.00
4.32	0.98	17.94	1.46	117.88	2.00	10.29	0.00	0.00
4.34	1.06	19.65	1.52	109.81	2.00	13.30	0.00	0.00
4.36	1.17	21.69	1.46	89.14	2.00	16.55	0.00	0.00
4.38	1.20	22.28	1.51	90.64	2.00	17.44	0.00	0.00
4.40	1.18	21.96	1.64	105.58	2.00	16.97	0.00	0.00
4.42	1.15	21.30	1.82	130.23	2.00	15.96	0.00	0.00
4.44	1.13	20.91	1.98	153.12	2.00	15.34	0.00	0.00
4.46	1.10	20.26	2.19	186.57	2.00	14.30	0.00	0.00
4.48	1.06	19.60	2.45	97.50	2.00	13.22	0.06	0.00
4.50	1.03	18.93	2.70	102.50	2.00	12.06	0.06	0.00
4.52	1.01	18.56	2.79	103.92	2.00	11.40	0.06	0.00
4.54	1.02	18.72	2.64	101.02	2.00	11.69	0.06	0.00
4.56	1.06	19.43	2.43	97.06	2.00	12.93	0.06	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
4.58	1.11	20.57	2.19	183.65	2.00	14.80	0.00	0.00
4.60	1.15	21.20	2.09	163.82	2.00	15.80	0.00	0.00
4.62	1.16	21.49	2.01	150.97	2.00	16.24	0.00	0.00
4.64	1.13	20.90	2.08	166.44	2.00	15.32	0.00	0.00
4.66	1.09	20.01	2.22	194.88	2.00	13.89	0.00	0.00
4.68	1.03	18.91	2.38	95.62	2.00	12.02	0.06	0.00
4.70	0.98	17.94	2.50	97.20	2.00	10.28	0.06	0.00
4.72	0.93	16.98	2.57	97.65	2.00	8.48	0.07	0.00
4.74	0.90	16.29	2.54	96.10	2.00	7.11	0.07	0.00
4.76	0.88	15.91	2.43	93.41	2.00	6.32	0.07	0.00
4.78	0.88	15.86	2.21	88.82	2.00	6.23	0.07	0.00
4.80	0.89	16.07	1.93	82.60	2.00	6.65	0.07	0.00
4.82	0.91	16.44	1.67	163.93	2.00	7.41	0.00	0.00
4.84	0.94	17.11	1.45	126.36	2.00	8.73	0.00	0.00
4.86	0.98	17.85	1.35	106.58	2.00	10.13	0.00	0.00
4.88	1.06	19.09	1.27	87.65	2.00	12.33	0.00	0.00
4.90	1.13	20.19	1.19	72.89	2.00	14.20	0.00	0.00
4.92	1.18	21.00	1.20	69.51	2.00	15.48	0.00	0.00
4.94	1.17	20.93	1.32	81.14	2.00	15.38	0.00	0.00
4.96	1.14	20.56	1.52	104.26	2.00	14.79	0.00	0.00
4.98	1.14	20.61	1.67	120.54	2.00	14.88	0.00	0.00
5.00	1.13	20.59	1.82	138.20	2.00	14.84	0.00	0.00
5.02	1.11	20.28	2.04	169.31	2.00	14.33	0.00	0.00
5.04	1.05	19.10	2.65	102.19	2.00	12.36	0.06	0.00
5.06	0.99	18.03	3.33	114.75	2.00	10.46	0.06	0.00
5.08	0.95	17.20	3.96	125.09	2.00	8.90	0.07	0.00
5.10	0.92	16.53	4.22	128.21	2.00	7.59	0.07	0.00
5.12	0.89	15.96	4.33	128.75	2.00	6.43	0.07	0.00
5.14	0.87	15.57	4.28	127.00	2.00	5.61	0.07	0.00
5.16	0.84	15.02	3.95	120.39	2.00	4.43	0.07	0.00
5.18	0.81	14.46	3.54	112.45	2.00	3.18	0.07	0.00
5.20	0.85	15.09	2.92	102.40	2.00	4.58	0.07	0.00
5.22	0.94	16.85	2.47	95.75	2.00	8.23	0.07	0.00
5.24	1.09	19.45	2.06	181.51	2.00	12.96	0.00	0.00
5.26	1.19	21.09	2.03	159.43	2.00	15.63	0.00	0.00
5.28	1.22	21.58	2.25	182.87	2.00	16.39	0.00	0.00
5.30	1.15	20.64	2.70	105.02	2.00	14.91	0.06	0.00
5.32	1.02	18.43	3.14	111.85	2.00	11.19	0.06	0.00
5.34	0.89	15.94	3.55	115.59	2.00	6.39	0.07	0.00
5.36	0.75	13.17	4.22	120.43	2.00	0.08	0.08	0.00
5.38	0.64	10.96	5.34	128.32	2.00	0.00	0.09	0.00
5.40	0.56	9.37	6.49	134.18	2.00	0.00	0.09	0.00
5.42	0.43	6.84	7.62	130.07	2.00	0.00	0.11	0.00
5.44	0.39	6.04	6.77	118.13	2.00	0.00	0.11	0.00
5.46	0.36	5.39	5.38	102.76	2.00	0.00	0.12	0.00
5.48	0.42	6.52	3.84	93.71	2.00	0.00	0.11	0.00
5.50	0.43	6.67	3.32	88.47	2.00	0.00	0.11	0.00
5.52	0.42	6.53	3.06	84.94	2.00	0.00	0.11	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
5.54	0.40	6.17	3.06	83.72	2.00	0.00	0.11	0.00
5.56	0.38	5.75	3.27	84.47	2.00	0.00	0.12	0.00
5.58	0.36	5.37	3.53	85.71	2.00	0.00	0.12	0.00
5.60	0.34	5.02	3.73	86.12	2.00	0.00	0.12	0.00
5.62	0.33	4.72	3.75	84.85	2.00	0.00	0.13	0.00
5.64	0.32	4.50	3.44	80.77	2.00	0.00	0.13	0.00
5.66	0.31	4.35	3.02	75.91	2.00	0.00	0.13	0.00
5.68	0.31	4.25	2.56	70.66	2.00	0.00	0.13	0.00
5.70	0.31	4.25	2.27	67.43	2.00	0.00	0.13	0.00
5.72	0.32	4.54	1.97	64.90	2.00	0.00	0.13	0.00
5.74	0.35	5.16	1.73	63.48	2.00	0.00	0.12	0.00
5.76	0.41	6.16	1.57	63.54	2.00	0.00	0.11	0.00
5.78	0.48	7.56	1.42	63.51	2.00	0.00	0.10	0.00
5.80	0.57	9.14	1.34	63.77	2.00	0.00	0.10	0.00
5.82	0.67	10.88	1.31	64.75	2.00	0.00	0.09	0.00
5.84	0.76	12.24	1.36	67.00	2.00	0.00	0.08	0.00
5.86	0.81	13.19	1.43	69.21	2.00	0.13	0.08	0.00
5.88	0.84	13.63	1.52	71.69	2.00	1.23	0.08	0.00
5.90	0.85	13.86	1.60	73.70	2.00	1.77	0.08	0.00
5.92	0.85	13.92	1.72	76.64	2.00	1.92	0.08	0.00
5.94	0.86	13.95	1.82	78.81	2.00	1.99	0.08	0.00
5.96	0.86	13.96	1.90	80.71	2.00	2.00	0.08	0.00
5.98	0.86	14.02	1.89	80.57	2.00	2.15	0.08	0.00
6.00	0.86	13.97	1.91	80.93	2.00	2.04	0.08	0.00
6.02	0.85	13.81	1.91	80.81	2.00	1.67	0.08	0.00
6.04	0.85	13.73	1.87	79.91	2.00	1.45	0.08	0.00
6.06	0.86	13.83	1.73	76.85	2.00	1.70	0.08	0.00
6.08	0.89	14.24	1.57	73.41	2.00	2.66	0.07	0.00
6.10	0.92	14.61	1.47	71.27	2.00	3.51	0.07	0.00
6.12	0.94	14.85	1.45	70.82	2.00	4.04	0.07	0.00
6.14	0.94	14.90	1.52	72.67	2.00	4.17	0.07	0.00
6.16	0.93	14.67	1.64	75.32	2.00	3.65	0.07	0.00
6.18	0.92	14.64	1.75	78.06	2.00	3.59	0.07	0.00
6.20	0.94	14.87	1.78	78.72	2.00	4.10	0.07	0.00
6.22	0.99	15.57	1.70	77.47	2.00	5.61	0.07	0.00
6.24	1.01	15.91	1.61	75.57	2.00	6.33	0.07	0.00
6.26	1.01	15.78	1.54	157.20	2.00	6.05	0.00	0.00
6.28	0.98	15.31	1.50	72.38	2.00	5.06	0.07	0.00
6.30	0.96	14.96	1.45	70.99	2.00	4.30	0.07	0.00
6.32	0.95	14.72	1.47	71.37	2.00	3.77	0.07	0.00
6.34	0.94	14.49	1.56	73.29	2.00	3.25	0.07	0.00
6.36	0.92	14.19	1.70	76.41	2.00	2.55	0.08	0.00
6.38	0.90	14.00	1.79	78.38	2.00	2.11	0.08	0.00
6.40	0.90	13.93	1.86	79.92	2.00	1.95	0.08	0.00
6.42	0.91	14.04	1.86	79.94	2.00	2.20	0.08	0.00
6.44	0.93	14.33	1.85	79.93	2.00	2.88	0.07	0.00
6.46	0.96	14.74	1.79	79.00	2.00	3.81	0.07	0.00
6.48	0.99	15.22	1.75	78.43	2.00	4.86	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.50	1.08	16.47	1.64	162.33	2.00	7.46	0.00	0.00
6.52	1.16	17.74	1.56	136.16	2.00	9.93	0.00	0.00
6.54	1.24	18.74	1.49	116.62	2.00	11.72	0.00	0.00
6.56	1.21	18.27	1.53	125.79	2.00	10.90	0.00	0.00
6.58	1.13	17.20	1.69	159.70	2.00	8.90	0.00	0.00
6.60	1.06	16.12	1.75	79.26	2.00	6.75	0.07	0.00
6.62	1.05	15.90	1.66	76.85	2.00	6.31	0.07	0.00
6.64	1.15	17.06	1.20	97.56	2.00	8.63	0.00	0.00
6.66	1.23	18.14	1.05	73.17	2.00	10.65	0.00	0.00
6.68	1.29	18.96	1.02	65.10	2.00	12.11	0.00	0.00
6.70	1.27	18.70	1.18	83.31	2.00	11.66	0.00	0.00
6.72	1.18	17.39	1.25	100.58	2.00	9.26	0.00	0.00
6.74	1.06	15.63	1.26	119.75	2.00	5.74	0.00	0.00
6.76	0.95	13.94	1.21	134.93	2.00	1.97	0.00	0.00
6.78	0.93	13.55	1.12	126.43	2.00	1.02	0.00	0.00
6.80	0.93	13.47	1.03	114.77	2.00	0.83	0.00	0.00
6.82	0.93	13.35	0.95	104.40	2.00	0.53	0.00	0.00
6.84	0.93	13.32	0.87	92.89	2.00	0.45	0.00	0.00
6.86	0.95	13.56	0.79	80.37	2.00	1.06	0.00	0.00
6.88	1.01	14.27	0.74	67.88	2.00	2.75	0.00	0.00
6.90	1.07	15.09	0.69	57.13	2.00	4.58	0.00	0.00
6.92	1.13	16.01	0.65	47.76	2.00	6.53	0.00	0.00
6.94	1.17	16.53	0.62	47.80	2.00	7.58	0.00	0.00
6.96	1.19	16.70	0.59	46.81	2.00	7.93	0.00	0.00
6.98	1.16	16.28	0.57	46.05	2.00	7.09	0.00	0.00
7.00	1.11	15.57	0.59	44.52	2.00	5.62	0.00	0.00
7.02	1.04	14.53	0.65	56.64	2.00	3.34	0.00	0.00
7.04	0.98	13.71	0.71	69.18	2.00	1.41	0.00	0.00
7.06	0.96	13.44	0.72	73.16	2.00	0.75	0.00	0.00
7.08	0.99	13.79	0.68	65.35	2.00	1.60	0.00	0.00
7.10	1.03	14.25	0.64	57.33	2.00	2.70	0.00	0.00
7.12	1.04	14.38	0.65	57.22	2.00	2.98	0.00	0.00
7.14	1.02	14.09	0.74	69.51	2.00	2.31	0.00	0.00
7.16	0.98	13.59	0.88	92.15	2.00	1.13	0.00	0.00
7.18	0.96	13.42	1.01	112.07	2.00	0.72	0.00	0.00
7.20	0.97	13.53	1.14	130.06	2.00	0.98	0.00	0.00
7.22	0.98	13.68	1.24	65.03	2.00	1.34	0.08	0.00
7.24	0.95	13.37	1.37	68.16	2.00	0.60	0.08	0.00
7.26	0.90	12.58	1.36	67.49	2.00	0.00	0.08	0.00
7.28	0.83	11.53	1.30	65.21	2.00	0.00	0.08	0.00
7.30	0.78	10.59	1.12	60.31	2.00	0.00	0.09	0.00
7.32	0.73	9.92	1.01	57.32	2.00	0.00	0.09	0.00
7.34	0.71	9.52	0.93	55.03	2.00	0.00	0.09	0.00
7.36	0.69	9.16	0.86	53.12	2.00	0.00	0.10	0.00
7.38	0.68	8.90	0.79	51.04	2.00	0.00	0.10	0.00
7.40	0.67	8.78	0.72	49.18	2.00	0.00	0.10	0.00
7.42	0.67	8.75	0.68	48.22	2.00	0.00	0.10	0.00
7.44	0.67	8.77	0.66	47.60	2.00	0.00	0.10	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.46	0.68	8.86	0.69	48.42	2.00	0.00	0.10	0.00
7.48	0.69	9.00	0.71	49.00	2.00	0.00	0.10	0.00
7.50	0.69	9.03	0.72	49.45	2.00	0.00	0.10	0.00
7.52	0.70	9.12	0.72	49.41	2.00	0.00	0.10	0.00
7.54	0.79	10.37	0.63	96.22	2.00	0.00	0.00	0.00
7.56	1.01	13.39	0.47	44.95	2.00	0.64	0.00	0.00
7.58	1.30	17.20	0.35	38.79	2.00	8.90	0.00	0.00
7.60	1.51	19.91	0.33	19.91	2.00	13.73	0.00	0.00
7.62	1.58	20.76	0.34	20.76	2.00	15.12	0.00	0.00
7.64	1.70	22.39	0.32	22.39	2.00	17.60	0.00	0.00
7.66	1.94	25.37	0.30	25.37	2.00	21.73	0.00	0.00
7.68	2.29	29.86	0.30	29.86	2.00	27.10	0.00	0.00
7.70	2.63	34.23	0.32	34.23	2.00	31.62	0.00	0.00
7.72	2.99	38.67	0.32	38.67	2.00	35.64	0.00	0.00
7.74	3.28	42.19	0.31	42.19	2.00	38.51	0.00	0.00
7.76	3.35	42.98	0.28	42.98	2.00	39.13	0.00	0.00
7.78	3.19	40.69	0.24	40.69	2.00	37.32	0.00	0.00
7.80	2.85	36.48	0.22	36.48	2.00	33.72	0.00	0.00
7.82	2.52	32.39	0.26	32.39	2.00	29.79	0.00	0.00
7.84	2.27	29.50	0.41	29.50	2.00	26.70	0.00	0.00
7.86	2.18	29.06	0.88	59.62	2.00	26.21	0.00	0.00
7.88	2.59	34.65	1.02	66.75	2.00	32.01	0.00	0.00
7.90	3.60	47.36	0.91	71.67	2.00	42.33	0.00	0.00
7.92	5.00	64.18	0.64	81.93	2.00	52.36	0.00	0.00
7.94	6.26	78.89	0.52	93.84	2.00	59.17	0.00	0.00
7.96	7.12	88.58	0.44	88.58	2.00	63.00	0.00	0.00
7.98	7.59	93.43	0.36	93.43	2.00	64.76	0.00	0.00
8.00	7.79	94.83	0.27	94.83	2.00	65.25	0.00	0.00
8.02	7.81	94.43	0.22	94.43	2.00	65.11	0.00	0.00
8.04	7.79	93.98	0.21	93.98	2.00	64.95	0.00	0.00
8.06	7.85	94.82	0.23	94.82	2.00	65.24	0.00	0.00
8.08	8.23	99.15	0.24	99.15	2.00	66.72	0.00	0.00
8.10	8.97	107.40	0.23	107.40	2.00	69.36	0.00	0.00
8.12	10.06	119.80	0.24	119.80	2.00	72.96	0.00	0.00
8.14	11.30	133.53	0.24	133.53	2.00	76.54	0.00	0.00
8.16	12.32	144.66	0.23	144.66	2.00	79.19	0.00	0.00
8.18	12.87	150.52	0.22	150.52	2.00	80.50	0.00	0.00
8.20	13.00	152.02	0.23	152.02	2.00	80.82	0.00	0.00
8.22	13.03	152.64	0.25	152.64	2.00	80.96	0.00	0.00
8.24	13.23	154.80	0.26	154.80	2.00	81.42	0.00	0.00
8.26	13.81	161.27	0.27	161.27	2.00	82.77	0.00	0.00
8.28	14.43	168.24	0.28	168.24	2.00	84.17	0.00	0.00
8.30	14.98	174.51	0.31	174.51	2.00	85.38	0.00	0.00
8.32	15.10	176.20	0.33	176.20	2.00	85.70	0.00	0.00
8.34	15.15	176.64	0.34	176.64	2.00	85.78	0.00	0.00
8.36	15.17	176.52	0.33	176.52	2.00	85.76	0.00	0.00
8.38	15.28	177.25	0.31	177.25	2.00	85.89	0.00	0.00
8.40	15.36	178.01	0.32	178.01	2.00	86.03	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.42	15.47	178.95	0.31	178.95	2.00	86.21	0.00	0.00
8.44	15.48	179.20	0.32	179.20	2.00	86.25	0.00	0.00
8.46	15.58	179.88	0.31	179.88	2.00	86.38	0.00	0.00
8.48	15.53	179.09	0.31	179.09	2.00	86.23	0.00	0.00
8.50	15.52	178.56	0.30	178.56	2.00	86.14	0.00	0.00
8.52	15.46	177.72	0.30	177.72	2.00	85.98	0.00	0.00
8.54	15.45	177.38	0.29	177.38	2.00	85.92	0.00	0.00
8.56	15.37	176.05	0.28	176.05	2.00	85.67	0.00	0.00
8.58	14.97	171.64	0.29	171.64	2.00	84.83	0.00	0.00
8.60	14.11	162.84	0.34	162.84	2.00	83.09	0.00	0.00
8.62	13.10	151.63	0.35	151.63	2.00	80.74	0.00	0.00
8.64	12.29	142.29	0.34	142.29	2.00	78.64	0.00	0.00
8.66	11.90	137.35	0.30	137.35	2.00	77.48	0.00	0.00
8.68	11.77	135.87	0.30	135.87	2.00	77.12	0.00	0.00
8.70	11.65	134.28	0.30	134.28	2.00	76.73	0.00	0.00
8.72	11.52	132.43	0.27	132.43	2.00	76.27	0.00	0.00
8.74	11.34	130.14	0.26	130.14	2.00	75.70	0.00	0.00
8.76	11.20	129.06	0.31	129.06	2.00	75.42	0.00	0.00
8.78	11.30	130.51	0.35	130.51	2.00	75.79	0.00	0.00
8.80	11.64	133.93	0.34	133.93	2.00	76.64	0.00	0.00
8.82	11.86	136.09	0.32	136.09	2.00	77.17	0.00	0.00
8.84	11.53	132.82	0.37	132.82	2.00	76.37	0.00	0.00
8.86	11.05	127.72	0.41	127.72	2.00	75.08	0.00	0.00
8.88	10.50	121.49	0.42	121.49	2.00	73.43	0.00	0.00
8.90	10.24	118.05	0.37	118.05	2.00	72.48	0.00	0.00
8.92	9.98	115.26	0.39	115.26	2.00	71.69	0.00	0.00
8.94	10.15	117.05	0.40	117.05	2.00	72.20	0.00	0.00
8.96	10.89	124.93	0.37	124.93	2.00	74.35	0.00	0.00
8.98	12.03	137.00	0.33	137.00	2.00	77.39	0.00	0.00
9.00	13.76	155.07	0.28	155.07	2.00	81.48	0.00	0.00
9.02	16.23	180.99	0.24	180.99	2.00	86.58	0.00	0.00
9.04	18.50	204.49	0.21	204.49	2.00	90.61	0.00	0.00
9.06	20.03	220.34	0.20	220.34	2.00	93.08	0.00	0.00
9.08	19.12	210.30	0.19	210.30	2.00	91.54	0.00	0.00
9.10	18.25	201.28	0.21	201.28	2.00	90.09	0.00	0.00
9.12	16.79	185.92	0.23	185.92	2.00	87.47	0.00	0.00
9.14	16.40	181.97	0.25	181.97	2.00	86.76	0.00	0.00
9.16	15.55	172.48	0.23	172.48	2.00	84.99	0.00	0.00
9.18	14.84	165.91	0.32	165.91	2.00	83.71	0.00	0.00
9.20	14.13	158.91	0.39	158.91	2.00	82.29	0.00	0.00
9.22	13.42	151.67	0.47	151.67	2.00	80.75	0.00	0.00
9.24	12.84	145.03	0.45	145.03	2.00	79.27	0.00	0.00
9.26	12.43	140.45	0.45	140.45	2.00	78.21	0.00	0.00
9.28	11.92	134.96	0.50	134.96	2.00	76.90	0.00	0.00
9.30	10.91	123.97	0.55	123.97	2.00	74.09	0.00	0.00
9.32	10.34	117.76	0.59	120.91	2.00	72.39	0.00	0.00
9.34	11.17	127.20	0.65	130.21	2.00	74.94	0.00	0.00
9.36	12.83	145.97	0.75	145.97	2.00	79.48	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.38	14.02	159.84	0.90	168.11	2.00	82.48	0.00	0.00
9.40	14.18	162.16	1.04	180.29	2.00	82.96	0.00	0.00
9.42	14.13	161.99	1.18	188.25	2.00	82.92	0.00	0.00
9.44	14.28	163.32	1.15	187.81	2.00	83.19	0.00	0.00
9.46	14.36	163.70	1.09	184.77	2.00	83.27	0.00	0.00
9.48	14.14	160.34	0.95	172.85	2.00	82.58	0.00	0.00
9.50	13.30	150.68	0.92	164.58	2.00	80.53	0.00	0.00
9.52	12.10	136.78	0.83	150.37	2.00	77.34	0.00	0.00
9.54	10.83	122.60	0.85	141.61	2.00	73.73	0.00	0.00
9.56	9.53	108.38	0.96	132.42	2.00	69.66	0.00	0.00
9.58	8.30	95.42	1.40	126.99	2.00	65.45	0.00	0.00
9.60	7.78	90.08	1.91	133.62	2.00	63.55	0.00	0.00
9.62	8.19	95.19	2.27	148.33	2.00	65.37	0.00	0.00
9.64	9.25	107.22	2.33	160.83	2.00	69.30	0.00	0.00
9.66	10.34	119.52	2.35	173.22	2.00	72.88	0.00	0.00
9.68	11.45	132.03	2.39	186.56	2.00	76.17	0.00	0.00
9.70	12.68	145.80	2.44	202.02	2.00	79.45	0.00	0.00
9.72	13.80	158.26	2.44	215.00	2.00	82.15	0.00	0.00
9.74	14.67	167.84	2.47	225.81	2.00	84.09	0.00	0.00
9.76	15.22	173.97	2.59	235.31	2.00	85.28	0.00	0.00
9.78	15.64	178.66	2.71	243.32	2.00	86.15	0.00	0.00
9.80	15.75	179.75	2.84	248.18	2.00	86.36	0.00	0.00
9.82	15.74	179.47	2.93	250.25	2.00	86.30	0.00	0.00
9.84	15.88	180.83	2.99	253.49	2.00	86.55	0.00	0.00
9.86	16.25	184.79	3.07	260.20	2.00	87.27	0.00	0.00
9.88	16.88	191.60	3.13	269.15	2.00	88.46	0.00	0.00
9.90	17.63	199.78	3.16	278.80	2.00	89.84	0.00	0.00
9.92	19.12	215.70	3.03	291.92	2.00	92.37	0.00	0.00
9.94	20.71	232.78	2.88	306.70	2.00	94.89	0.00	0.00
9.96	22.15	248.06	2.78	321.10	2.00	96.99	0.00	0.00
9.98	22.73	254.05	2.83	328.91	2.00	97.77	0.00	0.00
10.00	22.64	252.94	2.94	330.73	2.00	97.63	0.00	0.00
10.02	22.48	250.93	3.06	331.49	2.00	97.37	0.00	0.00
10.04	21.43	239.37	3.29	325.42	2.00	95.81	0.00	0.00
10.06	21.75	242.55	3.32	329.84	2.00	96.25	0.00	0.00
10.08	22.11	246.16	3.40	336.17	2.00	96.73	0.00	0.00
10.10	23.35	259.28	3.32	348.23	2.00	98.45	0.00	0.00
10.12	23.58	261.42	3.38	352.46	2.00	98.72	0.00	0.00
10.14	23.82	263.59	3.40	355.62	2.00	98.99	0.00	0.00
10.16	24.06	265.84	3.44	359.10	2.00	99.27	0.00	0.00
10.18	24.17	266.62	3.48	361.33	2.00	99.37	0.00	0.00
10.20	24.20	266.55	3.51	362.23	2.00	99.36	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)

Total estimated displacement: 0.49

Abbreviations

q_t:	Total cone resistance
Q_{tn}:	Adjusted cone resistance to an effective overburden stress of 1 atm
R_f:	Friction ration
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
FS:	Calculated factor of safety against liquefaction
D_r:	Calculated relative density
$Gamma_{max}$:	Calculated maximum cyclic shear strain
Lat. disp.:	Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.02	0.18	54.25	9.82	4.06	0.02	0.05
0.92	0.06	0.94	48.66	45.85	3.99	0.02	0.27
0.94	0.10	1.77	35.64	63.18	3.81	0.53	0.50
0.96	0.13	2.25	34.35	77.39	3.79	0.78	0.62
0.98	0.11	1.95	40.95	79.72	3.89	0.88	0.52
1.00	0.17	3.14	25.54	80.17	3.61	0.64	0.82
1.02	0.92	17.97	3.86	69.31	2.61	0.76	0.76
1.04	1.79	35.09	1.79	62.98	2.26	0.14	0.66
1.06	2.75	53.93	1.34	72.36	2.04	0.31	0.69
1.08	3.11	61.10	1.28	78.50	1.97	0.52	0.70
1.10	3.27	64.33	1.27	81.51	1.95	0.66	0.71
1.12	3.16	62.10	1.30	80.53	1.99	0.61	0.71
1.14	2.77	54.31	1.41	76.34	2.09	0.43	0.70
1.16	2.42	47.44	1.63	77.20	2.21	0.46	0.70
1.18	2.14	41.85	1.94	81.22	2.30	0.65	0.71
1.20	1.99	38.86	2.17	84.47	2.36	0.72	0.72
1.22	1.80	35.27	2.50	88.21	2.42	0.72	0.72
1.24	1.60	31.22	3.00	93.73	2.50	0.73	0.73
1.26	1.41	27.38	3.60	98.59	2.58	0.80	0.80
1.28	1.27	24.80	4.04	100.17	2.63	0.85	0.85
1.30	1.20	23.39	4.23	98.99	2.65	0.86	0.86
1.32	1.18	22.91	4.19	96.11	2.65	0.85	0.85
1.34	1.15	22.34	4.21	93.99	2.65	0.85	0.85
1.36	1.07	20.82	4.47	93.03	2.68	0.87	0.87
1.38	0.98	19.01	4.92	93.51	2.72	0.74	0.74
1.40	0.89	17.21	5.52	94.91	2.77	0.74	0.74
1.42	0.85	16.32	5.78	94.35	2.79	0.74	0.74
1.44	0.83	15.89	5.81	92.33	2.80	0.73	0.73
1.46	0.82	15.84	5.71	90.50	2.79	0.73	0.73
1.48	0.85	16.25	5.36	87.10	2.76	0.72	0.72
1.50	0.87	16.78	4.97	83.46	2.72	0.71	0.71
1.52	0.89	17.16	4.64	79.61	2.69	0.85	0.85
1.54	0.90	17.26	4.52	77.99	2.68	0.84	0.84
1.56	0.89	17.18	4.56	78.37	2.69	0.84	0.84
1.58	0.87	16.78	4.64	77.78	2.69	0.84	0.84
1.60	0.86	16.46	4.82	79.36	2.71	0.55	0.71
1.62	0.85	16.26	4.91	79.85	2.72	0.58	0.71
1.64	0.86	16.42	4.98	81.84	2.73	0.68	0.71
1.66	0.87	16.70	4.90	81.82	2.72	0.68	0.71
1.68	0.88	16.79	4.90	82.26	2.72	0.71	0.71
1.70	0.87	16.66	4.99	83.15	2.73	0.71	0.71
1.72	0.85	16.20	5.23	84.77	2.75	0.72	0.72
1.74	0.82	15.75	5.50	86.69	2.77	0.72	0.72
1.76	0.68	12.88	7.26	93.59	2.90	0.74	0.74
1.78	0.71	13.58	7.00	95.04	2.89	0.74	0.74
1.80	0.74	13.98	6.88	96.14	2.88	0.74	0.74
1.82	0.87	16.65	5.56	92.53	2.78	0.73	0.73
1.84	0.82	15.71	5.96	93.67	2.81	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.79	15.10	6.23	94.15	2.83	0.74	0.74
1.88	0.77	14.71	6.41	94.27	2.84	0.74	0.74
1.90	0.74	14.12	6.78	95.75	2.87	0.74	0.74
1.92	0.71	13.45	7.23	97.26	2.90	0.74	0.74
1.94	0.68	12.75	7.65	97.54	2.93	0.74	0.74
1.96	0.66	12.49	7.72	96.45	2.93	0.74	0.74
1.98	0.66	12.34	7.81	96.36	2.94	0.74	0.74
2.00	0.66	12.45	7.66	95.37	2.93	0.74	0.74
2.02	0.67	12.58	7.65	96.22	2.93	0.74	0.74
2.04	0.68	12.87	7.45	95.82	2.92	0.74	0.74
2.06	0.70	13.12	7.34	96.22	2.91	0.74	0.74
2.08	0.70	13.27	7.12	94.50	2.89	0.74	0.74
2.10	0.70	13.23	7.07	93.59	2.89	0.74	0.74
2.12	0.69	12.93	7.29	94.25	2.91	0.74	0.74
2.14	0.66	12.44	7.73	96.12	2.93	0.74	0.74
2.16	0.64	11.93	8.24	98.38	2.97	0.75	0.75
2.18	0.63	11.69	8.61	100.66	2.99	0.75	0.75
2.20	0.65	12.17	8.37	101.78	2.97	0.75	0.75
2.22	0.69	13.01	7.81	101.65	2.94	0.75	0.75
2.24	0.74	13.93	7.19	100.14	2.90	0.75	0.75
2.26	0.77	14.42	6.82	98.38	2.87	0.75	0.75
2.28	0.78	14.63	6.69	97.87	2.86	0.74	0.74
2.30	0.78	14.61	6.73	98.29	2.87	0.74	0.74
2.32	0.76	14.28	6.91	98.70	2.88	0.75	0.75
2.34	0.75	14.04	6.98	98.01	2.88	0.74	0.74
2.36	0.75	14.00	6.87	96.26	2.88	0.74	0.74
2.38	0.76	14.36	6.51	93.49	2.85	0.74	0.74
2.40	0.78	14.70	6.14	90.22	2.82	0.73	0.73
2.42	0.77	14.54	6.04	87.89	2.82	0.72	0.72
2.44	0.75	13.98	6.21	86.77	2.83	0.72	0.72
2.46	0.70	13.05	6.69	87.37	2.86	0.72	0.72
2.48	0.66	12.28	7.22	88.65	2.90	0.73	0.73
2.50	0.62	11.52	7.92	91.25	2.95	0.73	0.73
2.52	0.59	10.93	8.59	93.88	2.99	0.74	0.74
2.54	0.59	10.84	8.77	95.02	3.00	0.74	0.74
2.56	0.61	11.24	8.35	93.82	2.97	0.74	0.74
2.58	0.64	11.86	7.68	91.06	2.93	0.73	0.73
2.60	0.66	12.26	7.12	87.35	2.89	0.72	0.72
2.62	0.68	12.59	6.73	84.68	2.87	0.72	0.72
2.64	0.70	13.04	6.27	81.73	2.83	0.67	0.71
2.66	0.72	13.36	6.07	81.03	2.82	0.64	0.71
2.68	0.72	13.39	6.03	80.69	2.81	0.62	0.71
2.70	0.71	13.12	6.17	80.95	2.82	0.63	0.71
2.72	0.69	12.83	6.26	80.31	2.83	0.60	0.71
2.74	0.68	12.49	6.41	80.02	2.84	0.58	0.71
2.76	0.66	12.23	6.54	80.06	2.85	0.59	0.71
2.78	0.66	12.20	6.53	79.64	2.85	0.57	0.71
2.80	0.68	12.48	6.31	78.78	2.84	0.53	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.69	12.72	6.11	77.72	2.82	0.48	0.70
2.84	0.69	12.80	6.06	77.60	2.82	0.48	0.70
2.86	0.68	12.54	6.22	78.02	2.83	0.50	0.70
2.88	0.67	12.33	6.38	78.64	2.84	0.52	0.70
2.90	0.66	12.16	6.47	78.73	2.85	0.53	0.70
2.92	0.65	12.00	6.53	78.40	2.85	0.51	0.70
2.94	0.64	11.68	6.74	78.72	2.87	0.53	0.70
2.96	0.61	11.18	7.17	80.12	2.90	0.59	0.71
2.98	0.49	8.85	9.61	85.05	3.05	0.41	0.95
3.00	0.47	8.36	10.20	85.23	3.08	0.43	0.90
3.02	0.45	7.92	10.65	84.36	3.10	0.38	0.85
3.04	0.51	9.19	8.78	80.69	3.00	0.62	0.71
3.06	0.49	8.70	9.42	81.97	3.04	0.37	0.92
3.08	0.48	8.44	10.08	85.12	3.07	0.39	0.89
3.10	0.49	8.64	10.27	88.76	3.08	0.44	0.91
3.12	0.52	9.32	9.84	91.69	3.06	0.49	0.98
3.14	0.57	10.21	9.06	92.57	3.02	0.51	1.07
3.16	0.60	10.95	8.42	92.23	2.98	0.73	0.73
3.18	0.62	11.31	8.11	91.75	2.96	0.73	0.73
3.20	0.64	11.59	7.92	91.75	2.95	0.73	0.73
3.22	0.67	12.15	7.53	91.44	2.92	0.73	0.73
3.24	0.71	13.12	6.93	90.87	2.88	0.73	0.73
3.26	0.80	14.80	6.02	89.04	2.81	0.73	0.73
3.28	0.88	16.42	5.33	87.48	2.76	0.72	0.72
3.30	0.96	17.88	4.81	86.10	2.71	0.72	0.72
3.32	0.98	18.26	4.78	87.23	2.71	0.72	0.72
3.34	0.97	18.07	4.94	89.28	2.72	0.73	0.73
3.36	0.93	17.31	5.29	91.57	2.75	0.73	0.73
3.38	0.90	16.80	5.54	92.99	2.77	0.73	0.73
3.40	0.91	16.92	5.48	92.70	2.77	0.73	0.73
3.42	0.95	17.70	5.03	89.11	2.73	0.73	0.73
3.44	1.00	18.67	4.51	84.25	2.68	0.85	0.85
3.46	1.04	19.43	4.08	79.25	2.64	0.80	0.80
3.48	1.05	19.74	3.84	75.90	2.61	0.77	0.77
3.50	1.05	19.56	3.76	73.64	2.60	0.76	0.76
3.52	1.02	19.07	3.80	72.46	2.61	0.76	0.76
3.54	1.00	18.65	3.97	74.02	2.62	0.78	0.78
3.56	0.99	18.50	4.09	75.71	2.64	0.79	0.79
3.58	1.00	18.59	4.17	77.45	2.65	0.81	0.81
3.60	1.02	18.98	4.12	78.12	2.64	0.80	0.80
3.62	1.03	19.21	4.09	78.51	2.64	0.80	0.80
3.64	1.04	19.44	4.03	78.34	2.63	0.80	0.80
3.66	1.03	19.25	4.04	77.87	2.63	0.80	0.80
3.68	1.02	19.09	4.05	77.29	2.63	0.80	0.80
3.70	0.99	18.43	4.21	77.53	2.65	0.81	0.81
3.72	0.95	17.58	4.50	79.03	2.68	0.84	0.84
3.74	0.88	16.22	5.05	81.92	2.73	0.69	0.71
3.76	0.81	14.92	5.72	85.37	2.79	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.75	13.68	6.43	87.98	2.84	0.72	0.72
3.80	0.71	12.87	6.93	89.15	2.88	0.73	0.73
3.82	0.70	12.65	6.98	88.30	2.88	0.73	0.73
3.84	0.71	12.91	6.61	85.31	2.86	0.72	0.72
3.86	0.73	13.25	6.20	82.13	2.83	0.70	0.71
3.88	0.74	13.48	5.78	77.92	2.79	0.49	0.70
3.90	0.75	13.62	5.52	75.18	2.77	0.39	0.70
3.92	0.77	14.06	5.11	71.90	2.74	0.30	0.69
3.94	0.80	14.54	4.82	70.14	2.71	0.26	0.68
3.96	0.82	14.97	4.60	68.78	2.69	0.82	0.82
3.98	0.84	15.32	4.47	68.44	2.68	0.81	0.81
4.00	0.85	15.56	4.46	69.37	2.68	0.81	0.81
4.02	0.86	15.68	4.52	70.84	2.68	0.82	0.82
4.04	0.84	15.39	4.75	73.12	2.70	0.33	0.69
4.06	0.82	14.87	5.09	75.65	2.74	0.41	0.70
4.08	0.79	14.30	5.47	78.17	2.77	0.50	0.70
4.10	0.77	13.90	5.67	78.83	2.79	0.53	0.70
4.12	0.76	13.75	5.67	78.04	2.79	0.50	0.70
4.14	0.76	13.69	5.56	76.05	2.78	0.42	0.70
4.16	0.77	13.96	5.28	73.76	2.75	0.35	0.69
4.18	0.79	14.34	4.97	71.27	2.72	0.28	0.69
4.20	0.72	12.83	5.31	68.17	2.76	0.22	0.68
4.22	0.63	11.04	5.95	65.70	2.81	0.18	0.67
4.24	0.66	11.79	5.47	64.43	2.77	0.16	0.67
4.26	0.80	14.47	4.48	64.89	2.68	0.80	0.80
4.28	0.94	17.15	3.80	65.17	2.61	0.74	0.74
4.30	0.93	17.12	4.02	68.76	2.63	0.77	0.77
4.32	0.98	17.94	4.02	72.16	2.63	0.78	0.78
4.34	1.06	19.65	3.80	74.61	2.61	0.77	0.77
4.36	1.17	21.69	3.40	73.83	2.56	0.73	0.73
4.38	1.20	22.28	3.39	75.57	2.56	0.73	0.73
4.40	1.18	21.96	3.60	79.03	2.58	0.76	0.76
4.42	1.15	21.30	3.92	83.51	2.62	0.80	0.80
4.44	1.13	20.91	4.18	87.43	2.65	0.83	0.83
4.46	1.10	20.26	4.54	91.97	2.68	0.87	0.87
4.48	1.06	19.60	4.97	97.50	2.72	0.74	0.74
4.50	1.03	18.93	5.42	102.50	2.76	0.75	0.75
4.52	1.01	18.56	5.60	103.92	2.78	0.76	0.76
4.54	1.02	18.72	5.40	101.02	2.76	0.75	0.75
4.56	1.06	19.43	4.99	97.06	2.73	0.74	0.74
4.58	1.11	20.57	4.49	92.34	2.68	0.87	0.87
4.60	1.15	21.20	4.26	90.37	2.66	0.84	0.84
4.62	1.16	21.49	4.12	88.53	2.64	0.83	0.83
4.64	1.13	20.90	4.31	90.05	2.66	0.85	0.85
4.66	1.09	20.01	4.63	92.68	2.69	0.88	0.88
4.68	1.03	18.91	5.06	95.62	2.73	0.74	0.74
4.70	0.98	17.94	5.42	97.20	2.76	0.74	0.74
4.72	0.93	16.98	5.75	97.65	2.79	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.90	16.29	5.90	96.10	2.80	0.74	0.74
4.76	0.88	15.91	5.87	93.41	2.80	0.74	0.74
4.78	0.88	15.86	5.60	88.82	2.78	0.73	0.73
4.80	0.89	16.07	5.14	82.60	2.74	0.71	0.71
4.82	0.91	16.44	4.67	76.81	2.70	0.85	0.85
4.84	0.94	17.11	4.19	71.77	2.65	0.79	0.79
4.86	0.98	17.85	3.89	69.39	2.62	0.76	0.76
4.88	1.06	19.09	3.54	67.57	2.57	0.72	0.72
4.90	1.13	20.19	3.25	65.68	2.54	0.32	0.69
4.92	1.18	21.00	3.16	66.25	2.52	0.24	0.68
4.94	1.17	20.93	3.33	69.80	2.55	0.64	0.71
4.96	1.14	20.56	3.67	75.39	2.59	0.76	0.76
4.98	1.14	20.61	3.86	79.53	2.61	0.78	0.78
5.00	1.13	20.59	4.05	83.46	2.63	0.81	0.81
5.02	1.11	20.28	4.38	88.88	2.67	0.85	0.85
5.04	1.05	19.10	5.35	102.19	2.76	0.75	0.75
5.06	0.99	18.03	6.36	114.75	2.84	0.77	0.77
5.08	0.95	17.20	7.27	125.09	2.90	0.79	0.79
5.10	0.92	16.53	7.76	128.21	2.94	0.80	0.80
5.12	0.89	15.96	8.07	128.75	2.96	0.80	0.80
5.14	0.87	15.57	8.16	127.00	2.96	0.79	0.79
5.16	0.84	15.02	8.01	120.39	2.95	0.78	0.78
5.18	0.81	14.46	7.78	112.45	2.94	0.77	0.77
5.20	0.85	15.09	6.79	102.40	2.87	0.75	0.75
5.22	0.94	16.85	5.68	95.75	2.79	0.74	0.74
5.24	1.09	19.45	4.56	88.73	2.69	0.87	0.87
5.26	1.19	21.09	4.23	89.20	2.65	0.84	0.84
5.28	1.22	21.58	4.41	95.09	2.67	0.87	0.87
5.30	1.15	20.64	5.09	105.02	2.74	0.76	0.76
5.32	1.02	18.43	6.07	111.85	2.82	0.77	0.77
5.34	0.89	15.94	7.25	115.59	2.90	0.78	0.78
5.36	0.75	13.17	9.15	120.43	3.02	0.63	0.97
5.38	0.64	10.96	11.71	128.32	3.15	0.69	0.81
5.40	0.56	9.37	14.32	134.18	3.27	0.76	0.69
5.42	0.43	6.84	19.02	130.07	3.43	0.76	0.50
5.44	0.39	6.04	19.56	118.13	3.45	0.48	0.44
5.46	0.36	5.39	19.07	102.76	3.43	0.37	0.39
5.48	0.42	6.52	14.38	93.71	3.27	0.32	0.47
5.50	0.43	6.67	13.26	88.47	3.22	0.28	0.48
5.52	0.42	6.53	13.01	84.94	3.21	0.25	0.47
5.54	0.40	6.17	13.56	83.72	3.24	0.24	0.45
5.56	0.38	5.75	14.69	84.47	3.28	0.24	0.41
5.58	0.36	5.37	15.96	85.71	3.33	0.26	0.39
5.60	0.34	5.02	17.14	86.12	3.37	0.26	0.36
5.62	0.33	4.72	17.97	84.85	3.40	0.25	0.34
5.64	0.32	4.50	17.97	80.77	3.40	0.23	0.32
5.66	0.31	4.35	17.45	75.91	3.38	0.17	0.31
5.68	0.31	4.25	16.61	70.66	3.35	0.15	0.30

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.31	4.25	15.87	67.43	3.33	0.14	0.30
5.72	0.32	4.54	14.28	64.90	3.26	0.12	0.32
5.74	0.35	5.16	12.31	63.48	3.18	0.12	0.37
5.76	0.41	6.16	10.31	63.54	3.08	0.12	0.44
5.78	0.48	7.56	8.40	63.51	2.98	0.15	0.67
5.80	0.57	9.14	6.98	63.77	2.88	0.15	0.67
5.82	0.67	10.88	5.95	64.75	2.81	0.17	0.67
5.84	0.76	12.24	5.47	67.00	2.77	0.20	0.68
5.86	0.81	13.19	5.25	69.21	2.75	0.24	0.68
5.88	0.84	13.63	5.26	71.69	2.75	0.29	0.69
5.90	0.85	13.86	5.32	73.70	2.76	0.35	0.69
5.92	0.85	13.92	5.51	76.64	2.77	0.44	0.70
5.94	0.86	13.95	5.65	78.81	2.78	0.53	0.70
5.96	0.86	13.96	5.78	80.71	2.79	0.62	0.71
5.98	0.86	14.02	5.75	80.57	2.79	0.61	0.71
6.00	0.86	13.97	5.79	80.93	2.80	0.63	0.71
6.02	0.85	13.81	5.85	80.81	2.80	0.62	0.71
6.04	0.85	13.73	5.82	79.91	2.80	0.58	0.71
6.06	0.86	13.83	5.56	76.85	2.78	0.45	0.70
6.08	0.89	14.24	5.16	73.41	2.74	0.34	0.69
6.10	0.92	14.61	4.88	71.27	2.72	0.28	0.69
6.12	0.94	14.85	4.77	70.82	2.71	0.27	0.69
6.14	0.94	14.90	4.88	72.67	2.72	0.32	0.69
6.16	0.93	14.67	5.13	75.32	2.74	0.40	0.70
6.18	0.92	14.64	5.33	78.06	2.76	0.50	0.70
6.20	0.94	14.87	5.29	78.72	2.75	0.52	0.70
6.22	0.99	15.57	4.98	77.47	2.73	0.47	0.70
6.24	1.01	15.91	4.75	75.57	2.70	0.40	0.70
6.26	1.01	15.78	4.67	73.68	2.70	0.84	0.84
6.28	0.98	15.31	4.73	72.38	2.70	0.31	0.69
6.30	0.96	14.96	4.74	70.99	2.70	0.28	0.69
6.32	0.95	14.72	4.85	71.37	2.71	0.29	0.69
6.34	0.94	14.49	5.06	73.29	2.73	0.33	0.69
6.36	0.92	14.19	5.38	76.41	2.76	0.43	0.70
6.38	0.90	14.00	5.60	78.38	2.78	0.51	0.70
6.40	0.90	13.93	5.74	79.92	2.79	0.58	0.71
6.42	0.91	14.04	5.69	79.94	2.79	0.58	0.71
6.44	0.93	14.33	5.58	79.93	2.78	0.58	0.71
6.46	0.96	14.74	5.36	79.00	2.76	0.54	0.70
6.48	0.99	15.22	5.15	78.43	2.74	0.51	0.70
6.50	1.08	16.47	4.65	76.61	2.69	0.84	0.84
6.52	1.16	17.74	4.25	75.45	2.65	0.81	0.81
6.54	1.24	18.74	3.95	73.92	2.62	0.78	0.78
6.56	1.21	18.27	4.09	74.74	2.64	0.79	0.79
6.58	1.13	17.20	4.55	78.32	2.69	0.84	0.84
6.60	1.06	16.12	4.92	79.26	2.72	0.55	0.71
6.62	1.05	15.90	4.83	76.85	2.71	0.45	0.70
6.64	1.15	17.06	3.83	65.30	2.61	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.23	18.14	3.38	61.34	2.55	0.33	0.69
6.68	1.29	18.96	3.20	60.59	2.53	0.17	0.67
6.70	1.27	18.70	3.50	65.49	2.57	0.71	0.71
6.72	1.18	17.39	3.84	66.83	2.61	0.75	0.75
6.74	1.06	15.63	4.25	66.42	2.65	0.78	0.78
6.76	0.95	13.94	4.62	64.44	2.69	0.81	0.81
6.78	0.93	13.55	4.56	61.79	2.69	0.79	0.79
6.80	0.93	13.47	4.42	59.47	2.67	0.77	0.77
6.82	0.93	13.35	4.28	57.15	2.66	0.76	0.76
6.84	0.93	13.32	4.11	54.72	2.64	0.73	0.73
6.86	0.95	13.56	3.88	52.58	2.61	0.60	0.71
6.88	1.01	14.27	3.58	51.17	2.58	0.21	0.68
6.90	1.07	15.09	3.31	49.91	2.55	0.09	0.65
6.92	1.13	16.01	3.04	48.72	2.51	0.04	0.62
6.94	1.17	16.53	2.89	47.80	2.49	0.05	0.62
6.96	1.19	16.70	2.80	46.81	2.47	0.04	0.62
6.98	1.16	16.28	2.83	46.05	2.48	0.04	0.62
7.00	1.11	15.57	3.00	46.70	2.50	0.04	0.62
7.02	1.04	14.53	3.34	48.56	2.55	0.09	0.65
7.04	0.98	13.71	3.66	50.18	2.59	0.24	0.68
7.06	0.96	13.44	3.76	50.54	2.60	0.33	0.69
7.08	0.99	13.79	3.58	49.36	2.58	0.17	0.67
7.10	1.03	14.25	3.38	48.15	2.55	0.09	0.65
7.12	1.04	14.38	3.37	48.39	2.55	0.09	0.65
7.14	1.02	14.09	3.63	51.16	2.59	0.24	0.68
7.16	0.98	13.59	4.07	55.29	2.64	0.73	0.73
7.18	0.96	13.42	4.38	58.84	2.67	0.77	0.77
7.20	0.97	13.53	4.61	62.38	2.69	0.80	0.80
7.22	0.98	13.68	4.75	65.03	2.70	0.17	0.67
7.24	0.95	13.37	5.10	68.16	2.74	0.22	0.68
7.26	0.90	12.58	5.36	67.49	2.76	0.21	0.68
7.28	0.83	11.53	5.65	65.21	2.78	0.17	0.67
7.30	0.78	10.59	5.70	60.31	2.79	0.12	0.66
7.32	0.73	9.92	5.78	57.32	2.79	0.09	0.65
7.34	0.71	9.52	5.78	55.03	2.79	0.08	0.64
7.36	0.69	9.16	5.80	53.12	2.80	0.07	0.64
7.38	0.68	8.90	5.74	51.04	2.79	0.06	0.63
7.40	0.67	8.78	5.60	49.18	2.78	0.05	0.62
7.42	0.67	8.75	5.51	48.22	2.77	0.05	0.62
7.44	0.67	8.77	5.43	47.60	2.76	0.04	0.62
7.46	0.68	8.86	5.46	48.42	2.77	0.05	0.62
7.48	0.69	9.00	5.45	49.00	2.77	0.05	0.62
7.50	0.69	9.03	5.47	49.45	2.77	0.05	0.62
7.52	0.70	9.12	5.42	49.41	2.76	0.05	0.62
7.54	0.79	10.37	4.55	47.20	2.69	0.74	0.74
7.56	1.01	13.39	3.17	42.46	2.53	0.04	0.62
7.58	1.30	17.20	2.26	38.79	2.38	0.03	0.62
7.60	1.51	19.91	1.00	19.91	2.30	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.58	20.76	1.00	20.76	2.29	0.02	0.62
7.64	1.70	22.39	1.00	22.39	2.25	0.02	0.62
7.66	1.94	25.37	1.00	25.37	2.19	0.02	0.62
7.68	2.29	29.86	1.00	29.86	2.12	0.02	0.62
7.70	2.63	34.23	1.00	34.23	2.07	0.02	0.62
7.72	2.99	38.67	1.00	38.67	2.03	0.03	0.62
7.74	3.28	42.19	1.00	42.19	1.98	0.03	0.62
7.76	3.35	42.98	1.00	42.98	1.96	0.03	0.62
7.78	3.19	40.69	1.00	40.69	1.96	0.03	0.62
7.80	2.85	36.48	1.00	36.48	2.00	0.02	0.62
7.82	2.52	32.39	1.00	32.39	2.07	0.02	0.62
7.84	2.27	29.50	1.00	29.50	2.18	0.02	0.62
7.86	2.18	29.06	2.05	59.62	2.33	0.11	0.66
7.88	2.59	34.65	1.93	66.75	2.30	0.20	0.68
7.90	3.60	47.36	1.51	71.67	2.15	0.29	0.69
7.92	5.00	64.18	1.28	81.93	1.96	0.69	0.71
7.94	6.26	78.89	1.19	93.84	1.84	0.74	0.74
7.96	7.12	88.58	1.00	88.58	1.75	0.73	0.73
7.98	7.59	93.43	1.00	93.43	1.69	0.74	0.74
8.00	7.79	94.83	1.00	94.83	1.63	0.74	0.74
8.02	7.81	94.43	1.00	94.43	1.60	0.74	0.74
8.04	7.79	93.98	1.00	93.98	1.59	0.74	0.74
8.06	7.85	94.82	1.00	94.82	1.60	0.74	0.74
8.08	8.23	99.15	1.00	99.15	1.59	0.75	0.75
8.10	8.97	107.40	1.00	107.40	1.56	0.76	0.76
8.12	10.06	119.80	1.00	119.80	1.52	0.78	0.78
8.14	11.30	133.53	1.00	133.53	1.47	0.80	0.80
8.16	12.32	144.66	1.00	144.66	1.43	0.82	0.82
8.18	12.87	150.52	1.00	150.52	1.41	0.83	0.83
8.20	13.00	152.02	1.00	152.02	1.42	0.83	0.83
8.22	13.03	152.64	1.00	152.64	1.43	0.83	0.83
8.24	13.23	154.80	1.00	154.80	1.43	0.83	0.83
8.26	13.81	161.27	1.00	161.27	1.42	0.84	0.84
8.28	14.43	168.24	1.00	168.24	1.42	0.85	0.85
8.30	14.98	174.51	1.00	174.51	1.42	0.86	0.86
8.32	15.10	176.20	1.00	176.20	1.43	0.86	0.86
8.34	15.15	176.64	1.00	176.64	1.44	0.86	0.86
8.36	15.17	176.52	1.00	176.52	1.43	0.86	0.86
8.38	15.28	177.25	1.00	177.25	1.41	0.86	0.86
8.40	15.36	178.01	1.00	178.01	1.42	0.86	0.86
8.42	15.47	178.95	1.00	178.95	1.41	0.86	0.86
8.44	15.48	179.20	1.00	179.20	1.42	0.86	0.86
8.46	15.58	179.88	1.00	179.88	1.41	0.86	0.86
8.48	15.53	179.09	1.00	179.09	1.41	0.86	0.86
8.50	15.52	178.56	1.00	178.56	1.40	0.86	0.86
8.52	15.46	177.72	1.00	177.72	1.40	0.86	0.86
8.54	15.45	177.38	1.00	177.38	1.40	0.86	0.86
8.56	15.37	176.05	1.00	176.05	1.39	0.86	0.86

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	14.97	171.64	1.00	171.64	1.41	0.85	0.85
8.60	14.11	162.84	1.00	162.84	1.47	0.84	0.84
8.62	13.10	151.63	1.00	151.63	1.50	0.83	0.83
8.64	12.29	142.29	1.00	142.29	1.52	0.82	0.82
8.66	11.90	137.35	1.00	137.35	1.50	0.81	0.81
8.68	11.77	135.87	1.00	135.87	1.51	0.81	0.81
8.70	11.65	134.28	1.00	134.28	1.51	0.80	0.80
8.72	11.52	132.43	1.00	132.43	1.50	0.80	0.80
8.74	11.34	130.14	1.00	130.14	1.50	0.80	0.80
8.76	11.20	129.06	1.00	129.06	1.54	0.80	0.80
8.78	11.30	130.51	1.00	130.51	1.56	0.80	0.80
8.80	11.64	133.93	1.00	133.93	1.54	0.80	0.80
8.82	11.86	136.09	1.00	136.09	1.52	0.81	0.81
8.84	11.53	132.82	1.00	132.82	1.56	0.80	0.80
8.86	11.05	127.72	1.00	127.72	1.60	0.79	0.79
8.88	10.50	121.49	1.00	121.49	1.62	0.79	0.79
8.90	10.24	118.05	1.00	118.05	1.61	0.78	0.78
8.92	9.98	115.26	1.00	115.26	1.63	0.78	0.78
8.94	10.15	117.05	1.00	117.05	1.63	0.78	0.78
8.96	10.89	124.93	1.00	124.93	1.59	0.79	0.79
8.98	12.03	137.00	1.00	137.00	1.53	0.81	0.81
9.00	13.76	155.07	1.00	155.07	1.44	0.83	0.83
9.02	16.23	180.99	1.00	180.99	1.36	0.87	0.87
9.04	18.50	204.49	1.00	204.49	1.28	0.89	0.89
9.06	20.03	220.34	1.00	220.34	1.24	0.91	0.91
9.08	19.12	210.30	1.00	210.30	1.25	0.90	0.90
9.10	18.25	201.28	1.00	201.28	1.29	0.89	0.89
9.12	16.79	185.92	1.00	185.92	1.33	0.87	0.87
9.14	16.40	181.97	1.00	181.97	1.36	0.87	0.87
9.16	15.55	172.48	1.00	172.48	1.37	0.86	0.86
9.18	14.84	165.91	1.00	165.91	1.45	0.85	0.85
9.20	14.13	158.91	1.00	158.91	1.51	0.84	0.84
9.22	13.42	151.67	1.00	151.67	1.57	0.83	0.83
9.24	12.84	145.03	1.00	145.03	1.58	0.82	0.82
9.26	12.43	140.45	1.00	140.45	1.59	0.81	0.81
9.28	11.92	134.96	1.00	134.96	1.63	0.81	0.81
9.30	10.91	123.97	1.00	123.97	1.68	0.79	0.79
9.32	10.34	117.76	1.03	120.91	1.72	0.78	0.78
9.34	11.17	127.20	1.02	130.21	1.72	0.80	0.80
9.36	12.83	145.97	1.00	145.97	1.71	0.82	0.82
9.38	14.02	159.84	1.05	168.11	1.73	0.85	0.85
9.40	14.18	162.16	1.11	180.29	1.77	0.86	0.86
9.42	14.13	161.99	1.16	188.25	1.81	0.87	0.87
9.44	14.28	163.32	1.15	187.81	1.80	0.87	0.87
9.46	14.36	163.70	1.13	184.77	1.78	0.87	0.87
9.48	14.14	160.34	1.08	172.85	1.75	0.86	0.86
9.50	13.30	150.68	1.09	164.58	1.75	0.85	0.85
9.52	12.10	136.78	1.10	150.37	1.76	0.83	0.83

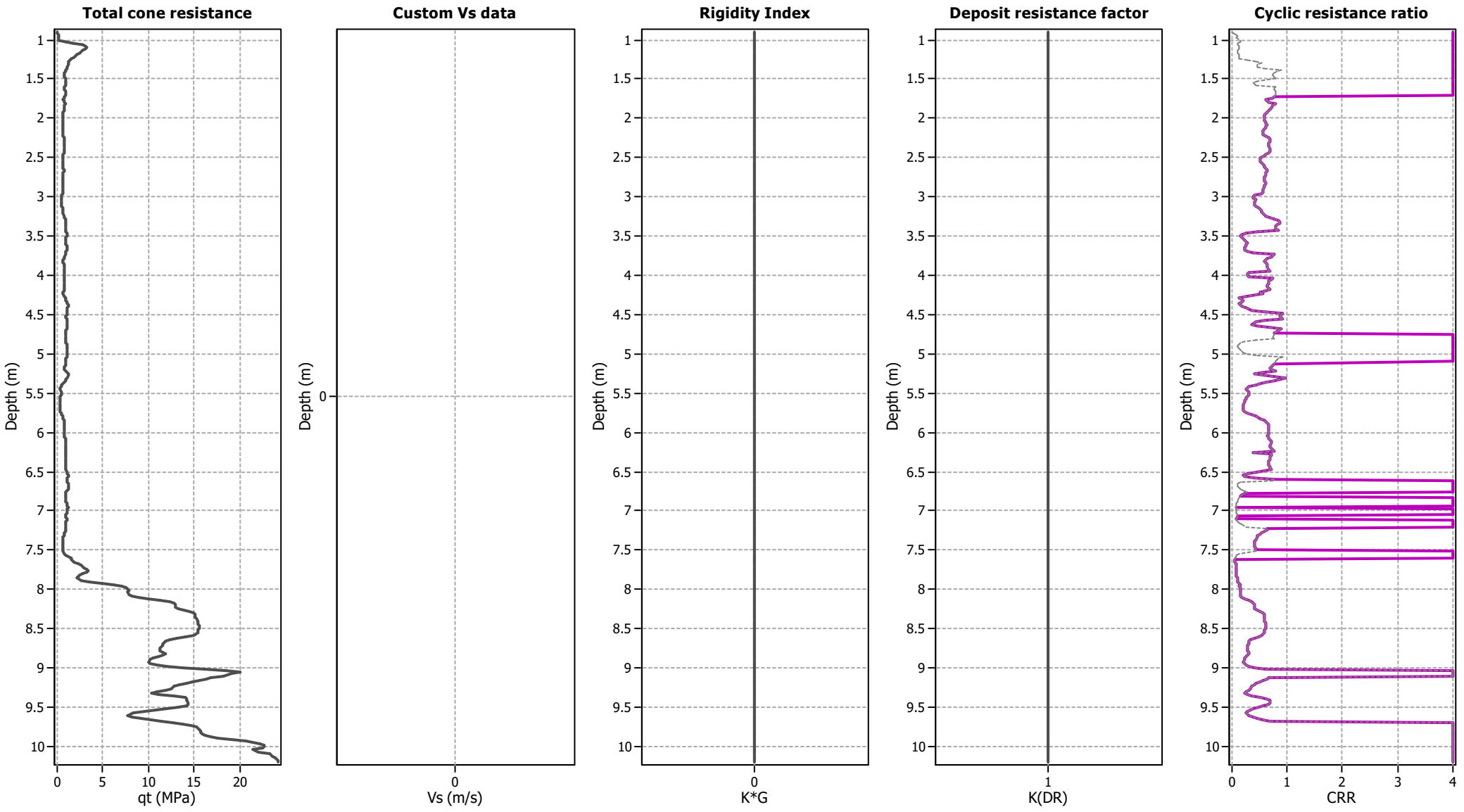
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	10.83	122.60	1.16	141.61	1.80	0.82	0.82
9.56	9.53	108.38	1.22	132.42	1.88	0.80	0.80
9.58	8.30	95.42	1.33	126.99	2.03	0.79	0.79
9.60	7.78	90.08	1.48	133.62	2.14	0.80	0.80
9.62	8.19	95.19	1.56	148.33	2.18	0.82	0.82
9.64	9.25	107.22	1.50	160.83	2.15	0.84	0.84
9.66	10.34	119.52	1.45	173.22	2.12	0.86	0.86
9.68	11.45	132.03	1.41	186.56	2.10	0.87	0.87
9.70	12.68	145.80	1.39	202.02	2.08	0.89	0.89
9.72	13.80	158.26	1.36	215.00	2.05	0.90	0.90
9.74	14.67	167.84	1.35	225.81	2.04	0.91	0.91
9.76	15.22	173.97	1.35	235.31	2.05	0.92	0.92
9.78	15.64	178.66	1.36	243.32	2.06	0.93	0.93
9.80	15.75	179.75	1.38	248.18	2.07	0.93	0.93
9.82	15.74	179.47	1.39	250.25	2.08	0.94	0.94
9.84	15.88	180.83	1.40	253.49	2.09	0.94	0.94
9.86	16.25	184.79	1.41	260.20	2.09	0.94	0.94
9.88	16.88	191.60	1.40	269.15	2.09	0.95	0.95
9.90	17.63	199.78	1.40	278.80	2.08	0.96	0.96
9.92	19.12	215.70	1.35	291.92	2.05	0.97	0.97
9.94	20.71	232.78	1.32	306.70	2.01	0.98	0.98
9.96	22.15	248.06	1.29	321.10	1.98	0.99	0.99
9.98	22.73	254.05	1.29	328.91	1.98	1.00	1.00
10.00	22.64	252.94	1.31	330.73	2.00	1.00	1.00
10.02	22.48	250.93	1.32	331.49	2.02	1.00	1.00
10.04	21.43	239.37	1.36	325.42	2.05	1.00	1.00
10.06	21.75	242.55	1.36	329.84	2.05	1.00	1.00
10.08	22.11	246.16	1.37	336.17	2.06	1.00	1.00
10.10	23.35	259.28	1.34	348.23	2.04	1.01	1.01
10.12	23.58	261.42	1.35	352.46	2.04	1.02	1.02
10.14	23.82	263.59	1.35	355.62	2.04	1.02	1.02
10.16	24.06	265.84	1.35	359.10	2.05	1.02	1.02
10.18	24.17	266.62	1.36	361.33	2.05	1.02	1.02
10.20	24.20	266.55	1.36	362.23	2.05	1.02	1.02

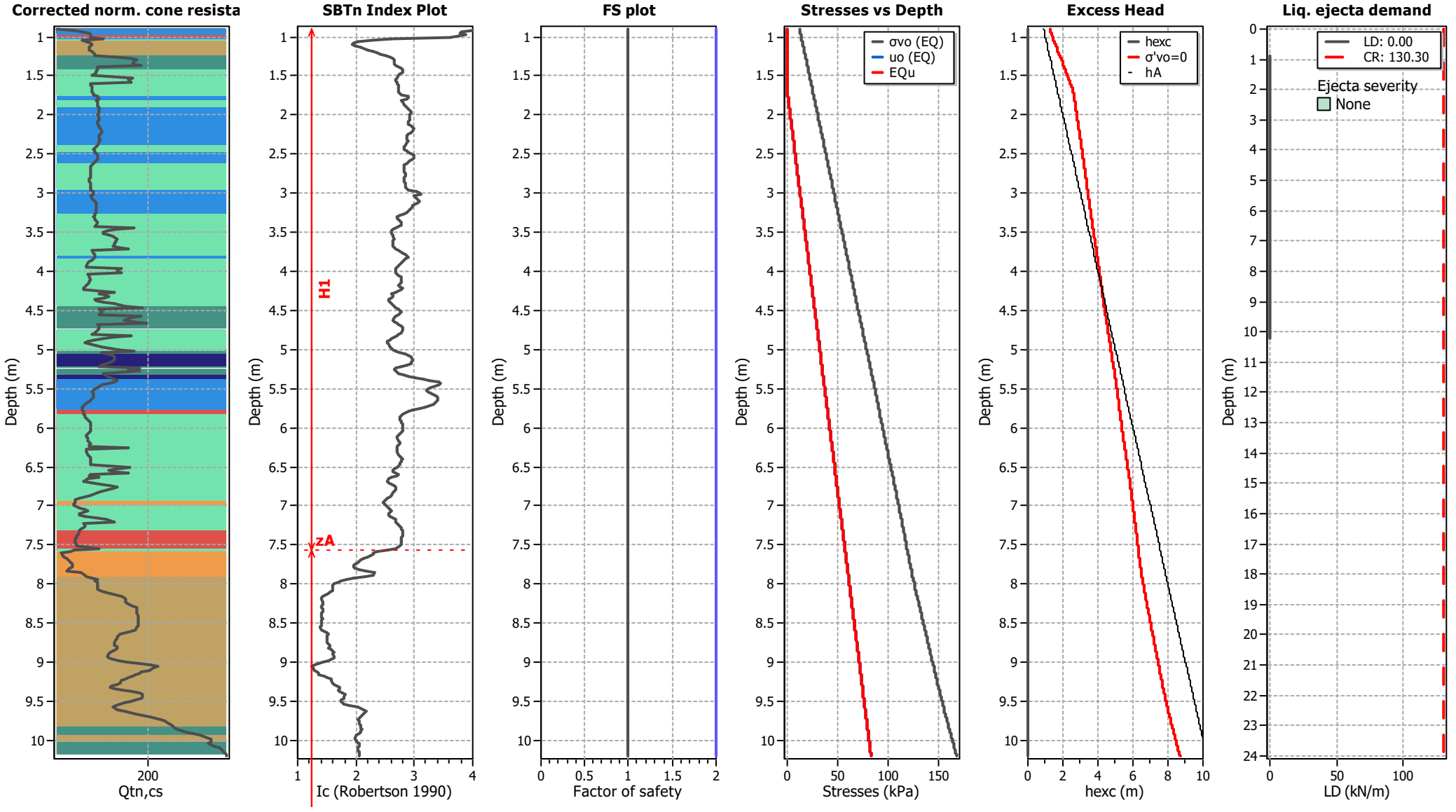
Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

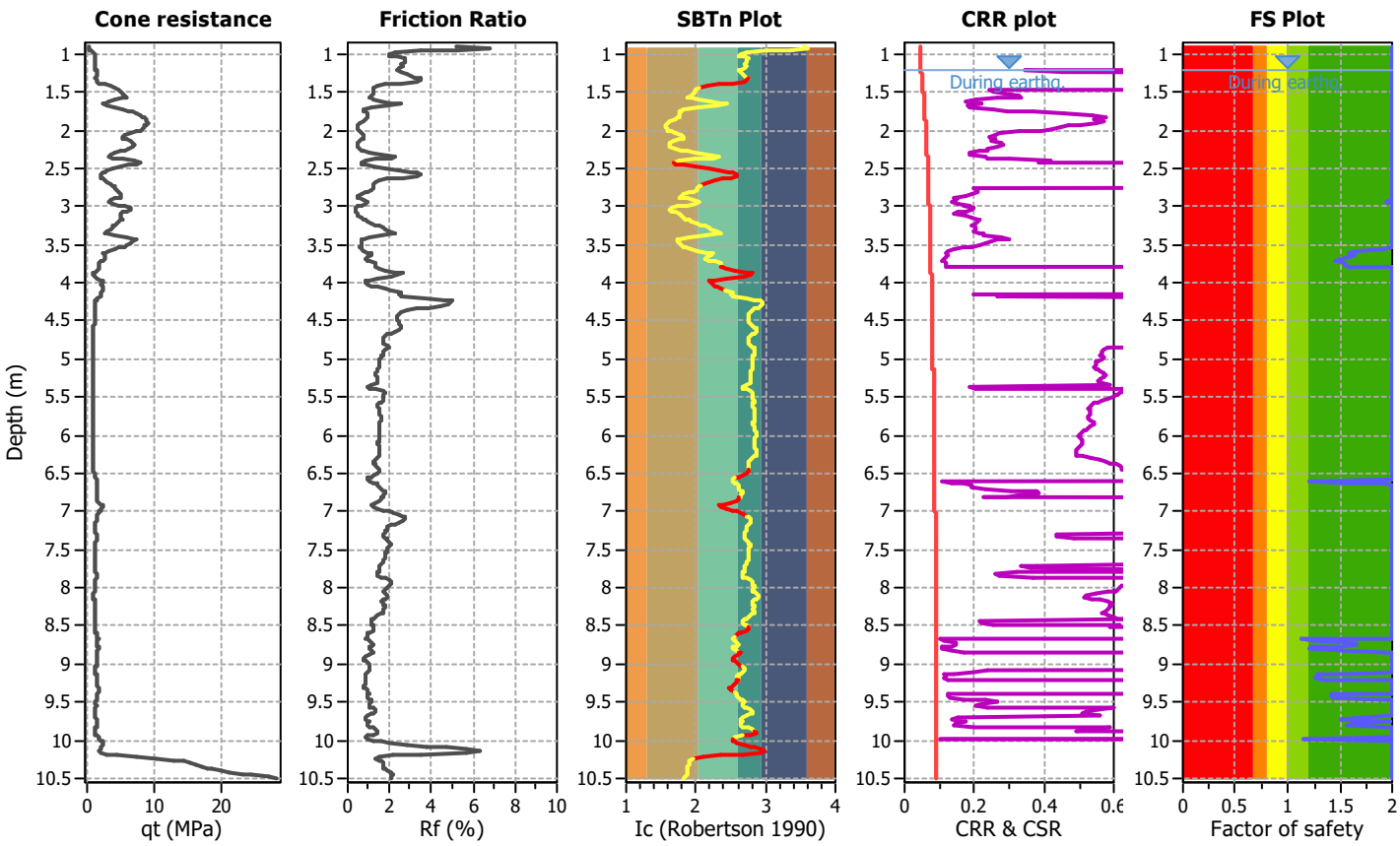
LIQUEFACTION ANALYSIS REPORT

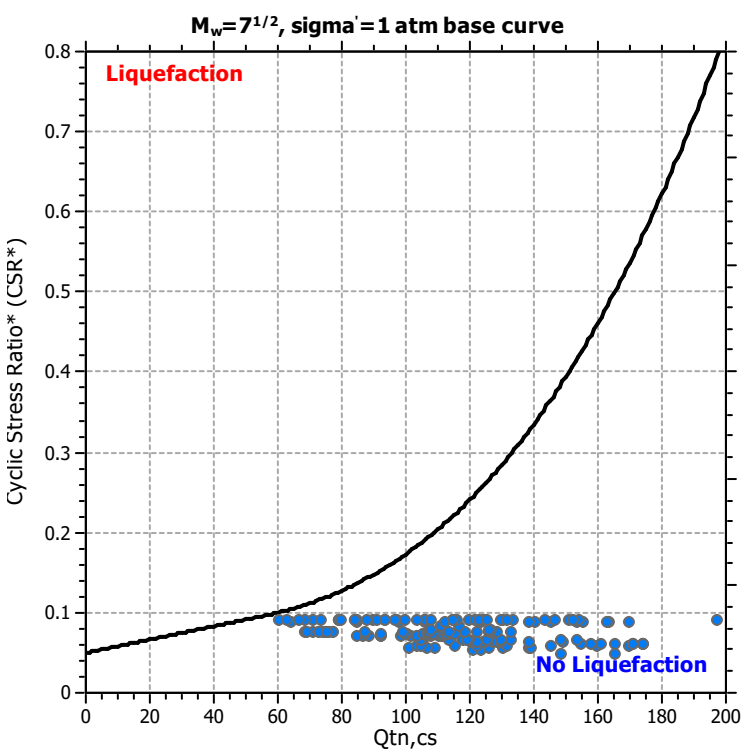
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

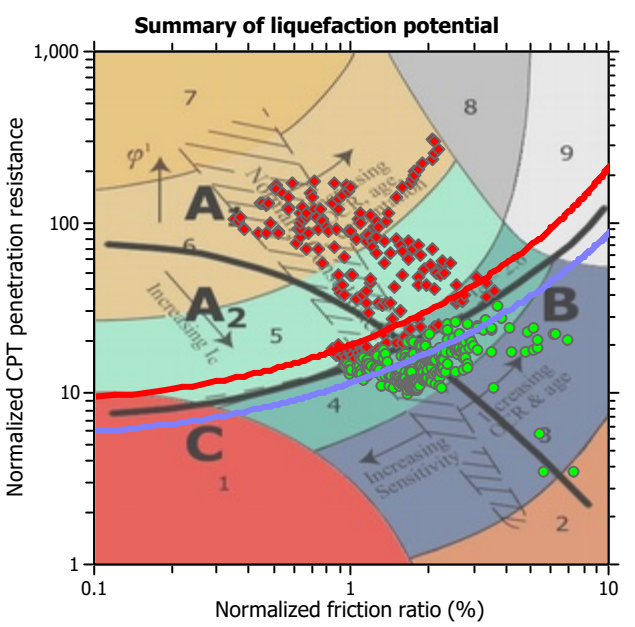
CPT file : CWLP CPT-7L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.20 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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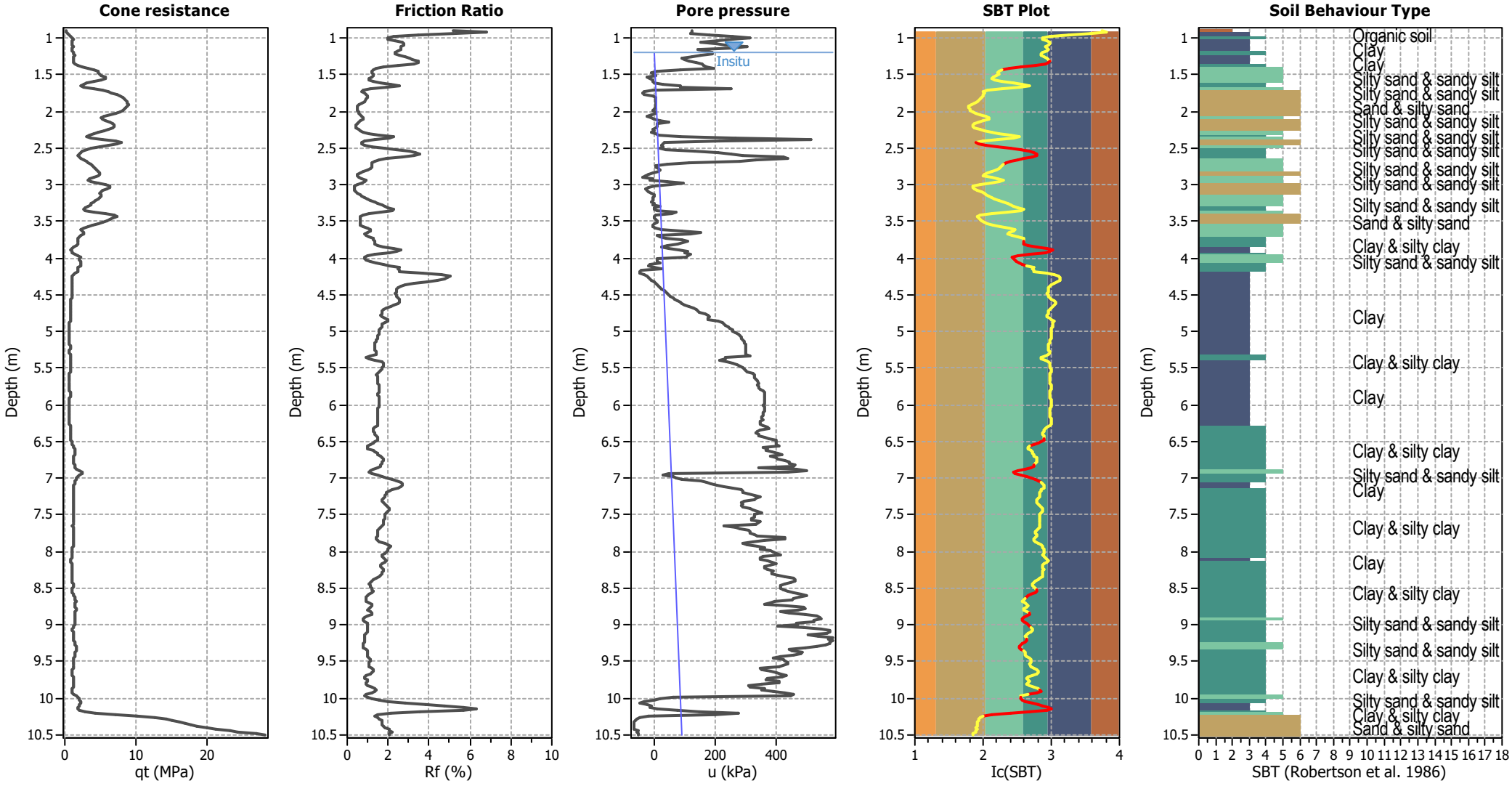
CPT name: CWLP CPT-7L

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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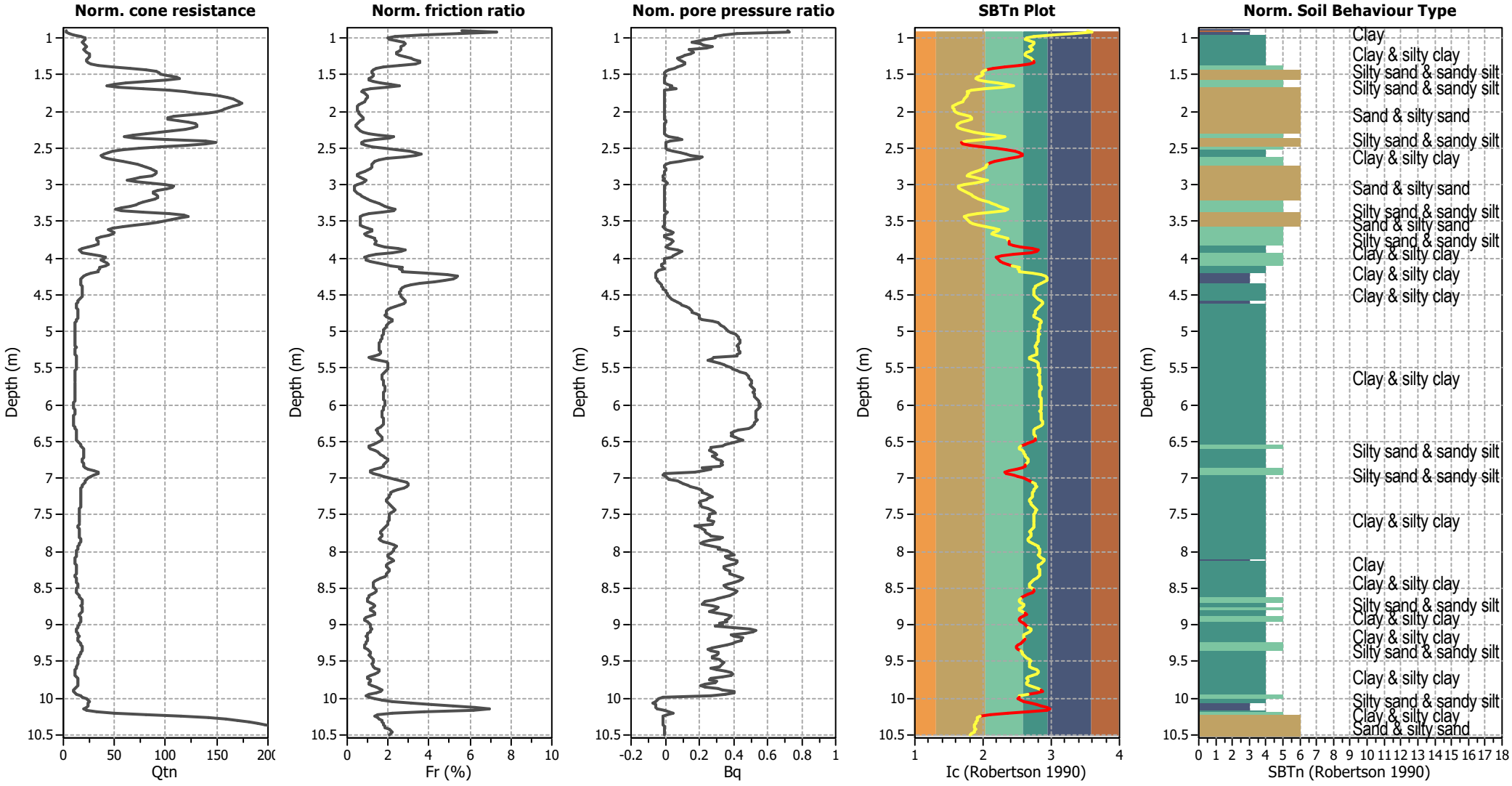
CPT name: CWLP CPT-7L

CPT basic interpretation plots (normalized)



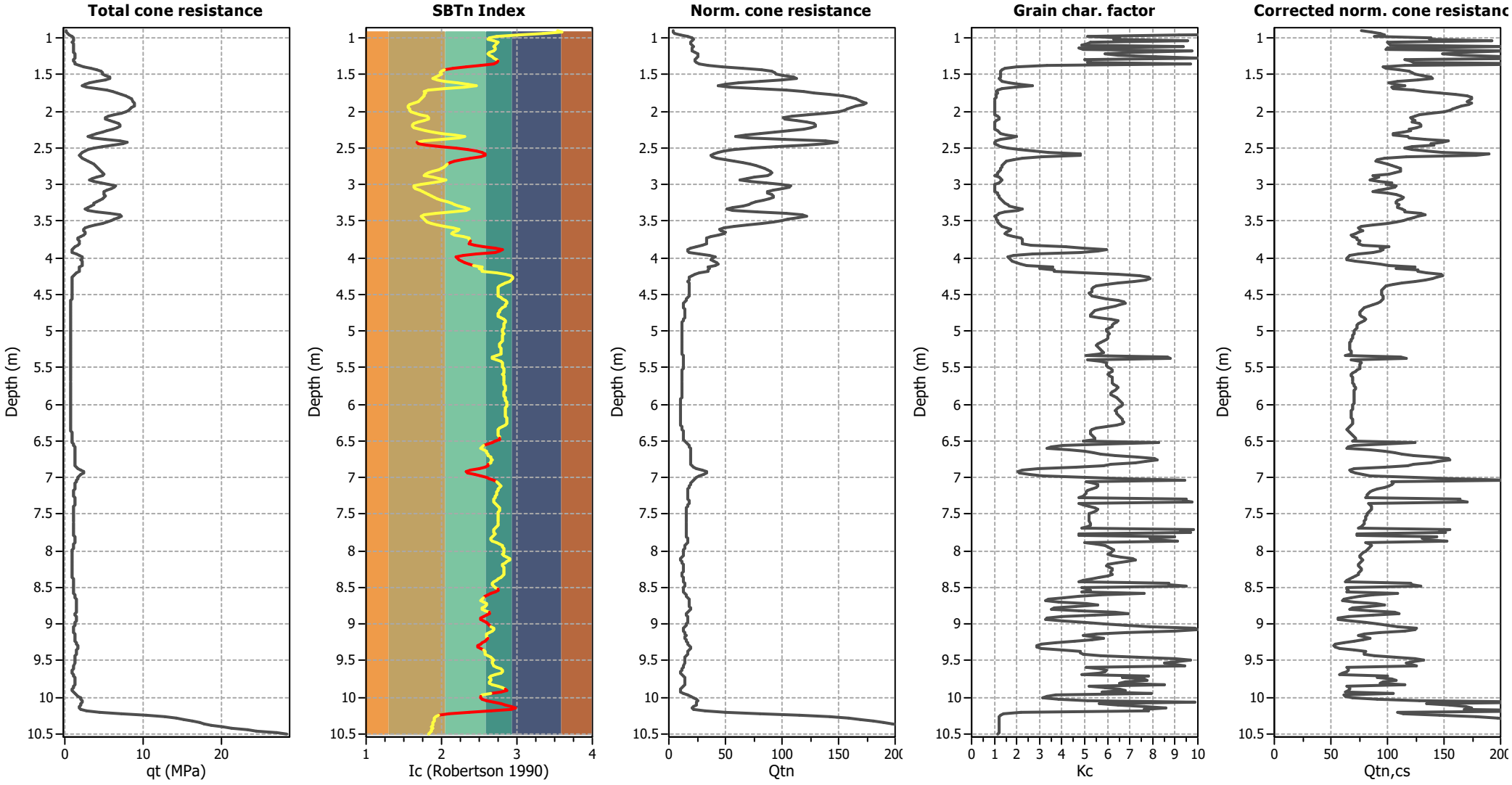
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

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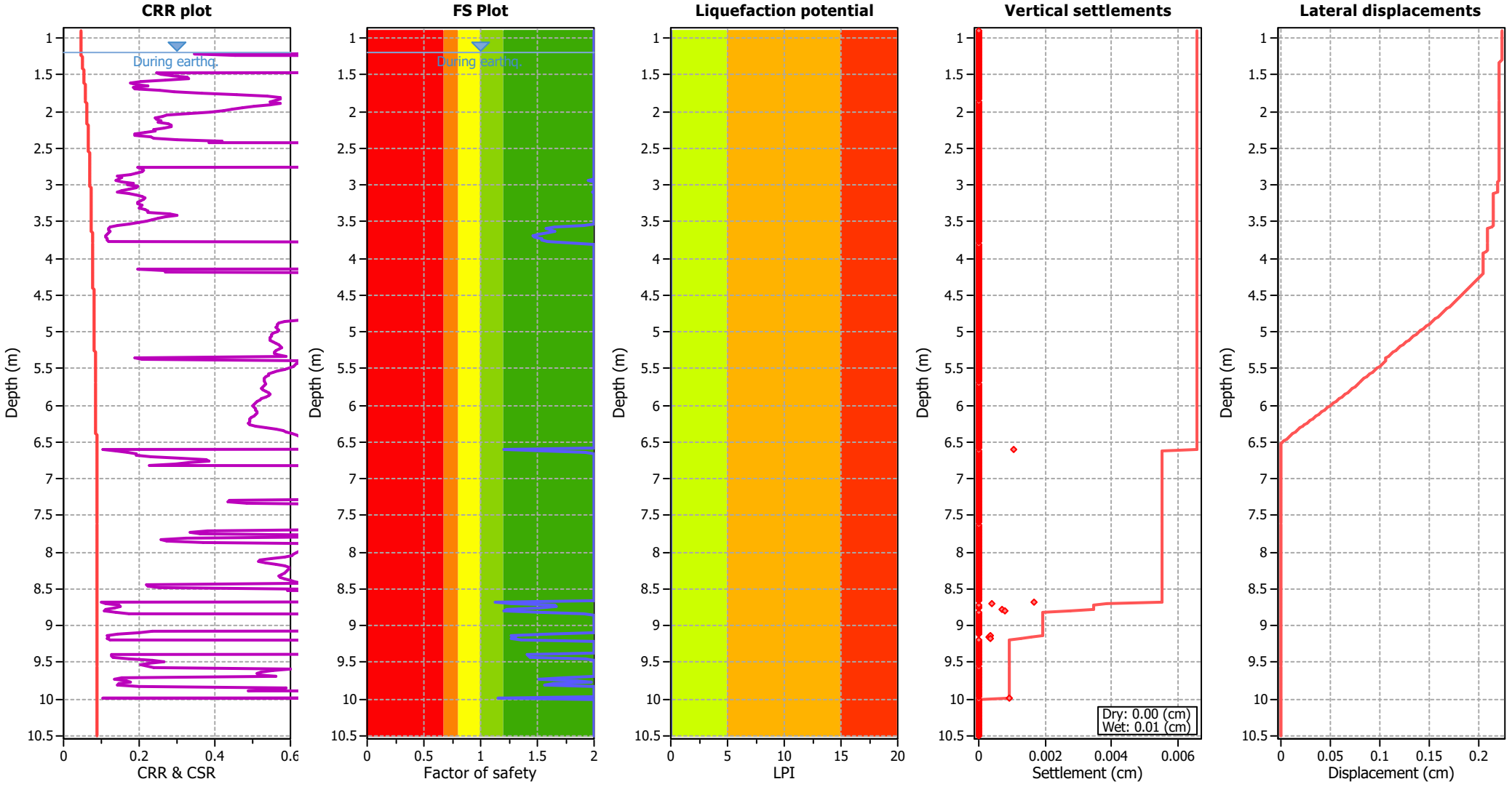
CPT name: CWLP CPT-7L

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

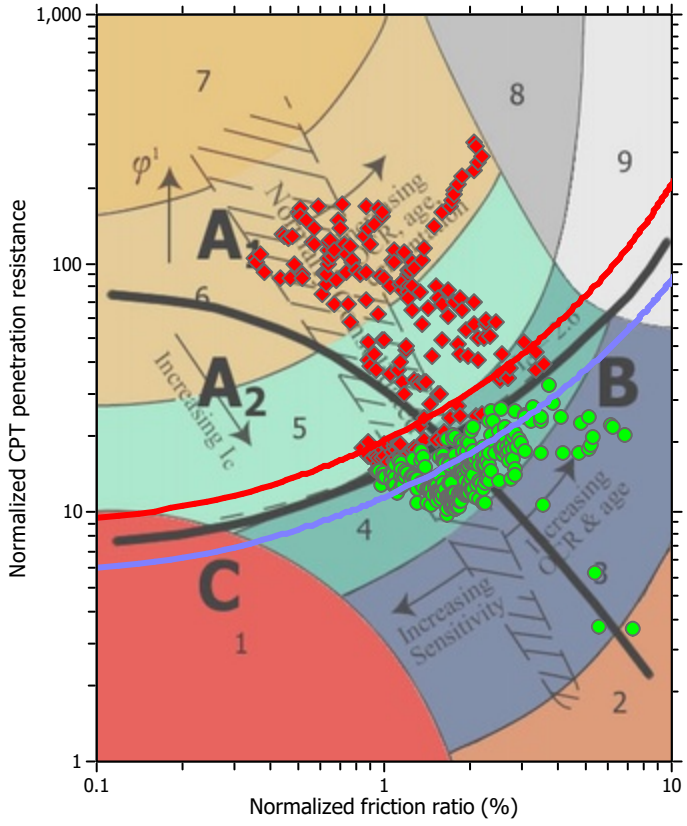
F.S. color scheme

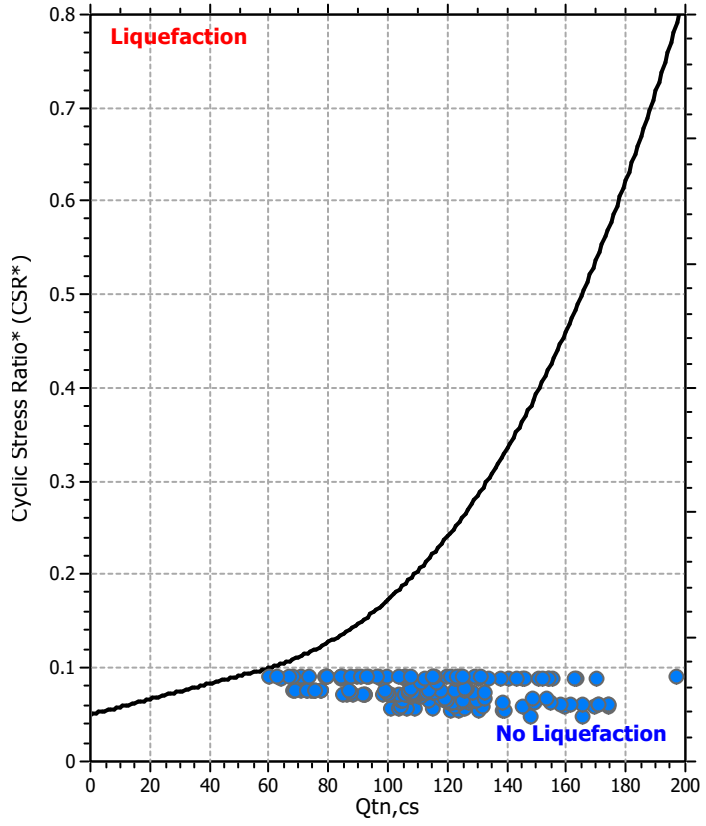
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

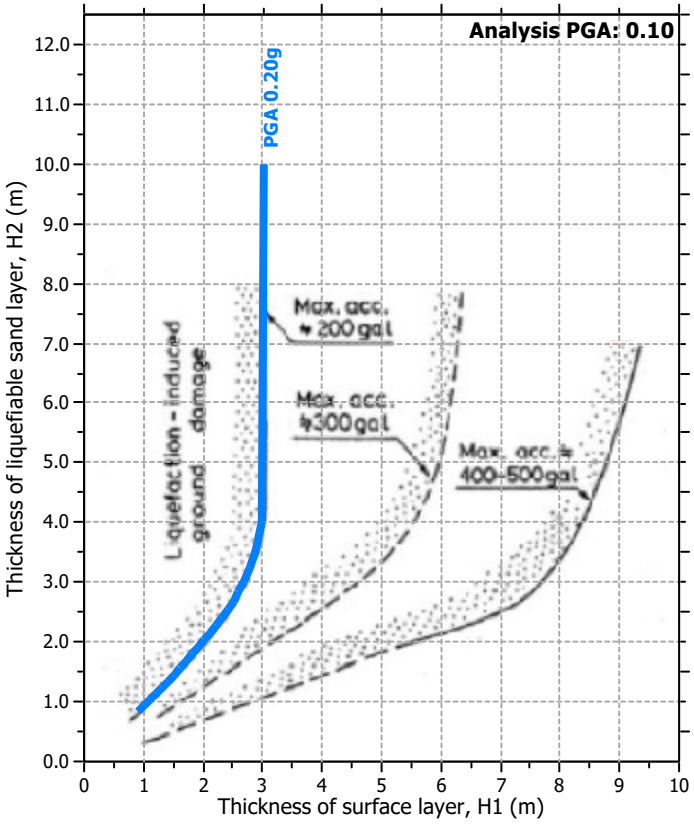
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

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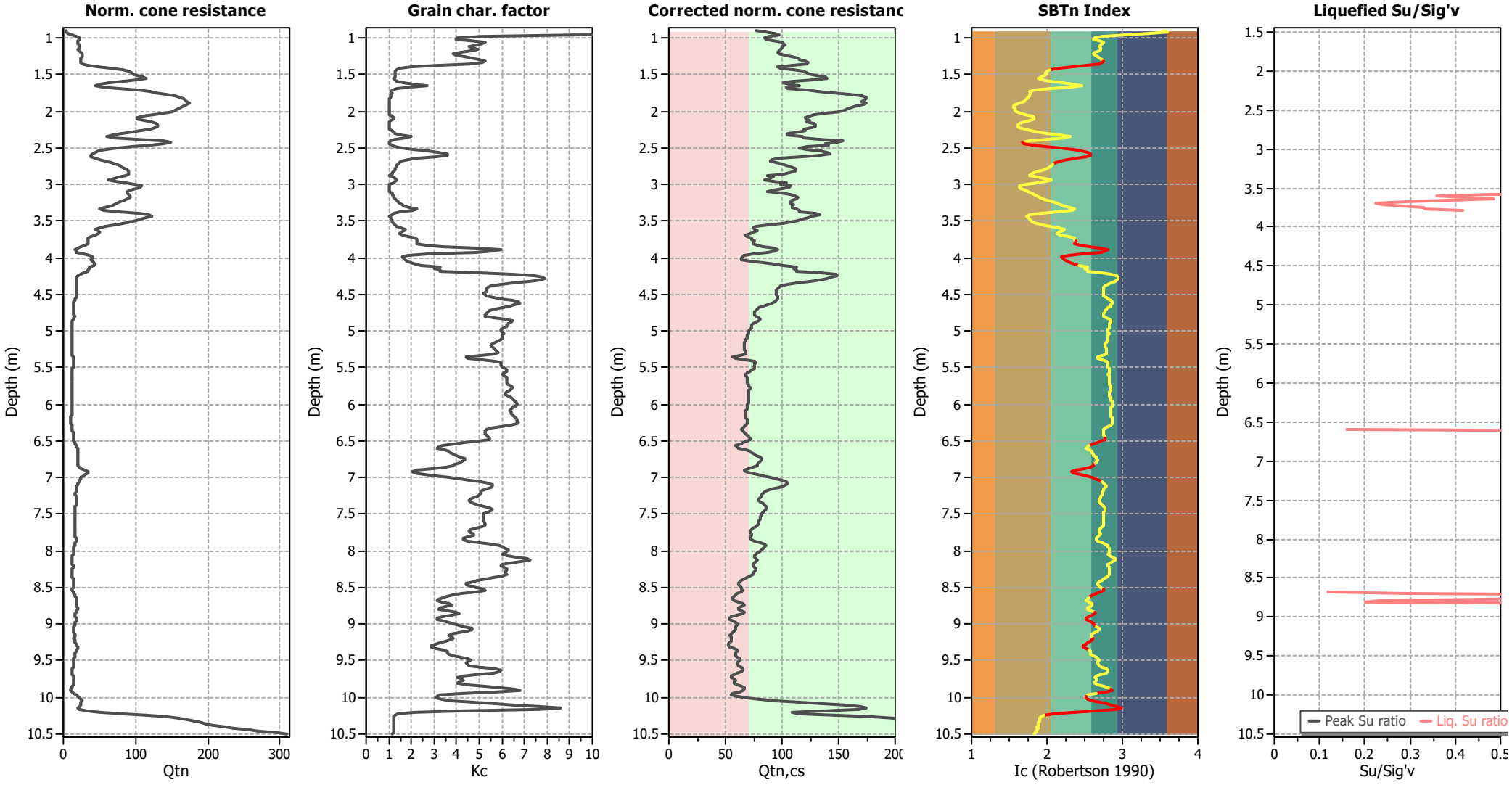
CPT name: CWLP CPT-7L

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

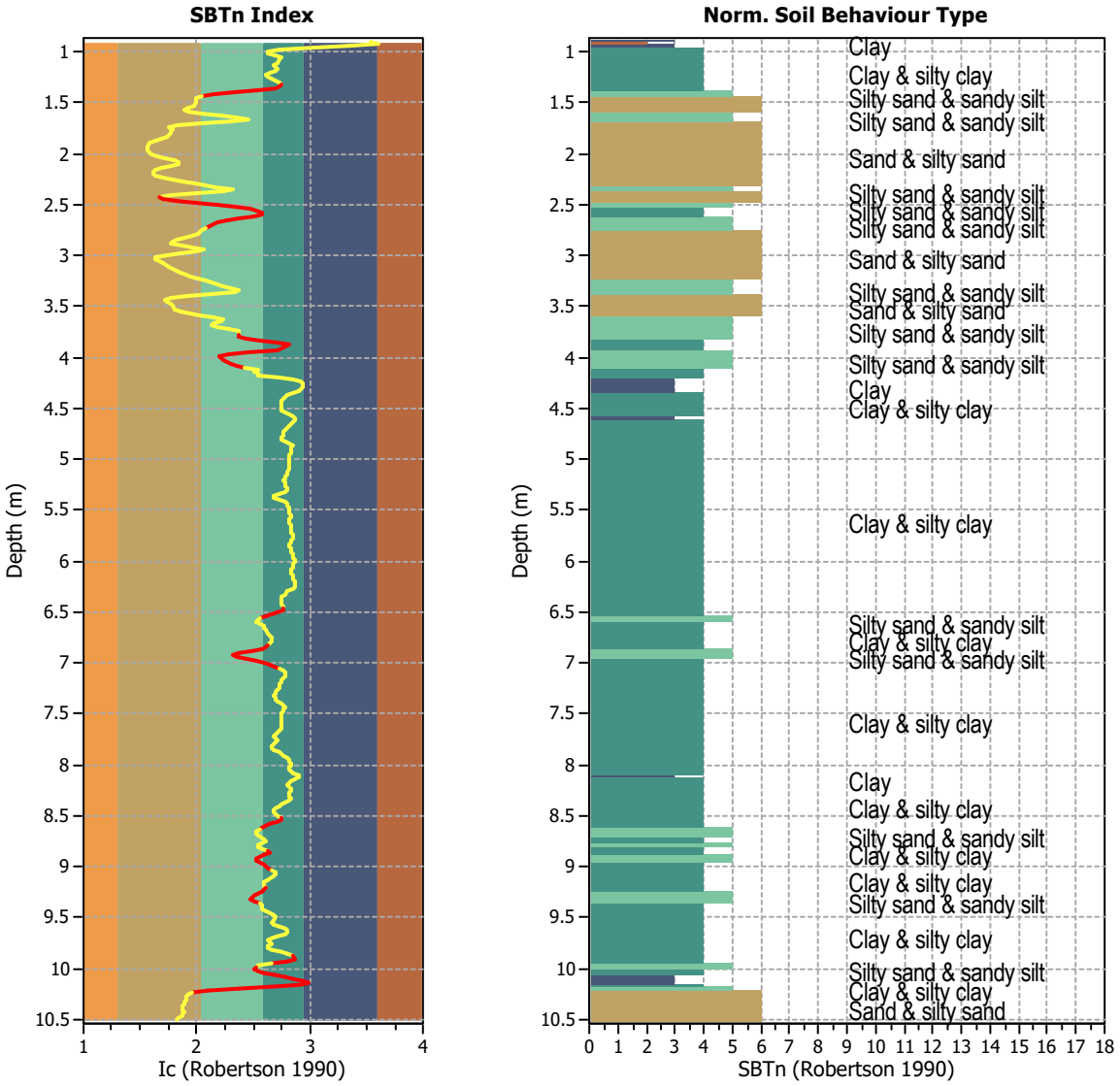
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	481
Total points excluded:	107
Exclusion percentage:	22.25%
Number of layers detected:	17

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	7	Start depth: 1.34 (m)	4	Clay & silty clay
		End depth: 1.46 (m)	6	Sand & silty sand
Transition layer 2	8	Start depth: 2.44 (m)	6	Sand & silty sand
		End depth: 2.58 (m)	4	Clay & silty clay
Transition layer 3	8	Start depth: 2.60 (m)	4	Clay & silty clay
		End depth: 2.74 (m)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 3.80 (m)	5	Silty sand & sandy silt
		End depth: 3.88 (m)	4	Clay & silty clay
Transition layer 5	6	Start depth: 3.88 (m)	4	Clay & silty clay
		End depth: 3.98 (m)	5	Silty sand & sandy silt
Transition layer 6	7	Start depth: 4.00 (m)	5	Silty sand & sandy silt
		End depth: 4.12 (m)	4	Clay & silty clay
Transition layer 7	6	Start depth: 6.48 (m)	4	Clay & silty clay
		End depth: 6.58 (m)	5	Silty sand & sandy silt
Transition layer 8	5	Start depth: 6.84 (m)	4	Clay & silty clay
		End depth: 6.92 (m)	5	Silty sand & sandy silt
Transition layer 9	9	Start depth: 6.92 (m)	5	Silty sand & sandy silt
		End depth: 7.08 (m)	4	Clay & silty clay
Transition layer 10	7	Start depth: 8.54 (m)	4	Clay & silty clay
		End depth: 8.66 (m)	5	Silty sand & sandy silt
Transition layer 11	4	Start depth: 8.86 (m)	4	Clay & silty clay
		End depth: 8.92 (m)	5	Silty sand & sandy silt
Transition layer 12	7	Start depth: 8.94 (m)	5	Silty sand & sandy silt
		End depth: 9.06 (m)	4	Clay & silty clay
Transition layer 13	5	Start depth: 9.22 (m)	4	Clay & silty clay
		End depth: 9.30 (m)	5	Silty sand & sandy silt
Transition layer 14	4	Start depth: 9.32 (m)	5	Silty sand & sandy silt
		End depth: 9.38 (m)	4	Clay & silty clay
Transition layer 15	4	Start depth: 9.90 (m)	4	Clay & silty clay
		End depth: 9.96 (m)	5	Silty sand & sandy silt
Transition layer 16	8	Start depth: 10.00 (m)	5	Silty sand & sandy silt
		End depth: 10.14 (m)	3	Clay
Transition layer 17	7	Start depth: 10.14 (m)	3	Clay
		End depth: 10.26 (m)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.17	9.70	125.20	100.00	14.96
2	0.92	0.17	9.70	125.20	100.00	15.27
3	0.94	0.17	18.70	121.80	84.99	15.70
4	0.96	0.50	18.80	183.70	59.88	16.17
5	0.98	0.90	20.70	259.20	42.61	16.41
6	1.00	1.14	21.40	315.20	36.85	16.55
7	1.02	1.09	22.40	254.50	36.52	16.62
8	1.04	1.01	24.00	208.10	39.90	16.68
9	1.06	0.92	26.70	152.90	43.25	16.75
10	1.08	0.90	28.90	206.70	42.61	16.84
11	1.10	1.14	29.10	237.00	41.34	16.92
12	1.12	1.08	30.90	304.40	39.72	16.93
13	1.14	1.05	28.20	260.40	40.69	16.85
14	1.16	0.99	24.70	142.60	41.55	16.78
15	1.18	0.96	27.50	170.90	40.07	16.81
16	1.20	1.21	28.90	191.50	37.56	16.90
17	1.22	1.31	28.20	190.90	36.00	17.02
18	1.24	1.28	34.40	153.50	36.72	17.13
19	1.26	1.29	37.70	123.60	38.57	17.23
20	1.28	1.25	37.70	92.30	40.42	17.26
21	1.30	1.14	38.70	101.30	41.84	17.26
22	1.32	1.16	39.20	116.80	43.23	17.32
23	1.34	1.20	45.00	138.70	42.42	17.40
24	1.36	1.30	45.20	159.50	40.00	17.47
25	1.38	1.49	43.40	165.10	31.91	17.56
26	1.40	2.40	43.60	171.80	23.29	17.68
27	1.42	3.36	44.40	195.10	17.34	17.89
28	1.44	4.20	54.00	85.90	14.12	18.08
29	1.46	4.84	57.20	8.30	12.88	18.21
30	1.48	4.83	57.10	-8.00	12.66	18.25
31	1.50	4.58	58.80	1.50	12.82	18.33
32	1.52	5.10	67.80	4.70	12.15	18.42
33	1.54	5.88	68.60	-21.80	10.96	18.47
34	1.56	5.92	61.70	-13.40	10.15	18.40
35	1.58	5.51	55.30	-5.70	11.22	18.23
36	1.60	3.89	49.50	-3.50	14.15	18.07
37	1.62	3.02	50.60	-1.00	19.45	17.96
38	1.64	2.50	54.80	29.70	24.44	17.94
39	1.66	2.17	56.60	84.50	28.60	17.92
40	1.68	1.95	56.60	84.50	22.63	17.93
41	1.70	4.04	44.80	256.00	13.74	17.92
42	1.72	5.99	35.90	-6.80	8.71	17.89
43	1.74	5.82	41.30	-31.40	7.32	18.03
44	1.76	6.47	54.40	-36.70	7.72	18.33
45	1.78	7.39	70.80	-31.20	7.56	18.59
46	1.80	7.92	76.60	-5.30	7.38	18.76
47	1.82	8.11	80.90	3.00	7.12	18.83
48	1.84	8.46	82.30	4.70	6.73	18.84

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	8.69	76.00	4.60	6.01	18.79
50	1.88	8.95	67.00	4.70	4.90	18.60
51	1.90	8.98	47.00	2.90	4.14	18.39
52	1.92	8.83	44.50	3.10	3.70	18.20
53	1.94	8.54	43.00	3.20	3.77	18.14
54	1.96	8.33	41.50	0.00	3.93	18.11
55	1.98	8.23	42.80	-3.00	4.08	18.09
56	2.00	7.96	41.10	3.30	4.45	18.07
57	2.02	7.28	41.10	3.70	5.17	18.00
58	2.04	6.20	39.70	-11.30	6.52	17.95
59	2.06	5.42	41.00	-23.50	8.10	17.90
60	2.08	4.98	40.30	-10.30	8.88	17.86
61	2.10	5.16	38.00	-0.90	8.87	17.87
62	2.12	5.51	42.60	21.20	7.35	17.84
63	2.14	6.48	33.60	48.50	5.93	17.79
64	2.16	6.81	29.50	8.20	4.89	17.72
65	2.18	7.08	33.80	8.20	4.59	17.69
66	2.20	6.94	30.10	8.30	4.52	17.68
67	2.22	6.95	28.80	4.30	4.89	17.66
68	2.24	6.22	33.70	-3.60	6.16	17.78
69	2.26	5.33	42.80	1.30	7.71	17.75
70	2.28	4.71	30.60	-8.60	9.81	17.77
71	2.30	4.26	40.80	4.90	12.82	17.84
72	2.32	3.37	56.10	14.90	17.91	18.08
73	2.34	2.85	68.30	85.10	23.17	18.27
74	2.36	2.82	80.10	268.10	20.19	18.41
75	2.38	4.93	70.80	514.80	12.70	18.52
76	2.40	7.74	60.40	213.50	7.44	18.49
77	2.42	8.49	55.60	34.70	5.66	18.39
78	2.44	7.69	48.90	30.30	6.15	18.29
79	2.46	5.96	49.70	22.70	8.45	18.28
80	2.48	4.76	63.80	30.90	12.63	18.28
81	2.50	3.73	63.00	20.70	18.54	18.35
82	2.52	2.74	77.10	39.50	24.19	18.33
83	2.54	2.46	75.80	132.50	29.34	18.31
84	2.56	2.23	73.60	211.50	31.99	18.26
85	2.58	1.99	74.60	253.80	34.50	18.18
86	2.60	1.77	67.80	291.00	34.49	18.01
87	2.62	1.84	47.30	427.50	31.29	17.81
88	2.64	2.10	42.70	440.20	25.54	17.60
89	2.66	2.50	36.70	337.10	21.56	17.58
90	2.68	2.86	39.40	282.10	18.28	17.62
91	2.70	3.38	41.40	113.50	16.28	17.74
92	2.72	3.76	43.70	41.60	15.00	17.85
93	2.74	3.93	47.40	4.60	14.33	17.95
94	2.76	4.16	50.30	7.20	13.84	18.02
95	2.78	4.35	50.20	16.80	13.14	18.04
96	2.80	4.46	48.00	20.60	11.72	17.93

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	4.67	34.90	13.40	10.21	17.76
98	2.84	4.86	30.70	-2.90	8.58	17.50
99	2.86	5.03	24.30	-17.50	7.75	17.31
100	2.88	4.84	20.90	-27.40	5.00	17.16
101	2.90	4.49	21.60	-38.20	9.93	17.17
102	2.92	2.66	29.40	-3.70	11.94	17.23
103	2.94	3.54	27.60	-13.60	14.56	17.35
104	2.96	3.45	32.90	43.30	12.60	17.45
105	2.98	4.01	33.30	93.70	9.55	17.52
106	3.00	6.28	26.90	55.30	5.00	17.44
107	3.02	6.51	21.00	1.10	5.02	17.34
108	3.04	6.39	23.00	-18.70	4.96	17.24
109	3.06	5.96	21.70	-30.00	5.00	17.18
110	3.08	5.44	18.80	-23.80	5.00	17.10
111	3.10	4.65	20.50	-18.80	5.00	17.13
112	3.12	4.93	25.00	-8.10	7.98	17.31
113	3.14	5.14	30.30	1.50	8.65	17.58
114	3.16	5.08	39.60	1.40	9.41	17.78
115	3.18	5.03	42.30	-5.40	10.43	17.92
116	3.20	4.76	46.00	-4.90	11.44	17.98
117	3.22	4.42	48.30	-5.70	13.20	18.03
118	3.24	3.84	53.00	-10.80	15.13	18.07
119	3.26	3.67	56.30	1.60	16.90	18.15
120	3.28	3.77	61.70	-3.60	18.41	18.23
121	3.30	3.43	67.80	20.50	19.91	18.18
122	3.32	2.84	53.20	-1.80	22.47	18.08
123	3.34	2.52	54.80	0.40	25.29	18.06
124	3.36	2.51	70.50	11.60	23.61	18.20
125	3.38	3.74	69.30	70.80	16.95	18.35
126	3.40	5.80	59.10	59.50	10.78	18.37
127	3.42	7.61	51.70	6.70	7.63	18.27
128	3.44	7.38	45.10	1.80	6.60	18.16
129	3.46	6.83	42.50	2.60	7.00	18.04
130	3.48	6.13	40.70	4.30	7.57	17.93
131	3.50	5.79	36.00	8.50	7.96	17.82
132	3.52	5.66	34.00	11.90	8.43	17.65
133	3.54	4.68	28.50	1.00	9.42	17.48
134	3.56	3.93	26.30	-5.80	11.32	17.25
135	3.58	3.10	22.80	-3.60	13.83	17.07
136	3.60	2.48	22.20	3.50	17.56	17.05
137	3.62	2.13	29.70	26.50	20.15	17.10
138	3.64	2.34	28.70	89.70	19.64	17.17
139	3.66	2.78	26.50	153.60	17.56	17.09
140	3.68	2.67	21.90	118.70	16.77	16.94
141	3.70	2.32	19.20	9.60	18.39	16.80
142	3.72	1.91	21.40	18.10	21.87	16.75
143	3.74	1.62	22.40	40.90	25.02	16.77
144	3.76	1.70	23.00	89.60	25.24	16.76

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	1.84	21.10	109.70	25.44	16.86
146	3.80	1.74	28.00	78.50	25.30	16.82
147	3.82	1.66	20.50	43.80	28.18	16.81
148	3.84	1.34	22.70	26.60	33.45	16.67
149	3.86	0.86	24.60	49.00	41.48	16.64
150	3.88	0.86	23.60	82.90	46.63	16.55
151	3.90	0.89	20.70	108.30	44.70	16.51
152	3.92	0.94	21.60	103.00	40.89	16.45
153	3.94	1.07	18.60	120.10	28.81	16.58
154	3.96	2.29	19.80	109.60	21.80	16.63
155	3.98	2.31	19.20	106.80	18.89	16.68
156	4.00	2.02	18.20	12.00	19.52	16.64
157	4.02	2.02	18.20	12.00	20.37	16.60
158	4.04	2.02	18.20	12.00	21.20	16.93
159	4.06	2.40	34.90	18.10	22.83	17.30
160	4.08	2.32	43.70	-12.80	24.65	17.56
161	4.10	2.12	43.10	-18.20	27.10	17.62
162	4.12	1.98	44.30	-0.40	32.35	17.66
163	4.14	1.41	54.90	25.90	31.11	17.65
164	4.16	2.32	40.50	-42.60	32.54	17.64
165	4.18	1.73	45.30	-48.60	32.54	17.64
166	4.20	1.42	54.40	-49.00	41.80	17.70
167	4.22	1.21	60.40	-35.30	48.76	17.70
168	4.24	1.07	54.00	-26.00	52.98	17.62
169	4.26	1.00	49.10	-20.70	54.52	17.48
170	4.28	0.96	45.70	-15.50	54.89	17.39
171	4.30	0.96	44.50	-10.40	53.94	17.27
172	4.32	0.94	35.70	-0.60	51.86	17.12
173	4.34	0.95	30.80	4.20	48.86	16.93
174	4.36	0.97	27.20	9.10	46.37	16.80
175	4.38	0.98	25.40	13.40	44.55	16.70
176	4.40	0.99	23.80	18.10	43.64	16.66
177	4.42	0.99	24.30	22.80	43.39	16.65
178	4.44	0.98	24.20	32.40	43.40	16.62
179	4.46	0.96	22.40	37.90	43.34	16.61
180	4.48	0.98	23.70	43.60	43.00	16.61
181	4.50	1.01	24.10	47.40	43.06	16.64
182	4.52	0.98	24.10	52.20	43.53	16.63
183	4.54	0.94	23.50	61.10	44.86	16.59
184	4.56	0.88	22.50	66.70	46.54	16.52
185	4.58	0.81	21.10	75.70	48.70	16.44
186	4.60	0.75	20.60	84.30	50.02	16.35
187	4.62	0.74	18.80	93.40	50.25	16.26
188	4.64	0.74	17.10	101.10	49.22	16.15
189	4.66	0.73	15.50	117.50	48.18	16.04
190	4.68	0.72	14.30	127.50	46.89	15.95
191	4.70	0.74	13.60	137.00	45.38	15.91
192	4.72	0.77	13.60	144.90	44.11	15.91

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.78	13.80	150.90	43.75	15.91
194	4.76	0.76	13.60	168.20	43.57	15.90
195	4.78	0.77	13.20	178.40	43.12	15.89
196	4.80	0.80	13.50	179.90	43.21	15.93
197	4.82	0.78	14.90	178.20	44.92	15.99
198	4.84	0.71	15.70	177.80	47.35	15.97
199	4.86	0.65	13.40	210.60	48.95	15.88
200	4.88	0.65	12.40	223.50	48.50	15.75
201	4.90	0.65	11.70	228.90	47.97	15.69
202	4.92	0.64	11.50	235.40	47.70	15.65
203	4.94	0.64	11.30	242.60	47.76	15.64
204	4.96	0.64	11.40	249.90	47.14	15.62
205	4.98	0.65	10.80	257.50	46.54	15.59
206	5.00	0.65	10.40	260.90	46.55	15.55
207	5.02	0.62	10.40	267.30	46.92	15.53
208	5.04	0.62	10.30	277.60	47.19	15.51
209	5.06	0.62	10.10	281.90	46.92	15.49
210	5.08	0.62	9.80	285.90	46.76	15.47
211	5.10	0.62	9.80	285.90	46.77	15.45
212	5.12	0.61	9.70	293.30	46.48	15.44
213	5.14	0.62	9.50	296.30	45.92	15.43
214	5.16	0.64	9.40	297.80	45.17	15.42
215	5.18	0.64	9.20	301.10	44.71	15.43
216	5.20	0.66	9.60	300.60	44.50	15.44
217	5.22	0.66	9.70	302.90	44.56	15.46
218	5.24	0.65	9.50	301.50	44.86	15.45
219	5.26	0.64	9.50	301.00	45.28	15.44
220	5.28	0.64	9.70	300.40	45.59	15.45
221	5.30	0.64	9.70	300.40	45.76	15.46
222	5.32	0.64	9.70	300.40	45.15	15.47
223	5.34	0.68	9.90	315.30	42.08	15.34
224	5.36	0.75	6.10	236.20	39.11	15.19
225	5.38	0.75	6.10	236.20	39.20	15.34
226	5.40	0.78	12.80	214.30	42.42	15.64
227	5.42	0.72	13.50	238.20	45.33	15.87
228	5.44	0.72	13.60	256.50	46.36	15.87
229	5.46	0.72	13.10	270.80	46.36	15.85
230	5.48	0.71	13.00	281.30	46.62	15.84
231	5.50	0.69	13.30	293.70	46.89	15.82
232	5.52	0.69	12.50	297.30	47.35	15.78
233	5.54	0.66	11.90	301.70	47.53	15.70
234	5.56	0.64	11.10	307.60	47.56	15.62
235	5.58	0.64	10.30	326.80	47.21	15.54
236	5.60	0.63	9.90	331.50	46.88	15.50
237	5.62	0.63	9.90	331.50	47.16	15.49
238	5.64	0.62	10.10	330.80	47.55	15.50
239	5.66	0.62	10.20	336.10	47.78	15.51
240	5.68	0.63	10.20	341.10	47.73	15.52

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.63	10.40	343.30	47.65	15.53
242	5.72	0.63	10.40	339.70	48.09	15.55
243	5.74	0.62	10.70	343.00	48.55	15.56
244	5.76	0.62	10.90	346.70	48.90	15.58
245	5.78	0.62	10.90	351.70	48.67	15.59
246	5.80	0.63	10.80	359.90	48.14	15.59
247	5.82	0.65	10.90	361.60	47.63	15.60
248	5.84	0.65	10.90	366.30	47.29	15.60
249	5.86	0.65	10.80	365.40	47.48	15.60
250	5.88	0.64	10.80	362.00	47.90	15.58
251	5.90	0.63	10.60	361.70	48.45	15.57
252	5.92	0.62	10.60	362.20	48.75	15.56
253	5.94	0.62	10.60	364.50	49.03	15.55
254	5.96	0.61	10.40	362.00	49.33	15.54
255	5.98	0.61	10.40	362.40	49.59	15.53
256	6.00	0.61	10.40	360.00	49.58	15.52
257	6.02	0.61	10.20	365.00	49.40	15.52
258	6.04	0.62	10.30	364.90	48.95	15.51
259	6.06	0.63	10.10	365.30	48.65	15.51
260	6.08	0.63	10.10	362.60	48.32	15.51
261	6.10	0.63	10.10	360.80	48.42	15.51
262	6.12	0.63	10.20	361.00	48.46	15.51
263	6.14	0.63	10.00	358.00	48.75	15.50
264	6.16	0.62	9.90	353.20	49.06	15.48
265	6.18	0.61	10.00	353.90	49.42	15.49
266	6.20	0.62	10.20	357.00	49.60	15.50
267	6.22	0.62	10.10	351.20	49.69	15.51
268	6.24	0.61	10.20	349.40	49.83	15.50
269	6.26	0.61	10.20	349.40	49.70	15.52
270	6.28	0.63	10.40	359.00	48.60	15.53
271	6.30	0.67	10.20	373.90	46.46	15.54
272	6.32	0.73	9.80	379.60	44.55	15.54
273	6.34	0.75	10.00	350.30	43.43	15.56
274	6.36	0.76	10.40	341.50	43.21	15.61
275	6.38	0.78	10.80	333.20	43.10	15.68
276	6.40	0.81	11.90	345.20	43.10	15.74
277	6.42	0.80	11.90	342.80	43.50	15.82
278	6.44	0.80	13.10	362.00	43.87	15.86
279	6.46	0.81	13.30	377.60	44.09	15.90
280	6.48	0.81	13.10	400.60	44.00	15.90
281	6.50	0.81	13.10	400.60	41.58	15.90
282	6.52	0.98	12.40	400.30	38.69	15.90
283	6.54	1.04	12.10	404.40	36.16	15.95
284	6.56	1.08	13.50	411.80	33.24	15.86
285	6.58	1.22	8.80	361.30	32.27	15.97
286	6.60	1.27	14.80	372.60	31.84	16.09
287	6.62	1.27	16.90	368.00	33.68	16.33
288	6.64	1.24	18.20	387.60	34.76	16.43

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.25	19.50	408.80	35.34	16.50
290	6.68	1.26	20.00	422.00	35.78	16.54
291	6.70	1.25	20.60	383.70	36.56	16.59
292	6.72	1.22	22.30	403.20	37.71	16.65
293	6.74	1.20	23.50	406.30	38.53	16.69
294	6.76	1.20	23.10	432.50	38.66	16.68
295	6.78	1.19	22.00	444.40	38.11	16.64
296	6.80	1.21	20.90	443.00	37.61	16.64
297	6.82	1.26	22.90	466.30	36.38	16.65
298	6.84	1.35	21.70	458.00	35.90	16.67
299	6.86	1.31	21.40	345.50	34.12	16.66
300	6.88	1.47	21.20	471.60	30.34	16.71
301	6.90	1.98	21.60	503.10	25.42	16.87
302	6.92	2.54	26.00	441.40	23.57	17.05
303	6.94	2.37	29.40	49.60	24.34	17.18
304	6.96	2.12	30.30	27.90	28.00	17.20
305	6.98	1.77	31.70	63.20	31.49	17.19
306	7.00	1.66	32.40	71.50	34.78	17.20
307	7.02	1.58	34.00	89.00	37.25	17.24
308	7.04	1.46	37.20	152.40	39.82	17.27
309	7.06	1.37	37.80	172.20	42.18	17.28
310	7.08	1.30	36.60	186.00	43.65	17.23
311	7.10	1.24	34.50	207.30	44.64	17.17
312	7.12	1.20	33.70	227.70	44.82	17.09
313	7.14	1.18	30.30	259.30	44.52	16.98
314	7.16	1.14	26.40	285.20	43.34	16.84
315	7.18	1.15	23.70	291.20	42.67	16.72
316	7.20	1.12	22.60	289.90	42.10	16.64
317	7.22	1.11	21.60	311.20	42.17	16.59
318	7.24	1.10	21.30	328.20	42.01	16.58
319	7.26	1.11	21.90	350.10	41.52	16.58
320	7.28	1.15	21.20	337.30	40.60	16.58
321	7.30	1.19	20.80	331.60	39.86	16.57
322	7.32	1.19	21.00	298.10	39.72	16.60
323	7.34	1.21	22.80	287.50	40.08	16.64
324	7.36	1.20	22.70	292.40	40.74	16.68
325	7.38	1.18	23.70	286.90	41.64	16.69
326	7.40	1.14	23.80	291.90	42.91	16.70
327	7.42	1.09	23.70	317.40	44.11	16.67
328	7.44	1.04	22.80	324.80	44.77	16.64
329	7.46	1.05	22.60	339.80	44.39	16.59
330	7.48	1.07	21.10	354.10	43.68	16.57
331	7.50	1.09	21.30	331.00	43.00	16.56
332	7.52	1.11	21.60	328.70	42.85	16.56
333	7.54	1.09	20.80	332.00	42.78	16.55
334	7.56	1.09	20.80	319.00	42.80	16.53
335	7.58	1.09	20.80	319.00	42.73	16.53
336	7.60	1.09	20.50	349.20	42.87	16.49

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.05	19.20	336.00	43.21	16.45
338	7.64	1.05	19.00	230.20	43.29	16.41
339	7.66	1.06	18.60	268.40	42.61	16.39
340	7.68	1.10	17.90	282.90	41.32	16.37
341	7.70	1.14	17.90	309.20	40.13	16.37
342	7.72	1.16	17.70	316.70	39.62	16.35
343	7.74	1.13	16.90	316.90	40.00	16.34
344	7.76	1.09	17.60	330.70	40.78	16.34
345	7.78	1.09	18.10	341.30	40.53	16.35
346	7.80	1.15	17.20	430.20	39.42	16.36
347	7.82	1.20	17.50	428.90	38.32	16.39
348	7.84	1.23	18.60	366.30	38.36	16.45
349	7.86	1.23	20.10	326.90	39.48	16.54
350	7.88	1.20	21.90	290.10	42.06	16.64
351	7.90	1.09	24.80	308.80	44.33	16.67
352	7.92	1.06	23.10	337.90	46.22	16.66
353	7.94	1.02	22.60	365.20	46.68	16.56
354	7.96	0.96	19.90	351.00	47.39	16.49
355	7.98	0.94	19.90	383.80	47.88	16.42
356	8.00	0.93	19.50	392.80	47.69	16.38
357	8.02	0.94	18.00	400.20	47.44	16.33
358	8.04	0.92	17.40	414.60	46.80	16.26
359	8.06	0.93	16.20	359.50	47.60	16.20
360	8.08	0.85	16.20	349.70	49.41	16.15
361	8.10	0.78	16.10	351.00	51.67	16.14
362	8.12	0.79	16.50	374.40	52.17	16.15
363	8.14	0.83	16.80	386.10	50.40	16.16
364	8.16	0.88	15.60	400.10	48.38	16.16
365	8.18	0.91	15.90	385.10	46.78	16.17
366	8.20	0.95	16.40	362.00	46.48	16.21
367	8.22	0.94	17.20	365.40	47.00	16.25
368	8.24	0.92	17.80	372.50	47.73	16.28
369	8.26	0.92	17.80	392.40	47.75	16.27
370	8.28	0.93	16.50	389.00	47.47	16.23
371	8.30	0.91	16.30	388.30	47.48	16.19
372	8.32	0.88	16.10	405.80	47.68	16.16
373	8.34	0.89	15.40	429.70	46.74	16.11
374	8.36	0.93	14.10	460.40	44.89	16.04
375	8.38	0.95	13.00	464.20	43.36	15.98
376	8.40	0.95	13.00	464.20	41.76	15.92
377	8.42	1.01	11.70	450.70	40.54	15.91
378	8.44	1.06	12.30	432.90	39.14	15.92
379	8.46	1.10	12.80	417.60	39.13	15.96
380	8.48	1.06	13.00	415.80	39.87	15.95
381	8.50	0.99	12.30	417.90	41.40	15.93
382	8.52	0.95	12.60	426.30	42.92	15.91
383	8.54	0.92	12.90	439.90	43.14	15.92
384	8.56	0.97	12.60	461.40	41.26	15.95

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	1.12	12.90	485.50	38.05	15.96
386	8.60	1.21	12.10	503.40	35.73	15.97
387	8.62	1.23	12.10	481.20	34.39	15.97
388	8.64	1.28	12.30	457.60	33.28	16.01
389	8.66	1.41	13.00	455.30	32.05	16.09
390	8.68	1.49	13.80	396.30	31.74	16.20
391	8.70	1.46	15.60	381.80	32.90	16.31
392	8.72	1.39	17.40	363.60	34.84	16.40
393	8.74	1.34	18.50	438.00	35.55	16.43
394	8.76	1.38	16.80	492.20	34.22	16.41
395	8.78	1.52	15.90	500.30	32.48	16.36
396	8.80	1.52	15.70	476.40	32.30	16.35
397	8.82	1.41	16.40	418.80	34.37	16.39
398	8.84	1.30	18.50	445.70	36.60	16.37
399	8.86	1.22	16.00	495.80	37.25	16.29
400	8.88	1.23	13.40	534.90	35.40	16.10
401	8.90	1.30	11.20	545.90	33.13	15.96
402	8.92	1.35	11.00	552.40	31.90	15.91
403	8.94	1.34	11.50	526.20	31.78	15.92
404	8.96	1.34	11.50	526.20	33.24	16.01
405	8.98	1.27	14.10	468.90	34.78	16.08
406	9.00	1.23	14.10	476.30	35.95	16.10
407	9.02	1.25	12.70	407.20	37.13	16.02
408	9.04	1.06	11.90	491.80	38.35	15.91
409	9.06	1.00	11.40	552.20	40.19	15.82
410	9.08	0.98	10.60	578.50	40.28	15.77
411	9.10	1.00	10.60	578.00	39.42	15.76
412	9.12	1.07	10.90	570.20	37.18	15.77
413	9.14	1.21	10.20	506.30	35.48	15.79
414	9.16	1.21	10.70	540.80	34.71	15.81
415	9.18	1.17	11.00	587.60	35.36	15.82
416	9.20	1.14	10.80	574.30	35.95	15.83
417	9.22	1.15	11.10	588.90	35.21	15.85
418	9.24	1.28	11.40	578.50	34.07	15.91
419	9.26	1.33	11.90	581.60	32.63	15.94
420	9.28	1.37	11.30	566.50	31.35	15.95
421	9.30	1.49	11.40	535.00	30.13	16.02
422	9.32	1.61	13.30	496.60	29.88	16.15
423	9.34	1.59	15.00	445.90	31.32	16.26
424	9.36	1.42	15.80	452.70	33.12	16.28
425	9.38	1.37	14.60	486.80	34.51	16.24
426	9.40	1.36	14.30	482.10	34.51	16.18
427	9.42	1.35	13.60	460.50	34.65	16.13
428	9.44	1.32	13.20	414.60	35.77	16.08
429	9.46	1.19	13.10	392.20	37.69	16.08
430	9.48	1.15	14.30	426.50	39.39	16.08
431	9.50	1.15	13.80	430.50	40.05	16.08
432	9.52	1.11	13.20	442.80	39.49	16.02

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	1.15	12.30	441.50	38.94	15.99
434	9.56	1.18	12.70	411.30	39.79	16.00
435	9.58	1.06	13.80	348.70	42.19	16.03
436	9.60	0.98	14.00	352.30	45.25	16.02
437	9.62	0.94	13.50	383.30	46.47	15.94
438	9.64	0.90	11.60	401.20	46.34	15.86
439	9.66	0.92	11.50	417.10	44.86	15.75
440	9.68	0.96	10.10	438.00	41.18	15.71
441	9.70	1.16	9.50	423.50	38.23	15.70
442	9.72	1.19	10.50	373.20	36.98	15.82
443	9.74	1.20	12.60	368.20	38.03	15.92
444	9.76	1.15	12.70	414.00	38.22	15.99
445	9.78	1.23	12.60	411.70	37.15	15.97
446	9.80	1.29	11.40	354.60	36.85	15.96
447	9.82	1.19	12.30	313.40	38.93	16.00
448	9.84	1.07	14.50	316.90	42.96	16.06
449	9.86	0.98	14.80	363.70	46.33	16.05
450	9.88	0.92	13.00	354.40	49.00	15.97
451	9.90	0.82	12.80	393.40	50.19	15.88
452	9.92	0.84	12.20	431.10	45.71	15.88
453	9.94	1.19	11.70	460.20	38.37	15.87
454	9.96	1.43	10.30	451.20	32.62	16.07
455	9.98	1.79	16.10	63.70	31.82	16.46
456	10.00	1.86	24.60	20.90	31.44	16.92
457	10.02	2.25	32.00	-0.20	32.83	17.30
458	10.04	2.23	43.00	-33.60	34.95	17.65
459	10.06	2.15	58.20	-48.00	40.17	18.01
460	10.08	2.06	81.90	-25.10	45.01	18.31
461	10.10	2.08	98.90	-10.60	48.91	18.55
462	10.12	2.10	115.80	-11.70	53.91	18.64
463	10.14	1.60	114.70	10.50	57.65	18.65
464	10.16	1.67	109.10	75.00	53.65	18.65
465	10.18	2.51	105.30	148.70	38.28	18.67
466	10.20	4.18	83.50	279.90	24.99	18.76
467	10.22	6.30	89.30	203.20	15.70	19.10
468	10.24	10.91	142.70	-16.90	11.87	19.56
469	10.26	13.51	185.80	-48.10	10.83	19.99
470	10.28	13.79	235.00	-58.90	10.51	20.23
471	10.30	15.49	251.50	-63.70	10.58	20.40
472	10.32	16.34	278.00	-64.50	10.26	20.52
473	10.34	16.91	299.60	-66.70	10.10	20.62
474	10.36	17.96	311.20	-66.30	9.80	20.68
475	10.38	18.52	311.20	-66.30	9.83	20.80
476	10.40	19.37	381.00	-66.20	9.65	20.95
477	10.42	22.42	430.70	-64.60	10.06	21.14
478	10.44	21.79	482.30	-54.50	9.73	21.31
479	10.46	25.62	544.50	-56.70	9.78	21.42
480	10.48	25.62	554.30	-52.40	8.93	21.53

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	29.52	584.80	-50.70	8.51	21.58

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	13.46	0.00	13.46	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	13.77	0.00	13.77	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	14.08	0.00	14.08	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	14.41	0.00	14.41	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	14.73	0.00	14.73	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	15.06	0.00	15.06	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	15.40	0.00	15.40	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	15.73	0.00	15.73	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	16.07	0.00	16.07	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	16.40	0.00	16.40	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	16.74	0.00	16.74	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	17.08	0.00	17.08	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	17.42	0.00	17.42	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	17.75	0.00	17.75	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	18.09	0.00	18.09	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	18.43	0.00	18.43	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	18.77	0.20	18.57	0.99	0.065	1.38	0.047	1.00	1.00	0.047	No
18	1.24	19.11	0.39	18.72	0.99	0.066	1.38	0.048	1.00	1.00	0.048	No
19	1.26	19.45	0.59	18.86	0.99	0.067	1.38	0.048	1.00	1.00	0.048	No
20	1.28	19.80	0.78	19.01	0.99	0.067	1.38	0.049	1.00	1.00	0.049	No
21	1.30	20.14	0.98	19.16	0.99	0.068	1.38	0.049	1.00	1.00	0.049	No
22	1.32	20.49	1.18	19.31	0.99	0.068	1.38	0.050	1.00	1.00	0.050	No
23	1.34	20.84	1.37	19.46	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
24	1.36	21.19	1.57	19.62	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
25	1.38	21.54	1.77	19.77	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
26	1.40	21.89	1.96	19.93	0.99	0.071	1.38	0.051	1.00	1.00	2.000	Yes
27	1.42	22.25	2.16	20.09	0.99	0.071	1.38	0.052	1.00	1.00	2.000	Yes
28	1.44	22.61	2.35	20.26	0.99	0.072	1.38	0.052	1.00	1.00	2.000	Yes
29	1.46	22.98	2.55	20.43	0.99	0.072	1.38	0.053	1.00	1.00	2.000	Yes
30	1.48	23.34	2.75	20.59	0.99	0.073	1.38	0.053	1.00	1.00	0.053	No
31	1.50	23.71	2.94	20.76	0.99	0.074	1.38	0.053	1.00	1.00	0.053	No
32	1.52	24.08	3.14	20.94	0.99	0.074	1.38	0.054	1.00	1.00	0.054	No
33	1.54	24.45	3.34	21.11	0.99	0.075	1.38	0.054	1.00	1.00	0.054	No
34	1.56	24.81	3.53	21.28	0.99	0.075	1.38	0.055	1.00	1.00	0.055	No
35	1.58	25.18	3.73	21.45	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
36	1.60	25.54	3.92	21.62	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
37	1.62	25.90	4.12	21.78	0.99	0.076	1.38	0.056	1.00	1.00	0.056	No
38	1.64	26.26	4.32	21.94	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
39	1.66	26.62	4.51	22.10	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
40	1.68	26.97	4.71	22.27	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
41	1.70	27.33	4.91	22.43	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
42	1.72	27.69	5.10	22.59	0.99	0.079	1.38	0.057	1.00	1.00	0.057	No
43	1.74	28.05	5.30	22.75	0.99	0.079	1.38	0.058	1.00	1.00	0.058	No
44	1.76	28.42	5.49	22.92	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
45	1.78	28.79	5.69	23.10	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
46	1.80	29.16	5.89	23.28	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
47	1.82	29.54	6.08	23.46	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
48	1.84	29.92	6.28	23.64	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	30.29	6.47	23.82	0.99	0.082	1.38	0.059	1.00	1.00	0.059	No
50	1.88	30.67	6.67	24.00	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
51	1.90	31.03	6.87	24.17	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
52	1.92	31.40	7.06	24.33	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
53	1.94	31.76	7.26	24.50	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
54	1.96	32.12	7.46	24.67	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
55	1.98	32.48	7.65	24.83	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
56	2.00	32.85	7.85	25.00	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
57	2.02	33.21	8.04	25.16	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
58	2.04	33.57	8.24	25.32	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
59	2.06	33.92	8.44	25.49	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
60	2.08	34.28	8.63	25.65	0.99	0.086	1.38	0.062	1.00	1.00	0.062	No
61	2.10	34.64	8.83	25.81	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
62	2.12	34.99	9.03	25.97	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
63	2.14	35.35	9.22	26.13	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
64	2.16	35.70	9.42	26.29	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
65	2.18	36.06	9.61	26.44	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
66	2.20	36.41	9.81	26.60	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
67	2.22	36.77	10.01	26.76	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
68	2.24	37.12	10.20	26.92	0.98	0.088	1.38	0.064	1.00	1.00	0.064	No
69	2.26	37.48	10.40	27.08	0.98	0.089	1.38	0.064	1.00	1.00	0.064	No
70	2.28	37.83	10.59	27.24	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
71	2.30	38.19	10.79	27.40	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
72	2.32	38.55	10.99	27.56	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
73	2.34	38.92	11.18	27.73	0.98	0.090	1.38	0.065	1.00	1.00	0.065	No
74	2.36	39.28	11.38	27.90	0.98	0.090	1.38	0.065	1.00	1.00	0.065	No
75	2.38	39.65	11.58	28.08	0.98	0.090	1.38	0.066	1.00	1.00	0.066	No
76	2.40	40.02	11.77	28.25	0.98	0.091	1.38	0.066	1.00	1.00	0.066	No
77	2.42	40.39	11.97	28.42	0.98	0.091	1.38	0.066	1.00	1.00	0.066	No
78	2.44	40.76	12.16	28.59	0.98	0.091	1.38	0.066	1.00	1.00	2.000	Yes
79	2.46	41.12	12.36	28.76	0.98	0.091	1.38	0.066	1.00	1.00	2.000	Yes
80	2.48	41.49	12.56	28.93	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
81	2.50	41.86	12.75	29.10	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
82	2.52	42.22	12.95	29.27	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
83	2.54	42.59	13.15	29.44	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
84	2.56	42.95	13.34	29.61	0.98	0.093	1.38	0.067	1.00	1.00	2.000	Yes
85	2.58	43.32	13.54	29.78	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
86	2.60	43.68	13.73	29.94	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
87	2.62	44.03	13.93	30.10	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
88	2.64	44.38	14.13	30.26	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
89	2.66	44.74	14.32	30.41	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
90	2.68	45.09	14.52	30.57	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
91	2.70	45.44	14.72	30.73	0.98	0.094	1.38	0.069	1.00	1.00	2.000	Yes
92	2.72	45.80	14.91	30.89	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
93	2.74	46.16	15.11	31.05	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
94	2.76	46.52	15.30	31.22	0.98	0.095	1.38	0.069	1.00	1.00	0.069	No
95	2.78	46.88	15.50	31.38	0.98	0.095	1.38	0.069	1.00	1.00	0.069	No
96	2.80	47.24	15.70	31.54	0.98	0.095	1.38	0.069	1.00	1.00	0.069	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	47.59	15.89	31.70	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
98	2.84	47.94	16.09	31.86	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
99	2.86	48.29	16.28	32.01	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
100	2.88	48.63	16.48	32.15	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
101	2.90	48.98	16.68	32.30	0.98	0.097	1.38	0.070	1.00	1.00	0.070	No
102	2.92	49.32	16.87	32.45	0.98	0.097	1.38	0.070	1.00	1.00	0.070	No
103	2.94	49.67	17.07	32.60	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
104	2.96	50.02	17.27	32.75	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
105	2.98	50.37	17.46	32.91	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
106	3.00	50.72	17.66	33.06	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
107	3.02	51.06	17.85	33.21	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
108	3.04	51.41	18.05	33.36	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
109	3.06	51.75	18.25	33.51	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
110	3.08	52.09	18.44	33.65	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
111	3.10	52.44	18.64	33.80	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
112	3.12	52.78	18.84	33.95	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
113	3.14	53.13	19.03	34.10	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
114	3.16	53.49	19.23	34.26	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
115	3.18	53.85	19.42	34.43	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
116	3.20	54.21	19.62	34.59	0.98	0.100	1.38	0.072	1.00	1.00	0.072	No
117	3.22	54.57	19.82	34.75	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
118	3.24	54.93	20.01	34.92	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
119	3.26	55.29	20.21	35.08	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
120	3.28	55.66	20.40	35.25	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
121	3.30	56.02	20.60	35.42	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
122	3.32	56.38	20.80	35.59	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
123	3.34	56.74	20.99	35.75	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
124	3.36	57.11	21.19	35.92	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
125	3.38	57.48	21.39	36.09	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
126	3.40	57.84	21.58	36.26	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
127	3.42	58.21	21.78	36.43	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
128	3.44	58.57	21.97	36.60	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
129	3.46	58.93	22.17	36.76	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
130	3.48	59.29	22.37	36.92	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
131	3.50	59.65	22.56	37.08	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
132	3.52	60.00	22.76	37.24	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
133	3.54	60.35	22.96	37.39	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
134	3.56	60.69	23.15	37.54	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
135	3.58	61.04	23.35	37.69	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
136	3.60	61.38	23.54	37.83	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
137	3.62	61.72	23.74	37.98	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
138	3.64	62.06	23.94	38.13	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
139	3.66	62.40	24.13	38.27	0.97	0.103	1.38	0.075	1.00	1.00	0.075	No
140	3.68	62.74	24.33	38.41	0.97	0.103	1.38	0.075	1.00	1.00	0.075	No
141	3.70	63.08	24.53	38.55	0.97	0.104	1.38	0.075	1.00	1.00	0.075	No
142	3.72	63.41	24.72	38.69	0.97	0.104	1.38	0.075	1.00	1.00	0.075	No
143	3.74	63.75	24.92	38.83	0.97	0.104	1.38	0.076	1.00	1.00	0.076	No
144	3.76	64.08	25.11	38.97	0.97	0.104	1.38	0.076	1.00	1.00	0.076	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	64.42	25.31	39.11	0.97	0.104	1.38	0.076	1.00	1.00	0.076	No
146	3.80	64.76	25.51	39.25	0.97	0.104	1.38	0.076	1.00	1.00	2.000	Yes
147	3.82	65.09	25.70	39.39	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
148	3.84	65.43	25.90	39.53	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
149	3.86	65.76	26.09	39.67	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
150	3.88	66.09	26.29	39.80	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
151	3.90	66.42	26.49	39.93	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
152	3.92	66.75	26.68	40.07	0.97	0.105	1.38	0.077	1.00	1.00	2.000	Yes
153	3.94	67.08	26.88	40.20	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
154	3.96	67.42	27.08	40.34	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
155	3.98	67.75	27.27	40.48	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
156	4.00	68.08	27.47	40.61	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
157	4.02	68.41	27.66	40.75	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
158	4.04	68.75	27.86	40.89	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
159	4.06	69.10	28.06	41.04	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
160	4.08	69.45	28.25	41.20	0.97	0.107	1.38	0.077	1.00	1.00	2.000	Yes
161	4.10	69.80	28.45	41.35	0.97	0.107	1.38	0.077	1.00	1.00	2.000	Yes
162	4.12	70.15	28.65	41.51	0.97	0.107	1.38	0.078	1.00	1.00	2.000	Yes
163	4.14	70.51	28.84	41.67	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
164	4.16	70.86	29.04	41.82	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
165	4.18	71.21	29.23	41.98	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
166	4.20	71.57	29.43	42.14	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
167	4.22	71.92	29.63	42.30	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
168	4.24	72.27	29.82	42.45	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
169	4.26	72.62	30.02	42.60	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
170	4.28	72.97	30.21	42.76	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
171	4.30	73.32	30.41	42.91	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
172	4.32	73.66	30.61	43.05	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
173	4.34	74.00	30.80	43.19	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
174	4.36	74.33	31.00	43.33	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
175	4.38	74.67	31.20	43.47	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
176	4.40	75.00	31.39	43.61	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
177	4.42	75.33	31.59	43.75	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
178	4.44	75.67	31.78	43.88	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
179	4.46	76.00	31.98	44.02	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
180	4.48	76.33	32.18	44.15	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
181	4.50	76.66	32.37	44.29	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
182	4.52	77.00	32.57	44.43	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
183	4.54	77.33	32.77	44.56	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
184	4.56	77.66	32.96	44.70	0.97	0.109	1.38	0.080	1.00	1.00	0.080	No
185	4.58	77.99	33.16	44.83	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
186	4.60	78.31	33.35	44.96	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
187	4.62	78.64	33.55	45.09	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
188	4.64	78.96	33.75	45.22	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
189	4.66	79.28	33.94	45.34	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
190	4.68	79.60	34.14	45.46	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
191	4.70	79.92	34.34	45.59	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
192	4.72	80.24	34.53	45.71	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	4.74	80.56	34.73	45.83	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
194	4.76	80.87	34.92	45.95	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
195	4.78	81.19	35.12	46.07	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
196	4.80	81.51	35.32	46.20	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
197	4.82	81.83	35.51	46.32	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
198	4.84	82.15	35.71	46.44	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
199	4.86	82.47	35.90	46.56	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
200	4.88	82.78	36.10	46.68	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
201	4.90	83.10	36.30	46.80	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
202	4.92	83.41	36.49	46.92	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
203	4.94	83.72	36.69	47.03	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
204	4.96	84.03	36.89	47.15	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
205	4.98	84.35	37.08	47.26	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
206	5.00	84.66	37.28	47.38	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
207	5.02	84.97	37.47	47.49	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
208	5.04	85.28	37.67	47.61	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
209	5.06	85.59	37.87	47.72	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
210	5.08	85.90	38.06	47.83	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
211	5.10	86.21	38.26	47.95	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
212	5.12	86.52	38.46	48.06	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
213	5.14	86.82	38.65	48.17	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
214	5.16	87.13	38.85	48.28	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
215	5.18	87.44	39.04	48.40	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
216	5.20	87.75	39.24	48.51	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
217	5.22	88.06	39.44	48.62	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
218	5.24	88.37	39.63	48.74	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
219	5.26	88.68	39.83	48.85	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
220	5.28	88.99	40.02	48.96	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
221	5.30	89.29	40.22	49.07	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
222	5.32	89.60	40.42	49.19	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
223	5.34	89.91	40.61	49.30	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
224	5.36	90.22	40.81	49.41	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
225	5.38	90.52	41.01	49.52	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
226	5.40	90.83	41.20	49.63	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
227	5.42	91.15	41.40	49.75	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
228	5.44	91.47	41.59	49.87	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
229	5.46	91.79	41.79	50.00	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
230	5.48	92.10	41.99	50.12	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
231	5.50	92.42	42.18	50.24	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
232	5.52	92.74	42.38	50.36	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
233	5.54	93.05	42.58	50.47	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
234	5.56	93.36	42.77	50.59	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
235	5.58	93.67	42.97	50.70	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
236	5.60	93.98	43.16	50.82	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
237	5.62	94.29	43.36	50.93	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
238	5.64	94.60	43.56	51.05	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
239	5.66	94.91	43.75	51.16	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
240	5.68	95.22	43.95	51.27	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	95.53	44.15	51.39	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
242	5.72	95.84	44.34	51.50	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
243	5.74	96.16	44.54	51.62	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
244	5.76	96.47	44.73	51.73	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
245	5.78	96.78	44.93	51.85	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
246	5.80	97.09	45.13	51.96	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
247	5.82	97.40	45.32	52.08	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
248	5.84	97.71	45.52	52.20	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
249	5.86	98.03	45.71	52.31	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
250	5.88	98.34	45.91	52.43	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
251	5.90	98.65	46.11	52.54	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
252	5.92	98.96	46.30	52.66	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
253	5.94	99.27	46.50	52.77	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
254	5.96	99.58	46.70	52.89	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
255	5.98	99.89	46.89	53.00	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
256	6.00	100.20	47.09	53.12	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
257	6.02	100.51	47.28	53.23	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
258	6.04	100.82	47.48	53.34	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
259	6.06	101.13	47.68	53.46	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
260	6.08	101.44	47.87	53.57	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
261	6.10	101.75	48.07	53.69	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
262	6.12	102.07	48.27	53.80	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
263	6.14	102.37	48.46	53.91	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
264	6.16	102.68	48.66	54.03	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
265	6.18	102.99	48.85	54.14	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
266	6.20	103.30	49.05	54.25	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
267	6.22	103.61	49.25	54.37	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
268	6.24	103.92	49.44	54.48	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
269	6.26	104.23	49.64	54.60	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
270	6.28	104.55	49.83	54.71	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
271	6.30	104.86	50.03	54.83	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
272	6.32	105.17	50.23	54.94	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
273	6.34	105.48	50.42	55.05	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
274	6.36	105.79	50.62	55.17	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
275	6.38	106.10	50.82	55.29	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
276	6.40	106.42	51.01	55.41	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
277	6.42	106.74	51.21	55.53	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
278	6.44	107.05	51.40	55.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
279	6.46	107.37	51.60	55.77	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
280	6.48	107.69	51.80	55.89	0.95	0.119	1.38	0.087	1.00	1.00	2.000	Yes
281	6.50	108.01	51.99	56.01	0.95	0.119	1.38	0.087	1.00	1.00	2.000	Yes
282	6.52	108.32	52.19	56.14	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
283	6.54	108.64	52.39	56.26	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
284	6.56	108.96	52.58	56.38	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
285	6.58	109.28	52.78	56.50	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
286	6.60	109.60	52.97	56.63	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
287	6.62	109.93	53.17	56.76	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
288	6.64	110.26	53.37	56.89	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
289	6.66	110.59	53.56	57.02	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
290	6.68	110.92	53.76	57.16	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
291	6.70	111.25	53.96	57.29	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
292	6.72	111.58	54.15	57.43	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
293	6.74	111.92	54.35	57.57	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
294	6.76	112.25	54.54	57.71	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
295	6.78	112.58	54.74	57.84	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
296	6.80	112.92	54.94	57.98	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
297	6.82	113.25	55.13	58.12	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
298	6.84	113.58	55.33	58.25	0.95	0.120	1.38	0.088	1.00	1.00	2.000	Yes
299	6.86	113.91	55.52	58.39	0.95	0.120	1.38	0.088	1.00	1.00	2.000	Yes
300	6.88	114.25	55.72	58.53	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
301	6.90	114.59	55.92	58.67	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
302	6.92	114.93	56.11	58.81	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
303	6.94	115.27	56.31	58.96	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
304	6.96	115.61	56.51	59.11	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
305	6.98	115.96	56.70	59.26	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
306	7.00	116.30	56.90	59.40	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
307	7.02	116.65	57.09	59.55	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
308	7.04	116.99	57.29	59.70	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
309	7.06	117.34	57.49	59.85	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
310	7.08	117.68	57.68	60.00	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
311	7.10	118.03	57.88	60.15	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
312	7.12	118.37	58.08	60.29	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
313	7.14	118.71	58.27	60.44	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
314	7.16	119.04	58.47	60.58	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
315	7.18	119.38	58.66	60.72	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
316	7.20	119.71	58.86	60.85	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
317	7.22	120.04	59.06	60.99	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
318	7.24	120.38	59.25	61.12	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
319	7.26	120.71	59.45	61.26	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
320	7.28	121.04	59.64	61.39	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
321	7.30	121.37	59.84	61.53	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
322	7.32	121.70	60.04	61.66	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
323	7.34	122.03	60.23	61.80	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
324	7.36	122.37	60.43	61.94	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
325	7.38	122.70	60.63	62.08	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
326	7.40	123.04	60.82	62.21	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
327	7.42	123.37	61.02	62.35	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
328	7.44	123.70	61.21	62.49	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
329	7.46	124.03	61.41	62.62	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
330	7.48	124.37	61.61	62.76	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
331	7.50	124.70	61.80	62.89	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
332	7.52	125.03	62.00	63.03	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
333	7.54	125.36	62.20	63.16	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
334	7.56	125.69	62.39	63.30	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
335	7.58	126.02	62.59	63.43	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
336	7.60	126.35	62.78	63.57	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	126.68	62.98	63.70	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
338	7.64	127.01	63.18	63.83	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
339	7.66	127.33	63.37	63.96	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
340	7.68	127.66	63.57	64.09	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
341	7.70	127.99	63.77	64.22	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
342	7.72	128.32	63.96	64.36	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
343	7.74	128.64	64.16	64.49	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
344	7.76	128.97	64.35	64.62	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
345	7.78	129.30	64.55	64.75	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
346	7.80	129.62	64.75	64.88	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
347	7.82	129.95	64.94	65.01	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
348	7.84	130.28	65.14	65.14	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
349	7.86	130.61	65.33	65.28	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
350	7.88	130.94	65.53	65.41	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
351	7.90	131.28	65.73	65.55	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
352	7.92	131.61	65.92	65.69	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
353	7.94	131.94	66.12	65.82	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
354	7.96	132.27	66.32	65.96	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
355	7.98	132.60	66.51	66.09	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
356	8.00	132.93	66.71	66.22	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
357	8.02	133.26	66.90	66.35	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
358	8.04	133.58	67.10	66.48	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
359	8.06	133.90	67.30	66.61	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
360	8.08	134.23	67.49	66.73	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
361	8.10	134.55	67.69	66.86	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
362	8.12	134.87	67.89	66.99	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
363	8.14	135.20	68.08	67.11	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
364	8.16	135.52	68.28	67.24	0.94	0.123	1.38	0.089	1.00	1.00	0.089	No
365	8.18	135.84	68.47	67.37	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
366	8.20	136.17	68.67	67.50	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
367	8.22	136.49	68.87	67.63	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
368	8.24	136.82	69.06	67.76	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
369	8.26	137.14	69.26	67.88	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
370	8.28	137.47	69.45	68.01	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
371	8.30	137.79	69.65	68.14	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
372	8.32	138.11	69.85	68.27	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
373	8.34	138.44	70.04	68.39	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
374	8.36	138.76	70.24	68.52	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
375	8.38	139.08	70.44	68.64	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
376	8.40	139.40	70.63	68.76	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
377	8.42	139.71	70.83	68.89	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
378	8.44	140.03	71.02	69.01	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
379	8.46	140.35	71.22	69.13	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
380	8.48	140.67	71.42	69.25	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
381	8.50	140.99	71.61	69.38	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
382	8.52	141.31	71.81	69.50	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
383	8.54	141.63	72.01	69.62	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
384	8.56	141.94	72.20	69.74	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	142.26	72.40	69.87	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
386	8.60	142.58	72.59	69.99	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
387	8.62	142.90	72.79	70.11	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
388	8.64	143.22	72.99	70.24	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
389	8.66	143.54	73.18	70.36	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
390	8.68	143.87	73.38	70.49	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
391	8.70	144.19	73.58	70.62	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
392	8.72	144.52	73.77	70.75	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
393	8.74	144.85	73.97	70.88	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
394	8.76	145.18	74.16	71.02	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
395	8.78	145.51	74.36	71.15	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
396	8.80	145.83	74.56	71.28	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
397	8.82	146.16	74.75	71.41	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
398	8.84	146.49	74.95	71.54	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
399	8.86	146.81	75.14	71.67	0.93	0.123	1.38	0.090	1.00	1.00	2.000	Yes
400	8.88	147.14	75.34	71.80	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
401	8.90	147.46	75.54	71.92	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
402	8.92	147.77	75.73	72.04	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
403	8.94	148.09	75.93	72.16	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
404	8.96	148.41	76.13	72.29	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
405	8.98	148.73	76.32	72.41	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
406	9.00	149.06	76.52	72.54	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
407	9.02	149.38	76.71	72.66	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
408	9.04	149.69	76.91	72.78	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
409	9.06	150.01	77.11	72.90	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
410	9.08	150.33	77.30	73.02	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
411	9.10	150.64	77.50	73.14	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
412	9.12	150.96	77.70	73.26	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
413	9.14	151.27	77.89	73.38	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
414	9.16	151.59	78.09	73.50	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
415	9.18	151.91	78.28	73.62	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
416	9.20	152.22	78.48	73.74	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
417	9.22	152.54	78.68	73.86	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
418	9.24	152.86	78.87	73.98	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
419	9.26	153.18	79.07	74.11	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
420	9.28	153.49	79.26	74.23	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
421	9.30	153.82	79.46	74.35	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
422	9.32	154.14	79.66	74.48	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
423	9.34	154.46	79.85	74.61	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
424	9.36	154.79	80.05	74.74	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
425	9.38	155.11	80.25	74.87	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
426	9.40	155.44	80.44	75.00	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
427	9.42	155.76	80.64	75.12	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
428	9.44	156.08	80.83	75.25	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
429	9.46	156.40	81.03	75.37	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
430	9.48	156.73	81.23	75.50	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
431	9.50	157.05	81.42	75.62	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
432	9.52	157.37	81.62	75.75	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
433	9.54	157.69	81.82	75.87	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
434	9.56	158.01	82.01	76.00	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
435	9.58	158.33	82.21	76.12	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
436	9.60	158.65	82.40	76.24	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
437	9.62	158.97	82.60	76.37	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
438	9.64	159.28	82.80	76.49	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
439	9.66	159.60	82.99	76.61	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
440	9.68	159.91	83.19	76.72	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
441	9.70	160.23	83.39	76.84	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
442	9.72	160.54	83.58	76.96	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
443	9.74	160.86	83.78	77.08	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
444	9.76	161.18	83.97	77.21	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
445	9.78	161.50	84.17	77.33	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
446	9.80	161.82	84.37	77.45	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
447	9.82	162.14	84.56	77.58	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
448	9.84	162.46	84.76	77.70	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
449	9.86	162.78	84.95	77.83	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
450	9.88	163.10	85.15	77.95	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
451	9.90	163.42	85.35	78.07	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
452	9.92	163.74	85.54	78.19	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
453	9.94	164.05	85.74	78.32	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
454	9.96	164.38	85.94	78.44	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
455	9.98	164.71	86.13	78.57	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
456	10.00	165.04	86.33	78.72	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
457	10.02	165.39	86.52	78.87	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
458	10.04	165.74	86.72	79.02	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
459	10.06	166.10	86.92	79.19	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
460	10.08	166.47	87.11	79.36	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
461	10.10	166.84	87.31	79.53	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
462	10.12	167.21	87.51	79.71	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
463	10.14	167.59	87.70	79.88	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
464	10.16	167.96	87.90	80.06	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
465	10.18	168.33	88.09	80.24	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
466	10.20	168.71	88.29	80.42	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
467	10.22	169.09	88.49	80.60	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
468	10.24	169.48	88.68	80.80	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
469	10.26	169.88	88.88	81.00	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
470	10.28	170.29	89.07	81.21	0.90	0.123	1.38	0.089	1.00	1.00	0.089	No
471	10.30	170.69	89.27	81.42	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
472	10.32	171.10	89.47	81.64	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
473	10.34	171.52	89.66	81.85	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
474	10.36	171.93	89.86	82.07	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
475	10.38	172.35	90.06	82.29	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
476	10.40	172.76	90.25	82.51	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
477	10.42	173.19	90.45	82.74	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
478	10.44	173.61	90.64	82.97	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
479	10.46	174.04	90.84	83.20	0.90	0.122	1.38	0.088	1.00	1.00	0.088	No
480	10.48	174.47	91.04	83.44	0.89	0.122	1.38	0.088	1.00	1.00	0.088	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
481	10.50	174.90	91.23	83.67	0.89	0.122	1.38	0.088	1.00	1.00	0.088	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.19	3.53	5.59	1.00	3.43	22.59	77.38	4.000	No	Yes	2.00
2	0.92	0.19	3.60	7.34	1.00	3.42	25.32	86.46	4.000	No	Yes	2.00
3	0.94	0.30	3.35	5.45	1.00	5.69	16.45	93.67	4.000	No	Yes	2.00
4	0.96	0.55	3.02	3.60	1.00	10.64	9.14	97.22	4.000	No	Yes	2.00
5	0.98	0.89	2.74	2.33	0.90	17.23	5.14	88.55	4.000	No	Yes	2.00
6	1.00	1.09	2.63	2.01	0.86	21.15	6.56	138.79	4.000	No	No	2.00
7	1.02	1.12	2.62	2.04	0.86	21.83	6.29	137.29	4.000	No	No	2.00
8	1.04	1.04	2.69	2.38	0.88	20.21	9.54	192.78	4.000	No	No	2.00
9	1.06	0.98	2.75	2.77	0.91	18.93	5.27	99.79	4.000	No	Yes	2.00
10	1.08	1.02	2.74	2.81	0.90	19.82	5.14	101.88	4.000	No	Yes	2.00
11	1.10	1.08	2.72	2.78	0.89	21.03	4.88	102.70	4.000	No	Yes	2.00
12	1.12	1.13	2.69	2.63	0.88	22.04	9.33	205.70	4.000	No	No	2.00
13	1.14	1.08	2.70	2.64	0.89	20.91	4.75	99.39	4.000	No	Yes	2.00
14	1.16	1.03	2.72	2.64	0.90	20.00	4.93	98.53	4.000	No	Yes	2.00
15	1.18	1.08	2.69	2.54	0.88	21.02	9.73	204.55	4.000	No	No	2.00
16	1.20	1.19	2.64	2.40	0.87	23.18	7.17	166.31	4.000	No	No	2.00
17	1.22	1.30	2.61	2.38	0.85	25.24	5.88	148.44	0.346	No	No	2.00
18	1.24	1.32	2.63	2.57	0.86	25.66	6.46	165.69	0.453	No	No	2.00
19	1.26	1.29	2.66	2.87	0.87	25.17	8.13	204.56	3.600	No	No	2.00
20	1.28	1.24	2.70	3.11	0.89	24.17	10.14	244.99	3.600	No	No	2.00
21	1.30	1.20	2.73	3.27	0.90	23.28	4.98	116.01	1.111	No	Yes	2.00
22	1.32	1.18	2.75	3.52	0.91	22.97	5.27	120.97	1.096	No	Yes	2.00
23	1.34	1.24	2.74	3.53	0.90	24.09	5.10	122.85	4.000	Yes	Yes	2.00
24	1.36	1.35	2.69	3.34	0.89	26.30	9.65	253.95	4.000	Yes	No	2.00
25	1.38	1.76	2.53	2.54	0.82	34.24	3.36	115.01	4.000	Yes	No	2.00
26	1.40	2.45	2.32	1.81	0.74	47.85	2.01	95.97	4.000	Yes	No	2.00
27	1.42	3.35	2.15	1.42	0.68	65.59	1.50	98.55	4.000	Yes	No	2.00
28	1.44	4.15	2.04	1.26	0.64	81.47	1.35	109.71	4.000	Yes	No	2.00
29	1.46	4.63	2.00	1.22	0.62	90.87	1.31	118.60	4.000	Yes	No	2.00
30	1.48	4.75	1.99	1.22	0.62	93.30	1.30	121.16	0.245	No	No	2.00
31	1.50	4.84	2.00	1.27	0.62	95.03	1.30	123.84	0.257	No	No	2.00
32	1.52	5.19	1.97	1.26	0.61	101.91	1.28	130.85	0.288	No	No	2.00
33	1.54	5.63	1.92	1.18	0.59	110.72	1.25	138.66	0.328	No	No	2.00
34	1.56	5.77	1.89	1.08	0.58	113.39	1.23	139.47	0.332	No	No	2.00
35	1.58	5.11	1.93	1.09	0.60	100.35	1.26	126.35	0.268	No	No	2.00
36	1.60	4.14	2.04	1.26	0.64	81.27	1.35	109.53	0.202	No	No	2.00
37	1.62	3.14	2.21	1.66	0.70	61.46	1.65	101.33	0.177	No	No	2.00
38	1.64	2.57	2.35	2.12	0.76	50.17	2.13	107.03	0.194	No	No	2.00
39	1.66	2.22	2.45	2.56	0.80	43.23	2.67	115.42	0.223	No	No	2.00
40	1.68	2.74	2.30	1.94	0.74	53.60	1.94	103.76	0.184	No	No	2.00
41	1.70	4.01	2.03	1.15	0.63	78.67	1.33	104.88	0.187	No	No	2.00
42	1.72	5.29	1.83	0.77	0.56	103.95	1.18	122.75	0.252	No	No	2.00
43	1.74	6.09	1.76	0.72	0.53	119.64	1.10	131.95	0.294	No	No	2.00
44	1.76	6.55	1.78	0.85	0.54	128.82	1.13	145.52	0.367	No	No	2.00
45	1.78	7.26	1.77	0.93	0.54	142.70	1.12	159.72	0.459	No	No	2.00
46	1.80	7.81	1.76	0.98	0.53	153.52	1.11	169.97	0.537	No	No	2.00
47	1.82	8.16	1.75	0.98	0.53	160.58	1.09	174.59	0.575	No	No	2.00
48	1.84	8.42	1.73	0.95	0.52	165.60	1.05	174.36	0.573	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	8.70	1.69	0.87	0.51	171.09	1.00	171.09	0.546	No	No	2.00
50	1.88	8.87	1.63	0.72	0.48	174.49	1.00	174.49	0.574	No	No	2.00
51	1.90	8.92	1.59	0.59	0.47	171.29	1.00	171.29	0.547	No	No	2.00
52	1.92	8.78	1.56	0.51	0.46	165.73	1.00	165.73	0.503	No	No	2.00
53	1.94	8.56	1.56	0.50	0.46	161.53	1.00	161.53	0.472	No	No	2.00
54	1.96	8.36	1.57	0.51	0.46	158.13	1.00	158.13	0.448	No	No	2.00
55	1.98	8.17	1.58	0.51	0.47	154.79	1.00	154.79	0.425	No	No	2.00
56	2.00	7.82	1.61	0.53	0.47	149.44	1.00	149.44	0.390	No	No	2.00
57	2.02	7.15	1.65	0.57	0.49	139.03	1.00	139.03	0.330	No	No	2.00
58	2.04	6.30	1.72	0.65	0.52	123.67	1.03	127.58	0.273	No	No	2.00
59	2.06	5.53	1.80	0.73	0.55	108.51	1.15	124.97	0.262	No	No	2.00
60	2.08	5.19	1.83	0.77	0.56	101.68	1.19	120.77	0.244	No	No	2.00
61	2.10	5.22	1.83	0.78	0.56	102.31	1.19	121.50	0.247	No	No	2.00
62	2.12	5.72	1.76	0.67	0.53	112.29	1.11	124.08	0.258	No	No	2.00
63	2.14	6.27	1.69	0.56	0.51	122.36	1.00	122.36	0.250	No	No	2.00
64	2.16	6.80	1.63	0.48	0.49	128.48	1.00	128.48	0.277	No	No	2.00
65	2.18	6.95	1.61	0.45	0.48	129.84	1.00	129.84	0.284	No	No	2.00
66	2.20	6.99	1.61	0.44	0.48	130.11	1.00	130.11	0.285	No	No	2.00
67	2.22	6.70	1.63	0.46	0.49	125.74	1.00	125.74	0.265	No	No	2.00
68	2.24	6.17	1.70	0.57	0.51	119.29	1.00	119.29	0.238	No	No	2.00
69	2.26	5.42	1.78	0.66	0.54	106.21	1.13	119.93	0.240	No	No	2.00
70	2.28	4.76	1.88	0.81	0.58	93.30	1.22	113.84	0.217	No	No	2.00
71	2.30	4.11	2.00	1.04	0.62	80.45	1.30	104.85	0.187	No	No	2.00
72	2.32	3.50	2.17	1.59	0.69	68.31	1.54	105.09	0.188	No	No	2.00
73	2.34	3.04	2.32	2.27	0.75	59.16	1.99	117.82	0.232	No	No	2.00
74	2.36	3.58	2.23	2.06	0.72	69.96	1.71	119.49	0.239	No	No	2.00
75	2.38	5.22	1.99	1.36	0.62	102.30	1.30	132.96	0.299	No	No	2.00
76	2.40	7.10	1.77	0.88	0.54	138.41	1.11	153.85	0.419	No	No	2.00
77	2.42	7.99	1.68	0.69	0.50	148.82	1.00	148.82	0.387	No	No	2.00
78	2.44	7.39	1.70	0.70	0.51	138.84	1.00	138.84	4.000	Yes	No	2.00
79	2.46	6.14	1.82	0.89	0.56	120.43	1.17	140.78	4.000	Yes	No	2.00
80	2.48	4.82	1.99	1.23	0.62	94.33	1.30	122.41	4.000	Yes	No	2.00
81	2.50	3.75	2.19	1.83	0.70	73.13	1.58	115.62	4.000	Yes	No	2.00
82	2.52	2.99	2.34	2.44	0.76	58.12	2.10	122.34	4.000	Yes	No	2.00
83	2.54	2.50	2.47	3.07	0.81	48.51	2.78	134.71	4.000	Yes	No	2.00
84	2.56	2.26	2.53	3.37	0.83	43.80	3.40	148.90	4.000	Yes	No	2.00
85	2.58	2.04	2.58	3.60	0.85	39.44	4.83	190.36	4.000	Yes	No	2.00
86	2.60	1.92	2.58	3.37	0.85	37.06	4.82	178.55	4.000	Yes	No	2.00
87	2.62	1.97	2.51	2.73	0.82	37.99	3.07	116.58	4.000	Yes	No	2.00
88	2.64	2.21	2.38	1.95	0.77	42.83	2.26	96.98	4.000	Yes	No	2.00
89	2.66	2.55	2.27	1.58	0.73	49.39	1.83	90.41	4.000	Yes	No	2.00
90	2.68	2.96	2.18	1.35	0.70	57.45	1.56	89.82	4.000	Yes	No	2.00
91	2.70	3.36	2.12	1.25	0.67	65.36	1.44	94.29	4.000	Yes	No	2.00
92	2.72	3.70	2.07	1.21	0.66	72.06	1.38	99.57	4.000	Yes	No	2.00
93	2.74	3.95	2.05	1.21	0.65	77.04	1.35	104.37	4.000	Yes	No	2.00
94	2.76	4.15	2.03	1.20	0.64	80.92	1.34	108.14	0.198	No	No	2.00
95	2.78	4.33	2.01	1.16	0.63	84.46	1.31	110.92	0.207	No	No	2.00
96	2.80	4.50	1.95	1.00	0.61	87.82	1.27	111.73	0.210	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	4.67	1.89	0.82	0.59	90.13	1.23	111.03	0.207	No	No	2.00
98	2.84	4.85	1.82	0.62	0.56	90.75	1.18	106.64	0.193	No	No	2.00
99	2.86	4.91	1.78	0.52	0.54	89.83	1.13	101.67	0.178	No	No	2.00
100	2.88	4.78	1.77	0.47	0.54	86.90	1.00	86.90	0.141	No	No	2.00
101	2.90	3.99	1.88	0.61	0.58	75.79	1.22	92.74	0.154	No	No	2.00
102	2.92	3.56	1.96	0.75	0.61	69.29	1.28	88.57	0.145	No	No	2.00
103	2.94	3.22	2.06	0.95	0.65	62.49	1.36	85.20	0.138	No	No	1.95
104	2.96	3.67	1.99	0.86	0.62	71.48	1.30	92.69	0.154	No	No	2.00
105	2.98	4.59	1.86	0.68	0.58	85.74	1.21	103.89	0.184	No	No	2.00
106	3.00	5.61	1.73	0.49	0.53	98.83	1.00	98.83	0.170	No	No	2.00
107	3.02	6.39	1.64	0.37	0.49	108.19	1.00	108.19	0.198	No	No	2.00
108	3.04	6.28	1.64	0.35	0.49	105.89	1.00	105.89	0.190	No	No	2.00
109	3.06	5.93	1.66	0.36	0.50	100.64	1.00	100.64	0.175	No	No	2.00
110	3.08	5.35	1.71	0.38	0.52	92.28	1.00	92.28	0.153	No	No	2.00
111	3.10	5.00	1.75	0.43	0.53	87.75	1.00	87.75	0.143	No	No	1.99
112	3.12	4.90	1.79	0.52	0.55	87.30	1.15	99.96	0.173	No	No	2.00
113	3.14	5.05	1.82	0.63	0.56	90.87	1.18	107.07	0.194	No	No	2.00
114	3.16	5.08	1.86	0.74	0.57	92.53	1.21	111.69	0.210	No	No	2.00
115	3.18	4.96	1.90	0.87	0.59	91.75	1.24	113.59	0.216	No	No	2.00
116	3.20	4.74	1.94	0.97	0.61	88.84	1.26	112.38	0.212	No	No	2.00
117	3.22	4.34	2.01	1.15	0.63	83.27	1.31	109.50	0.202	No	No	2.00
118	3.24	3.98	2.08	1.34	0.66	77.40	1.39	107.38	0.195	No	No	2.00
119	3.26	3.76	2.14	1.54	0.68	73.09	1.48	107.93	0.197	No	No	2.00
120	3.28	3.62	2.18	1.74	0.70	70.39	1.57	110.67	0.206	No	No	2.00
121	3.30	3.35	2.23	1.85	0.72	64.95	1.69	109.46	0.202	No	No	2.00
122	3.32	2.93	2.30	2.04	0.74	56.74	1.92	108.92	0.200	No	No	2.00
123	3.34	2.62	2.37	2.32	0.77	50.69	2.23	113.24	0.215	No	No	2.00
124	3.36	2.93	2.33	2.26	0.76	56.66	2.04	115.60	0.224	No	No	2.00
125	3.38	4.02	2.14	1.67	0.68	78.28	1.48	115.84	0.225	No	No	2.00
126	3.40	5.72	1.92	1.06	0.60	103.31	1.25	128.86	0.279	No	No	2.00
127	3.42	6.93	1.78	0.76	0.54	118.43	1.12	133.16	0.300	No	No	2.00
128	3.44	7.27	1.73	0.64	0.52	121.54	1.04	126.42	0.268	No	No	2.00
129	3.46	6.78	1.75	0.64	0.53	113.83	1.08	122.59	0.251	No	No	2.00
130	3.48	6.25	1.77	0.64	0.54	105.75	1.12	118.45	0.235	No	No	2.00
131	3.50	5.86	1.79	0.64	0.55	99.61	1.14	113.99	0.218	No	No	2.00
132	3.52	5.38	1.81	0.62	0.56	91.87	1.17	107.33	0.195	No	No	2.00
133	3.54	4.76	1.86	0.63	0.58	82.34	1.21	99.44	0.171	No	No	2.00
134	3.56	3.90	1.94	0.67	0.61	69.23	1.26	87.35	0.142	No	No	1.91
135	3.58	3.17	2.03	0.76	0.64	58.02	1.34	77.52	0.123	No	No	1.65
136	3.60	2.57	2.16	0.99	0.69	48.92	1.52	74.18	0.118	No	No	1.58
137	3.62	2.32	2.23	1.19	0.72	44.64	1.70	76.10	0.121	No	No	1.62
138	3.64	2.43	2.22	1.20	0.71	46.74	1.66	77.76	0.124	No	No	1.65
139	3.66	2.62	2.16	1.01	0.69	49.41	1.52	74.91	0.119	No	No	1.59
140	3.68	2.61	2.13	0.89	0.68	48.62	1.47	71.44	0.114	No	No	1.51
141	3.70	2.31	2.18	0.93	0.70	43.60	1.57	68.50	0.110	No	No	1.46
142	3.72	1.95	2.28	1.11	0.74	37.26	1.86	69.30	0.111	No	No	1.47
143	3.74	1.75	2.37	1.32	0.77	33.24	2.20	73.17	0.116	No	No	1.54
144	3.76	1.73	2.37	1.33	0.77	32.88	2.23	73.24	0.117	No	No	1.54

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	1.77	2.38	1.41	0.77	33.70	2.25	75.91	0.121	No	No	1.59
146	3.80	1.76	2.37	1.37	0.77	33.41	2.23	74.67	4.000	Yes	No	2.00
147	3.82	1.59	2.44	1.56	0.80	30.04	2.61	78.43	4.000	Yes	No	2.00
148	3.84	1.29	2.56	1.84	0.84	24.23	4.18	101.24	4.000	Yes	No	2.00
149	3.86	1.03	2.72	2.46	0.91	19.00	4.91	93.31	4.000	Yes	Yes	2.00
150	3.88	0.88	2.81	2.81	0.94	16.14	5.99	96.67	4.000	Yes	Yes	2.00
151	3.90	0.91	2.78	2.59	0.93	16.74	5.57	93.32	4.000	Yes	Yes	2.00
152	3.92	0.99	2.71	2.21	0.90	18.16	4.79	87.01	4.000	Yes	Yes	2.00
153	3.94	1.45	2.46	1.44	0.81	27.33	2.70	73.79	4.000	Yes	No	2.00
154	3.96	1.91	2.28	1.04	0.74	35.89	1.85	66.52	4.000	Yes	No	2.00
155	3.98	2.22	2.20	0.89	0.71	40.66	1.61	65.30	4.000	Yes	No	2.00
156	4.00	2.12	2.22	0.90	0.72	39.03	1.65	64.57	4.000	Yes	No	2.00
157	4.02	2.02	2.24	0.93	0.72	37.29	1.72	64.27	4.000	Yes	No	2.00
158	4.04	2.15	2.26	1.14	0.73	39.95	1.80	71.77	4.000	Yes	No	2.00
159	4.06	2.25	2.31	1.48	0.75	42.39	1.96	82.92	4.000	Yes	No	2.00
160	4.08	2.28	2.36	1.83	0.77	43.60	2.16	94.06	4.000	Yes	No	2.00
161	4.10	2.14	2.42	2.11	0.79	40.86	2.46	100.65	4.000	Yes	No	2.00
162	4.12	1.84	2.54	2.68	0.84	34.87	3.58	124.71	4.000	Yes	No	2.00
163	4.14	1.90	2.51	2.54	0.83	36.14	2.99	107.93	0.197	No	No	2.00
164	4.16	1.82	2.54	2.69	0.84	34.45	3.68	126.70	0.269	No	No	2.00
165	4.18	1.81	2.54	2.68	0.84	34.40	3.68	126.42	0.268	No	No	2.00
166	4.20	1.44	2.73	3.89	0.91	27.08	4.98	134.76	1.292	No	Yes	2.00
167	4.22	1.22	2.85	4.88	0.96	22.76	6.46	147.10	1.086	No	Yes	2.00
168	4.24	1.09	2.92	5.37	0.98	20.05	7.44	149.09	0.956	No	Yes	2.00
169	4.26	1.01	2.94	5.31	0.99	18.44	7.80	143.90	0.880	No	Yes	2.00
170	4.28	0.97	2.95	5.17	0.99	17.71	7.89	139.82	0.845	No	Yes	2.00
171	4.30	0.95	2.93	4.78	0.99	17.31	7.67	132.73	0.826	No	Yes	2.00
172	4.32	0.95	2.90	4.23	0.98	17.25	7.17	123.75	0.823	No	Yes	2.00
173	4.34	0.95	2.85	3.56	0.96	17.33	6.48	112.38	0.827	No	Yes	2.00
174	4.36	0.97	2.81	3.11	0.94	17.65	5.93	104.72	0.842	No	Yes	2.00
175	4.38	0.98	2.77	2.81	0.93	17.90	5.54	99.25	0.854	No	Yes	2.00
176	4.40	0.99	2.76	2.67	0.92	18.08	5.35	96.80	0.863	No	Yes	2.00
177	4.42	0.99	2.75	2.63	0.92	18.09	5.30	95.89	0.863	No	Yes	2.00
178	4.44	0.98	2.75	2.60	0.92	17.94	5.30	95.11	0.856	No	Yes	2.00
179	4.46	0.98	2.75	2.58	0.92	17.90	5.29	94.72	0.854	No	Yes	2.00
180	4.48	0.99	2.75	2.56	0.92	18.07	5.22	94.35	0.862	No	Yes	2.00
181	4.50	1.00	2.75	2.60	0.92	18.22	5.23	95.37	0.869	No	Yes	2.00
182	4.52	0.99	2.76	2.63	0.92	17.95	5.33	95.68	0.856	No	Yes	2.00
183	4.54	0.94	2.78	2.70	0.93	17.10	5.61	95.94	0.816	No	Yes	2.00
184	4.56	0.89	2.81	2.76	0.94	16.00	5.97	95.52	0.763	No	Yes	2.00
185	4.58	0.83	2.85	2.86	0.96	14.78	6.45	95.34	0.705	No	Yes	2.00
186	4.60	0.78	2.87	2.86	0.96	13.91	6.75	93.85	0.663	No	Yes	2.00
187	4.62	0.76	2.87	2.77	0.97	13.43	6.80	91.35	0.641	No	Yes	2.00
188	4.64	0.75	2.85	2.55	0.96	13.29	6.57	87.24	0.634	No	Yes	2.00
189	4.66	0.75	2.84	2.34	0.95	13.18	6.33	83.43	0.629	No	Yes	2.00
190	4.68	0.75	2.82	2.16	0.95	13.24	6.05	80.10	0.632	No	Yes	2.00
191	4.70	0.77	2.79	2.01	0.94	13.59	5.72	77.74	0.648	No	Yes	2.00
192	4.72	0.79	2.77	1.92	0.93	14.04	5.45	76.53	0.670	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.80	2.76	1.90	0.92	14.19	5.38	76.28	0.677	No	Yes	2.00
194	4.76	0.80	2.76	1.88	0.92	14.21	5.34	75.87	0.678	No	Yes	2.00
195	4.78	0.81	2.75	1.85	0.92	14.36	5.25	75.33	0.685	No	Yes	2.00
196	4.80	0.82	2.75	1.89	0.92	14.50	5.26	76.34	0.692	No	Yes	2.00
197	4.82	0.80	2.78	2.06	0.93	14.11	5.62	79.32	0.673	No	Yes	2.00
198	4.84	0.75	2.82	2.20	0.95	13.14	6.15	80.82	0.627	No	Yes	2.00
199	4.86	0.70	2.85	2.22	0.96	12.28	6.50	79.88	0.586	No	Yes	2.00
200	4.88	0.69	2.84	2.06	0.96	11.95	6.40	76.52	0.570	No	Yes	2.00
201	4.90	0.69	2.83	1.97	0.95	11.89	6.29	74.70	0.567	No	Yes	2.00
202	4.92	0.68	2.83	1.92	0.95	11.83	6.23	73.66	0.564	No	Yes	2.00
203	4.94	0.68	2.83	1.91	0.95	11.77	6.24	73.44	0.561	No	Yes	2.00
204	4.96	0.69	2.82	1.85	0.95	11.89	6.10	72.53	0.567	No	Yes	2.00
205	4.98	0.69	2.81	1.79	0.94	11.97	5.97	71.45	0.571	No	Yes	2.00
206	5.00	0.68	2.81	1.76	0.94	11.82	5.97	70.62	0.564	No	Yes	2.00
207	5.02	0.67	2.82	1.76	0.95	11.63	6.05	70.39	0.555	No	Yes	2.00
208	5.04	0.67	2.82	1.76	0.95	11.50	6.11	70.27	0.548	No	Yes	2.00
209	5.06	0.67	2.82	1.73	0.95	11.50	6.05	69.61	0.548	No	Yes	2.00
210	5.08	0.67	2.81	1.70	0.95	11.48	6.02	69.09	0.548	No	Yes	2.00
211	5.10	0.66	2.81	1.69	0.95	11.42	6.02	68.75	0.545	No	Yes	2.00
212	5.12	0.67	2.81	1.66	0.94	11.47	5.96	68.33	0.547	No	Yes	2.00
213	5.14	0.67	2.80	1.62	0.94	11.60	5.84	67.69	0.553	No	Yes	2.00
214	5.16	0.68	2.79	1.57	0.94	11.78	5.68	66.84	0.562	No	Yes	2.00
215	5.18	0.69	2.78	1.55	0.93	11.93	5.58	66.57	0.569	No	Yes	2.00
216	5.20	0.70	2.77	1.55	0.93	12.04	5.53	66.64	0.574	No	Yes	2.00
217	5.22	0.70	2.77	1.56	0.93	12.06	5.55	66.88	0.575	No	Yes	2.00
218	5.24	0.70	2.78	1.57	0.93	11.93	5.61	66.95	0.569	No	Yes	2.00
219	5.26	0.69	2.79	1.59	0.94	11.79	5.70	67.18	0.562	No	Yes	2.00
220	5.28	0.69	2.79	1.61	0.94	11.71	5.77	67.51	0.558	No	Yes	2.00
221	5.30	0.69	2.80	1.62	0.94	11.67	5.80	67.74	0.557	No	Yes	2.00
222	5.32	0.70	2.79	1.59	0.94	11.89	5.67	67.45	0.567	No	Yes	2.00
223	5.34	0.74	2.73	1.32	0.92	12.36	5.03	62.20	0.590	No	Yes	2.00
224	5.36	0.77	2.67	1.08	0.89	12.80	8.68	111.13	0.187	No	No	2.00
225	5.38	0.80	2.68	1.17	0.89	13.32	8.78	116.93	0.206	No	No	2.00
226	5.40	0.79	2.74	1.54	0.92	13.30	5.10	67.84	0.634	No	Yes	2.00
227	5.42	0.78	2.79	1.93	0.94	13.26	5.71	75.73	0.633	No	Yes	2.00
228	5.44	0.76	2.81	2.00	0.94	12.92	5.93	76.67	0.616	No	Yes	2.00
229	5.46	0.76	2.81	1.98	0.94	12.85	5.93	76.22	0.613	No	Yes	2.00
230	5.48	0.75	2.81	1.98	0.95	12.71	5.99	76.12	0.606	No	Yes	2.00
231	5.50	0.75	2.82	1.98	0.95	12.53	6.05	75.80	0.598	No	Yes	2.00
232	5.52	0.73	2.82	1.97	0.95	12.23	6.15	75.21	0.583	No	Yes	2.00
233	5.54	0.71	2.83	1.91	0.95	11.88	6.19	73.54	0.567	No	Yes	2.00
234	5.56	0.70	2.83	1.83	0.95	11.58	6.19	71.72	0.552	No	Yes	2.00
235	5.58	0.69	2.82	1.74	0.95	11.41	6.12	69.77	0.544	No	Yes	2.00
236	5.60	0.69	2.82	1.68	0.95	11.33	6.05	68.50	0.540	No	Yes	2.00
237	5.62	0.69	2.82	1.69	0.95	11.21	6.11	68.45	0.535	No	Yes	2.00
238	5.64	0.68	2.83	1.72	0.95	11.12	6.19	68.89	0.531	No	Yes	2.00
239	5.66	0.68	2.83	1.74	0.95	11.09	6.24	69.23	0.529	No	Yes	2.00
240	5.68	0.68	2.83	1.74	0.95	11.14	6.23	69.40	0.531	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.69	2.83	1.74	0.95	11.18	6.22	69.47	0.533	No	Yes	2.00
242	5.72	0.69	2.84	1.78	0.96	11.11	6.31	70.10	0.530	No	Yes	2.00
243	5.74	0.68	2.84	1.82	0.96	11.03	6.42	70.75	0.526	No	Yes	2.00
244	5.76	0.68	2.85	1.86	0.96	10.98	6.49	71.31	0.524	No	Yes	2.00
245	5.78	0.69	2.85	1.85	0.96	11.05	6.44	71.20	0.527	No	Yes	2.00
246	5.80	0.70	2.84	1.81	0.96	11.20	6.32	70.83	0.534	No	Yes	2.00
247	5.82	0.71	2.83	1.78	0.95	11.34	6.21	70.45	0.541	No	Yes	2.00
248	5.84	0.71	2.82	1.76	0.95	11.44	6.14	70.19	0.546	No	Yes	2.00
249	5.86	0.71	2.83	1.77	0.95	11.36	6.18	70.17	0.542	No	Yes	2.00
250	5.88	0.70	2.83	1.78	0.96	11.18	6.27	70.12	0.534	No	Yes	2.00
251	5.90	0.69	2.84	1.80	0.96	10.99	6.39	70.24	0.524	No	Yes	2.00
252	5.92	0.69	2.85	1.81	0.96	10.87	6.46	70.19	0.518	No	Yes	2.00
253	5.94	0.68	2.85	1.81	0.96	10.75	6.52	70.14	0.513	No	Yes	2.00
254	5.96	0.68	2.86	1.82	0.96	10.63	6.59	70.08	0.507	No	Yes	2.00
255	5.98	0.67	2.86	1.82	0.97	10.53	6.65	70.01	0.502	No	Yes	2.00
256	6.00	0.67	2.86	1.81	0.97	10.50	6.65	69.78	0.501	No	Yes	2.00
257	6.02	0.67	2.86	1.80	0.97	10.52	6.61	69.54	0.502	No	Yes	2.00
258	6.04	0.68	2.85	1.76	0.96	10.61	6.50	68.98	0.506	No	Yes	2.00
259	6.06	0.69	2.85	1.74	0.96	10.67	6.44	68.67	0.509	No	Yes	2.00
260	6.08	0.69	2.84	1.71	0.96	10.73	6.36	68.27	0.512	No	Yes	2.00
261	6.10	0.69	2.84	1.72	0.96	10.71	6.39	68.35	0.511	No	Yes	2.00
262	6.12	0.69	2.84	1.72	0.96	10.67	6.40	68.25	0.509	No	Yes	2.00
263	6.14	0.69	2.85	1.72	0.96	10.55	6.46	68.19	0.503	No	Yes	2.00
264	6.16	0.68	2.85	1.73	0.96	10.43	6.53	68.14	0.498	No	Yes	2.00
265	6.18	0.68	2.86	1.75	0.97	10.35	6.61	68.46	0.494	No	Yes	2.00
266	6.20	0.67	2.86	1.77	0.97	10.32	6.65	68.67	0.492	No	Yes	2.00
267	6.22	0.68	2.86	1.78	0.97	10.32	6.67	68.84	0.492	No	Yes	2.00
268	6.24	0.67	2.86	1.78	0.97	10.27	6.70	68.86	0.490	No	Yes	2.00
269	6.26	0.68	2.86	1.78	0.97	10.34	6.67	68.99	0.493	No	Yes	2.00
270	6.28	0.70	2.84	1.72	0.96	10.63	6.43	68.34	0.507	No	Yes	2.00
271	6.30	0.74	2.81	1.60	0.95	11.21	5.95	66.71	0.534	No	Yes	2.00
272	6.32	0.78	2.77	1.49	0.93	11.75	5.54	65.15	0.561	No	Yes	2.00
273	6.34	0.80	2.75	1.44	0.93	12.15	5.31	64.53	0.580	No	Yes	2.00
274	6.36	0.82	2.75	1.46	0.93	12.37	5.26	65.11	0.590	No	Yes	2.00
275	6.38	0.84	2.75	1.50	0.93	12.67	5.24	66.43	0.605	No	Yes	2.00
276	6.40	0.85	2.75	1.55	0.93	12.88	5.24	67.49	0.614	No	Yes	2.00
277	6.42	0.86	2.76	1.63	0.93	13.03	5.32	69.37	0.622	No	Yes	2.00
278	6.44	0.87	2.76	1.68	0.93	13.07	5.40	70.58	0.623	No	Yes	2.00
279	6.46	0.87	2.77	1.73	0.93	13.13	5.45	71.53	0.626	No	Yes	2.00
280	6.48	0.87	2.76	1.72	0.93	13.16	5.43	71.40	4.000	Yes	Yes	2.00
281	6.50	0.93	2.72	1.56	0.92	13.97	4.93	68.90	4.000	Yes	Yes	2.00
282	6.52	1.01	2.67	1.39	0.89	15.08	8.25	124.45	4.000	Yes	No	2.00
283	6.54	1.10	2.62	1.28	0.87	16.39	6.01	98.45	4.000	Yes	No	2.00
284	6.56	1.18	2.56	1.07	0.85	17.40	4.06	70.64	4.000	Yes	No	2.00
285	6.58	1.25	2.54	1.08	0.84	18.48	3.54	65.42	4.000	Yes	No	2.00
286	6.60	1.31	2.53	1.12	0.84	19.36	3.32	64.35	0.105	No	No	1.20
287	6.62	1.32	2.57	1.37	0.86	19.65	4.32	84.77	0.137	No	No	1.57
288	6.64	1.32	2.59	1.51	0.86	19.62	5.00	98.01	0.168	No	No	1.92

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	1.32	2.60	1.59	0.87	19.66	5.40	106.06	0.191	No	No	2.00
290	6.68	1.32	2.61	1.65	0.87	19.68	5.72	112.52	0.191	No	No	2.00
291	6.70	1.31	2.62	1.75	0.88	19.54	6.32	123.50	0.230	No	No	2.00
292	6.72	1.29	2.65	1.88	0.89	19.25	7.32	140.85	0.306	No	No	2.00
293	6.74	1.28	2.66	1.97	0.89	19.04	8.09	154.04	0.378	No	No	2.00
294	6.76	1.27	2.67	1.97	0.89	18.92	8.22	155.47	0.387	No	No	2.00
295	6.78	1.28	2.66	1.89	0.89	18.92	7.68	145.39	0.329	No	No	2.00
296	6.80	1.30	2.65	1.85	0.89	19.17	7.22	138.53	0.295	No	No	2.00
297	6.82	1.35	2.62	1.77	0.88	19.87	6.18	122.82	0.227	No	No	2.00
298	6.84	1.38	2.61	1.74	0.87	20.22	5.81	117.42	4.000	Yes	No	2.00
299	6.86	1.45	2.57	1.60	0.86	21.18	4.58	97.10	4.000	Yes	No	2.00
300	6.88	1.66	2.49	1.38	0.83	24.08	2.93	70.47	4.000	Yes	No	2.00
301	6.90	2.08	2.38	1.17	0.78	29.75	2.25	66.94	4.000	Yes	No	2.00
302	6.92	2.35	2.33	1.15	0.77	33.51	2.03	68.20	4.000	Yes	No	2.00
303	6.94	2.37	2.35	1.27	0.77	33.86	2.12	71.85	4.000	Yes	No	2.00
304	6.96	2.09	2.44	1.54	0.81	30.15	2.59	77.97	4.000	Yes	No	2.00
305	6.98	1.86	2.52	1.81	0.84	26.96	3.16	85.18	4.000	Yes	No	2.00
306	7.00	1.68	2.59	2.09	0.87	24.53	5.01	122.89	4.000	Yes	No	2.00
307	7.02	1.59	2.64	2.35	0.89	23.21	6.91	160.29	4.000	Yes	No	2.00
308	7.04	1.49	2.69	2.64	0.90	21.93	9.45	207.30	4.000	Yes	No	2.00
309	7.06	1.41	2.73	2.88	0.92	20.68	5.05	104.46	4.000	Yes	Yes	2.00
310	7.08	1.34	2.76	2.98	0.93	19.61	5.36	105.00	4.000	Yes	Yes	2.00
311	7.10	1.28	2.78	3.00	0.94	18.74	5.56	104.26	0.894	No	Yes	2.00
312	7.12	1.25	2.78	2.91	0.94	18.14	5.60	101.58	0.865	No	Yes	2.00
313	7.14	1.22	2.77	2.74	0.94	17.61	5.54	97.51	0.840	No	Yes	2.00
314	7.16	1.21	2.75	2.47	0.93	17.30	5.29	91.54	0.825	No	Yes	2.00
315	7.18	1.19	2.74	2.27	0.92	16.90	5.15	87.05	0.806	No	Yes	2.00
316	7.20	1.18	2.73	2.14	0.92	16.68	5.04	84.04	0.796	No	Yes	2.00
317	7.22	1.16	2.73	2.10	0.92	16.40	5.05	82.81	0.782	No	Yes	2.00
318	7.24	1.16	2.73	2.07	0.92	16.39	5.02	82.23	0.782	No	Yes	2.00
319	7.26	1.18	2.72	2.03	0.92	16.57	4.92	81.50	0.790	No	Yes	2.00
320	7.28	1.21	2.70	1.96	0.91	16.96	4.73	80.30	0.809	No	Yes	2.00
321	7.30	1.23	2.69	1.89	0.91	17.23	9.49	163.53	0.438	No	No	2.00
322	7.32	1.25	2.69	1.91	0.90	17.46	9.34	163.00	0.435	No	No	2.00
323	7.34	1.25	2.69	1.96	0.91	17.46	9.75	170.20	0.485	No	No	2.00
324	7.36	1.25	2.71	2.05	0.91	17.39	4.76	82.80	0.829	No	Yes	2.00
325	7.38	1.22	2.72	2.13	0.92	17.02	4.94	84.11	0.812	No	Yes	2.00
326	7.40	1.19	2.75	2.23	0.93	16.48	5.20	85.76	0.786	No	Yes	2.00
327	7.42	1.14	2.77	2.30	0.94	15.84	5.45	86.34	0.756	No	Yes	2.00
328	7.44	1.12	2.78	2.32	0.94	15.43	5.59	86.24	0.736	No	Yes	2.00
329	7.46	1.11	2.77	2.24	0.94	15.33	5.51	84.51	0.731	No	Yes	2.00
330	7.48	1.13	2.76	2.16	0.93	15.49	5.36	83.04	0.739	No	Yes	2.00
331	7.50	1.15	2.75	2.09	0.93	15.68	5.22	81.86	0.748	No	Yes	2.00
332	7.52	1.15	2.74	2.07	0.93	15.71	5.19	81.51	0.749	No	Yes	2.00
333	7.54	1.15	2.74	2.05	0.93	15.68	5.17	81.12	0.748	No	Yes	2.00
334	7.56	1.15	2.74	2.04	0.93	15.58	5.18	80.66	0.743	No	Yes	2.00
335	7.58	1.15	2.74	2.03	0.93	15.57	5.16	80.38	0.742	No	Yes	2.00
336	7.60	1.13	2.74	2.00	0.93	15.33	5.19	79.61	0.731	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	1.11	2.75	1.98	0.93	14.98	5.26	78.89	0.715	No	Yes	2.00
338	7.64	1.10	2.75	1.95	0.93	14.75	5.28	77.87	0.703	No	Yes	2.00
339	7.66	1.11	2.74	1.88	0.93	14.89	5.14	76.54	0.710	No	Yes	2.00
340	7.68	1.15	2.72	1.78	0.92	15.34	4.88	74.80	0.732	No	Yes	2.00
341	7.70	1.18	2.69	1.69	0.91	15.78	9.80	154.61	0.381	No	No	2.00
342	7.72	1.20	2.68	1.64	0.90	15.90	9.22	146.63	0.336	No	No	2.00
343	7.74	1.18	2.69	1.65	0.91	15.66	9.66	151.26	0.362	No	No	2.00
344	7.76	1.16	2.71	1.70	0.91	15.33	4.77	73.17	0.731	No	Yes	2.00
345	7.78	1.17	2.70	1.69	0.91	15.47	4.72	73.06	0.738	No	Yes	2.00
346	7.80	1.21	2.68	1.63	0.90	15.98	9.01	143.95	0.322	No	No	2.00
347	7.82	1.26	2.66	1.57	0.90	16.59	7.88	130.77	0.259	No	No	2.00
348	7.84	1.28	2.66	1.63	0.90	16.90	7.93	133.92	0.273	No	No	2.00
349	7.86	1.27	2.68	1.77	0.90	16.80	9.07	152.44	0.369	No	No	2.00
350	7.88	1.22	2.73	2.04	0.92	16.16	5.03	81.25	0.771	No	Yes	2.00
351	7.90	1.17	2.77	2.24	0.94	15.40	5.50	84.67	0.735	No	Yes	2.00
352	7.92	1.12	2.80	2.39	0.95	14.66	5.90	86.52	0.699	No	Yes	2.00
353	7.94	1.08	2.81	2.32	0.95	14.05	6.00	84.30	0.670	No	Yes	2.00
354	7.96	1.04	2.82	2.30	0.96	13.49	6.16	83.07	0.644	No	Yes	2.00
355	7.98	1.01	2.83	2.26	0.96	13.04	6.27	81.67	0.622	No	Yes	2.00
356	8.00	1.00	2.83	2.20	0.96	12.92	6.22	80.43	0.616	No	Yes	2.00
357	8.02	1.00	2.82	2.12	0.96	12.77	6.17	78.79	0.609	No	Yes	2.00
358	8.04	0.99	2.81	2.00	0.96	12.68	6.03	76.41	0.605	No	Yes	2.00
359	8.06	0.96	2.83	2.01	0.96	12.22	6.20	75.82	0.583	No	Yes	2.00
360	8.08	0.91	2.86	2.08	0.97	11.51	6.61	76.10	0.549	No	Yes	2.00
361	8.10	0.87	2.89	2.22	0.99	10.87	7.13	77.50	0.519	No	Yes	2.00
362	8.12	0.86	2.90	2.27	0.99	10.77	7.25	78.08	0.514	No	Yes	2.00
363	8.14	0.90	2.87	2.14	0.98	11.23	6.83	76.75	0.536	No	Yes	2.00
364	8.16	0.94	2.84	2.00	0.97	11.78	6.38	75.15	0.562	No	Yes	2.00
365	8.18	0.98	2.81	1.90	0.96	12.26	6.02	73.86	0.585	No	Yes	2.00
366	8.20	1.00	2.81	1.92	0.95	12.51	5.96	74.56	0.597	No	Yes	2.00
367	8.22	1.00	2.82	1.99	0.96	12.51	6.07	75.95	0.597	No	Yes	2.00
368	8.24	0.99	2.83	2.07	0.96	12.38	6.23	77.18	0.591	No	Yes	2.00
369	8.26	0.99	2.83	2.05	0.96	12.30	6.24	76.73	0.587	No	Yes	2.00
370	8.28	0.98	2.83	1.99	0.96	12.25	6.18	75.63	0.584	No	Yes	2.00
371	8.30	0.97	2.83	1.95	0.96	12.07	6.18	74.59	0.576	No	Yes	2.00
372	8.32	0.96	2.83	1.93	0.96	11.89	6.22	74.01	0.567	No	Yes	2.00
373	8.34	0.97	2.81	1.82	0.96	11.98	6.02	72.06	0.571	No	Yes	2.00
374	8.36	1.00	2.78	1.65	0.94	12.28	5.62	68.96	0.586	No	Yes	2.00
375	8.38	1.02	2.75	1.51	0.93	12.55	5.29	66.45	0.599	No	Yes	2.00
376	8.40	1.05	2.72	1.38	0.92	12.86	4.97	63.87	0.613	No	Yes	2.00
377	8.42	1.08	2.70	1.31	0.91	13.25	4.72	62.56	0.632	No	Yes	2.00
378	8.44	1.13	2.68	1.24	0.90	13.80	8.71	120.23	0.217	No	No	2.00
379	8.46	1.14	2.67	1.27	0.90	13.97	8.70	121.57	0.222	No	No	2.00
380	8.48	1.12	2.69	1.30	0.91	13.64	9.51	129.71	0.255	No	No	2.00
381	8.50	1.07	2.72	1.36	0.92	12.98	4.90	63.56	0.619	No	Yes	2.00
382	8.52	1.03	2.75	1.43	0.93	12.39	5.20	64.46	0.591	No	Yes	2.00
383	8.54	1.02	2.75	1.44	0.93	12.34	5.25	64.75	4.000	Yes	Yes	2.00
384	8.56	1.08	2.72	1.36	0.92	13.08	4.87	63.66	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	1.18	2.65	1.20	0.90	14.34	7.63	109.42	4.000	Yes	No	2.00
386	8.60	1.27	2.61	1.10	0.88	15.39	5.68	87.41	4.000	Yes	No	2.00
387	8.62	1.32	2.58	1.03	0.87	16.00	4.75	76.09	4.000	Yes	No	2.00
388	8.64	1.38	2.56	1.01	0.86	16.77	4.08	68.41	4.000	Yes	No	2.00
389	8.66	1.47	2.53	0.99	0.85	17.78	3.43	60.94	4.000	Yes	No	2.00
390	8.68	1.52	2.52	1.03	0.85	18.50	3.28	60.59	0.101	No	No	1.13
391	8.70	1.51	2.55	1.14	0.86	18.39	3.87	71.11	0.113	No	No	1.27
392	8.72	1.46	2.59	1.30	0.87	17.82	5.05	89.93	0.148	No	No	1.65
393	8.74	1.44	2.60	1.35	0.88	17.54	5.55	97.34	0.149	No	No	1.67
394	8.76	1.50	2.58	1.26	0.87	18.13	4.65	84.23	0.136	No	No	1.52
395	8.78	1.56	2.54	1.14	0.85	18.85	3.65	68.71	0.110	No	No	1.23
396	8.80	1.57	2.54	1.13	0.85	18.91	3.55	67.12	0.108	No	No	1.21
397	8.82	1.49	2.58	1.26	0.87	17.93	4.74	84.98	0.137	No	No	1.53
398	8.84	1.39	2.63	1.37	0.89	16.67	6.35	105.95	0.172	No	No	1.92
399	8.86	1.33	2.64	1.35	0.89	15.95	6.91	110.14	4.000	Yes	No	2.00
400	8.88	1.34	2.60	1.13	0.88	15.95	5.44	86.72	4.000	Yes	No	2.00
401	8.90	1.39	2.55	0.96	0.86	16.45	4.00	65.77	4.000	Yes	No	2.00
402	8.92	1.43	2.53	0.88	0.85	16.86	3.36	56.57	4.000	Yes	No	2.00
403	8.94	1.44	2.52	0.88	0.85	16.98	3.30	55.96	4.000	Yes	No	2.00
404	8.96	1.41	2.56	0.98	0.86	16.60	4.06	67.38	4.000	Yes	No	2.00
405	8.98	1.37	2.59	1.09	0.87	16.11	5.01	80.70	4.000	Yes	No	2.00
406	9.00	1.33	2.61	1.15	0.88	15.64	5.85	91.48	4.000	Yes	No	2.00
407	9.02	1.26	2.64	1.16	0.89	14.74	6.80	100.24	4.000	Yes	No	2.00
408	9.04	1.19	2.66	1.16	0.90	13.81	7.91	109.21	4.000	Yes	No	2.00
409	9.06	1.11	2.69	1.18	0.91	12.74	9.87	125.75	4.000	Yes	No	2.00
410	9.08	1.09	2.70	1.15	0.91	12.53	9.98	124.95	0.235	No	No	2.00
411	9.10	1.12	2.68	1.11	0.91	12.79	9.01	115.23	0.200	No	No	2.00
412	9.12	1.19	2.64	1.02	0.89	13.69	6.85	93.71	0.141	No	No	1.57
413	9.14	1.26	2.60	0.96	0.88	14.50	5.49	79.67	0.114	No	No	1.28
414	9.16	1.29	2.59	0.93	0.87	14.90	4.96	73.92	0.118	No	No	1.31
415	9.18	1.27	2.60	0.97	0.88	14.65	5.41	79.32	0.114	No	No	1.27
416	9.20	1.26	2.61	0.99	0.88	14.42	5.84	84.25	0.122	No	No	1.36
417	9.22	1.29	2.60	0.97	0.88	14.84	5.30	78.69	4.000	Yes	No	2.00
418	9.24	1.36	2.57	0.95	0.87	15.60	4.55	71.00	4.000	Yes	No	2.00
419	9.26	1.43	2.54	0.90	0.86	16.44	3.72	61.22	4.000	Yes	No	2.00
420	9.28	1.49	2.51	0.86	0.85	17.21	3.10	53.28	4.000	Yes	No	2.00
421	9.30	1.58	2.49	0.84	0.83	18.25	2.89	52.82	4.000	Yes	No	2.00
422	9.32	1.65	2.48	0.89	0.83	19.04	2.86	54.42	4.000	Yes	No	2.00
423	9.34	1.62	2.51	1.00	0.85	18.73	3.08	57.70	4.000	Yes	No	2.00
424	9.36	1.54	2.55	1.09	0.86	17.74	3.99	70.73	4.000	Yes	No	2.00
425	9.38	1.46	2.58	1.14	0.87	16.80	4.83	81.10	4.000	Yes	No	2.00
426	9.40	1.44	2.58	1.10	0.87	16.48	4.83	79.60	0.127	No	No	1.41
427	9.42	1.42	2.59	1.08	0.87	16.20	4.92	79.77	0.127	No	No	1.42
428	9.44	1.36	2.61	1.11	0.88	15.42	5.71	88.11	0.129	No	No	1.44
429	9.46	1.29	2.65	1.20	0.90	14.56	7.29	106.20	0.172	No	No	1.92
430	9.48	1.23	2.68	1.28	0.91	13.85	8.98	124.40	0.233	No	No	2.00
431	9.50	1.21	2.69	1.31	0.91	13.57	9.71	131.80	0.264	No	No	2.00
432	9.52	1.21	2.68	1.24	0.91	13.56	9.09	123.25	0.229	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	1.22	2.67	1.20	0.91	13.66	8.50	116.08	0.203	No	No	2.00
434	9.56	1.20	2.69	1.24	0.91	13.36	9.42	125.82	0.239	No	No	2.00
435	9.58	1.14	2.73	1.38	0.93	12.60	5.05	63.65	0.601	No	Yes	2.00
436	9.60	1.05	2.79	1.54	0.95	11.58	5.69	65.95	0.553	No	Yes	2.00
437	9.62	1.01	2.81	1.54	0.96	10.96	5.96	65.27	0.523	No	Yes	2.00
438	9.64	0.99	2.81	1.47	0.96	10.73	5.93	63.61	0.512	No	Yes	2.00
439	9.66	1.00	2.78	1.32	0.95	10.81	5.61	60.64	0.516	No	Yes	2.00
440	9.68	1.08	2.71	1.12	0.92	11.80	4.85	57.22	0.563	No	Yes	2.00
441	9.70	1.17	2.66	0.99	0.90	12.81	7.80	99.87	0.155	No	No	1.73
442	9.72	1.25	2.63	1.00	0.89	13.70	6.68	91.49	0.136	No	No	1.52
443	9.74	1.24	2.65	1.10	0.90	13.67	7.60	103.99	0.166	No	No	1.85
444	9.76	1.26	2.66	1.15	0.90	13.86	7.79	107.92	0.177	No	No	1.98
445	9.78	1.29	2.64	1.08	0.89	14.18	6.82	96.70	0.148	No	No	1.65
446	9.80	1.30	2.63	1.06	0.89	14.26	6.56	93.59	0.141	No	No	1.57
447	9.82	1.24	2.67	1.18	0.91	13.56	8.50	115.24	0.200	No	No	2.00
448	9.84	1.14	2.75	1.42	0.93	12.34	5.21	64.32	0.589	No	Yes	2.00
449	9.86	1.05	2.81	1.59	0.96	11.25	5.92	66.67	0.537	No	Yes	2.00
450	9.88	0.97	2.85	1.68	0.97	10.28	6.52	67.00	0.490	No	Yes	2.00
451	9.90	0.93	2.87	1.66	0.98	9.71	6.79	65.89	4.000	Yes	Yes	2.00
452	9.92	1.02	2.80	1.42	0.95	10.86	5.79	62.87	4.000	Yes	Yes	2.00
453	9.94	1.23	2.66	1.07	0.90	13.24	7.94	105.07	4.000	Yes	No	2.00
454	9.96	1.52	2.54	0.93	0.86	16.72	3.72	62.16	4.000	Yes	No	2.00
455	9.98	1.72	2.53	1.09	0.85	19.08	3.31	63.24	0.104	No	No	1.15
456	10.00	1.97	2.52	1.34	0.85	22.09	3.14	69.32	4.000	Yes	No	2.00
457	10.02	2.11	2.55	1.71	0.86	23.83	3.83	91.31	4.000	Yes	No	2.00
458	10.04	2.21	2.59	2.18	0.88	25.04	5.12	128.30	4.000	Yes	No	2.00
459	10.06	2.14	2.69	3.09	0.92	24.41	9.85	240.52	4.000	Yes	No	2.00
460	10.08	2.09	2.78	4.14	0.95	23.96	5.64	135.18	4.000	Yes	Yes	2.00
461	10.10	2.08	2.85	5.18	0.97	23.85	6.50	154.96	4.000	Yes	Yes	2.00
462	10.12	1.92	2.93	6.25	1.00	22.04	7.66	168.81	4.000	Yes	Yes	2.00
463	10.14	1.79	2.99	6.96	1.00	20.36	8.57	174.56	4.000	Yes	Yes	2.00
464	10.16	1.94	2.93	6.19	1.00	22.13	7.60	168.12	4.000	Yes	Yes	2.00
465	10.18	2.82	2.66	3.75	0.90	32.24	7.85	253.02	4.000	Yes	No	2.00
466	10.20	4.37	2.36	2.21	0.79	49.73	2.20	109.29	4.000	Yes	No	2.00
467	10.22	7.16	2.10	1.50	0.69	80.76	1.41	114.16	4.000	Yes	No	2.00
468	10.24	10.25	1.96	1.38	0.64	114.90	1.28	146.63	4.000	Yes	No	2.00
469	10.26	12.73	1.92	1.50	0.62	142.46	1.25	177.88	4.000	Yes	No	2.00
470	10.28	14.25	1.90	1.59	0.62	159.30	1.24	197.56	0.797	No	No	2.00
471	10.30	15.20	1.91	1.70	0.62	169.73	1.24	210.80	4.000	No	No	2.00
472	10.32	16.24	1.89	1.72	0.61	180.96	1.23	223.16	4.000	No	No	2.00
473	10.34	17.06	1.89	1.75	0.61	189.82	1.23	233.22	4.000	No	No	2.00
474	10.36	17.79	1.88	1.74	0.61	197.48	1.22	240.88	4.000	No	No	2.00
475	10.38	18.61	1.88	1.81	0.61	206.38	1.22	251.94	4.000	No	No	2.00
476	10.40	20.09	1.87	1.88	0.60	222.53	1.22	270.39	4.000	No	No	2.00
477	10.42	21.19	1.89	2.05	0.61	234.64	1.23	288.01	4.000	No	No	2.00
478	10.44	23.27	1.87	2.10	0.60	257.18	1.22	313.09	4.000	No	No	2.00
479	10.46	24.33	1.87	2.18	0.61	268.66	1.22	327.53	4.000	No	No	2.00
480	10.48	26.91	1.84	2.10	0.59	295.98	1.19	352.18	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	10.50	28.21	1.82	2.05	0.58	309.43	1.17	362.66	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	1.95	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	1.99	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	1.91	0.00	0.00	0.02	0.00
3.58	1.65	0.00	0.00	0.02	0.00	3.60	1.58	0.00	0.00	0.02	0.00
3.62	1.62	0.00	0.00	0.02	0.00	3.64	1.65	0.00	0.00	0.02	0.00
3.66	1.59	0.00	0.00	0.02	0.00	3.68	1.51	0.00	0.00	0.02	0.00
3.70	1.46	0.00	0.00	0.02	0.00	3.72	1.47	0.00	0.00	0.02	0.00
3.74	1.54	0.00	0.00	0.02	0.00	3.76	1.54	0.00	0.00	0.02	0.00
3.78	1.59	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	1.20	0.00	0.00	0.02	0.00
6.62	1.57	0.00	0.00	0.02	0.00	6.64	1.92	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	2.00	0.00	0.00	0.02	0.00
8.18	2.00	0.00	0.00	0.02	0.00	8.20	2.00	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	1.13	0.00	0.00	0.02	0.00
8.70	1.27	0.00	0.00	0.02	0.00	8.72	1.65	0.00	0.00	0.02	0.00
8.74	1.67	0.00	0.00	0.02	0.00	8.76	1.52	0.00	0.00	0.02	0.00
8.78	1.23	0.00	0.00	0.02	0.00	8.80	1.21	0.00	0.00	0.02	0.00
8.82	1.53	0.00	0.00	0.02	0.00	8.84	1.92	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	1.57	0.00	0.00	0.02	0.00
9.14	1.28	0.00	0.00	0.02	0.00	9.16	1.31	0.00	0.00	0.02	0.00
9.18	1.27	0.00	0.00	0.02	0.00	9.20	1.36	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	1.41	0.00	0.00	0.02	0.00
9.42	1.42	0.00	0.00	0.02	0.00	9.44	1.44	0.00	0.00	0.02	0.00
9.46	1.92	0.00	0.00	0.02	0.00	9.48	2.00	0.00	0.00	0.02	0.00
9.50	2.00	0.00	0.00	0.02	0.00	9.52	2.00	0.00	0.00	0.02	0.00
9.54	2.00	0.00	0.00	0.02	0.00	9.56	2.00	0.00	0.00	0.02	0.00
9.58	2.00	0.00	0.00	0.02	0.00	9.60	2.00	0.00	0.00	0.02	0.00
9.62	2.00	0.00	0.00	0.02	0.00	9.64	2.00	0.00	0.00	0.02	0.00
9.66	2.00	0.00	0.00	0.02	0.00	9.68	2.00	0.00	0.00	0.02	0.00
9.70	1.73	0.00	0.00	0.02	0.00	9.72	1.52	0.00	0.00	0.02	0.00
9.74	1.85	0.00	0.00	0.02	0.00	9.76	1.98	0.00	0.00	0.02	0.00
9.78	1.65	0.00	0.00	0.02	0.00	9.80	1.57	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	2.00	0.00	0.00	0.02	0.00	9.88	2.00	0.00	0.00	0.02	0.00
9.90	2.00	0.00	0.00	0.02	0.00	9.92	2.00	0.00	0.00	0.02	0.00
9.94	2.00	0.00	0.00	0.02	0.00	9.96	2.00	0.00	0.00	0.02	0.00
9.98	1.15	0.00	0.00	0.02	0.00	10.00	2.00	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	2.00	0.00	0.00	0.02	0.00
10.22	2.00	0.00	0.00	0.02	0.00	10.24	2.00	0.00	0.00	0.02	0.00
10.26	2.00	0.00	0.00	0.02	0.00	10.28	2.00	0.00	0.00	0.02	0.00
10.30	2.00	0.00	0.00	0.02	0.00	10.32	2.00	0.00	0.00	0.02	0.00
10.34	2.00	0.00	0.00	0.02	0.00	10.36	2.00	0.00	0.00	0.02	0.00
10.38	2.00	0.00	0.00	0.02	0.00	10.40	2.00	0.00	0.00	0.02	0.00
10.42	2.00	0.00	0.00	0.02	0.00	10.44	2.00	0.00	0.00	0.02	0.00
10.46	2.00	0.00	0.00	0.02	0.00	10.48	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.50	2.00	0.00	0.00	0.02	0.00						

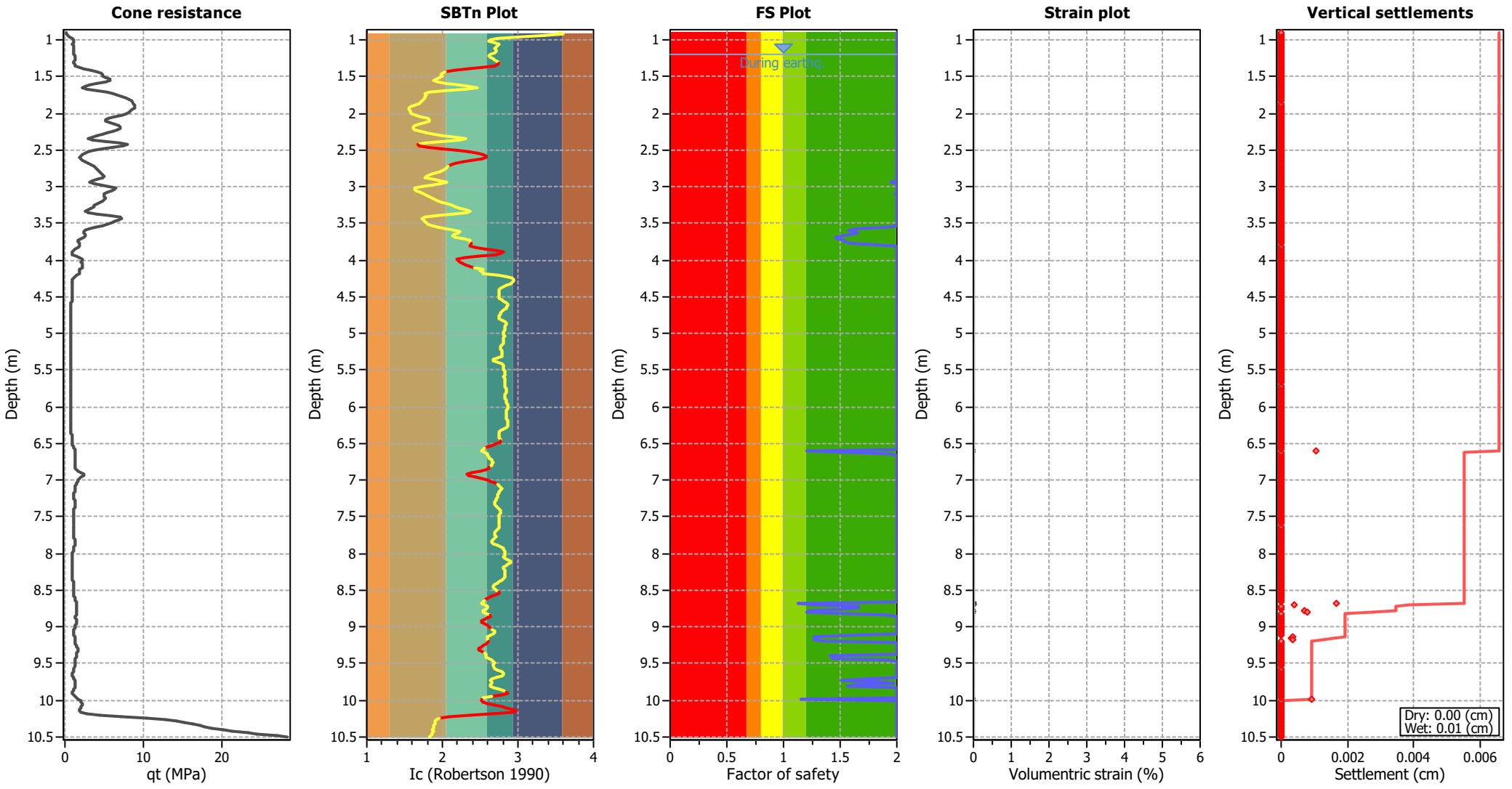
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
1.20	166.31	2.00	0.00	0.93	0.00	1.22	148.44	2.00	0.00	0.93	0.00
1.24	165.69	2.00	0.00	0.93	0.00	1.26	204.56	2.00	0.00	0.93	0.00
1.28	244.99	2.00	0.00	0.93	0.00	1.30	116.01	2.00	0.00	0.93	0.00
1.32	120.97	2.00	0.00	0.93	0.00	1.34	122.85	2.00	0.00	0.93	0.00
1.36	253.95	2.00	0.00	0.92	0.00	1.38	115.01	2.00	0.00	0.92	0.00
1.40	95.97	2.00	0.00	0.92	0.00	1.42	98.55	2.00	0.00	0.92	0.00
1.44	109.71	2.00	0.00	0.92	0.00	1.46	118.60	2.00	0.00	0.92	0.00
1.48	121.16	2.00	0.00	0.92	0.00	1.50	123.84	2.00	0.00	0.92	0.00
1.52	130.85	2.00	0.00	0.92	0.00	1.54	138.66	2.00	0.00	0.91	0.00
1.56	139.47	2.00	0.00	0.91	0.00	1.58	126.35	2.00	0.00	0.91	0.00
1.60	109.53	2.00	0.00	0.91	0.00	1.62	101.33	2.00	0.00	0.91	0.00
1.64	107.03	2.00	0.00	0.91	0.00	1.66	115.42	2.00	0.00	0.91	0.00
1.68	103.76	2.00	0.00	0.91	0.00	1.70	104.88	2.00	0.00	0.91	0.00
1.72	122.75	2.00	0.00	0.90	0.00	1.74	131.95	2.00	0.00	0.90	0.00
1.76	145.52	2.00	0.00	0.90	0.00	1.78	159.72	2.00	0.00	0.90	0.00
1.80	169.97	2.00	0.00	0.90	0.00	1.82	174.59	2.00	0.00	0.90	0.00
1.84	174.36	2.00	0.00	0.90	0.00	1.86	171.09	2.00	0.00	0.90	0.00
1.88	174.49	2.00	0.00	0.90	0.00	1.90	171.29	2.00	0.00	0.89	0.00
1.92	165.73	2.00	0.00	0.89	0.00	1.94	161.53	2.00	0.00	0.89	0.00
1.96	158.13	2.00	0.00	0.89	0.00	1.98	154.79	2.00	0.00	0.89	0.00
2.00	149.44	2.00	0.00	0.89	0.00	2.02	139.03	2.00	0.00	0.89	0.00
2.04	127.58	2.00	0.00	0.89	0.00	2.06	124.97	2.00	0.00	0.89	0.00
2.08	120.77	2.00	0.00	0.88	0.00	2.10	121.50	2.00	0.00	0.88	0.00
2.12	124.08	2.00	0.00	0.88	0.00	2.14	122.36	2.00	0.00	0.88	0.00
2.16	128.48	2.00	0.00	0.88	0.00	2.18	129.84	2.00	0.00	0.88	0.00
2.20	130.11	2.00	0.00	0.88	0.00	2.22	125.74	2.00	0.00	0.88	0.00
2.24	119.29	2.00	0.00	0.88	0.00	2.26	119.93	2.00	0.00	0.87	0.00
2.28	113.84	2.00	0.00	0.87	0.00	2.30	104.85	2.00	0.00	0.87	0.00
2.32	105.09	2.00	0.00	0.87	0.00	2.34	117.82	2.00	0.00	0.87	0.00
2.36	119.49	2.00	0.00	0.87	0.00	2.38	132.96	2.00	0.00	0.87	0.00
2.40	153.85	2.00	0.00	0.87	0.00	2.42	148.82	2.00	0.00	0.87	0.00
2.44	138.84	2.00	0.00	0.86	0.00	2.46	140.78	2.00	0.00	0.86	0.00
2.48	122.41	2.00	0.00	0.86	0.00	2.50	115.62	2.00	0.00	0.86	0.00
2.52	122.34	2.00	0.00	0.86	0.00	2.54	134.71	2.00	0.00	0.86	0.00
2.56	148.90	2.00	0.00	0.86	0.00	2.58	190.36	2.00	0.00	0.86	0.00
2.60	178.55	2.00	0.00	0.86	0.00	2.62	116.58	2.00	0.00	0.85	0.00
2.64	96.98	2.00	0.00	0.85	0.00	2.66	90.41	2.00	0.00	0.85	0.00
2.68	89.82	2.00	0.00	0.85	0.00	2.70	94.29	2.00	0.00	0.85	0.00
2.72	99.57	2.00	0.00	0.85	0.00	2.74	104.37	2.00	0.00	0.85	0.00
2.76	108.14	2.00	0.00	0.85	0.00	2.78	110.92	2.00	0.00	0.85	0.00
2.80	111.73	2.00	0.00	0.84	0.00	2.82	111.03	2.00	0.00	0.84	0.00
2.84	106.64	2.00	0.00	0.84	0.00	2.86	101.67	2.00	0.00	0.84	0.00
2.88	86.90	2.00	0.00	0.84	0.00	2.90	92.74	2.00	0.00	0.84	0.00
2.92	88.57	2.00	0.00	0.84	0.00	2.94	85.20	1.95	0.00	0.84	0.00
2.96	92.69	2.00	0.00	0.84	0.00	2.98	103.89	2.00	0.00	0.83	0.00
3.00	98.83	2.00	0.00	0.83	0.00	3.02	108.19	2.00	0.00	0.83	0.00
3.04	105.89	2.00	0.00	0.83	0.00	3.06	100.64	2.00	0.00	0.83	0.00
3.08	92.28	2.00	0.00	0.83	0.00	3.10	87.75	1.99	0.00	0.83	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
3.12	99.96	2.00	0.00	0.83	0.00	3.14	107.07	2.00	0.00	0.83	0.00
3.16	111.69	2.00	0.00	0.82	0.00	3.18	113.59	2.00	0.00	0.82	0.00
3.20	112.38	2.00	0.00	0.82	0.00	3.22	109.50	2.00	0.00	0.82	0.00
3.24	107.38	2.00	0.00	0.82	0.00	3.26	107.93	2.00	0.00	0.82	0.00
3.28	110.67	2.00	0.00	0.82	0.00	3.30	109.46	2.00	0.00	0.82	0.00
3.32	108.92	2.00	0.00	0.82	0.00	3.34	113.24	2.00	0.00	0.81	0.00
3.36	115.60	2.00	0.00	0.81	0.00	3.38	115.84	2.00	0.00	0.81	0.00
3.40	128.86	2.00	0.00	0.81	0.00	3.42	133.16	2.00	0.00	0.81	0.00
3.44	126.42	2.00	0.00	0.81	0.00	3.46	122.59	2.00	0.00	0.81	0.00
3.48	118.45	2.00	0.00	0.81	0.00	3.50	113.99	2.00	0.00	0.81	0.00
3.52	107.33	2.00	0.00	0.80	0.00	3.54	99.44	2.00	0.00	0.80	0.00
3.56	87.35	1.91	0.00	0.80	0.00	3.58	77.52	1.65	0.00	0.80	0.00
3.60	74.18	1.58	0.00	0.80	0.00	3.62	76.10	1.62	0.00	0.80	0.00
3.64	77.76	1.65	0.00	0.80	0.00	3.66	74.91	1.59	0.00	0.80	0.00
3.68	71.44	1.51	0.00	0.80	0.00	3.70	68.50	1.46	0.00	0.79	0.00
3.72	69.30	1.47	0.00	0.79	0.00	3.74	73.17	1.54	0.00	0.79	0.00
3.76	73.24	1.54	0.00	0.79	0.00	3.78	75.91	1.59	0.00	0.79	0.00
3.80	74.67	2.00	0.00	0.79	0.00	3.82	78.43	2.00	0.00	0.79	0.00
3.84	101.24	2.00	0.00	0.79	0.00	3.86	93.31	2.00	0.00	0.79	0.00
3.88	96.67	2.00	0.00	0.78	0.00	3.90	93.32	2.00	0.00	0.78	0.00
3.92	87.01	2.00	0.00	0.78	0.00	3.94	73.79	2.00	0.00	0.78	0.00
3.96	66.52	2.00	0.00	0.78	0.00	3.98	65.30	2.00	0.00	0.78	0.00
4.00	64.57	2.00	0.00	0.78	0.00	4.02	64.27	2.00	0.00	0.78	0.00
4.04	71.77	2.00	0.00	0.78	0.00	4.06	82.92	2.00	0.00	0.77	0.00
4.08	94.06	2.00	0.00	0.77	0.00	4.10	100.65	2.00	0.00	0.77	0.00
4.12	124.71	2.00	0.00	0.77	0.00	4.14	107.93	2.00	0.00	0.77	0.00
4.16	126.70	2.00	0.00	0.77	0.00	4.18	126.42	2.00	0.00	0.77	0.00
4.20	134.76	2.00	0.00	0.77	0.00	4.22	147.10	2.00	0.00	0.77	0.00
4.24	149.09	2.00	0.00	0.76	0.00	4.26	143.90	2.00	0.00	0.76	0.00
4.28	139.82	2.00	0.00	0.76	0.00	4.30	132.73	2.00	0.00	0.76	0.00
4.32	123.75	2.00	0.00	0.76	0.00	4.34	112.38	2.00	0.00	0.76	0.00
4.36	104.72	2.00	0.00	0.76	0.00	4.38	99.25	2.00	0.00	0.76	0.00
4.40	96.80	2.00	0.00	0.76	0.00	4.42	95.89	2.00	0.00	0.75	0.00
4.44	95.11	2.00	0.00	0.75	0.00	4.46	94.72	2.00	0.00	0.75	0.00
4.48	94.35	2.00	0.00	0.75	0.00	4.50	95.37	2.00	0.00	0.75	0.00
4.52	95.68	2.00	0.00	0.75	0.00	4.54	95.94	2.00	0.00	0.75	0.00
4.56	95.52	2.00	0.00	0.75	0.00	4.58	95.34	2.00	0.00	0.75	0.00
4.60	93.85	2.00	0.00	0.74	0.00	4.62	91.35	2.00	0.00	0.74	0.00
4.64	87.24	2.00	0.00	0.74	0.00	4.66	83.43	2.00	0.00	0.74	0.00
4.68	80.10	2.00	0.00	0.74	0.00	4.70	77.74	2.00	0.00	0.74	0.00
4.72	76.53	2.00	0.00	0.74	0.00	4.74	76.28	2.00	0.00	0.74	0.00
4.76	75.87	2.00	0.00	0.74	0.00	4.78	75.33	2.00	0.00	0.73	0.00
4.80	76.34	2.00	0.00	0.73	0.00	4.82	79.32	2.00	0.00	0.73	0.00
4.84	80.82	2.00	0.00	0.73	0.00	4.86	79.88	2.00	0.00	0.73	0.00
4.88	76.52	2.00	0.00	0.73	0.00	4.90	74.70	2.00	0.00	0.73	0.00
4.92	73.66	2.00	0.00	0.73	0.00	4.94	73.44	2.00	0.00	0.73	0.00
4.96	72.53	2.00	0.00	0.72	0.00	4.98	71.45	2.00	0.00	0.72	0.00
5.00	70.62	2.00	0.00	0.72	0.00	5.02	70.39	2.00	0.00	0.72	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.04	70.27	2.00	0.00	0.72	0.00	5.06	69.61	2.00	0.00	0.72	0.00
5.08	69.09	2.00	0.00	0.72	0.00	5.10	68.75	2.00	0.00	0.72	0.00
5.12	68.33	2.00	0.00	0.72	0.00	5.14	67.69	2.00	0.00	0.71	0.00
5.16	66.84	2.00	0.00	0.71	0.00	5.18	66.57	2.00	0.00	0.71	0.00
5.20	66.64	2.00	0.00	0.71	0.00	5.22	66.88	2.00	0.00	0.71	0.00
5.24	66.95	2.00	0.00	0.71	0.00	5.26	67.18	2.00	0.00	0.71	0.00
5.28	67.51	2.00	0.00	0.71	0.00	5.30	67.74	2.00	0.00	0.71	0.00
5.32	67.45	2.00	0.00	0.70	0.00	5.34	62.20	2.00	0.00	0.70	0.00
5.36	111.13	2.00	0.00	0.70	0.00	5.38	116.93	2.00	0.00	0.70	0.00
5.40	67.84	2.00	0.00	0.70	0.00	5.42	75.73	2.00	0.00	0.70	0.00
5.44	76.67	2.00	0.00	0.70	0.00	5.46	76.22	2.00	0.00	0.70	0.00
5.48	76.12	2.00	0.00	0.70	0.00	5.50	75.80	2.00	0.00	0.69	0.00
5.52	75.21	2.00	0.00	0.69	0.00	5.54	73.54	2.00	0.00	0.69	0.00
5.56	71.72	2.00	0.00	0.69	0.00	5.58	69.77	2.00	0.00	0.69	0.00
5.60	68.50	2.00	0.00	0.69	0.00	5.62	68.45	2.00	0.00	0.69	0.00
5.64	68.89	2.00	0.00	0.69	0.00	5.66	69.23	2.00	0.00	0.69	0.00
5.68	69.40	2.00	0.00	0.68	0.00	5.70	69.47	2.00	0.00	0.68	0.00
5.72	70.10	2.00	0.00	0.68	0.00	5.74	70.75	2.00	0.00	0.68	0.00
5.76	71.31	2.00	0.00	0.68	0.00	5.78	71.20	2.00	0.00	0.68	0.00
5.80	70.83	2.00	0.00	0.68	0.00	5.82	70.45	2.00	0.00	0.68	0.00
5.84	70.19	2.00	0.00	0.68	0.00	5.86	70.17	2.00	0.00	0.67	0.00
5.88	70.12	2.00	0.00	0.67	0.00	5.90	70.24	2.00	0.00	0.67	0.00
5.92	70.19	2.00	0.00	0.67	0.00	5.94	70.14	2.00	0.00	0.67	0.00
5.96	70.08	2.00	0.00	0.67	0.00	5.98	70.01	2.00	0.00	0.67	0.00
6.00	69.78	2.00	0.00	0.67	0.00	6.02	69.54	2.00	0.00	0.67	0.00
6.04	68.98	2.00	0.00	0.66	0.00	6.06	68.67	2.00	0.00	0.66	0.00
6.08	68.27	2.00	0.00	0.66	0.00	6.10	68.35	2.00	0.00	0.66	0.00
6.12	68.25	2.00	0.00	0.66	0.00	6.14	68.19	2.00	0.00	0.66	0.00
6.16	68.14	2.00	0.00	0.66	0.00	6.18	68.46	2.00	0.00	0.66	0.00
6.20	68.67	2.00	0.00	0.66	0.00	6.22	68.84	2.00	0.00	0.65	0.00
6.24	68.86	2.00	0.00	0.65	0.00	6.26	68.99	2.00	0.00	0.65	0.00
6.28	68.34	2.00	0.00	0.65	0.00	6.30	66.71	2.00	0.00	0.65	0.00
6.32	65.15	2.00	0.00	0.65	0.00	6.34	64.53	2.00	0.00	0.65	0.00
6.36	65.11	2.00	0.00	0.65	0.00	6.38	66.43	2.00	0.00	0.65	0.00
6.40	67.49	2.00	0.00	0.64	0.00	6.42	69.37	2.00	0.00	0.64	0.00
6.44	70.58	2.00	0.00	0.64	0.00	6.46	71.53	2.00	0.00	0.64	0.00
6.48	71.40	2.00	0.00	0.64	0.00	6.50	68.90	2.00	0.00	0.64	0.00
6.52	124.45	2.00	0.00	0.64	0.00	6.54	98.45	2.00	0.00	0.64	0.00
6.56	70.64	2.00	0.00	0.64	0.00	6.58	65.42	2.00	0.00	0.63	0.00
6.60	64.35	1.20	0.05	0.63	0.00	6.62	84.77	1.57	0.00	0.63	0.00
6.64	98.01	1.92	0.00	0.63	0.00	6.66	106.06	2.00	0.00	0.63	0.00
6.68	112.52	2.00	0.00	0.63	0.00	6.70	123.50	2.00	0.00	0.63	0.00
6.72	140.85	2.00	0.00	0.63	0.00	6.74	154.04	2.00	0.00	0.63	0.00
6.76	155.47	2.00	0.00	0.62	0.00	6.78	145.39	2.00	0.00	0.62	0.00
6.80	138.53	2.00	0.00	0.62	0.00	6.82	122.82	2.00	0.00	0.62	0.00
6.84	117.42	2.00	0.00	0.62	0.00	6.86	97.10	2.00	0.00	0.62	0.00
6.88	70.47	2.00	0.00	0.62	0.00	6.90	66.94	2.00	0.00	0.62	0.00
6.92	68.20	2.00	0.00	0.62	0.00	6.94	71.85	2.00	0.00	0.61	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.96	77.97	2.00	0.00	0.61	0.00	6.98	85.18	2.00	0.00	0.61	0.00
7.00	122.89	2.00	0.00	0.61	0.00	7.02	160.29	2.00	0.00	0.61	0.00
7.04	207.30	2.00	0.00	0.61	0.00	7.06	104.46	2.00	0.00	0.61	0.00
7.08	105.00	2.00	0.00	0.61	0.00	7.10	104.26	2.00	0.00	0.61	0.00
7.12	101.58	2.00	0.00	0.60	0.00	7.14	97.51	2.00	0.00	0.60	0.00
7.16	91.54	2.00	0.00	0.60	0.00	7.18	87.05	2.00	0.00	0.60	0.00
7.20	84.04	2.00	0.00	0.60	0.00	7.22	82.81	2.00	0.00	0.60	0.00
7.24	82.23	2.00	0.00	0.60	0.00	7.26	81.50	2.00	0.00	0.60	0.00
7.28	80.30	2.00	0.00	0.60	0.00	7.30	163.53	2.00	0.00	0.59	0.00
7.32	163.00	2.00	0.00	0.59	0.00	7.34	170.20	2.00	0.00	0.59	0.00
7.36	82.80	2.00	0.00	0.59	0.00	7.38	84.11	2.00	0.00	0.59	0.00
7.40	85.76	2.00	0.00	0.59	0.00	7.42	86.34	2.00	0.00	0.59	0.00
7.44	86.24	2.00	0.00	0.59	0.00	7.46	84.51	2.00	0.00	0.59	0.00
7.48	83.04	2.00	0.00	0.58	0.00	7.50	81.86	2.00	0.00	0.58	0.00
7.52	81.51	2.00	0.00	0.58	0.00	7.54	81.12	2.00	0.00	0.58	0.00
7.56	80.66	2.00	0.00	0.58	0.00	7.58	80.38	2.00	0.00	0.58	0.00
7.60	79.61	2.00	0.00	0.58	0.00	7.62	78.89	2.00	0.00	0.58	0.00
7.64	77.87	2.00	0.00	0.58	0.00	7.66	76.54	2.00	0.00	0.57	0.00
7.68	74.80	2.00	0.00	0.57	0.00	7.70	154.61	2.00	0.00	0.57	0.00
7.72	146.63	2.00	0.00	0.57	0.00	7.74	151.26	2.00	0.00	0.57	0.00
7.76	73.17	2.00	0.00	0.57	0.00	7.78	73.06	2.00	0.00	0.57	0.00
7.80	143.95	2.00	0.00	0.57	0.00	7.82	130.77	2.00	0.00	0.57	0.00
7.84	133.92	2.00	0.00	0.56	0.00	7.86	152.44	2.00	0.00	0.56	0.00
7.88	81.25	2.00	0.00	0.56	0.00	7.90	84.67	2.00	0.00	0.56	0.00
7.92	86.52	2.00	0.00	0.56	0.00	7.94	84.30	2.00	0.00	0.56	0.00
7.96	83.07	2.00	0.00	0.56	0.00	7.98	81.67	2.00	0.00	0.56	0.00
8.00	80.43	2.00	0.00	0.56	0.00	8.02	78.79	2.00	0.00	0.55	0.00
8.04	76.41	2.00	0.00	0.55	0.00	8.06	75.82	2.00	0.00	0.55	0.00
8.08	76.10	2.00	0.00	0.55	0.00	8.10	77.50	2.00	0.00	0.55	0.00
8.12	78.08	2.00	0.00	0.55	0.00	8.14	76.75	2.00	0.00	0.55	0.00
8.16	75.15	2.00	0.00	0.55	0.00	8.18	73.86	2.00	0.00	0.55	0.00
8.20	74.56	2.00	0.00	0.54	0.00	8.22	75.95	2.00	0.00	0.54	0.00
8.24	77.18	2.00	0.00	0.54	0.00	8.26	76.73	2.00	0.00	0.54	0.00
8.28	75.63	2.00	0.00	0.54	0.00	8.30	74.59	2.00	0.00	0.54	0.00
8.32	74.01	2.00	0.00	0.54	0.00	8.34	72.06	2.00	0.00	0.54	0.00
8.36	68.96	2.00	0.00	0.54	0.00	8.38	66.45	2.00	0.00	0.53	0.00
8.40	63.87	2.00	0.00	0.53	0.00	8.42	62.56	2.00	0.00	0.53	0.00
8.44	120.23	2.00	0.00	0.53	0.00	8.46	121.57	2.00	0.00	0.53	0.00
8.48	129.71	2.00	0.00	0.53	0.00	8.50	63.56	2.00	0.00	0.53	0.00
8.52	64.46	2.00	0.00	0.53	0.00	8.54	64.75	2.00	0.00	0.53	0.00
8.56	63.66	2.00	0.00	0.52	0.00	8.58	109.42	2.00	0.00	0.52	0.00
8.60	87.41	2.00	0.00	0.52	0.00	8.62	76.09	2.00	0.00	0.52	0.00
8.64	68.41	2.00	0.00	0.52	0.00	8.66	60.94	2.00	0.00	0.52	0.00
8.68	60.59	1.13	0.08	0.52	0.00	8.70	71.11	1.27	0.02	0.52	0.00
8.72	89.93	1.65	0.00	0.52	0.00	8.74	97.34	1.67	0.00	0.51	0.00
8.76	84.23	1.52	0.00	0.51	0.00	8.78	68.71	1.23	0.04	0.51	0.00
8.80	67.12	1.21	0.04	0.51	0.00	8.82	84.98	1.53	0.00	0.51	0.00
8.84	105.95	1.92	0.00	0.51	0.00	8.86	110.14	2.00	0.00	0.51	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.88	86.72	2.00	0.00	0.51	0.00	8.90	65.77	2.00	0.00	0.51	0.00
8.92	56.57	2.00	0.00	0.50	0.00	8.94	55.96	2.00	0.00	0.50	0.00
8.96	67.38	2.00	0.00	0.50	0.00	8.98	80.70	2.00	0.00	0.50	0.00
9.00	91.48	2.00	0.00	0.50	0.00	9.02	100.24	2.00	0.00	0.50	0.00
9.04	109.21	2.00	0.00	0.50	0.00	9.06	125.75	2.00	0.00	0.50	0.00
9.08	124.95	2.00	0.00	0.50	0.00	9.10	115.23	2.00	0.00	0.49	0.00
9.12	93.71	1.57	0.00	0.49	0.00	9.14	79.67	1.28	0.02	0.49	0.00
9.16	73.92	1.31	0.02	0.49	0.00	9.18	79.32	1.27	0.02	0.49	0.00
9.20	84.25	1.36	0.00	0.49	0.00	9.22	78.69	2.00	0.00	0.49	0.00
9.24	71.00	2.00	0.00	0.49	0.00	9.26	61.22	2.00	0.00	0.49	0.00
9.28	53.28	2.00	0.00	0.48	0.00	9.30	52.82	2.00	0.00	0.48	0.00
9.32	54.42	2.00	0.00	0.48	0.00	9.34	57.70	2.00	0.00	0.48	0.00
9.36	70.73	2.00	0.00	0.48	0.00	9.38	81.10	2.00	0.00	0.48	0.00
9.40	79.60	1.41	0.00	0.48	0.00	9.42	79.77	1.42	0.00	0.48	0.00
9.44	88.11	1.44	0.00	0.48	0.00	9.46	106.20	1.92	0.00	0.47	0.00
9.48	124.40	2.00	0.00	0.47	0.00	9.50	131.80	2.00	0.00	0.47	0.00
9.52	123.25	2.00	0.00	0.47	0.00	9.54	116.08	2.00	0.00	0.47	0.00
9.56	125.82	2.00	0.00	0.47	0.00	9.58	63.65	2.00	0.00	0.47	0.00
9.60	65.95	2.00	0.00	0.47	0.00	9.62	65.27	2.00	0.00	0.47	0.00
9.64	63.61	2.00	0.00	0.46	0.00	9.66	60.64	2.00	0.00	0.46	0.00
9.68	57.22	2.00	0.00	0.46	0.00	9.70	99.87	1.73	0.00	0.46	0.00
9.72	91.49	1.52	0.00	0.46	0.00	9.74	103.99	1.85	0.00	0.46	0.00
9.76	107.92	1.98	0.00	0.46	0.00	9.78	96.70	1.65	0.00	0.46	0.00
9.80	93.59	1.57	0.00	0.46	0.00	9.82	115.24	2.00	0.00	0.45	0.00
9.84	64.32	2.00	0.00	0.45	0.00	9.86	66.67	2.00	0.00	0.45	0.00
9.88	67.00	2.00	0.00	0.45	0.00	9.90	65.89	2.00	0.00	0.45	0.00
9.92	62.87	2.00	0.00	0.45	0.00	9.94	105.07	2.00	0.00	0.45	0.00
9.96	62.16	2.00	0.00	0.45	0.00	9.98	63.24	1.15	0.05	0.45	0.00
10.00	69.32	2.00	0.00	0.44	0.00	10.02	91.31	2.00	0.00	0.44	0.00
10.04	128.30	2.00	0.00	0.44	0.00	10.06	240.52	2.00	0.00	0.44	0.00
10.08	135.18	2.00	0.00	0.44	0.00	10.10	154.96	2.00	0.00	0.44	0.00
10.12	168.81	2.00	0.00	0.44	0.00	10.14	174.56	2.00	0.00	0.44	0.00
10.16	168.12	2.00	0.00	0.44	0.00	10.18	253.02	2.00	0.00	0.43	0.00
10.20	109.29	2.00	0.00	0.43	0.00	10.22	114.16	2.00	0.00	0.43	0.00
10.24	146.63	2.00	0.00	0.43	0.00	10.26	177.88	2.00	0.00	0.43	0.00
10.28	197.56	2.00	0.00	0.43	0.00	10.30	210.80	2.00	0.00	0.43	0.00
10.32	223.16	2.00	0.00	0.43	0.00	10.34	233.22	2.00	0.00	0.43	0.00
10.36	240.88	2.00	0.00	0.42	0.00	10.38	251.94	2.00	0.00	0.42	0.00
10.40	270.39	2.00	0.00	0.42	0.00	10.42	288.01	2.00	0.00	0.42	0.00
10.44	313.09	2.00	0.00	0.42	0.00	10.46	327.53	2.00	0.00	0.42	0.00
10.48	352.18	2.00	0.00	0.42	0.00	10.50	362.66	2.00	0.00	0.42	0.00

Total estimated settlement: 0.01

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

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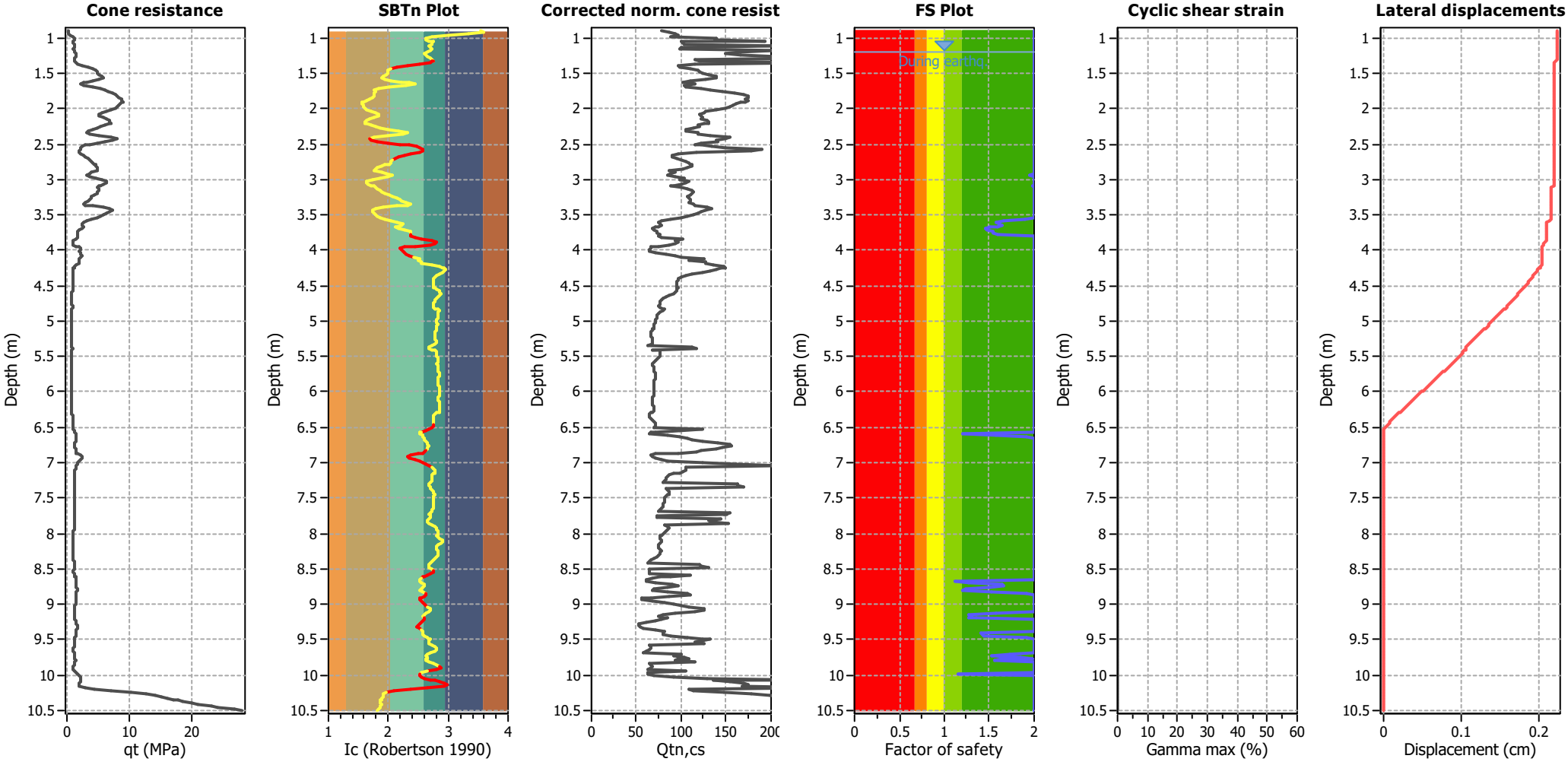
CPT name: CWLP CPT-7L

Estimation of post-earthquake lateral Displacements

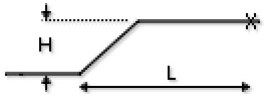
Geometric parameters: Level ground (or gently sloping) with free face (L: 27.70 m - H: 3.40 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
1.20	1.19	23.18	2.36	166.31	2.00	18.75	0.00	0.00
1.22	1.30	25.24	2.35	148.44	2.00	21.57	0.00	0.00
1.24	1.32	25.66	2.53	165.69	2.00	22.10	0.00	0.00
1.26	1.29	25.17	2.83	204.56	2.00	21.47	0.00	0.00
1.28	1.24	24.17	3.06	244.99	2.00	20.13	0.00	0.00
1.30	1.20	23.28	3.21	116.01	2.00	18.89	0.05	0.00
1.32	1.18	22.97	3.46	120.97	2.00	18.44	0.05	0.00
1.34	1.24	24.09	3.48	122.85	2.00	20.02	0.05	0.00
1.36	1.35	26.30	3.29	253.95	2.00	22.92	0.00	0.00
1.38	1.76	34.24	2.51	115.01	2.00	31.62	0.00	0.00
1.40	2.45	47.85	1.79	95.97	2.00	42.67	0.00	0.00
1.42	3.35	65.59	1.41	98.55	2.00	53.08	0.00	0.00
1.44	4.15	81.47	1.25	109.71	2.00	60.24	0.00	0.00
1.46	4.63	90.87	1.21	118.60	2.00	63.84	0.00	0.00
1.48	4.75	93.30	1.21	121.16	2.00	64.71	0.00	0.00
1.50	4.84	95.03	1.27	123.84	2.00	65.32	0.00	0.00
1.52	5.19	101.91	1.25	130.85	2.00	67.62	0.00	0.00
1.54	5.63	110.72	1.17	138.66	2.00	70.36	0.00	0.00
1.56	5.77	113.39	1.07	139.47	2.00	71.15	0.00	0.00
1.58	5.11	100.35	1.09	126.35	2.00	67.12	0.00	0.00
1.60	4.14	81.27	1.25	109.53	2.00	60.15	0.00	0.00
1.62	3.14	61.46	1.64	101.33	2.00	50.93	0.00	0.00
1.64	2.57	50.17	2.10	107.03	2.00	44.23	0.00	0.00
1.66	2.22	43.23	2.53	115.42	2.00	39.32	0.00	0.00
1.68	2.74	53.60	1.92	103.76	2.00	46.42	0.00	0.00
1.70	4.01	78.67	1.14	104.88	2.00	59.08	0.00	0.00
1.72	5.29	103.95	0.77	122.75	2.00	68.28	0.00	0.00
1.74	6.09	119.64	0.72	131.95	2.00	72.92	0.00	0.00
1.76	6.55	128.82	0.85	145.52	2.00	75.36	0.00	0.00
1.78	7.26	142.70	0.93	159.72	2.00	78.74	0.00	0.00
1.80	7.81	153.52	0.97	169.97	2.00	81.15	0.00	0.00
1.82	8.16	160.58	0.98	174.59	2.00	82.63	0.00	0.00
1.84	8.42	165.60	0.95	174.36	2.00	83.65	0.00	0.00
1.86	8.70	171.09	0.86	171.09	2.00	84.72	0.00	0.00
1.88	8.87	174.49	0.71	174.49	2.00	85.37	0.00	0.00
1.90	8.92	171.29	0.59	171.29	2.00	84.76	0.00	0.00
1.92	8.78	165.73	0.51	165.73	2.00	83.67	0.00	0.00
1.94	8.56	161.53	0.50	161.53	2.00	82.83	0.00	0.00
1.96	8.36	158.13	0.51	158.13	2.00	82.12	0.00	0.00
1.98	8.17	154.79	0.51	154.79	2.00	81.42	0.00	0.00
2.00	7.82	149.44	0.53	149.44	2.00	80.26	0.00	0.00
2.02	7.15	139.03	0.57	139.03	2.00	77.88	0.00	0.00
2.04	6.30	123.67	0.64	127.58	2.00	74.01	0.00	0.00
2.06	5.53	108.51	0.73	124.97	2.00	69.70	0.00	0.00
2.08	5.19	101.68	0.77	120.77	2.00	67.55	0.00	0.00
2.10	5.22	102.31	0.77	121.50	2.00	67.75	0.00	0.00
2.12	5.72	112.29	0.67	124.08	2.00	70.83	0.00	0.00
2.14	6.27	122.36	0.56	122.36	2.00	73.66	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
2.16	6.80	128.48	0.48	128.48	2.00	75.27	0.00	0.00
2.18	6.95	129.84	0.45	129.84	2.00	75.62	0.00	0.00
2.20	6.99	130.11	0.44	130.11	2.00	75.69	0.00	0.00
2.22	6.70	125.74	0.46	125.74	2.00	74.56	0.00	0.00
2.24	6.17	119.29	0.57	119.29	2.00	72.82	0.00	0.00
2.26	5.42	106.21	0.66	119.93	2.00	68.99	0.00	0.00
2.28	4.76	93.30	0.80	113.84	2.00	64.71	0.00	0.00
2.30	4.11	80.45	1.03	104.85	2.00	59.82	0.00	0.00
2.32	3.50	68.31	1.57	105.09	2.00	54.42	0.00	0.00
2.34	3.04	59.16	2.25	117.82	2.00	49.67	0.00	0.00
2.36	3.58	69.96	2.04	119.49	2.00	55.21	0.00	0.00
2.38	5.22	102.30	1.35	132.96	2.00	67.75	0.00	0.00
2.40	7.10	138.41	0.88	153.85	2.00	77.73	0.00	0.00
2.42	7.99	148.82	0.69	148.82	2.00	80.12	0.00	0.00
2.44	7.39	138.84	0.70	138.84	2.00	77.83	0.00	0.00
2.46	6.14	120.43	0.88	140.78	2.00	73.14	0.00	0.00
2.48	4.82	94.33	1.22	122.41	2.00	65.07	0.00	0.00
2.50	3.75	73.13	1.81	115.62	2.00	56.67	0.00	0.00
2.52	2.99	58.12	2.41	122.34	2.00	49.09	0.00	0.00
2.54	2.50	48.51	3.02	134.71	2.00	43.12	0.00	0.00
2.56	2.26	43.80	3.30	148.90	2.00	39.75	0.00	0.00
2.58	2.04	39.44	3.53	190.36	2.00	36.29	0.00	0.00
2.60	1.92	37.06	3.29	178.55	2.00	34.24	0.00	0.00
2.62	1.97	37.99	2.67	116.58	2.00	35.05	0.00	0.00
2.64	2.21	42.83	1.91	96.98	2.00	39.01	0.00	0.00
2.66	2.55	49.39	1.55	90.41	2.00	43.72	0.00	0.00
2.68	2.96	57.45	1.33	89.82	2.00	48.71	0.00	0.00
2.70	3.36	65.36	1.24	94.29	2.00	52.96	0.00	0.00
2.72	3.70	72.06	1.19	99.57	2.00	56.18	0.00	0.00
2.74	3.95	77.04	1.19	104.37	2.00	58.39	0.00	0.00
2.76	4.15	80.92	1.19	108.14	2.00	60.01	0.00	0.00
2.78	4.33	84.46	1.14	110.92	2.00	61.43	0.00	0.00
2.80	4.50	87.82	0.99	111.73	2.00	62.71	0.00	0.00
2.82	4.67	90.13	0.81	111.03	2.00	63.57	0.00	0.00
2.84	4.85	90.75	0.62	106.64	2.00	63.80	0.00	0.00
2.86	4.91	89.83	0.52	101.67	2.00	63.46	0.00	0.00
2.88	4.78	86.90	0.47	86.90	2.00	62.37	0.00	0.00
2.90	3.99	75.79	0.60	92.74	2.00	57.85	0.00	0.00
2.92	3.56	69.29	0.74	88.57	2.00	54.89	0.00	0.00
2.94	3.22	62.49	0.93	85.20	1.95	51.48	0.06	0.00
2.96	3.67	71.48	0.85	92.69	2.00	55.92	0.00	0.00
2.98	4.59	85.74	0.68	103.89	2.00	61.92	0.00	0.00
3.00	5.61	98.83	0.48	98.83	2.00	66.61	0.00	0.00
3.02	6.39	108.19	0.37	108.19	2.00	69.60	0.00	0.00
3.04	6.28	105.89	0.35	105.89	2.00	68.89	0.00	0.00
3.06	5.93	100.64	0.36	100.64	2.00	67.21	0.00	0.00
3.08	5.35	92.28	0.38	92.28	2.00	64.35	0.00	0.00
3.10	5.00	87.75	0.43	87.75	1.99	62.69	0.17	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
3.12	4.90	87.30	0.52	99.96	2.00	62.52	0.00	0.00
3.14	5.05	90.87	0.63	107.07	2.00	63.84	0.00	0.00
3.16	5.08	92.53	0.74	111.69	2.00	64.44	0.00	0.00
3.18	4.96	91.75	0.86	113.59	2.00	64.16	0.00	0.00
3.20	4.74	88.84	0.96	112.38	2.00	63.09	0.00	0.00
3.22	4.34	83.27	1.13	109.50	2.00	60.96	0.00	0.00
3.24	3.98	77.40	1.32	107.38	2.00	58.54	0.00	0.00
3.26	3.76	73.09	1.52	107.93	2.00	56.65	0.00	0.00
3.28	3.62	70.39	1.71	110.67	2.00	55.41	0.00	0.00
3.30	3.35	64.95	1.82	109.46	2.00	52.75	0.00	0.00
3.32	2.93	56.74	2.00	108.92	2.00	48.29	0.00	0.00
3.34	2.62	50.69	2.27	113.24	2.00	44.58	0.00	0.00
3.36	2.93	56.66	2.22	115.60	2.00	48.25	0.00	0.00
3.38	4.02	78.28	1.65	115.84	2.00	58.92	0.00	0.00
3.40	5.72	103.31	1.05	128.86	2.00	68.07	0.00	0.00
3.42	6.93	118.43	0.75	133.16	2.00	72.58	0.00	0.00
3.44	7.27	121.54	0.64	126.42	2.00	73.44	0.00	0.00
3.46	6.78	113.83	0.63	122.59	2.00	71.28	0.00	0.00
3.48	6.25	105.75	0.64	118.45	2.00	68.85	0.00	0.00
3.50	5.86	99.61	0.63	113.99	2.00	66.87	0.00	0.00
3.52	5.38	91.87	0.61	107.33	2.00	64.20	0.00	0.00
3.54	4.76	82.34	0.62	99.44	2.00	60.59	0.00	0.00
3.56	3.90	69.23	0.66	87.35	1.91	54.86	0.07	0.00
3.58	3.17	58.02	0.75	77.52	1.65	49.03	0.17	0.00
3.60	2.57	48.92	0.97	74.18	1.58	43.40	0.00	0.00
3.62	2.32	44.64	1.16	76.10	1.62	40.38	0.00	0.00
3.64	2.43	46.74	1.16	77.76	1.65	41.90	0.00	0.00
3.66	2.62	49.41	0.98	74.91	1.59	43.73	0.00	0.00
3.68	2.61	48.62	0.86	71.44	1.51	43.20	0.00	0.00
3.70	2.31	43.60	0.90	68.50	1.46	39.60	0.00	0.00
3.72	1.95	37.26	1.08	69.30	1.47	34.41	0.00	0.00
3.74	1.75	33.24	1.27	73.17	1.54	30.65	0.00	0.00
3.76	1.73	32.88	1.28	73.24	1.54	30.28	0.00	0.00
3.78	1.77	33.70	1.36	75.91	1.59	31.10	0.00	0.00
3.80	1.76	33.41	1.32	74.67	2.00	30.82	0.00	0.00
3.82	1.59	30.04	1.50	78.43	2.00	27.30	0.00	0.00
3.84	1.29	24.23	1.75	101.24	2.00	20.22	0.00	0.00
3.86	1.03	19.00	2.30	93.31	2.00	12.18	0.06	0.00
3.88	0.88	16.14	2.60	96.67	2.00	6.80	0.07	0.00
3.90	0.91	16.74	2.40	93.32	2.00	8.01	0.07	0.00
3.92	0.99	18.16	2.06	87.01	2.00	10.69	0.06	0.00
3.94	1.45	27.33	1.38	73.79	2.00	24.19	0.00	0.00
3.96	1.91	35.89	1.01	66.52	2.00	33.18	0.00	0.00
3.98	2.22	40.66	0.86	65.30	2.00	37.30	0.00	0.00
4.00	2.12	39.03	0.87	64.57	2.00	35.95	0.00	0.00
4.02	2.02	37.29	0.90	64.27	2.00	34.44	0.00	0.00
4.04	2.15	39.95	1.11	71.77	2.00	36.71	0.00	0.00
4.06	2.25	42.39	1.43	82.92	2.00	38.67	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
4.08	2.28	43.60	1.78	94.06	2.00	39.60	0.00	0.00
4.10	2.14	40.86	2.04	100.65	2.00	37.46	0.00	0.00
4.12	1.84	34.87	2.58	124.71	2.00	32.23	0.00	0.00
4.14	1.90	36.14	2.45	107.93	2.00	33.41	0.00	0.00
4.16	1.82	34.45	2.58	126.70	2.00	31.83	0.00	0.00
4.18	1.81	34.40	2.58	126.42	2.00	31.78	0.00	0.00
4.20	1.44	27.08	3.70	134.76	2.00	23.89	0.05	0.00
4.22	1.22	22.76	4.59	147.10	2.00	18.14	0.05	0.00
4.24	1.09	20.05	5.01	149.09	2.00	13.96	0.06	0.00
4.26	1.01	18.44	4.93	143.90	2.00	11.20	0.06	0.00
4.28	0.97	17.71	4.79	139.82	2.00	9.87	0.06	0.00
4.30	0.95	17.31	4.42	132.73	2.00	9.11	0.07	0.00
4.32	0.95	17.25	3.90	123.75	2.00	9.00	0.07	0.00
4.34	0.95	17.33	3.28	112.38	2.00	9.15	0.07	0.00
4.36	0.97	17.65	2.87	104.72	2.00	9.75	0.07	0.00
4.38	0.98	17.90	2.59	99.25	2.00	10.22	0.06	0.00
4.40	0.99	18.08	2.47	96.80	2.00	10.55	0.06	0.00
4.42	0.99	18.09	2.43	95.89	2.00	10.57	0.06	0.00
4.44	0.98	17.94	2.40	95.11	2.00	10.28	0.06	0.00
4.46	0.98	17.90	2.38	94.72	2.00	10.22	0.06	0.00
4.48	0.99	18.07	2.36	94.35	2.00	10.53	0.06	0.00
4.50	1.00	18.22	2.40	95.37	2.00	10.81	0.06	0.00
4.52	0.99	17.95	2.42	95.68	2.00	10.31	0.06	0.00
4.54	0.94	17.10	2.48	95.94	2.00	8.71	0.07	0.00
4.56	0.89	16.00	2.52	95.52	2.00	6.51	0.07	0.00
4.58	0.83	14.78	2.59	95.34	2.00	3.90	0.07	0.00
4.60	0.78	13.91	2.58	93.85	2.00	1.89	0.08	0.00
4.62	0.76	13.43	2.48	91.35	2.00	0.74	0.08	0.00
4.64	0.75	13.29	2.28	87.24	2.00	0.38	0.08	0.00
4.66	0.75	13.18	2.09	83.43	2.00	0.11	0.08	0.00
4.68	0.75	13.24	1.93	80.10	2.00	0.28	0.08	0.00
4.70	0.77	13.59	1.80	77.74	2.00	1.12	0.08	0.00
4.72	0.79	14.04	1.73	76.53	2.00	2.19	0.08	0.00
4.74	0.80	14.19	1.71	76.28	2.00	2.55	0.08	0.00
4.76	0.80	14.21	1.69	75.87	2.00	2.60	0.08	0.00
4.78	0.81	14.36	1.66	75.33	2.00	2.95	0.07	0.00
4.80	0.82	14.50	1.70	76.34	2.00	3.27	0.07	0.00
4.82	0.80	14.11	1.85	79.32	2.00	2.36	0.08	0.00
4.84	0.75	13.14	1.96	80.82	2.00	0.02	0.08	0.00
4.86	0.70	12.28	1.96	79.88	2.00	0.00	0.08	0.00
4.88	0.69	11.95	1.82	76.52	2.00	0.00	0.08	0.00
4.90	0.69	11.89	1.73	74.70	2.00	0.00	0.08	0.00
4.92	0.68	11.83	1.68	73.66	2.00	0.00	0.08	0.00
4.94	0.68	11.77	1.68	73.44	2.00	0.00	0.08	0.00
4.96	0.69	11.89	1.63	72.53	2.00	0.00	0.08	0.00
4.98	0.69	11.97	1.57	71.45	2.00	0.00	0.08	0.00
5.00	0.68	11.82	1.54	70.62	2.00	0.00	0.08	0.00
5.02	0.67	11.63	1.54	70.39	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
5.04	0.67	11.50	1.54	70.27	2.00	0.00	0.08	0.00
5.06	0.67	11.50	1.51	69.61	2.00	0.00	0.08	0.00
5.08	0.67	11.48	1.48	69.09	2.00	0.00	0.08	0.00
5.10	0.66	11.42	1.47	68.75	2.00	0.00	0.09	0.00
5.12	0.67	11.47	1.45	68.33	2.00	0.00	0.08	0.00
5.14	0.67	11.60	1.41	67.69	2.00	0.00	0.08	0.00
5.16	0.68	11.78	1.37	66.84	2.00	0.00	0.08	0.00
5.18	0.69	11.93	1.35	66.57	2.00	0.00	0.08	0.00
5.20	0.70	12.04	1.35	66.64	2.00	0.00	0.08	0.00
5.22	0.70	12.06	1.36	66.88	2.00	0.00	0.08	0.00
5.24	0.70	11.93	1.37	66.95	2.00	0.00	0.08	0.00
5.26	0.69	11.79	1.38	67.18	2.00	0.00	0.08	0.00
5.28	0.69	11.71	1.40	67.51	2.00	0.00	0.08	0.00
5.30	0.69	11.67	1.41	67.74	2.00	0.00	0.08	0.00
5.32	0.70	11.89	1.39	67.45	2.00	0.00	0.08	0.00
5.34	0.74	12.36	1.16	62.20	2.00	0.00	0.08	0.00
5.36	0.77	12.80	0.95	111.13	2.00	0.00	0.00	0.00
5.38	0.80	13.32	1.04	116.93	2.00	0.47	0.00	0.00
5.40	0.79	13.30	1.37	67.84	2.00	0.41	0.08	0.00
5.42	0.78	13.26	1.70	75.73	2.00	0.32	0.08	0.00
5.44	0.76	12.92	1.76	76.67	2.00	0.00	0.08	0.00
5.46	0.76	12.85	1.74	76.22	2.00	0.00	0.08	0.00
5.48	0.75	12.71	1.74	76.12	2.00	0.00	0.08	0.00
5.50	0.75	12.53	1.74	75.80	2.00	0.00	0.08	0.00
5.52	0.73	12.23	1.72	75.21	2.00	0.00	0.08	0.00
5.54	0.71	11.88	1.66	73.54	2.00	0.00	0.08	0.00
5.56	0.70	11.58	1.59	71.72	2.00	0.00	0.08	0.00
5.58	0.69	11.41	1.51	69.77	2.00	0.00	0.09	0.00
5.60	0.69	11.33	1.45	68.50	2.00	0.00	0.09	0.00
5.62	0.69	11.21	1.45	68.45	2.00	0.00	0.09	0.00
5.64	0.68	11.12	1.48	68.89	2.00	0.00	0.09	0.00
5.66	0.68	11.09	1.49	69.23	2.00	0.00	0.09	0.00
5.68	0.68	11.14	1.50	69.40	2.00	0.00	0.09	0.00
5.70	0.69	11.18	1.50	69.47	2.00	0.00	0.09	0.00
5.72	0.69	11.11	1.53	70.10	2.00	0.00	0.09	0.00
5.74	0.68	11.03	1.57	70.75	2.00	0.00	0.09	0.00
5.76	0.68	10.98	1.59	71.31	2.00	0.00	0.09	0.00
5.78	0.69	11.05	1.59	71.20	2.00	0.00	0.09	0.00
5.80	0.70	11.20	1.56	70.83	2.00	0.00	0.09	0.00
5.82	0.71	11.34	1.54	70.45	2.00	0.00	0.09	0.00
5.84	0.71	11.44	1.52	70.19	2.00	0.00	0.08	0.00
5.86	0.71	11.36	1.52	70.17	2.00	0.00	0.09	0.00
5.88	0.70	11.18	1.53	70.12	2.00	0.00	0.09	0.00
5.90	0.69	10.99	1.54	70.24	2.00	0.00	0.09	0.00
5.92	0.69	10.87	1.55	70.19	2.00	0.00	0.09	0.00
5.94	0.68	10.75	1.55	70.14	2.00	0.00	0.09	0.00
5.96	0.68	10.63	1.55	70.08	2.00	0.00	0.09	0.00
5.98	0.67	10.53	1.55	70.01	2.00	0.00	0.09	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.00	0.67	10.50	1.54	69.78	2.00	0.00	0.09	0.00
6.02	0.67	10.52	1.53	69.54	2.00	0.00	0.09	0.00
6.04	0.68	10.61	1.50	68.98	2.00	0.00	0.09	0.00
6.06	0.69	10.67	1.48	68.67	2.00	0.00	0.09	0.00
6.08	0.69	10.73	1.46	68.27	2.00	0.00	0.09	0.00
6.10	0.69	10.71	1.47	68.35	2.00	0.00	0.09	0.00
6.12	0.69	10.67	1.46	68.25	2.00	0.00	0.09	0.00
6.14	0.69	10.55	1.46	68.19	2.00	0.00	0.09	0.00
6.16	0.68	10.43	1.47	68.14	2.00	0.00	0.09	0.00
6.18	0.68	10.35	1.49	68.46	2.00	0.00	0.09	0.00
6.20	0.67	10.32	1.50	68.67	2.00	0.00	0.09	0.00
6.22	0.68	10.32	1.50	68.84	2.00	0.00	0.09	0.00
6.24	0.67	10.27	1.51	68.86	2.00	0.00	0.09	0.00
6.26	0.68	10.34	1.51	68.99	2.00	0.00	0.09	0.00
6.28	0.70	10.63	1.47	68.34	2.00	0.00	0.09	0.00
6.30	0.74	11.21	1.37	66.71	2.00	0.00	0.09	0.00
6.32	0.78	11.75	1.29	65.15	2.00	0.00	0.08	0.00
6.34	0.80	12.15	1.25	64.53	2.00	0.00	0.08	0.00
6.36	0.82	12.37	1.27	65.11	2.00	0.00	0.08	0.00
6.38	0.84	12.67	1.31	66.43	2.00	0.00	0.08	0.00
6.40	0.85	12.88	1.35	67.49	2.00	0.00	0.08	0.00
6.42	0.86	13.03	1.43	69.37	2.00	0.00	0.08	0.00
6.44	0.87	13.07	1.48	70.58	2.00	0.00	0.08	0.00
6.46	0.87	13.13	1.51	71.53	2.00	0.00	0.08	0.00
6.48	0.87	13.16	1.51	71.40	2.00	0.05	0.08	0.00
6.50	0.93	13.97	1.38	68.90	2.00	2.04	0.08	0.00
6.52	1.01	15.08	1.24	124.45	2.00	4.57	0.00	0.00
6.54	1.10	16.39	1.15	98.45	2.00	7.30	0.00	0.00
6.56	1.18	17.40	0.97	70.64	2.00	9.29	0.00	0.00
6.58	1.25	18.48	0.99	65.42	2.00	11.27	0.00	0.00
6.60	1.31	19.36	1.03	64.35	1.20	12.81	0.00	0.00
6.62	1.32	19.65	1.26	84.77	1.57	13.29	0.00	0.00
6.64	1.32	19.62	1.38	98.01	1.92	13.24	0.00	0.00
6.66	1.32	19.66	1.46	106.06	2.00	13.31	0.00	0.00
6.68	1.32	19.68	1.52	112.52	2.00	13.35	0.00	0.00
6.70	1.31	19.54	1.60	123.50	2.00	13.11	0.00	0.00
6.72	1.29	19.25	1.72	140.85	2.00	12.62	0.00	0.00
6.74	1.28	19.04	1.80	154.04	2.00	12.26	0.00	0.00
6.76	1.27	18.92	1.80	155.47	2.00	12.05	0.00	0.00
6.78	1.28	18.92	1.72	145.39	2.00	12.05	0.00	0.00
6.80	1.30	19.17	1.69	138.53	2.00	12.49	0.00	0.00
6.82	1.35	19.87	1.62	122.82	2.00	13.67	0.00	0.00
6.84	1.38	20.22	1.60	117.42	2.00	14.25	0.00	0.00
6.86	1.45	21.18	1.48	97.10	2.00	15.78	0.00	0.00
6.88	1.66	24.08	1.29	70.47	2.00	20.01	0.00	0.00
6.90	2.08	29.75	1.10	66.94	2.00	26.99	0.00	0.00
6.92	2.35	33.51	1.09	68.20	2.00	30.92	0.00	0.00
6.94	2.37	33.86	1.20	71.85	2.00	31.26	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.96	2.09	30.15	1.46	77.97	2.00	27.43	0.00	0.00
6.98	1.86	26.96	1.69	85.18	2.00	23.73	0.00	0.00
7.00	1.68	24.53	1.94	122.89	2.00	20.62	0.00	0.00
7.02	1.59	23.21	2.18	160.29	2.00	18.79	0.00	0.00
7.04	1.49	21.93	2.43	207.30	2.00	16.93	0.00	0.00
7.06	1.41	20.68	2.64	104.46	2.00	14.98	0.06	0.00
7.08	1.34	19.61	2.71	105.00	2.00	13.22	0.06	0.00
7.10	1.28	18.74	2.72	104.26	2.00	11.74	0.06	0.00
7.12	1.25	18.14	2.63	101.58	2.00	10.65	0.06	0.00
7.14	1.22	17.61	2.47	97.51	2.00	9.67	0.07	0.00
7.16	1.21	17.30	2.22	91.54	2.00	9.09	0.07	0.00
7.18	1.19	16.90	2.04	87.05	2.00	8.32	0.07	0.00
7.20	1.18	16.68	1.92	84.04	2.00	7.90	0.07	0.00
7.22	1.16	16.40	1.88	82.81	2.00	7.32	0.07	0.00
7.24	1.16	16.39	1.86	82.23	2.00	7.30	0.07	0.00
7.26	1.18	16.57	1.82	81.50	2.00	7.66	0.07	0.00
7.28	1.21	16.96	1.76	80.30	2.00	8.44	0.07	0.00
7.30	1.23	17.23	1.70	163.53	2.00	8.95	0.00	0.00
7.32	1.25	17.46	1.72	163.00	2.00	9.40	0.00	0.00
7.34	1.25	17.46	1.77	170.20	2.00	9.39	0.00	0.00
7.36	1.25	17.39	1.85	82.80	2.00	9.26	0.07	0.00
7.38	1.22	17.02	1.91	84.11	2.00	8.55	0.07	0.00
7.40	1.19	16.48	2.00	85.76	2.00	7.50	0.07	0.00
7.42	1.14	15.84	2.05	86.34	2.00	6.18	0.07	0.00
7.44	1.12	15.43	2.06	86.24	2.00	5.31	0.07	0.00
7.46	1.11	15.33	1.99	84.51	2.00	5.11	0.07	0.00
7.48	1.13	15.49	1.92	83.04	2.00	5.45	0.07	0.00
7.50	1.15	15.68	1.86	81.86	2.00	5.85	0.07	0.00
7.52	1.15	15.71	1.85	81.51	2.00	5.91	0.07	0.00
7.54	1.15	15.68	1.83	81.12	2.00	5.84	0.07	0.00
7.56	1.15	15.58	1.81	80.66	2.00	5.63	0.07	0.00
7.58	1.15	15.57	1.80	80.38	2.00	5.60	0.07	0.00
7.60	1.13	15.33	1.78	79.61	2.00	5.10	0.07	0.00
7.62	1.11	14.98	1.76	78.89	2.00	4.35	0.07	0.00
7.64	1.10	14.75	1.72	77.87	2.00	3.82	0.07	0.00
7.66	1.11	14.89	1.66	76.54	2.00	4.15	0.07	0.00
7.68	1.15	15.34	1.58	74.80	2.00	5.11	0.07	0.00
7.70	1.18	15.78	1.51	154.61	2.00	6.05	0.00	0.00
7.72	1.20	15.90	1.46	146.63	2.00	6.30	0.00	0.00
7.74	1.18	15.66	1.47	151.26	2.00	5.81	0.00	0.00
7.76	1.16	15.33	1.51	73.17	2.00	5.11	0.07	0.00
7.78	1.17	15.47	1.50	73.06	2.00	5.41	0.07	0.00
7.80	1.21	15.98	1.45	143.95	2.00	6.48	0.00	0.00
7.82	1.26	16.59	1.41	130.77	2.00	7.70	0.00	0.00
7.84	1.28	16.90	1.46	133.92	2.00	8.31	0.00	0.00
7.86	1.27	16.80	1.58	152.44	2.00	8.13	0.00	0.00
7.88	1.22	16.16	1.82	81.25	2.00	6.84	0.07	0.00
7.90	1.17	15.40	1.99	84.67	2.00	5.25	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.92	1.12	14.66	2.11	86.52	2.00	3.63	0.07	0.00
7.94	1.08	14.05	2.03	84.30	2.00	2.22	0.08	0.00
7.96	1.04	13.49	2.00	83.07	2.00	0.89	0.08	0.00
7.98	1.01	13.04	1.96	81.67	2.00	0.00	0.08	0.00
8.00	1.00	12.92	1.91	80.43	2.00	0.00	0.08	0.00
8.02	1.00	12.77	1.84	78.79	2.00	0.00	0.08	0.00
8.04	0.99	12.68	1.73	76.41	2.00	0.00	0.08	0.00
8.06	0.96	12.22	1.73	75.82	2.00	0.00	0.08	0.00
8.08	0.91	11.51	1.77	76.10	2.00	0.00	0.08	0.00
8.10	0.87	10.87	1.88	77.50	2.00	0.00	0.09	0.00
8.12	0.86	10.77	1.91	78.08	2.00	0.00	0.09	0.00
8.14	0.90	11.23	1.82	76.75	2.00	0.00	0.09	0.00
8.16	0.94	11.78	1.71	75.15	2.00	0.00	0.08	0.00
8.18	0.98	12.26	1.63	73.86	2.00	0.00	0.08	0.00
8.20	1.00	12.51	1.65	74.56	2.00	0.00	0.08	0.00
8.22	1.00	12.51	1.72	75.95	2.00	0.00	0.08	0.00
8.24	0.99	12.38	1.78	77.18	2.00	0.00	0.08	0.00
8.26	0.99	12.30	1.76	76.73	2.00	0.00	0.08	0.00
8.28	0.98	12.25	1.71	75.63	2.00	0.00	0.08	0.00
8.30	0.97	12.07	1.67	74.59	2.00	0.00	0.08	0.00
8.32	0.96	11.89	1.66	74.01	2.00	0.00	0.08	0.00
8.34	0.97	11.98	1.56	72.06	2.00	0.00	0.08	0.00
8.36	1.00	12.28	1.42	68.96	2.00	0.00	0.08	0.00
8.38	1.02	12.55	1.31	66.45	2.00	0.00	0.08	0.00
8.40	1.05	12.86	1.20	63.87	2.00	0.00	0.08	0.00
8.42	1.08	13.25	1.14	62.56	2.00	0.28	0.08	0.00
8.44	1.13	13.80	1.09	120.23	2.00	1.63	0.00	0.00
8.46	1.14	13.97	1.11	121.57	2.00	2.04	0.00	0.00
8.48	1.12	13.64	1.14	129.71	2.00	1.25	0.00	0.00
8.50	1.07	12.98	1.18	63.56	2.00	0.00	0.08	0.00
8.52	1.03	12.39	1.23	64.46	2.00	0.00	0.08	0.00
8.54	1.02	12.34	1.24	64.75	2.00	0.00	0.08	0.00
8.56	1.08	13.08	1.18	63.66	2.00	0.00	0.08	0.00
8.58	1.18	14.34	1.06	109.42	2.00	2.90	0.00	0.00
8.60	1.27	15.39	0.97	87.41	2.00	5.23	0.00	0.00
8.62	1.32	16.00	0.92	76.09	2.00	6.52	0.00	0.00
8.64	1.38	16.77	0.90	68.41	2.00	8.06	0.00	0.00
8.66	1.47	17.78	0.89	60.94	2.00	10.00	0.00	0.00
8.68	1.52	18.50	0.93	60.59	1.13	11.31	0.00	0.00
8.70	1.51	18.39	1.03	71.11	1.27	11.11	0.00	0.00
8.72	1.46	17.82	1.17	89.93	1.65	10.06	0.00	0.00
8.74	1.44	17.54	1.22	97.34	1.67	9.54	0.00	0.00
8.76	1.50	18.13	1.14	84.23	1.52	10.64	0.00	0.00
8.78	1.56	18.85	1.04	68.71	1.23	11.92	0.00	0.00
8.80	1.57	18.91	1.02	67.12	1.21	12.02	0.00	0.00
8.82	1.49	17.93	1.13	84.98	1.53	10.27	0.00	0.00
8.84	1.39	16.67	1.22	105.95	1.92	7.88	0.00	0.00
8.86	1.33	15.95	1.20	110.14	2.00	6.40	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.88	1.34	15.95	1.01	86.72	2.00	6.40	0.00	0.00
8.90	1.39	16.45	0.85	65.77	2.00	7.43	0.00	0.00
8.92	1.43	16.86	0.79	56.57	2.00	8.24	0.00	0.00
8.94	1.44	16.98	0.79	55.96	2.00	8.48	0.00	0.00
8.96	1.41	16.60	0.88	67.38	2.00	7.73	0.00	0.00
8.98	1.37	16.11	0.97	80.70	2.00	6.74	0.00	0.00
9.00	1.33	15.64	1.03	91.48	2.00	5.77	0.00	0.00
9.02	1.26	14.74	1.02	100.24	2.00	3.82	0.00	0.00
9.04	1.19	13.81	1.01	109.21	2.00	1.65	0.00	0.00
9.06	1.11	12.74	1.02	125.75	2.00	0.00	0.00	0.00
9.08	1.09	12.53	1.00	124.95	2.00	0.00	0.00	0.00
9.10	1.12	12.79	0.96	115.23	2.00	0.00	0.00	0.00
9.12	1.19	13.69	0.89	93.71	1.57	1.36	0.00	0.00
9.14	1.26	14.50	0.84	79.67	1.28	3.27	0.00	0.00
9.16	1.29	14.90	0.82	73.92	1.31	4.15	0.00	0.00
9.18	1.27	14.65	0.85	79.32	1.27	3.60	0.00	0.00
9.20	1.26	14.42	0.87	84.25	1.36	3.08	0.00	0.00
9.22	1.29	14.84	0.86	78.69	2.00	4.03	0.00	0.00
9.24	1.36	15.60	0.85	71.00	2.00	5.67	0.00	0.00
9.26	1.43	16.44	0.81	61.22	2.00	7.41	0.00	0.00
9.28	1.49	17.21	0.77	53.28	2.00	8.93	0.00	0.00
9.30	1.58	18.25	0.76	52.82	2.00	10.86	0.00	0.00
9.32	1.65	19.04	0.80	54.42	2.00	12.26	0.00	0.00
9.34	1.62	18.73	0.91	57.70	2.00	11.71	0.00	0.00
9.36	1.54	17.74	0.98	70.73	2.00	9.91	0.00	0.00
9.38	1.46	16.80	1.02	81.10	2.00	8.12	0.00	0.00
9.40	1.44	16.48	0.98	79.60	1.41	7.50	0.00	0.00
9.42	1.42	16.20	0.96	79.77	1.42	6.92	0.00	0.00
9.44	1.36	15.42	0.98	88.11	1.44	5.30	0.00	0.00
9.46	1.29	14.56	1.05	106.20	1.92	3.40	0.00	0.00
9.48	1.23	13.85	1.12	124.40	2.00	1.76	0.00	0.00
9.50	1.21	13.57	1.14	131.80	2.00	1.09	0.00	0.00
9.52	1.21	13.56	1.08	123.25	2.00	1.05	0.00	0.00
9.54	1.22	13.66	1.04	116.08	2.00	1.28	0.00	0.00
9.56	1.20	13.36	1.08	125.82	2.00	0.55	0.00	0.00
9.58	1.14	12.60	1.19	63.65	2.00	0.00	0.08	0.00
9.60	1.05	11.58	1.31	65.95	2.00	0.00	0.08	0.00
9.62	1.01	10.96	1.30	65.27	2.00	0.00	0.09	0.00
9.64	0.99	10.73	1.23	63.61	2.00	0.00	0.09	0.00
9.66	1.00	10.81	1.11	60.64	2.00	0.00	0.09	0.00
9.68	1.08	11.80	0.96	57.22	2.00	0.00	0.08	0.00
9.70	1.17	12.81	0.86	99.87	1.73	0.00	0.00	0.00
9.72	1.25	13.70	0.87	91.49	1.52	1.40	0.00	0.00
9.74	1.24	13.67	0.96	103.99	1.85	1.33	0.00	0.00
9.76	1.26	13.86	1.00	107.92	1.98	1.77	0.00	0.00
9.78	1.29	14.18	0.95	96.70	1.65	2.53	0.00	0.00
9.80	1.30	14.26	0.93	93.59	1.57	2.71	0.00	0.00
9.82	1.24	13.56	1.03	115.24	2.00	1.05	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.84	1.14	12.34	1.22	64.32	2.00	0.00	0.08	0.00
9.86	1.05	11.25	1.34	66.67	2.00	0.00	0.09	0.00
9.88	0.97	10.28	1.40	67.00	2.00	0.00	0.09	0.00
9.90	0.93	9.71	1.37	65.89	2.00	0.00	0.09	0.00
9.92	1.02	10.86	1.20	62.87	2.00	0.00	0.09	0.00
9.94	1.23	13.24	0.93	105.07	2.00	0.27	0.00	0.00
9.96	1.52	16.72	0.83	62.16	2.00	7.97	0.00	0.00
9.98	1.72	19.08	0.99	63.24	1.15	12.33	0.00	0.00
10.00	1.97	22.09	1.23	69.32	2.00	17.16	0.00	0.00
10.02	2.11	23.83	1.57	91.31	2.00	19.67	0.00	0.00
10.04	2.21	25.04	2.01	128.30	2.00	21.30	0.00	0.00
10.06	2.14	24.41	2.85	240.52	2.00	20.46	0.00	0.00
10.08	2.09	23.96	3.81	135.18	2.00	19.84	0.05	0.00
10.10	2.08	23.85	4.76	154.96	2.00	19.69	0.05	0.00
10.12	1.92	22.04	5.71	168.81	2.00	17.09	0.06	0.00
10.14	1.79	20.36	6.31	174.56	2.00	14.47	0.06	0.00
10.16	1.94	22.13	5.65	168.12	2.00	17.22	0.05	0.00
10.18	2.82	32.24	3.53	253.02	2.00	29.64	0.00	0.00
10.20	4.37	49.73	2.12	109.29	2.00	43.94	0.00	0.00
10.22	7.16	80.76	1.47	114.16	2.00	59.95	0.00	0.00
10.24	10.25	114.90	1.36	146.63	2.00	71.58	0.00	0.00
10.26	12.73	142.46	1.48	177.88	2.00	78.68	0.00	0.00
10.28	14.25	159.30	1.57	197.56	2.00	82.37	0.00	0.00
10.30	15.20	169.73	1.68	210.80	2.00	84.46	0.00	0.00
10.32	16.24	180.96	1.70	223.16	2.00	86.58	0.00	0.00
10.34	17.06	189.82	1.74	233.22	2.00	88.15	0.00	0.00
10.36	17.79	197.48	1.73	240.88	2.00	89.46	0.00	0.00
10.38	18.61	206.38	1.80	251.94	2.00	90.91	0.00	0.00
10.40	20.09	222.53	1.86	270.39	2.00	93.40	0.00	0.00
10.42	21.19	234.64	2.04	288.01	2.00	95.15	0.00	0.00
10.44	23.27	257.18	2.09	313.09	2.00	98.18	0.00	0.00
10.46	24.33	268.66	2.17	327.53	2.00	99.62	0.00	0.00
10.48	26.91	295.98	2.09	352.18	2.00	100.00	0.00	0.00
10.50	28.21	309.43	2.04	362.66	2.00	100.00	0.00	0.00

Total estimated displacement: 0.22

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.19	3.43	22.59	77.38	3.53	0.72	0.92
0.92	0.19	3.42	25.32	86.46	3.60	0.70	0.90
0.94	0.30	5.69	16.45	93.67	3.35	1.33	1.46
0.96	0.55	10.64	9.14	97.22	3.02	1.31	2.67
0.98	0.89	17.23	5.14	88.55	2.74	0.73	0.73
1.00	1.09	21.15	4.02	85.03	2.63	0.81	0.81
1.02	1.12	21.83	3.96	86.45	2.62	0.81	0.81
1.04	1.04	20.21	4.60	92.92	2.69	0.88	0.88
1.06	0.98	18.93	5.27	99.79	2.75	0.75	0.75
1.08	1.02	19.82	5.14	101.88	2.74	0.75	0.75
1.10	1.08	21.03	4.88	102.70	2.72	0.75	0.75
1.12	1.13	22.04	4.56	100.53	2.69	0.89	0.89
1.14	1.08	20.91	4.75	99.39	2.70	0.75	0.75
1.16	1.03	20.00	4.93	98.53	2.72	0.75	0.75
1.18	1.08	21.02	4.63	97.33	2.69	0.89	0.89
1.20	1.19	23.18	4.15	96.23	2.64	0.85	0.85
1.22	1.30	25.24	3.87	97.59	2.61	0.82	0.82
1.24	1.32	25.66	4.00	102.57	2.63	0.85	0.85
1.26	1.29	25.17	4.34	109.26	2.66	0.89	0.89
1.28	1.24	24.17	4.70	113.57	2.70	0.93	0.93
1.30	1.20	23.28	4.98	116.01	2.73	0.78	0.78
1.32	1.18	22.97	5.27	120.97	2.75	0.78	0.78
1.34	1.24	24.09	5.10	122.85	2.74	0.79	0.79
1.36	1.35	26.30	4.62	121.46	2.69	0.94	0.94
1.38	1.76	34.24	3.17	108.58	2.53	0.77	0.77
1.40	2.45	47.85	2.01	95.97	2.32	0.74	0.74
1.42	3.35	65.59	1.50	98.55	2.15	0.75	0.75
1.44	4.15	81.47	1.35	109.71	2.04	0.77	0.77
1.46	4.63	90.87	1.31	118.60	2.00	0.78	0.78
1.48	4.75	93.30	1.30	121.16	1.99	0.78	0.78
1.50	4.84	95.03	1.30	123.84	2.00	0.79	0.79
1.52	5.19	101.91	1.28	130.85	1.97	0.80	0.80
1.54	5.63	110.72	1.25	138.66	1.92	0.81	0.81
1.56	5.77	113.39	1.23	139.47	1.89	0.81	0.81
1.58	5.11	100.35	1.26	126.35	1.93	0.79	0.79
1.60	4.14	81.27	1.35	109.53	2.04	0.77	0.77
1.62	3.14	61.46	1.65	101.33	2.21	0.75	0.75
1.64	2.57	50.17	2.13	107.03	2.35	0.76	0.76
1.66	2.22	43.23	2.67	115.42	2.45	0.78	0.78
1.68	2.74	53.60	1.94	103.76	2.30	0.76	0.76
1.70	4.01	78.67	1.33	104.88	2.03	0.76	0.76
1.72	5.29	103.95	1.18	122.75	1.83	0.79	0.79
1.74	6.09	119.64	1.10	131.95	1.76	0.80	0.80
1.76	6.55	128.82	1.13	145.52	1.78	0.82	0.82
1.78	7.26	142.70	1.12	159.72	1.77	0.84	0.84
1.80	7.81	153.52	1.11	169.97	1.76	0.85	0.85
1.82	8.16	160.58	1.09	174.59	1.75	0.86	0.86
1.84	8.42	165.60	1.05	174.36	1.73	0.86	0.86

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	8.70	171.09	1.00	171.09	1.69	0.85	0.85
1.88	8.87	174.49	1.00	174.49	1.63	0.86	0.86
1.90	8.92	171.29	1.00	171.29	1.59	0.85	0.85
1.92	8.78	165.73	1.00	165.73	1.56	0.85	0.85
1.94	8.56	161.53	1.00	161.53	1.56	0.84	0.84
1.96	8.36	158.13	1.00	158.13	1.57	0.84	0.84
1.98	8.17	154.79	1.00	154.79	1.58	0.83	0.83
2.00	7.82	149.44	1.00	149.44	1.61	0.83	0.83
2.02	7.15	139.03	1.00	139.03	1.65	0.81	0.81
2.04	6.30	123.67	1.03	127.58	1.72	0.79	0.79
2.06	5.53	108.51	1.15	124.97	1.80	0.79	0.79
2.08	5.19	101.68	1.19	120.77	1.83	0.78	0.78
2.10	5.22	102.31	1.19	121.50	1.83	0.79	0.79
2.12	5.72	112.29	1.11	124.08	1.76	0.79	0.79
2.14	6.27	122.36	1.00	122.36	1.69	0.79	0.79
2.16	6.80	128.48	1.00	128.48	1.63	0.80	0.80
2.18	6.95	129.84	1.00	129.84	1.61	0.80	0.80
2.20	6.99	130.11	1.00	130.11	1.61	0.80	0.80
2.22	6.70	125.74	1.00	125.74	1.63	0.79	0.79
2.24	6.17	119.29	1.00	119.29	1.70	0.78	0.78
2.26	5.42	106.21	1.13	119.93	1.78	0.78	0.78
2.28	4.76	93.30	1.22	113.84	1.88	0.77	0.77
2.30	4.11	80.45	1.30	104.85	2.00	0.76	0.76
2.32	3.50	68.31	1.54	105.09	2.17	0.76	0.76
2.34	3.04	59.16	1.99	117.82	2.32	0.78	0.78
2.36	3.58	69.96	1.71	119.49	2.23	0.78	0.78
2.38	5.22	102.30	1.30	132.96	1.99	0.80	0.80
2.40	7.10	138.41	1.11	153.85	1.77	0.83	0.83
2.42	7.99	148.82	1.00	148.82	1.68	0.83	0.83
2.44	7.39	138.84	1.00	138.84	1.70	0.81	0.81
2.46	6.14	120.43	1.17	140.78	1.82	0.81	0.81
2.48	4.82	94.33	1.30	122.41	1.99	0.79	0.79
2.50	3.75	73.13	1.58	115.62	2.19	0.78	0.78
2.52	2.99	58.12	2.10	122.34	2.34	0.79	0.79
2.54	2.50	48.51	2.78	134.71	2.47	0.81	0.81
2.56	2.26	43.80	3.18	139.48	2.53	0.83	0.83
2.58	2.04	39.44	3.60	142.12	2.58	0.88	0.88
2.60	1.92	37.06	3.60	133.46	2.58	0.86	0.86
2.62	1.97	37.99	3.07	116.75	2.51	0.78	0.78
2.64	2.21	42.83	2.26	96.98	2.38	0.74	0.74
2.66	2.55	49.39	1.83	90.41	2.27	0.73	0.73
2.68	2.96	57.45	1.56	89.82	2.18	0.73	0.73
2.70	3.36	65.36	1.44	94.29	2.12	0.74	0.74
2.72	3.70	72.06	1.38	99.57	2.07	0.75	0.75
2.74	3.95	77.04	1.35	104.37	2.05	0.76	0.76
2.76	4.15	80.92	1.34	108.14	2.03	0.76	0.76
2.78	4.33	84.46	1.31	110.92	2.01	0.77	0.77
2.80	4.50	87.82	1.27	111.73	1.95	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	4.67	90.13	1.23	111.03	1.89	0.77	0.77
2.84	4.85	90.75	1.18	106.64	1.82	0.76	0.76
2.86	4.91	89.83	1.13	101.67	1.78	0.75	0.75
2.88	4.78	86.90	1.00	86.90	1.77	0.72	0.72
2.90	3.99	75.79	1.22	92.74	1.88	0.73	0.73
2.92	3.56	69.29	1.28	88.57	1.96	0.73	0.73
2.94	3.22	62.49	1.36	85.20	2.06	0.72	0.72
2.96	3.67	71.48	1.30	92.69	1.99	0.73	0.73
2.98	4.59	85.74	1.21	103.89	1.86	0.76	0.76
3.00	5.61	98.83	1.00	98.83	1.73	0.75	0.75
3.02	6.39	108.19	1.00	108.19	1.64	0.76	0.76
3.04	6.28	105.89	1.00	105.89	1.64	0.76	0.76
3.06	5.93	100.64	1.00	100.64	1.66	0.75	0.75
3.08	5.35	92.28	1.00	92.28	1.71	0.73	0.73
3.10	5.00	87.75	1.00	87.75	1.75	0.72	0.72
3.12	4.90	87.30	1.15	99.96	1.79	0.75	0.75
3.14	5.05	90.87	1.18	107.07	1.82	0.76	0.76
3.16	5.08	92.53	1.21	111.69	1.86	0.77	0.77
3.18	4.96	91.75	1.24	113.59	1.90	0.77	0.77
3.20	4.74	88.84	1.26	112.38	1.94	0.77	0.77
3.22	4.34	83.27	1.31	109.50	2.01	0.77	0.77
3.24	3.98	77.40	1.39	107.38	2.08	0.76	0.76
3.26	3.76	73.09	1.48	107.93	2.14	0.76	0.76
3.28	3.62	70.39	1.57	110.67	2.18	0.77	0.77
3.30	3.35	64.95	1.69	109.46	2.23	0.77	0.77
3.32	2.93	56.74	1.92	108.92	2.30	0.76	0.76
3.34	2.62	50.69	2.23	113.24	2.37	0.77	0.77
3.36	2.93	56.66	2.04	115.60	2.33	0.78	0.78
3.38	4.02	78.28	1.48	115.84	2.14	0.78	0.78
3.40	5.72	103.31	1.25	128.86	1.92	0.80	0.80
3.42	6.93	118.43	1.12	133.16	1.78	0.80	0.80
3.44	7.27	121.54	1.04	126.42	1.73	0.79	0.79
3.46	6.78	113.83	1.08	122.59	1.75	0.79	0.79
3.48	6.25	105.75	1.12	118.45	1.77	0.78	0.78
3.50	5.86	99.61	1.14	113.99	1.79	0.77	0.77
3.52	5.38	91.87	1.17	107.33	1.81	0.76	0.76
3.54	4.76	82.34	1.21	99.44	1.86	0.75	0.75
3.56	3.90	69.23	1.26	87.35	1.94	0.72	0.72
3.58	3.17	58.02	1.34	77.52	2.03	0.48	0.70
3.60	2.57	48.92	1.52	74.18	2.16	0.36	0.69
3.62	2.32	44.64	1.70	76.10	2.23	0.42	0.70
3.64	2.43	46.74	1.66	77.76	2.22	0.48	0.70
3.66	2.62	49.41	1.52	74.91	2.16	0.38	0.70
3.68	2.61	48.62	1.47	71.44	2.13	0.29	0.69
3.70	2.31	43.60	1.57	68.50	2.18	0.23	0.68
3.72	1.95	37.26	1.86	69.30	2.28	0.24	0.68
3.74	1.75	33.24	2.20	73.17	2.37	0.33	0.69
3.76	1.73	32.88	2.23	73.24	2.37	0.33	0.69

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	1.77	33.70	2.25	75.91	2.38	0.42	0.70
3.80	1.76	33.41	2.23	74.67	2.37	0.37	0.69
3.82	1.59	30.04	2.61	78.43	2.44	0.51	0.70
3.84	1.29	24.23	3.42	82.97	2.56	0.75	0.75
3.86	1.03	19.00	4.91	93.31	2.72	0.74	0.74
3.88	0.88	16.14	5.99	96.67	2.81	0.74	0.74
3.90	0.91	16.74	5.57	93.32	2.78	0.74	0.74
3.92	0.99	18.16	4.79	87.01	2.71	0.72	0.72
3.94	1.45	27.33	2.70	73.79	2.46	0.35	0.69
3.96	1.91	35.89	1.85	66.52	2.28	0.19	0.67
3.98	2.22	40.66	1.61	65.30	2.20	0.17	0.67
4.00	2.12	39.03	1.65	64.57	2.22	0.16	0.67
4.02	2.02	37.29	1.72	64.27	2.24	0.16	0.67
4.04	2.15	39.95	1.80	71.77	2.26	0.29	0.69
4.06	2.25	42.39	1.96	82.92	2.31	0.71	0.71
4.08	2.28	43.60	2.16	94.06	2.36	0.74	0.74
4.10	2.14	40.86	2.46	100.65	2.42	0.75	0.75
4.12	1.84	34.87	3.24	113.04	2.54	0.79	0.79
4.14	1.90	36.14	3.04	110.04	2.51	0.76	0.76
4.16	1.82	34.45	3.27	112.78	2.54	0.79	0.79
4.18	1.81	34.40	3.27	112.58	2.54	0.79	0.79
4.20	1.44	27.08	4.98	134.76	2.73	0.81	0.81
4.22	1.22	22.76	6.46	147.10	2.85	0.82	0.82
4.24	1.09	20.05	7.44	149.09	2.92	0.83	0.83
4.26	1.01	18.44	7.80	143.90	2.94	0.82	0.82
4.28	0.97	17.71	7.89	139.82	2.95	0.81	0.81
4.30	0.95	17.31	7.67	132.73	2.93	0.80	0.80
4.32	0.95	17.25	7.17	123.75	2.90	0.79	0.79
4.34	0.95	17.33	6.48	112.38	2.85	0.77	0.77
4.36	0.97	17.65	5.93	104.72	2.81	0.76	0.76
4.38	0.98	17.90	5.54	99.25	2.77	0.75	0.75
4.40	0.99	18.08	5.35	96.80	2.76	0.74	0.74
4.42	0.99	18.09	5.30	95.89	2.75	0.74	0.74
4.44	0.98	17.94	5.30	95.11	2.75	0.74	0.74
4.46	0.98	17.90	5.29	94.72	2.75	0.74	0.74
4.48	0.99	18.07	5.22	94.35	2.75	0.74	0.74
4.50	1.00	18.22	5.23	95.37	2.75	0.74	0.74
4.52	0.99	17.95	5.33	95.68	2.76	0.74	0.74
4.54	0.94	17.10	5.61	95.94	2.78	0.74	0.74
4.56	0.89	16.00	5.97	95.52	2.81	0.74	0.74
4.58	0.83	14.78	6.45	95.34	2.85	0.74	0.74
4.60	0.78	13.91	6.75	93.85	2.87	0.74	0.74
4.62	0.76	13.43	6.80	91.35	2.87	0.73	0.73
4.64	0.75	13.29	6.57	87.24	2.85	0.72	0.72
4.66	0.75	13.18	6.33	83.43	2.84	0.71	0.71
4.68	0.75	13.24	6.05	80.10	2.82	0.59	0.71
4.70	0.77	13.59	5.72	77.74	2.79	0.48	0.70
4.72	0.79	14.04	5.45	76.53	2.77	0.44	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.80	14.19	5.38	76.28	2.76	0.43	0.70
4.76	0.80	14.21	5.34	75.87	2.76	0.41	0.70
4.78	0.81	14.36	5.25	75.33	2.75	0.40	0.70
4.80	0.82	14.50	5.26	76.34	2.75	0.43	0.70
4.82	0.80	14.11	5.62	79.32	2.78	0.55	0.71
4.84	0.75	13.14	6.15	80.82	2.82	0.63	0.71
4.86	0.70	12.28	6.50	79.88	2.85	0.58	0.71
4.88	0.69	11.95	6.40	76.52	2.84	0.44	0.70
4.90	0.69	11.89	6.29	74.70	2.83	0.38	0.69
4.92	0.68	11.83	6.23	73.66	2.83	0.34	0.69
4.94	0.68	11.77	6.24	73.44	2.83	0.34	0.69
4.96	0.69	11.89	6.10	72.53	2.82	0.31	0.69
4.98	0.69	11.97	5.97	71.45	2.81	0.29	0.69
5.00	0.68	11.82	5.97	70.62	2.81	0.27	0.68
5.02	0.67	11.63	6.05	70.39	2.82	0.26	0.68
5.04	0.67	11.50	6.11	70.27	2.82	0.26	0.68
5.06	0.67	11.50	6.05	69.61	2.82	0.25	0.68
5.08	0.67	11.48	6.02	69.09	2.81	0.24	0.68
5.10	0.66	11.42	6.02	68.75	2.81	0.23	0.68
5.12	0.67	11.47	5.96	68.33	2.81	0.22	0.68
5.14	0.67	11.60	5.84	67.69	2.80	0.21	0.68
5.16	0.68	11.78	5.68	66.84	2.79	0.20	0.68
5.18	0.69	11.93	5.58	66.57	2.78	0.19	0.67
5.20	0.70	12.04	5.53	66.64	2.77	0.19	0.67
5.22	0.70	12.06	5.55	66.88	2.77	0.20	0.68
5.24	0.70	11.93	5.61	66.95	2.78	0.20	0.68
5.26	0.69	11.79	5.70	67.18	2.79	0.20	0.68
5.28	0.69	11.71	5.77	67.51	2.79	0.21	0.68
5.30	0.69	11.67	5.80	67.74	2.80	0.21	0.68
5.32	0.70	11.89	5.67	67.45	2.79	0.21	0.68
5.34	0.74	12.36	5.03	62.20	2.73	0.13	0.66
5.36	0.77	12.80	4.44	56.91	2.67	0.77	0.77
5.38	0.80	13.32	4.46	59.45	2.68	0.78	0.78
5.40	0.79	13.30	5.10	67.84	2.74	0.21	0.68
5.42	0.78	13.26	5.71	75.73	2.79	0.41	0.70
5.44	0.76	12.92	5.93	76.67	2.81	0.44	0.70
5.46	0.76	12.85	5.93	76.22	2.81	0.43	0.70
5.48	0.75	12.71	5.99	76.12	2.81	0.42	0.70
5.50	0.75	12.53	6.05	75.80	2.82	0.41	0.70
5.52	0.73	12.23	6.15	75.21	2.82	0.39	0.70
5.54	0.71	11.88	6.19	73.54	2.83	0.34	0.69
5.56	0.70	11.58	6.19	71.72	2.83	0.29	0.69
5.58	0.69	11.41	6.12	69.77	2.82	0.25	0.68
5.60	0.69	11.33	6.05	68.50	2.82	0.23	0.68
5.62	0.69	11.21	6.11	68.45	2.82	0.22	0.68
5.64	0.68	11.12	6.19	68.89	2.83	0.23	0.68
5.66	0.68	11.09	6.24	69.23	2.83	0.24	0.68
5.68	0.68	11.14	6.23	69.40	2.83	0.24	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.69	11.18	6.22	69.47	2.83	0.24	0.68
5.72	0.69	11.11	6.31	70.10	2.84	0.26	0.68
5.74	0.68	11.03	6.42	70.75	2.84	0.27	0.69
5.76	0.68	10.98	6.49	71.31	2.85	0.28	0.69
5.78	0.69	11.05	6.44	71.20	2.85	0.28	0.69
5.80	0.70	11.20	6.32	70.83	2.84	0.27	0.69
5.82	0.71	11.34	6.21	70.45	2.83	0.26	0.68
5.84	0.71	11.44	6.14	70.19	2.82	0.26	0.68
5.86	0.71	11.36	6.18	70.17	2.83	0.26	0.68
5.88	0.70	11.18	6.27	70.12	2.83	0.26	0.68
5.90	0.69	10.99	6.39	70.24	2.84	0.26	0.68
5.92	0.69	10.87	6.46	70.19	2.85	0.26	0.68
5.94	0.68	10.75	6.52	70.14	2.85	0.26	0.68
5.96	0.68	10.63	6.59	70.08	2.86	0.26	0.68
5.98	0.67	10.53	6.65	70.01	2.86	0.25	0.68
6.00	0.67	10.50	6.65	69.78	2.86	0.25	0.68
6.02	0.67	10.52	6.61	69.54	2.86	0.25	0.68
6.04	0.68	10.61	6.50	68.98	2.85	0.23	0.68
6.06	0.69	10.67	6.44	68.67	2.85	0.23	0.68
6.08	0.69	10.73	6.36	68.27	2.84	0.22	0.68
6.10	0.69	10.71	6.39	68.35	2.84	0.22	0.68
6.12	0.69	10.67	6.40	68.25	2.84	0.22	0.68
6.14	0.69	10.55	6.46	68.19	2.85	0.22	0.68
6.16	0.68	10.43	6.53	68.14	2.85	0.22	0.68
6.18	0.68	10.35	6.61	68.46	2.86	0.22	0.68
6.20	0.67	10.32	6.65	68.67	2.86	0.23	0.68
6.22	0.68	10.32	6.67	68.84	2.86	0.23	0.68
6.24	0.67	10.27	6.70	68.86	2.86	0.23	0.68
6.26	0.68	10.34	6.67	68.99	2.86	0.23	0.68
6.28	0.70	10.63	6.43	68.34	2.84	0.22	0.68
6.30	0.74	11.21	5.95	66.71	2.81	0.19	0.67
6.32	0.78	11.75	5.54	65.15	2.77	0.17	0.67
6.34	0.80	12.15	5.31	64.53	2.75	0.16	0.67
6.36	0.82	12.37	5.26	65.11	2.75	0.17	0.67
6.38	0.84	12.67	5.24	66.43	2.75	0.19	0.67
6.40	0.85	12.88	5.24	67.49	2.75	0.21	0.68
6.42	0.86	13.03	5.32	69.37	2.76	0.24	0.68
6.44	0.87	13.07	5.40	70.58	2.76	0.27	0.68
6.46	0.87	13.13	5.45	71.53	2.77	0.29	0.69
6.48	0.87	13.16	5.43	71.40	2.76	0.29	0.69
6.50	0.93	13.97	4.93	68.90	2.72	0.23	0.68
6.52	1.01	15.08	4.36	65.83	2.67	0.79	0.79
6.54	1.10	16.39	3.90	63.84	2.62	0.75	0.75
6.56	1.18	17.40	3.39	58.98	2.56	0.27	0.68
6.58	1.25	18.48	3.23	59.69	2.54	0.18	0.67
6.60	1.31	19.36	3.16	61.18	2.53	0.16	0.67
6.62	1.32	19.65	3.46	68.04	2.57	0.72	0.72
6.64	1.32	19.62	3.65	71.56	2.59	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.32	19.66	3.75	73.70	2.60	0.76	0.76
6.68	1.32	19.68	3.83	75.33	2.61	0.77	0.77
6.70	1.31	19.54	3.97	77.51	2.62	0.79	0.79
6.72	1.29	19.25	4.18	80.47	2.65	0.81	0.81
6.74	1.28	19.04	4.33	82.53	2.66	0.83	0.83
6.76	1.27	18.92	4.36	82.45	2.67	0.83	0.83
6.78	1.28	18.92	4.25	80.50	2.66	0.82	0.82
6.80	1.30	19.17	4.16	79.80	2.65	0.81	0.81
6.82	1.35	19.87	3.94	78.20	2.62	0.79	0.79
6.84	1.38	20.22	3.85	77.83	2.61	0.78	0.78
6.86	1.45	21.18	3.54	74.95	2.57	0.74	0.74
6.88	1.66	24.08	2.93	70.47	2.49	0.26	0.68
6.90	2.08	29.75	2.25	66.94	2.38	0.20	0.68
6.92	2.35	33.51	2.03	68.20	2.33	0.22	0.68
6.94	2.37	33.86	2.12	71.85	2.35	0.30	0.69
6.96	2.09	30.15	2.59	77.97	2.44	0.49	0.70
6.98	1.86	26.96	3.10	83.69	2.52	0.72	0.72
7.00	1.68	24.53	3.65	89.57	2.59	0.79	0.79
7.02	1.59	23.21	4.09	95.04	2.64	0.84	0.84
7.04	1.49	21.93	4.58	100.51	2.69	0.89	0.89
7.06	1.41	20.68	5.05	104.46	2.73	0.76	0.76
7.08	1.34	19.61	5.36	105.00	2.76	0.76	0.76
7.10	1.28	18.74	5.56	104.26	2.78	0.76	0.76
7.12	1.25	18.14	5.60	101.58	2.78	0.75	0.75
7.14	1.22	17.61	5.54	97.51	2.77	0.74	0.74
7.16	1.21	17.30	5.29	91.54	2.75	0.73	0.73
7.18	1.19	16.90	5.15	87.05	2.74	0.72	0.72
7.20	1.18	16.68	5.04	84.04	2.73	0.72	0.72
7.22	1.16	16.40	5.05	82.81	2.73	0.71	0.71
7.24	1.16	16.39	5.02	82.23	2.73	0.70	0.71
7.26	1.18	16.57	4.92	81.50	2.72	0.66	0.71
7.28	1.21	16.96	4.73	80.30	2.70	0.60	0.71
7.30	1.23	17.23	4.59	79.06	2.69	0.84	0.84
7.32	1.25	17.46	4.56	79.66	2.69	0.84	0.84
7.34	1.25	17.46	4.63	80.90	2.69	0.85	0.85
7.36	1.25	17.39	4.76	82.80	2.71	0.71	0.71
7.38	1.22	17.02	4.94	84.11	2.72	0.72	0.72
7.40	1.19	16.48	5.20	85.76	2.75	0.72	0.72
7.42	1.14	15.84	5.45	86.34	2.77	0.72	0.72
7.44	1.12	15.43	5.59	86.24	2.78	0.72	0.72
7.46	1.11	15.33	5.51	84.51	2.77	0.72	0.72
7.48	1.13	15.49	5.36	83.04	2.76	0.71	0.71
7.50	1.15	15.68	5.22	81.86	2.75	0.68	0.71
7.52	1.15	15.71	5.19	81.51	2.74	0.66	0.71
7.54	1.15	15.68	5.17	81.12	2.74	0.64	0.71
7.56	1.15	15.58	5.18	80.66	2.74	0.62	0.71
7.58	1.15	15.57	5.16	80.38	2.74	0.60	0.71
7.60	1.13	15.33	5.19	79.61	2.74	0.57	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.11	14.98	5.26	78.89	2.75	0.53	0.70
7.64	1.10	14.75	5.28	77.87	2.75	0.49	0.70
7.66	1.11	14.89	5.14	76.54	2.74	0.44	0.70
7.68	1.15	15.34	4.88	74.80	2.72	0.38	0.70
7.70	1.18	15.78	4.64	73.24	2.69	0.83	0.83
7.72	1.20	15.90	4.54	72.21	2.68	0.82	0.82
7.74	1.18	15.66	4.62	72.34	2.69	0.83	0.83
7.76	1.16	15.33	4.77	73.17	2.71	0.33	0.69
7.78	1.17	15.47	4.72	73.06	2.70	0.33	0.69
7.80	1.21	15.98	4.50	71.99	2.68	0.82	0.82
7.82	1.26	16.59	4.29	71.22	2.66	0.80	0.80
7.84	1.28	16.90	4.30	72.69	2.66	0.80	0.80
7.86	1.27	16.80	4.52	75.87	2.68	0.83	0.83
7.88	1.22	16.16	5.03	81.25	2.73	0.65	0.71
7.90	1.17	15.40	5.50	84.67	2.77	0.72	0.72
7.92	1.12	14.66	5.90	86.52	2.80	0.72	0.72
7.94	1.08	14.05	6.00	84.30	2.81	0.72	0.72
7.96	1.04	13.49	6.16	83.07	2.82	0.71	0.71
7.98	1.01	13.04	6.27	81.67	2.83	0.67	0.71
8.00	1.00	12.92	6.22	80.43	2.83	0.61	0.71
8.02	1.00	12.77	6.17	78.79	2.82	0.53	0.70
8.04	0.99	12.68	6.03	76.41	2.81	0.43	0.70
8.06	0.96	12.22	6.20	75.82	2.83	0.41	0.70
8.08	0.91	11.51	6.61	76.10	2.86	0.42	0.70
8.10	0.87	10.87	7.13	77.50	2.89	0.47	0.70
8.12	0.86	10.77	7.25	78.08	2.90	0.50	0.70
8.14	0.90	11.23	6.83	76.75	2.87	0.45	0.70
8.16	0.94	11.78	6.38	75.15	2.84	0.39	0.70
8.18	0.98	12.26	6.02	73.86	2.81	0.35	0.69
8.20	1.00	12.51	5.96	74.56	2.81	0.37	0.69
8.22	1.00	12.51	6.07	75.95	2.82	0.42	0.70
8.24	0.99	12.38	6.23	77.18	2.83	0.46	0.70
8.26	0.99	12.30	6.24	76.73	2.83	0.44	0.70
8.28	0.98	12.25	6.18	75.63	2.83	0.41	0.70
8.30	0.97	12.07	6.18	74.59	2.83	0.37	0.69
8.32	0.96	11.89	6.22	74.01	2.83	0.35	0.69
8.34	0.97	11.98	6.02	72.06	2.81	0.30	0.69
8.36	1.00	12.28	5.62	68.96	2.78	0.23	0.68
8.38	1.02	12.55	5.29	66.45	2.75	0.19	0.67
8.40	1.05	12.86	4.97	63.87	2.72	0.15	0.67
8.42	1.08	13.25	4.72	62.56	2.70	0.14	0.66
8.44	1.13	13.80	4.45	61.42	2.68	0.78	0.78
8.46	1.14	13.97	4.45	62.15	2.67	0.79	0.79
8.48	1.12	13.64	4.59	62.65	2.69	0.80	0.80
8.50	1.07	12.98	4.90	63.56	2.72	0.15	0.67
8.52	1.03	12.39	5.20	64.46	2.75	0.16	0.67
8.54	1.02	12.34	5.25	64.75	2.75	0.17	0.67
8.56	1.08	13.08	4.87	63.66	2.72	0.15	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	1.18	14.34	4.24	60.85	2.65	0.77	0.77
8.60	1.27	15.39	3.82	58.77	2.61	0.72	0.72
8.62	1.32	16.00	3.58	57.36	2.58	0.42	0.70
8.64	1.38	16.77	3.40	56.93	2.56	0.22	0.68
8.66	1.47	17.78	3.19	56.79	2.53	0.12	0.66
8.68	1.52	18.50	3.14	58.16	2.52	0.12	0.66
8.70	1.51	18.39	3.33	61.27	2.55	0.28	0.69
8.72	1.46	17.82	3.66	65.23	2.59	0.73	0.73
8.74	1.44	17.54	3.79	66.42	2.60	0.74	0.74
8.76	1.50	18.13	3.55	64.45	2.58	0.72	0.72
8.78	1.56	18.85	3.26	61.52	2.54	0.23	0.68
8.80	1.57	18.91	3.23	61.13	2.54	0.20	0.68
8.82	1.49	17.93	3.58	64.19	2.58	0.72	0.72
8.84	1.39	16.67	3.97	66.27	2.63	0.76	0.76
8.86	1.33	15.95	4.10	65.30	2.64	0.77	0.77
8.88	1.34	15.95	3.76	59.95	2.60	0.72	0.72
8.90	1.39	16.45	3.37	55.45	2.55	0.18	0.67
8.92	1.43	16.86	3.17	53.45	2.53	0.09	0.65
8.94	1.44	16.98	3.15	53.50	2.52	0.08	0.64
8.96	1.41	16.60	3.39	56.26	2.56	0.21	0.68
8.98	1.37	16.11	3.65	58.82	2.59	0.62	0.71
9.00	1.33	15.64	3.86	60.36	2.61	0.73	0.73
9.02	1.26	14.74	4.07	60.04	2.64	0.75	0.75
9.04	1.19	13.81	4.30	59.35	2.66	0.76	0.76
9.06	1.11	12.74	4.65	59.30	2.69	0.79	0.79
9.08	1.09	12.53	4.67	58.52	2.70	0.79	0.79
9.10	1.12	12.79	4.50	57.63	2.68	0.77	0.77
9.12	1.19	13.69	4.08	55.87	2.64	0.74	0.74
9.14	1.26	14.50	3.77	54.72	2.60	0.57	0.71
9.16	1.29	14.90	3.64	54.21	2.59	0.35	0.69
9.18	1.27	14.65	3.75	54.99	2.60	0.55	0.71
9.20	1.26	14.42	3.86	55.61	2.61	0.72	0.72
9.22	1.29	14.84	3.73	55.29	2.60	0.52	0.70
9.24	1.36	15.60	3.53	55.05	2.57	0.28	0.69
9.26	1.43	16.44	3.29	54.05	2.54	0.12	0.66
9.28	1.49	17.21	3.08	53.06	2.51	0.07	0.64
9.30	1.58	18.25	2.89	52.82	2.49	0.06	0.63
9.32	1.65	19.04	2.86	54.42	2.48	0.07	0.64
9.34	1.62	18.73	3.08	57.64	2.51	0.09	0.65
9.36	1.54	17.74	3.37	59.74	2.55	0.27	0.69
9.38	1.46	16.80	3.60	60.53	2.58	0.64	0.71
9.40	1.44	16.48	3.60	59.41	2.58	0.56	0.71
9.42	1.42	16.20	3.63	58.79	2.59	0.57	0.71
9.44	1.36	15.42	3.83	59.01	2.61	0.72	0.72
9.46	1.29	14.56	4.18	60.80	2.65	0.76	0.76
9.48	1.23	13.85	4.50	62.33	2.68	0.79	0.79
9.50	1.21	13.57	4.63	62.81	2.69	0.80	0.80
9.52	1.21	13.56	4.52	61.28	2.68	0.79	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	1.22	13.66	4.41	60.24	2.67	0.78	0.78
9.56	1.20	13.36	4.58	61.14	2.69	0.79	0.79
9.58	1.14	12.60	5.05	63.65	2.73	0.15	0.67
9.60	1.05	11.58	5.69	65.95	2.79	0.18	0.67
9.62	1.01	10.96	5.96	65.27	2.81	0.17	0.67
9.64	0.99	10.73	5.93	63.61	2.81	0.15	0.67
9.66	1.00	10.81	5.61	60.64	2.78	0.12	0.66
9.68	1.08	11.80	4.85	57.22	2.71	0.09	0.65
9.70	1.17	12.81	4.28	54.77	2.66	0.75	0.75
9.72	1.25	13.70	4.05	55.44	2.63	0.73	0.73
9.74	1.24	13.67	4.24	57.96	2.65	0.76	0.76
9.76	1.26	13.86	4.27	59.24	2.66	0.76	0.76
9.78	1.29	14.18	4.08	57.80	2.64	0.74	0.74
9.80	1.30	14.26	4.02	57.34	2.63	0.74	0.74
9.82	1.24	13.56	4.41	59.81	2.67	0.78	0.78
9.84	1.14	12.34	5.21	64.32	2.75	0.16	0.67
9.86	1.05	11.25	5.92	66.67	2.81	0.19	0.67
9.88	0.97	10.28	6.52	67.00	2.85	0.20	0.68
9.90	0.93	9.71	6.79	65.89	2.87	0.18	0.67
9.92	1.02	10.86	5.79	62.87	2.80	0.14	0.66
9.94	1.23	13.24	4.30	56.99	2.66	0.76	0.76
9.96	1.52	16.72	3.29	54.95	2.54	0.13	0.66
9.98	1.72	19.08	3.16	60.23	2.53	0.15	0.67
10.00	1.97	22.09	3.10	68.42	2.52	0.24	0.68
10.02	2.11	23.83	3.32	79.15	2.55	0.73	0.73
10.04	2.21	25.04	3.68	92.18	2.59	0.80	0.80
10.06	2.14	24.41	4.65	113.55	2.69	0.93	0.93
10.08	2.09	23.96	5.64	135.18	2.78	0.81	0.81
10.10	2.08	23.85	6.50	154.96	2.85	0.83	0.83
10.12	1.92	22.04	7.66	168.81	2.93	0.85	0.85
10.14	1.79	20.36	8.57	174.56	2.99	0.86	0.86
10.16	1.94	22.13	7.60	168.12	2.93	0.85	0.85
10.18	2.82	32.24	4.29	138.22	2.66	0.94	0.94
10.20	4.37	49.73	2.20	109.29	2.36	0.76	0.76
10.22	7.16	80.76	1.41	114.16	2.10	0.77	0.77
10.24	10.25	114.90	1.28	146.63	1.96	0.82	0.82
10.26	12.73	142.46	1.25	177.88	1.92	0.86	0.86
10.28	14.25	159.30	1.24	197.56	1.90	0.88	0.88
10.30	15.20	169.73	1.24	210.80	1.91	0.90	0.90
10.32	16.24	180.96	1.23	223.16	1.89	0.91	0.91
10.34	17.06	189.82	1.23	233.22	1.89	0.92	0.92
10.36	17.79	197.48	1.22	240.88	1.88	0.93	0.93
10.38	18.61	206.38	1.22	251.94	1.88	0.94	0.94
10.40	20.09	222.53	1.22	270.39	1.87	0.95	0.95
10.42	21.19	234.64	1.23	288.01	1.89	0.97	0.97
10.44	23.27	257.18	1.22	313.09	1.87	0.99	0.99
10.46	24.33	268.66	1.22	327.53	1.87	1.00	1.00
10.48	26.91	295.98	1.19	352.18	1.84	1.02	1.02

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	28.21	309.43	1.17	362.66	1.82	1.02	1.02

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

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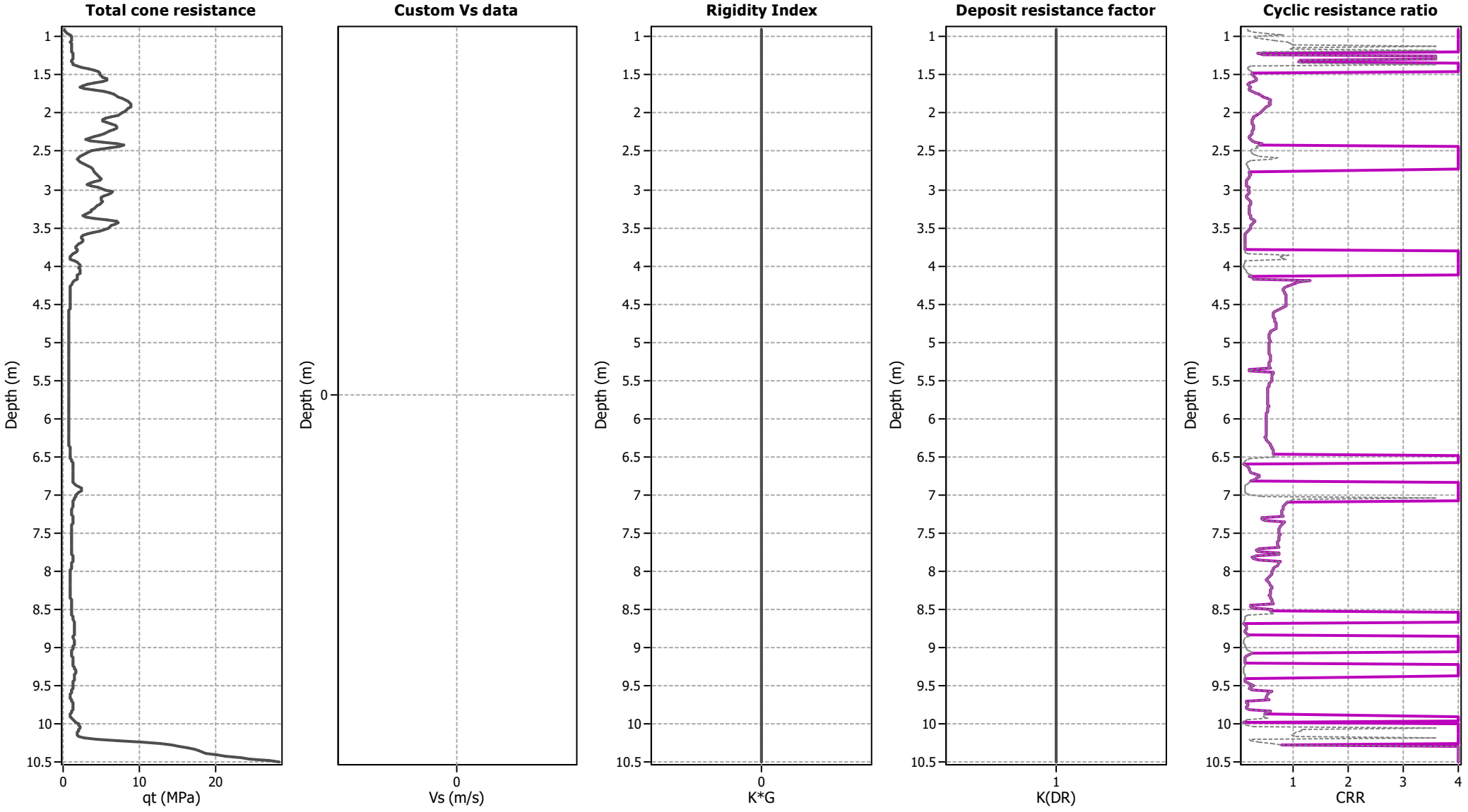
CPT name: CWLP CPT-7L

Aging Calculation Estimation



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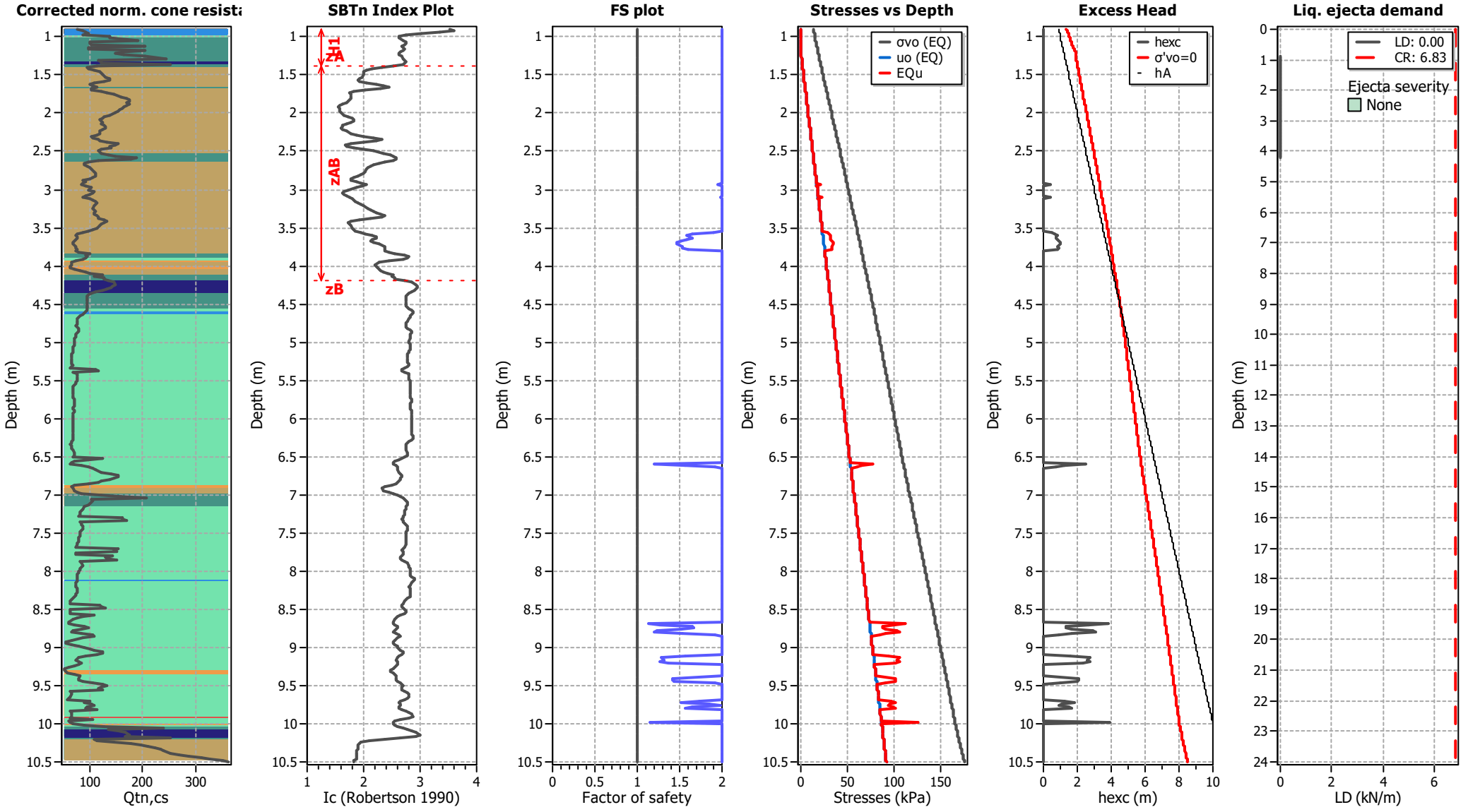
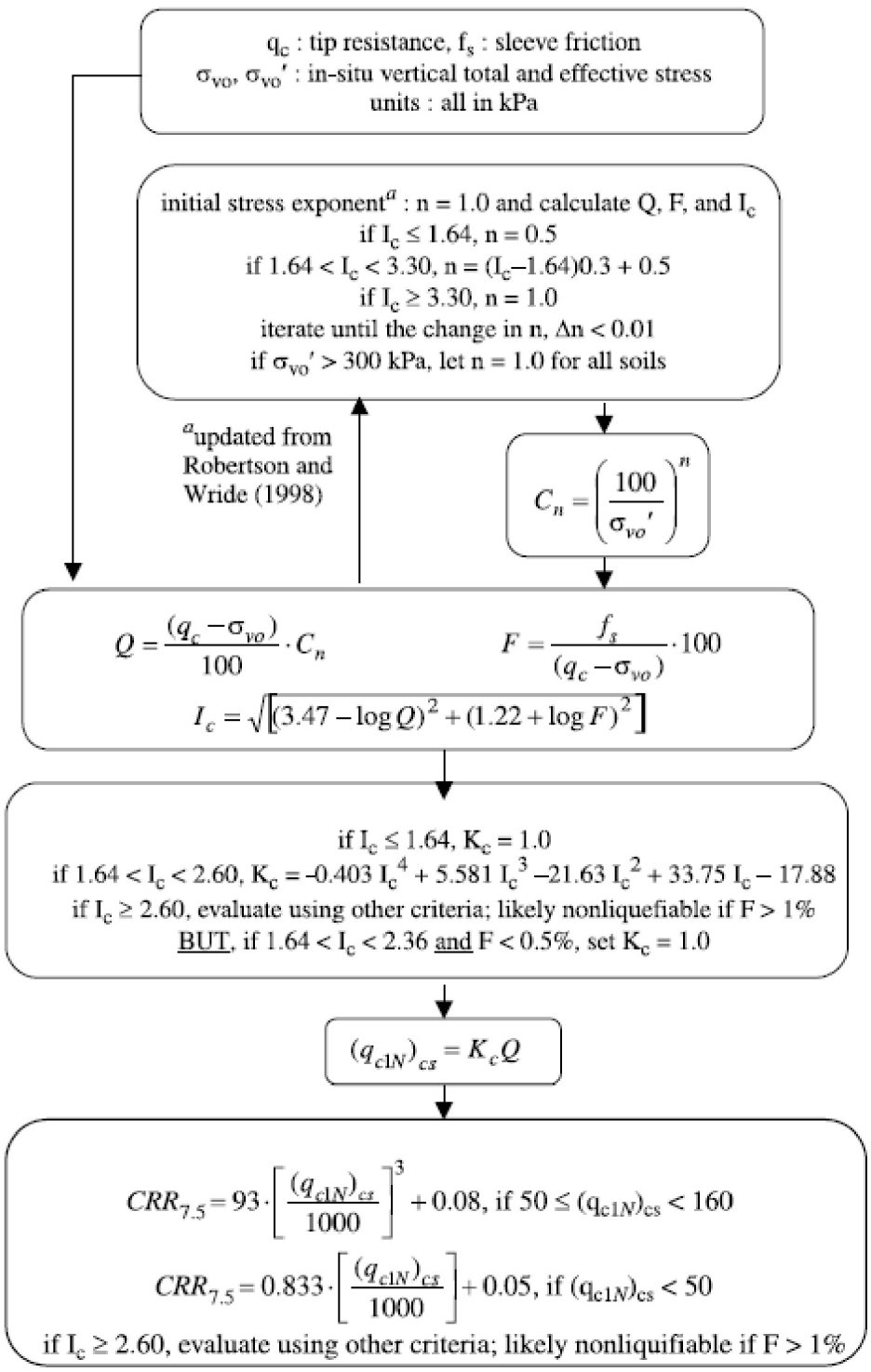
CPT name: CWLP CPT-7L

Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

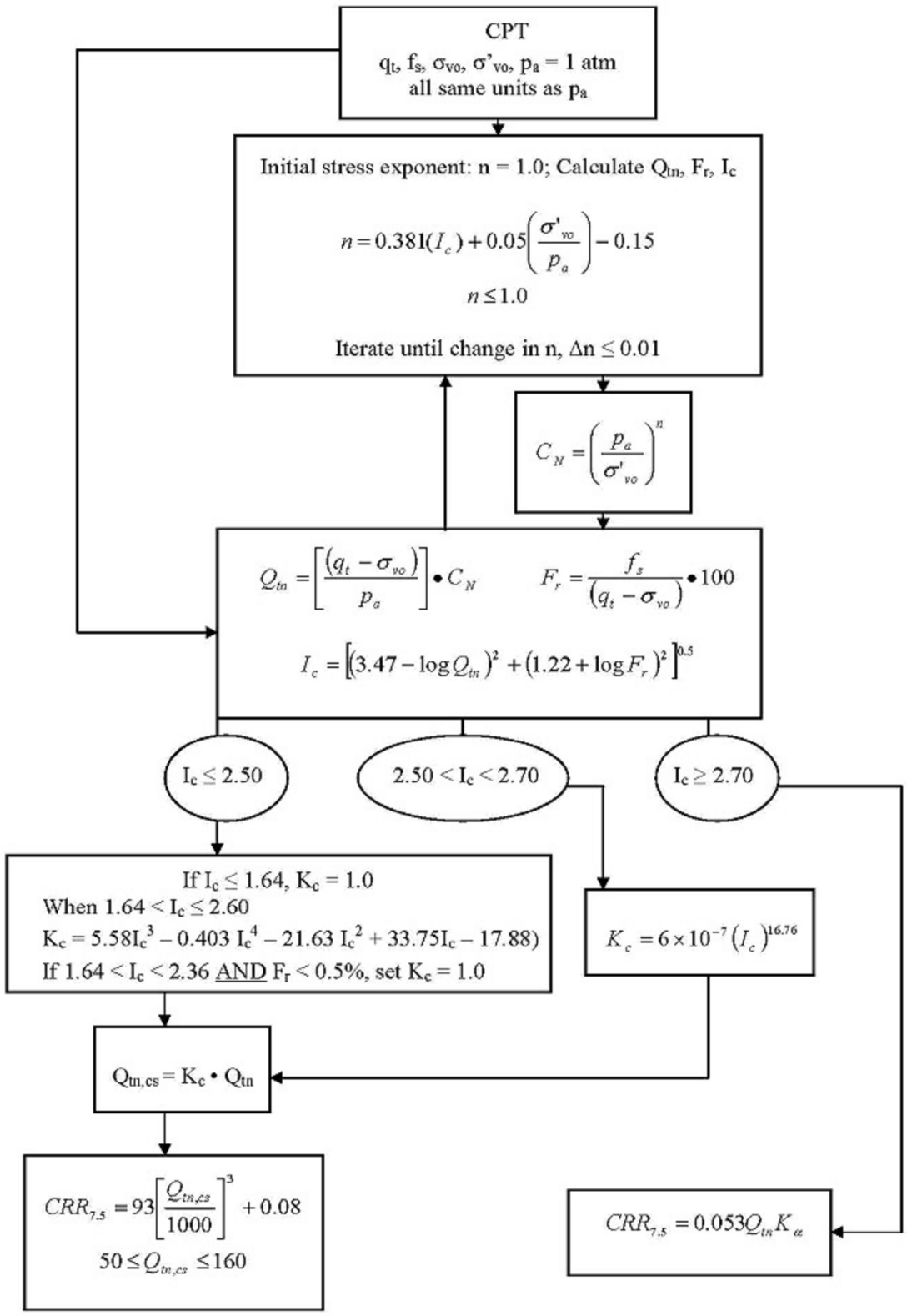
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

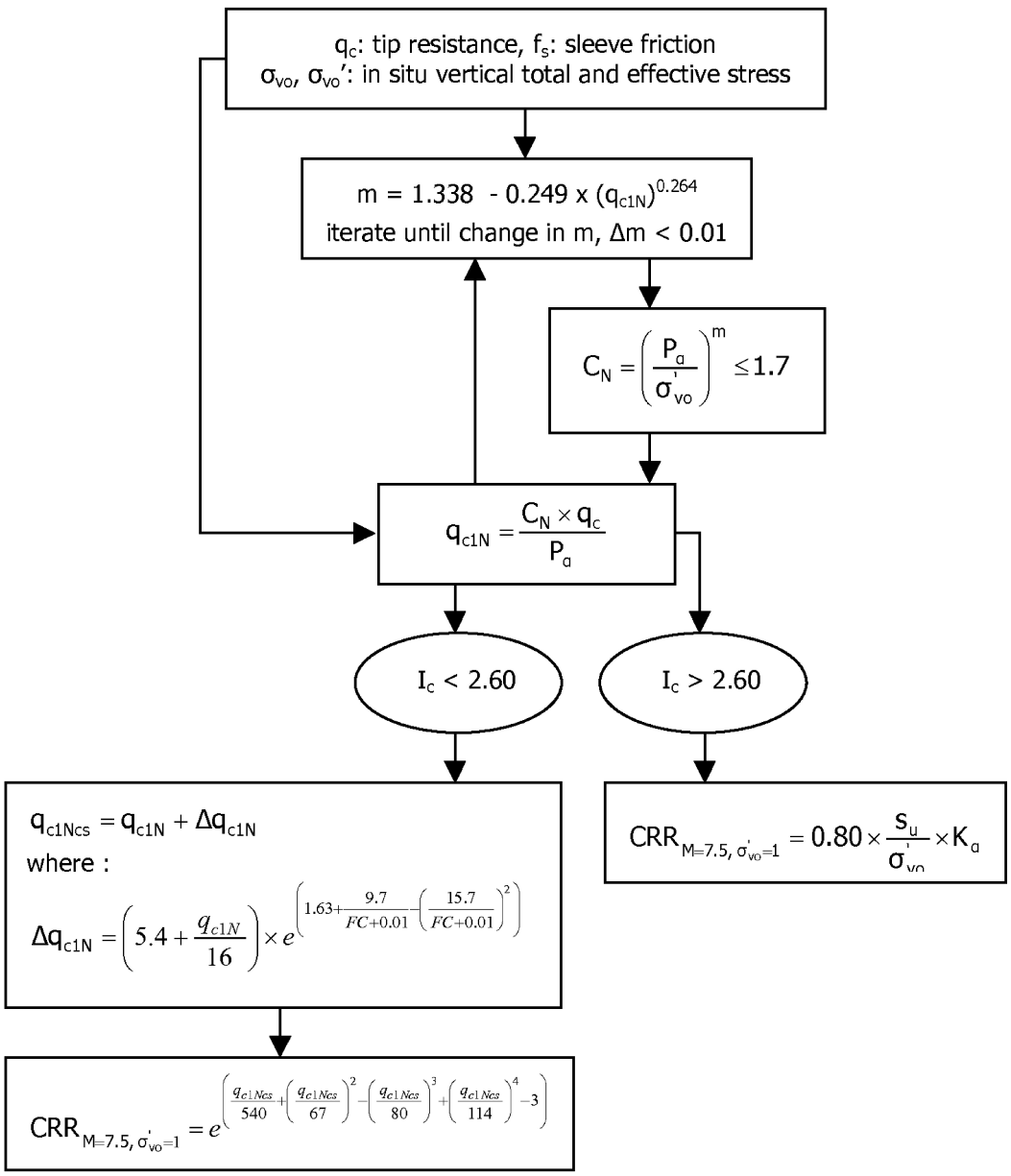
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

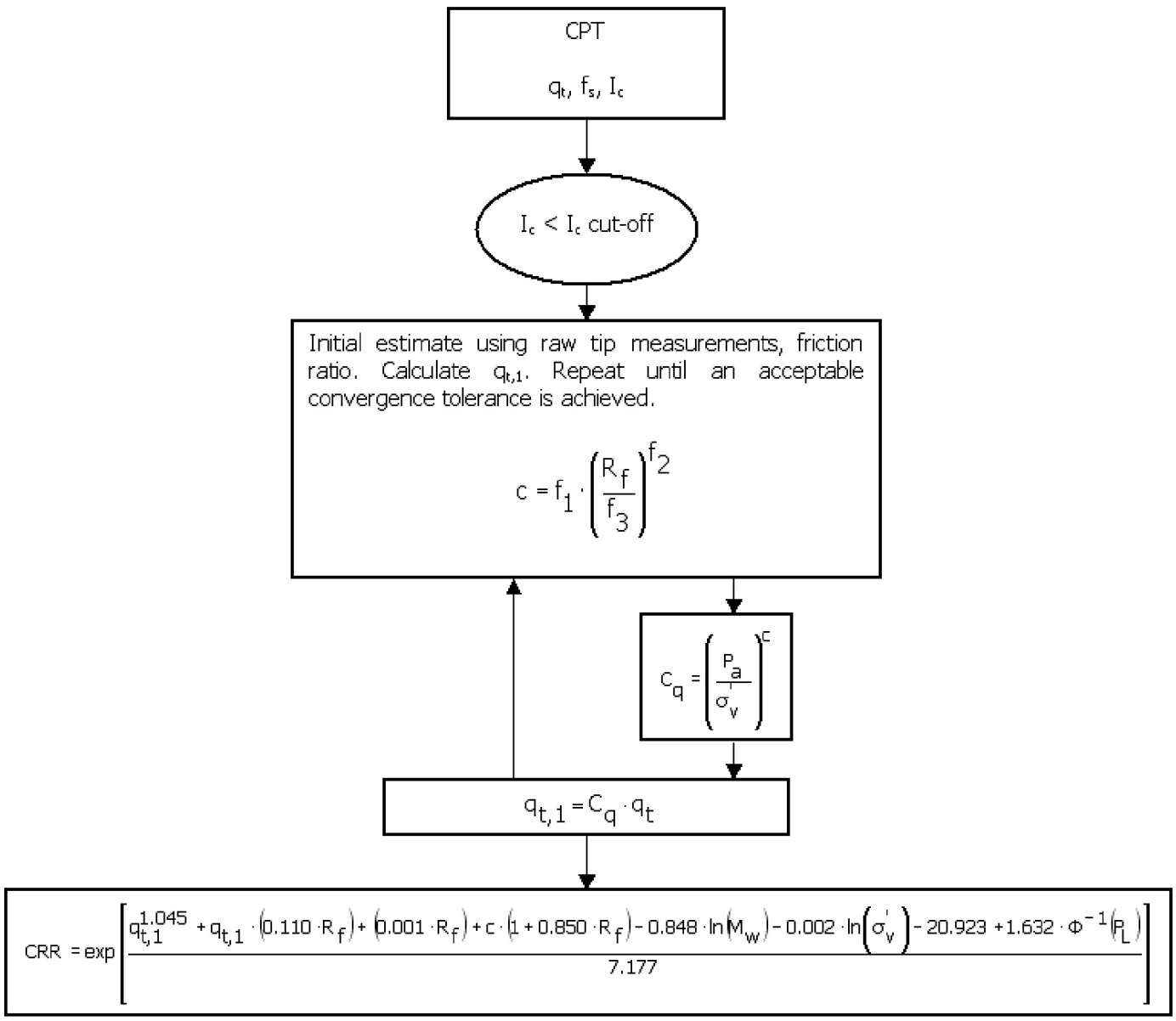


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

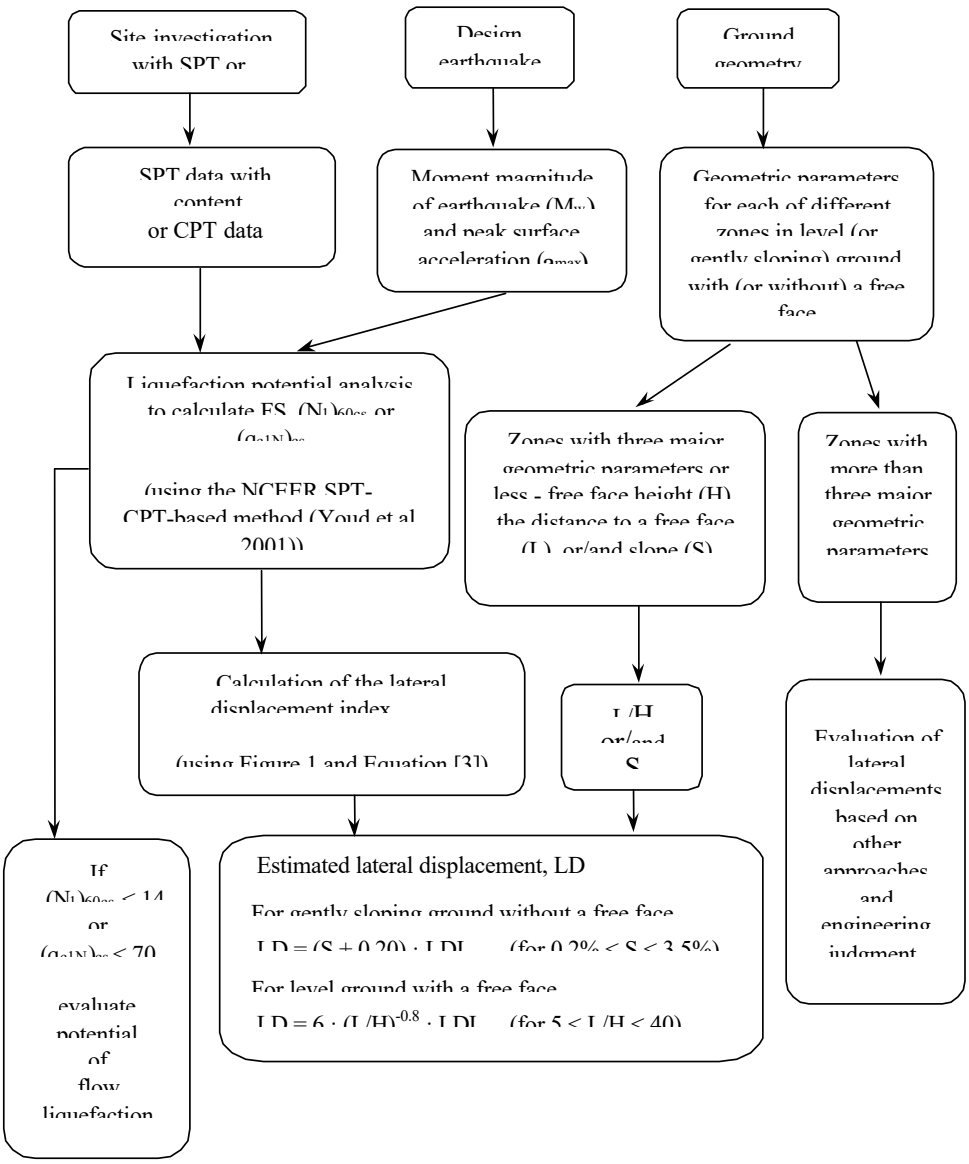
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

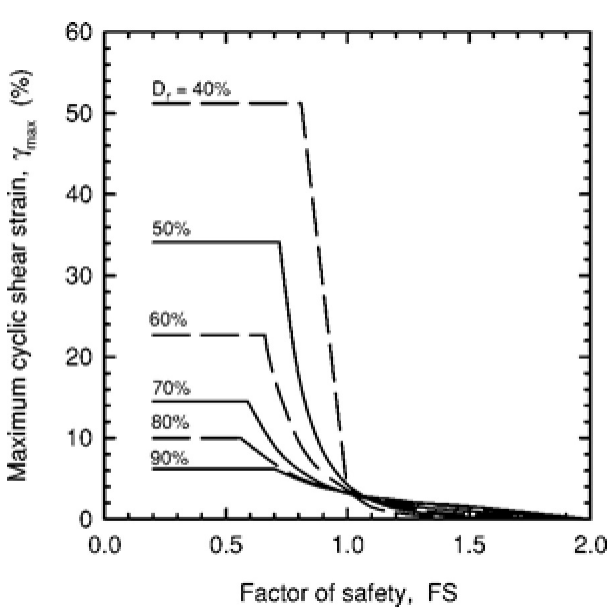
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



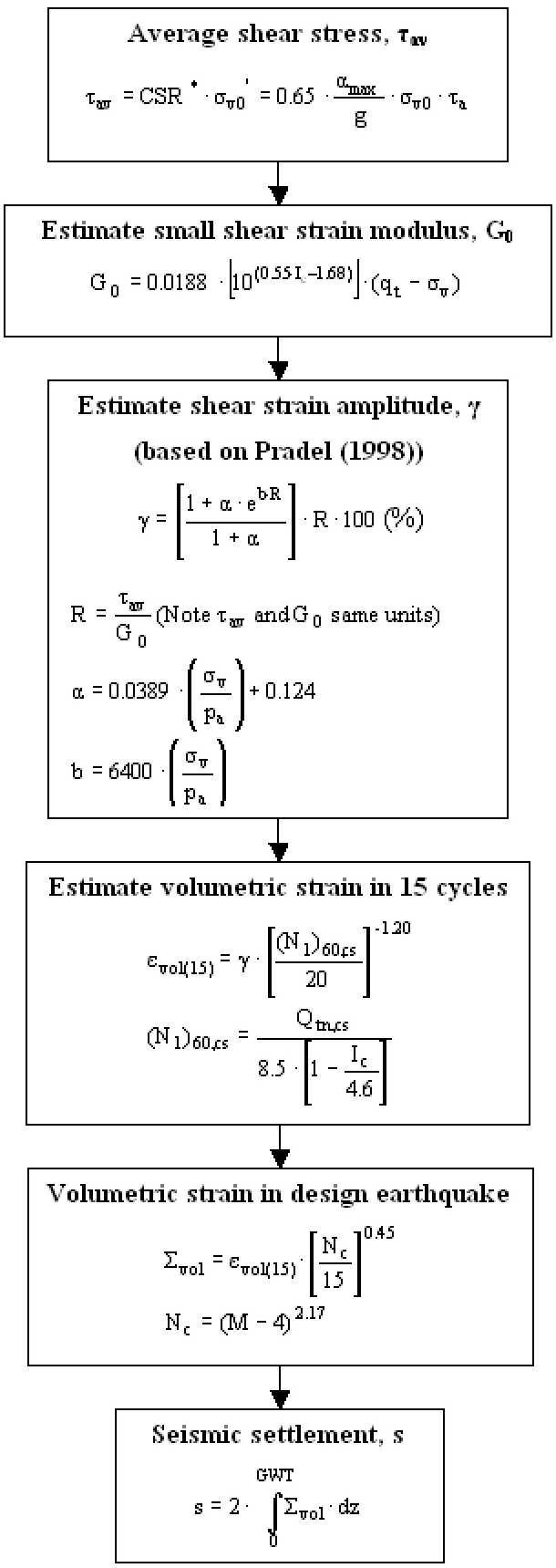
[1] Figure 1

$$\mathrm{LDI} = \int_0^{z_{\max}} \gamma_{\max} dz$$

[1] Equation [3]

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

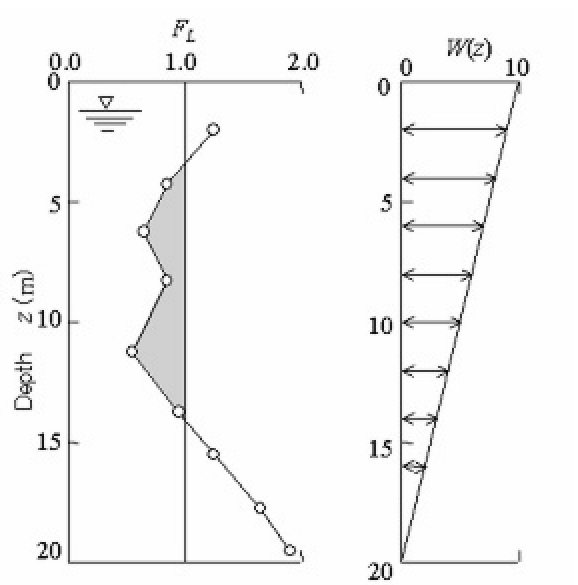
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

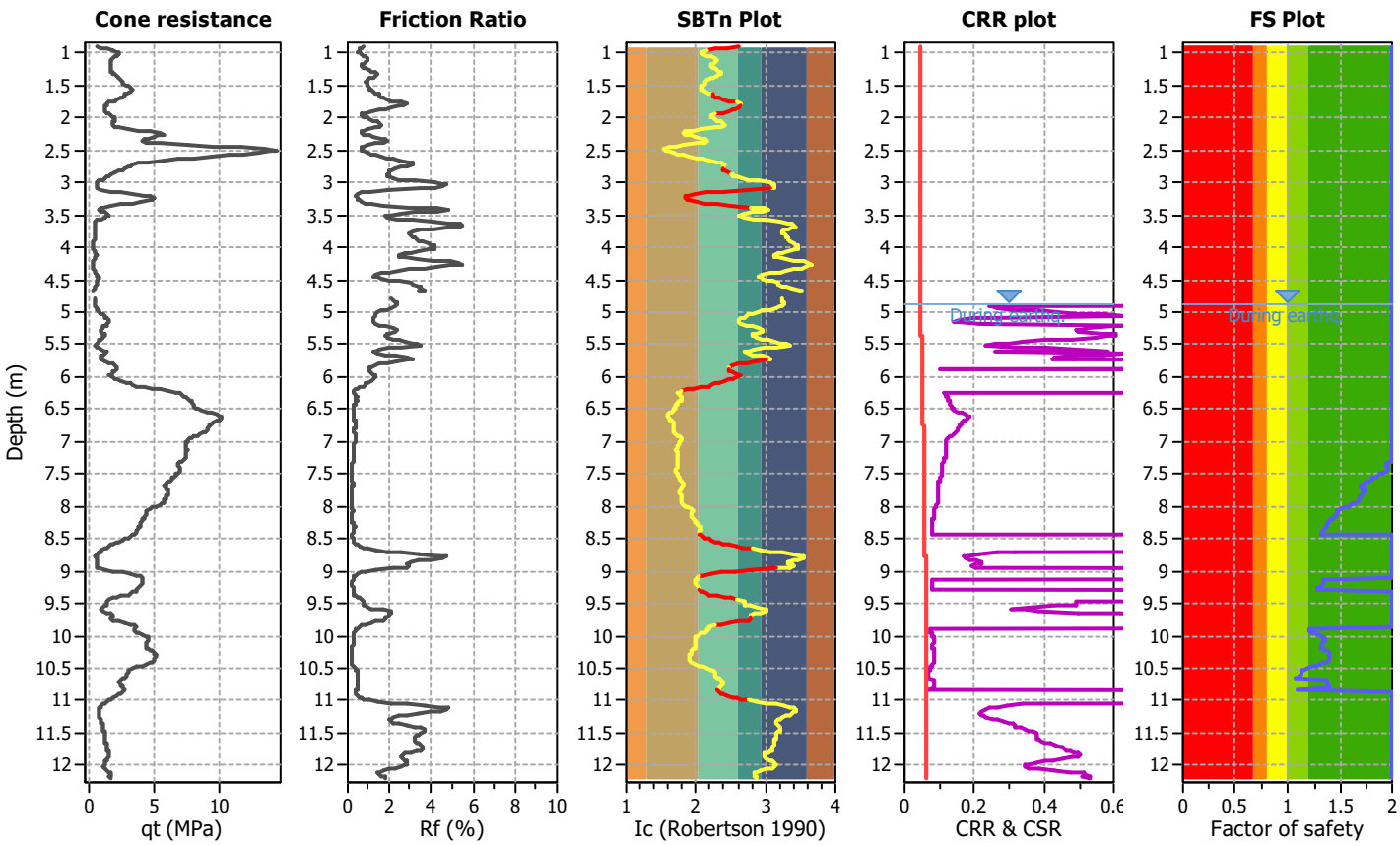
Project title : CWLP Liquefaction Analysis

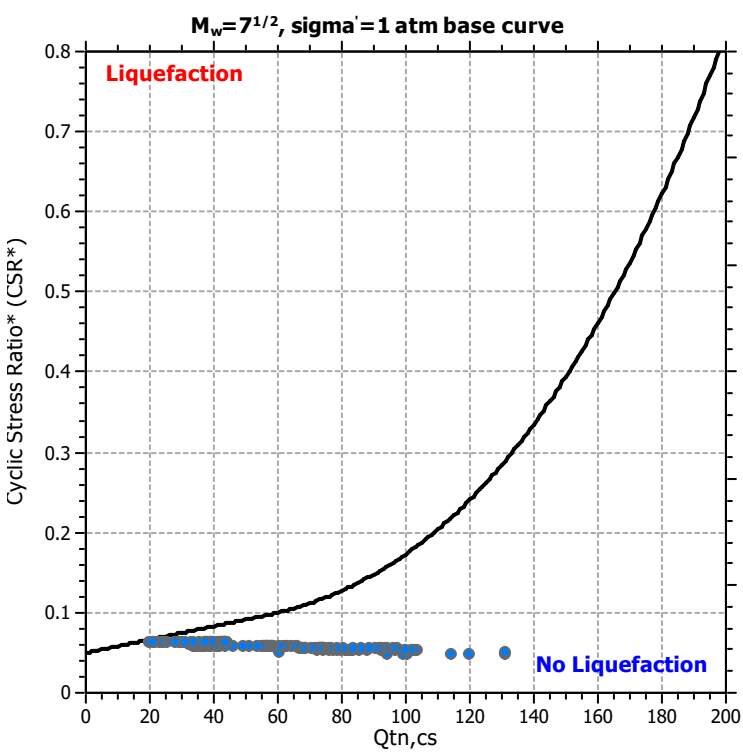
Location : East Lake Shore Drive, Springfield, Illinois

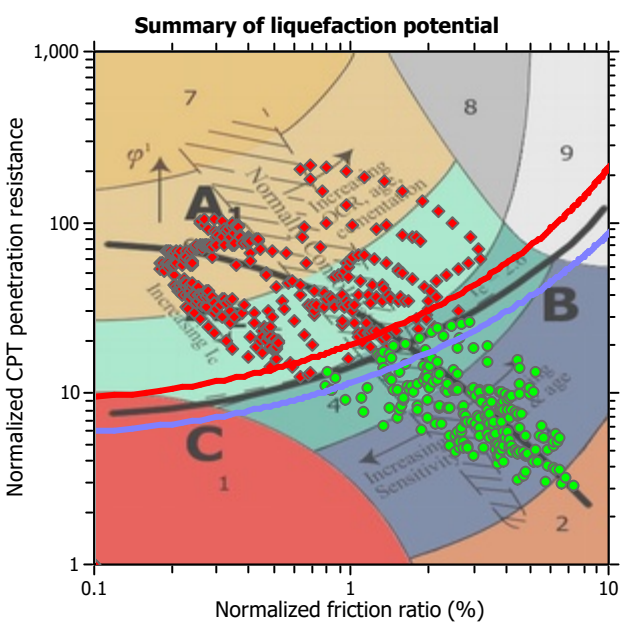
CPT file : CWLP CPT-4CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	4.88 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.88 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based





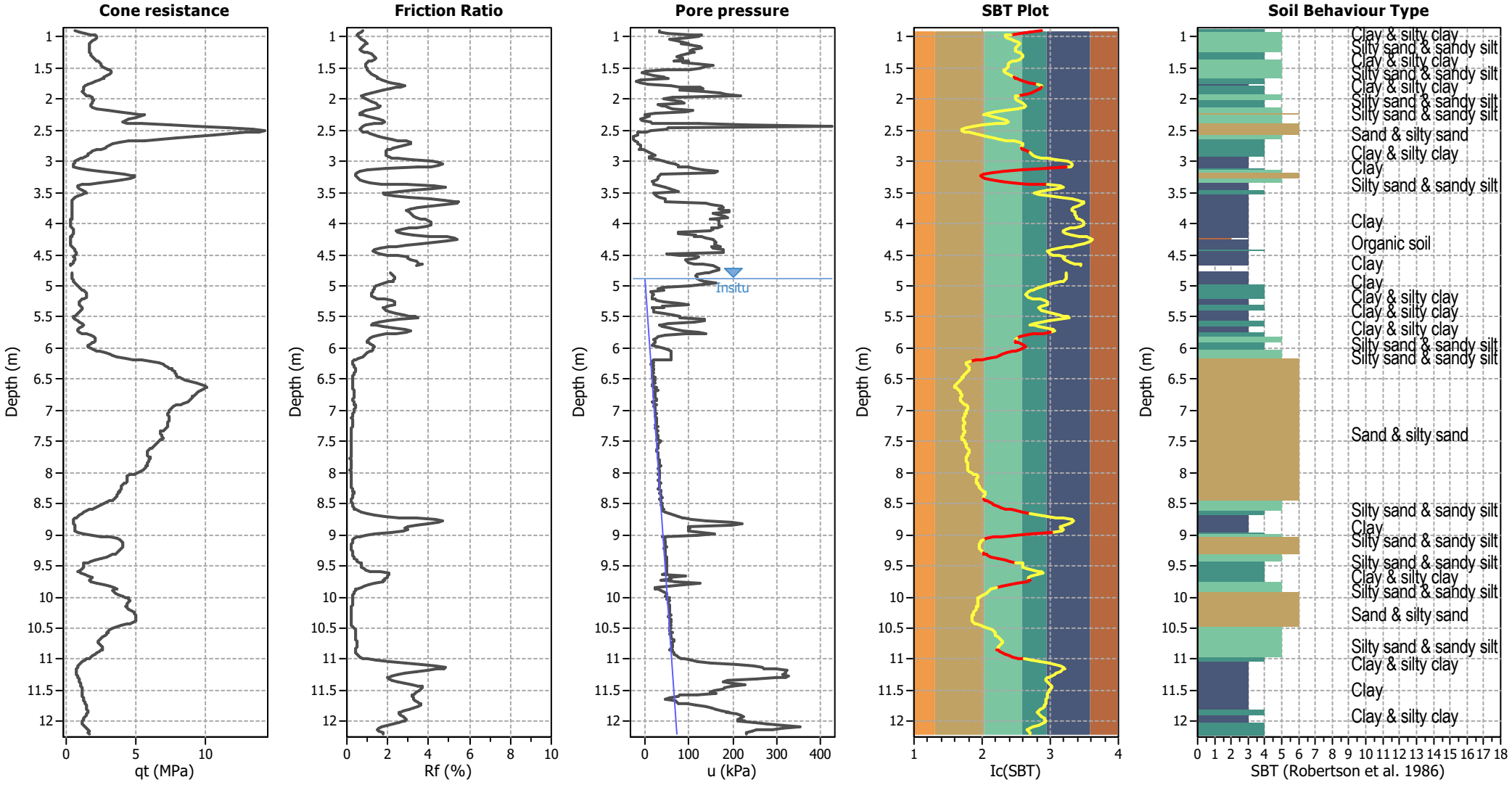


Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

This software is licensed to: Chritina Matthews

CPT name: CWLP CPT-4CCR

CPT basic interpretation plots



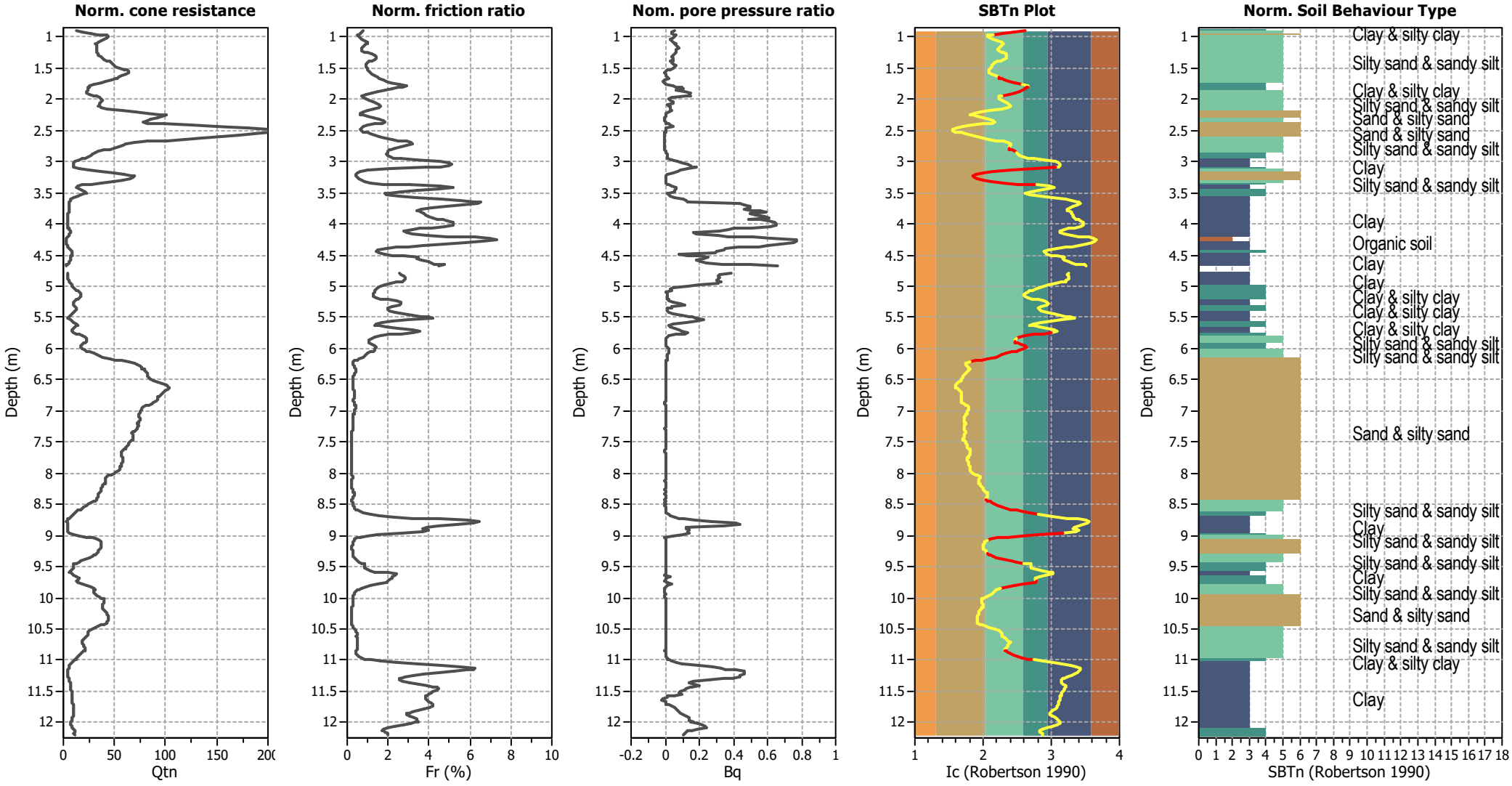
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



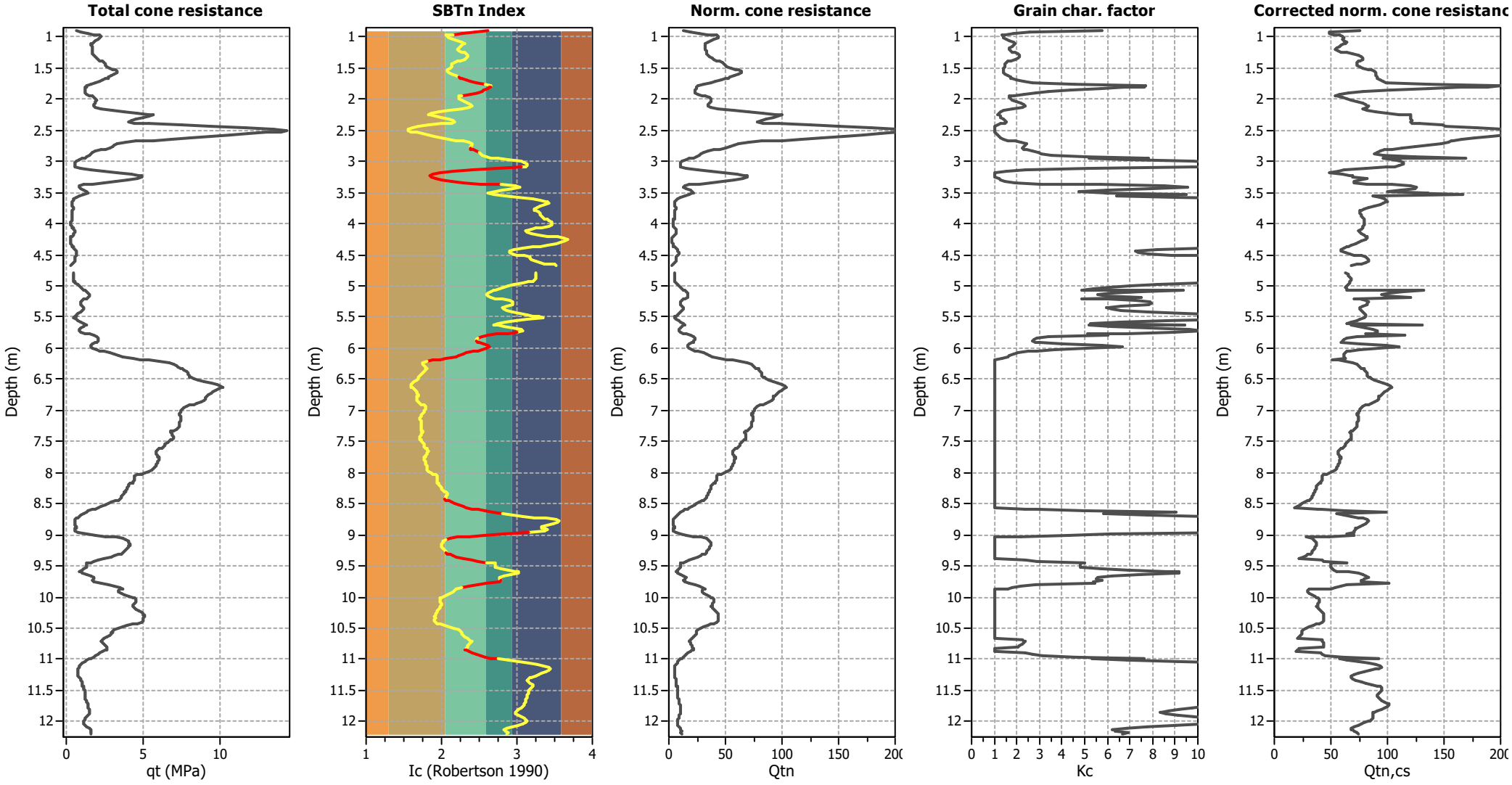
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

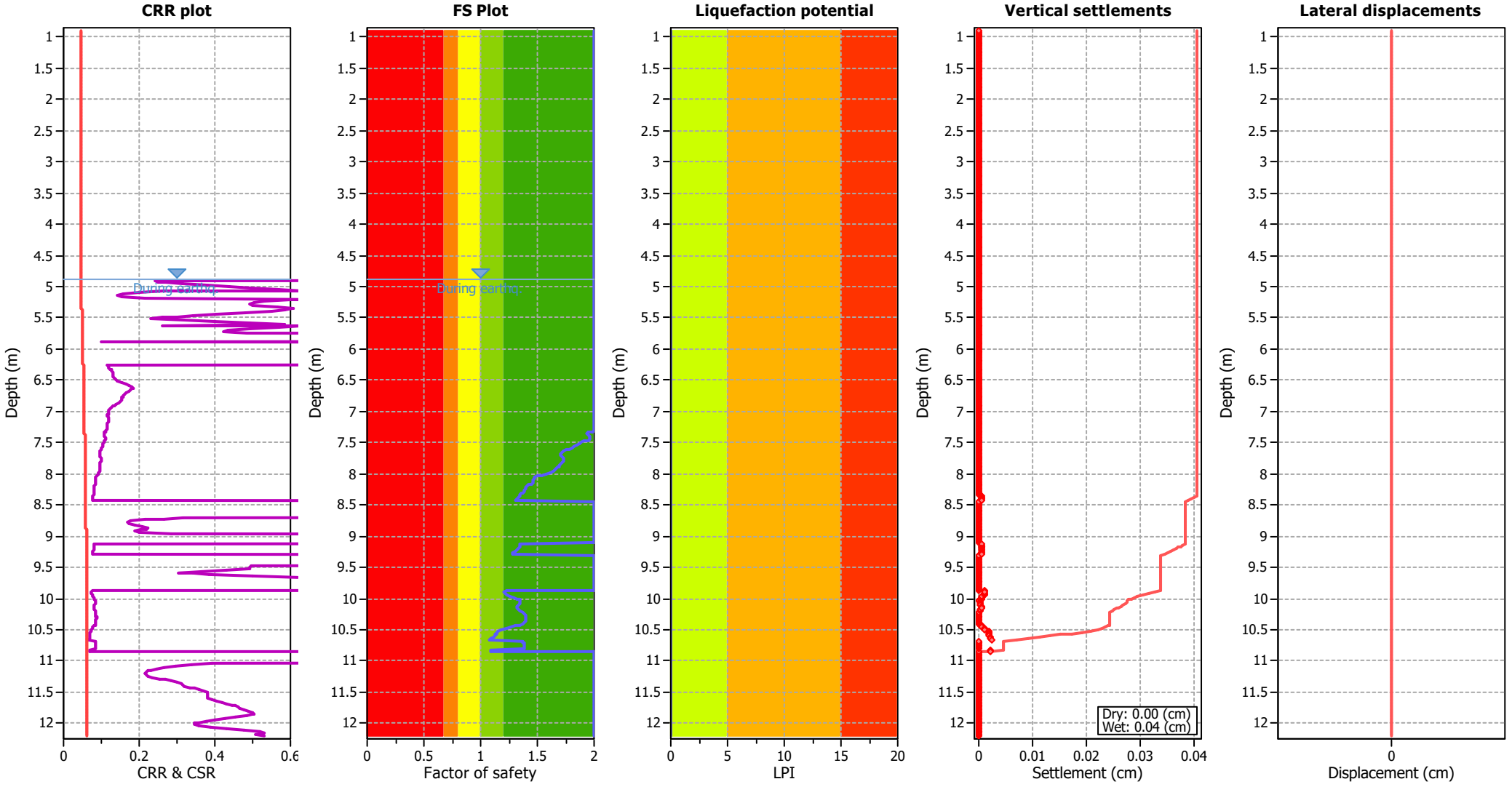
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

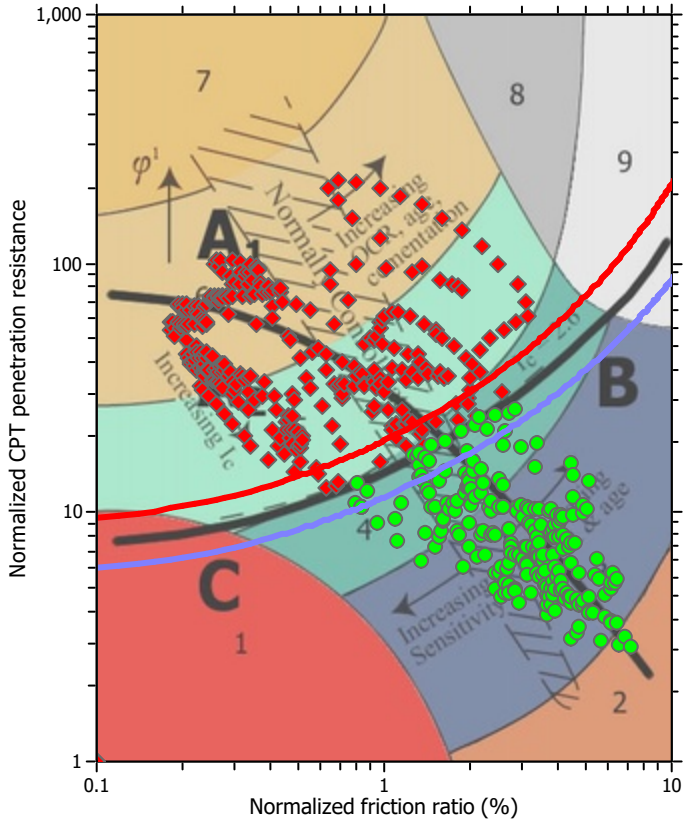
F.S. color scheme

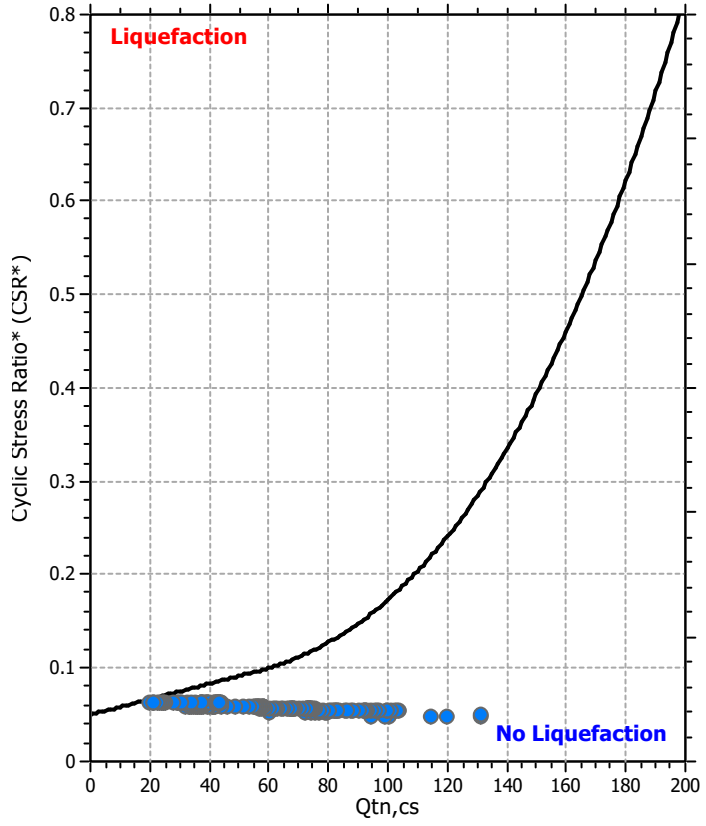
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

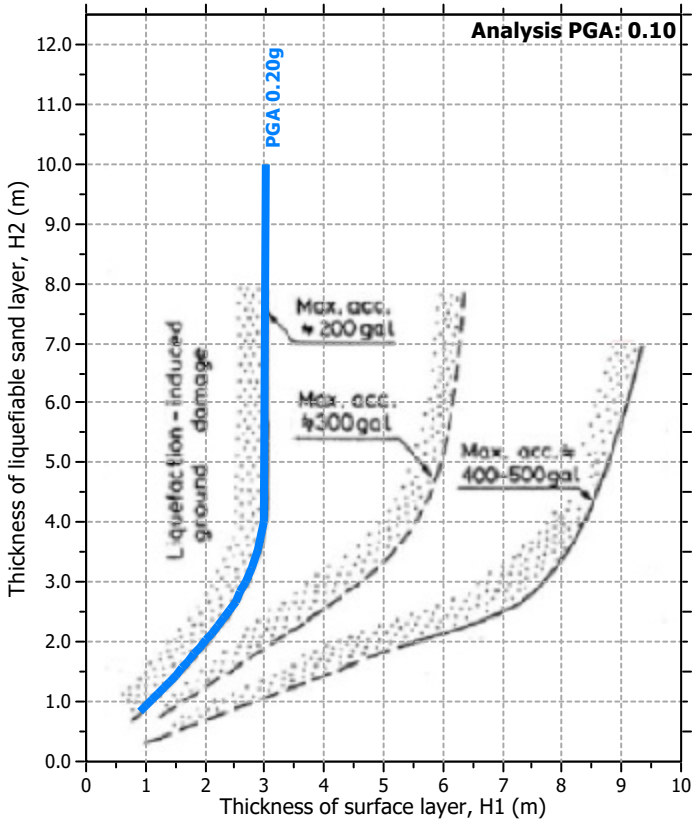
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



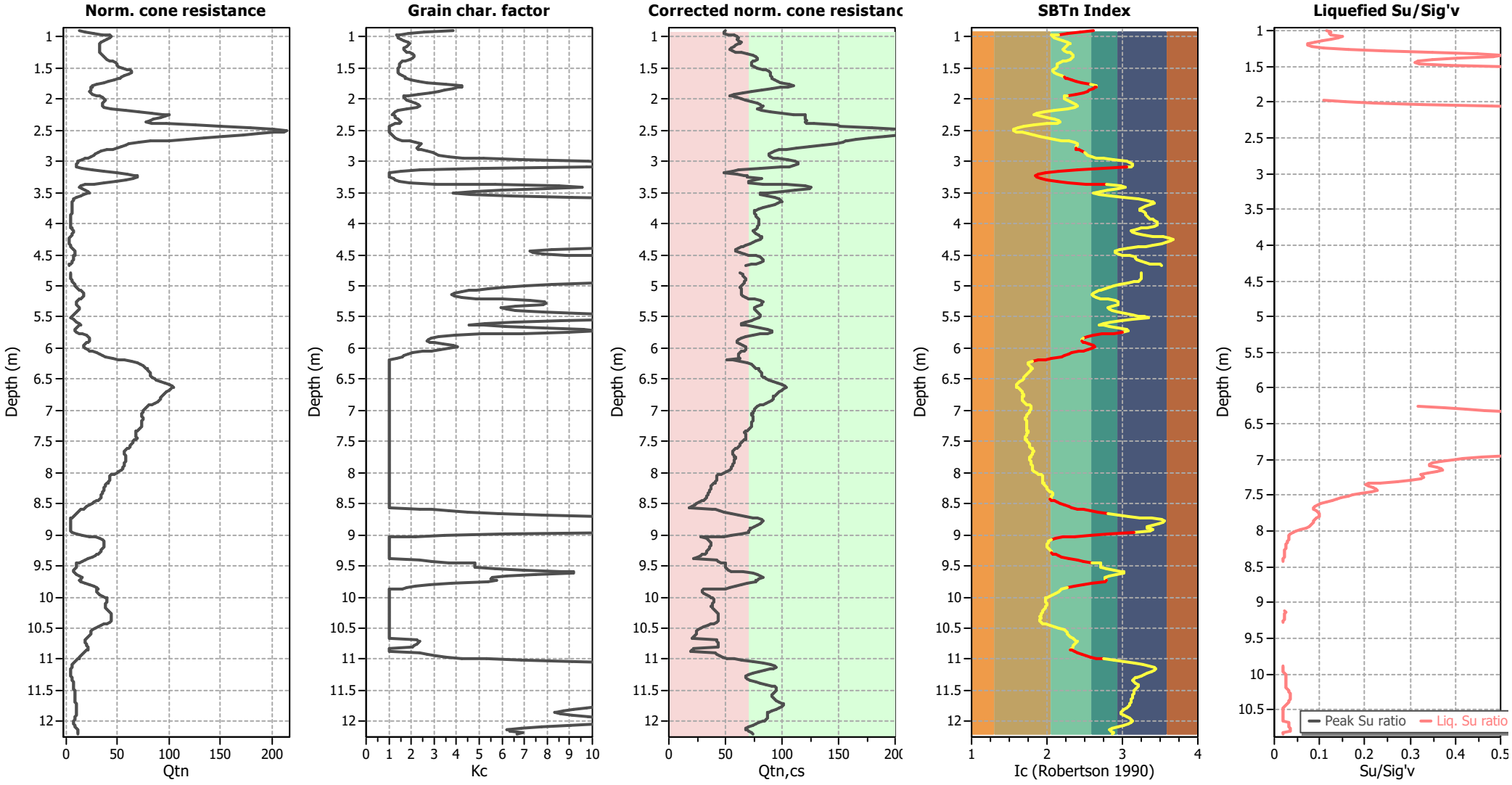




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

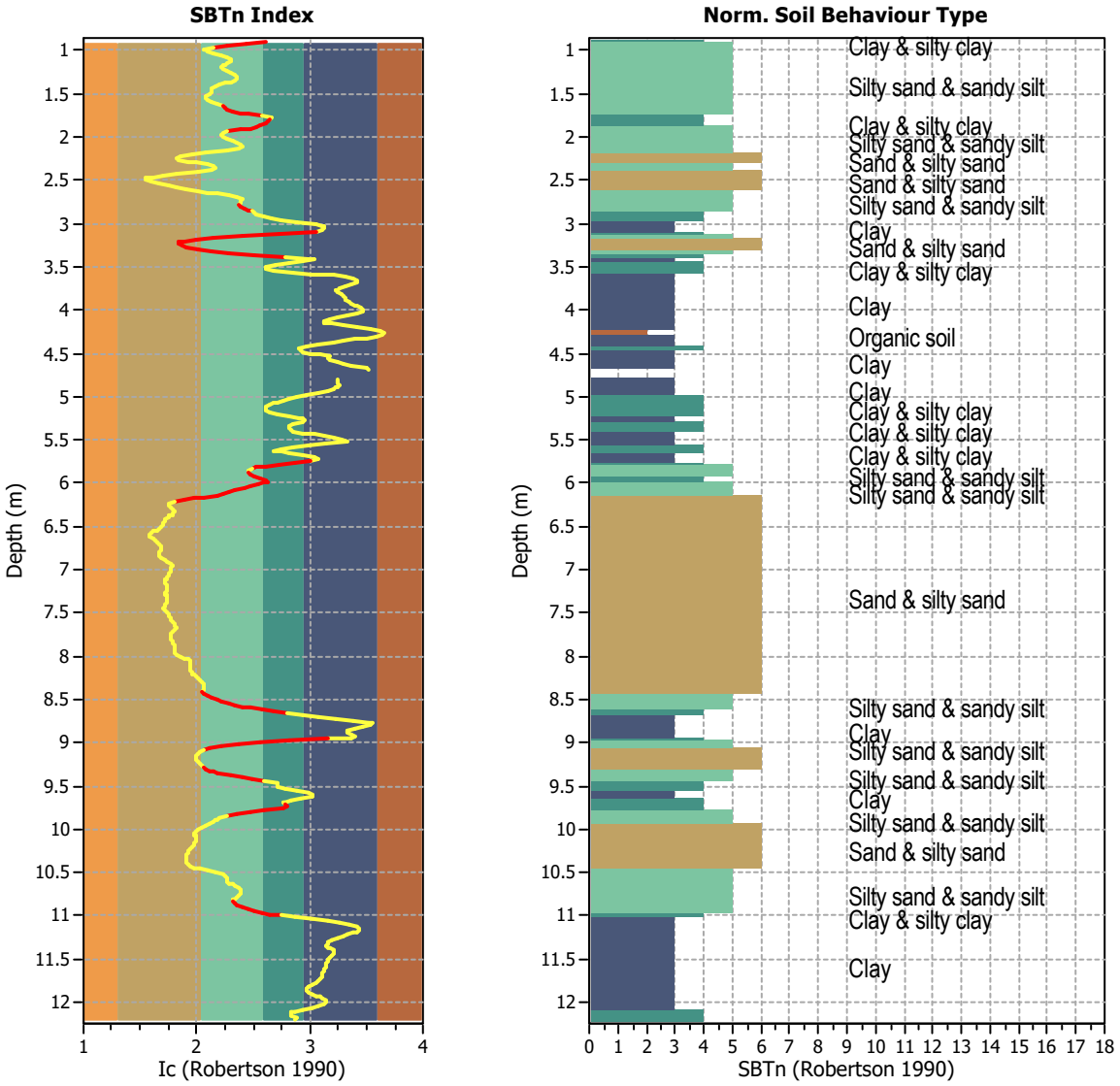
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.88 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.88 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	566
I_c maximum check value:	3.00	Total points excluded:	110
I_c change ratio value:	0.0100	Exclusion percentage:	19.43%
Minimum number of points in layer:	2	Number of layers detected:	14

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 0.90 (m)	4	Clay & silty clay
		End depth: 0.98 (m)	6	Sand & silty sand
Transition layer 2	7	Start depth: 1.66 (m)	5	Silty sand & sandy silt
		End depth: 1.78 (m)	4	Clay & silty clay
Transition layer 3	8	Start depth: 1.82 (m)	4	Clay & silty clay
		End depth: 1.96 (m)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 2.80 (m)	5	Silty sand & sandy silt
		End depth: 2.88 (m)	4	Clay & silty clay
Transition layer 5	6	Start depth: 3.12 (m)	4	Clay & silty clay
		End depth: 3.22 (m)	6	Sand & silty sand
Transition layer 6	9	Start depth: 3.24 (m)	6	Sand & silty sand
		End depth: 3.40 (m)	3	Clay
Transition layer 7	6	Start depth: 5.76 (m)	3	Clay
		End depth: 5.86 (m)	5	Silty sand & sandy silt
Transition layer 8	5	Start depth: 5.90 (m)	5	Silty sand & sandy silt
		End depth: 5.98 (m)	4	Clay & silty clay
Transition layer 9	14	Start depth: 5.98 (m)	4	Clay & silty clay
		End depth: 6.24 (m)	6	Sand & silty sand
Transition layer 10	13	Start depth: 8.44 (m)	6	Sand & silty sand
		End depth: 8.68 (m)	4	Clay & silty clay
Transition layer 11	7	Start depth: 8.98 (m)	4	Clay & silty clay
		End depth: 9.10 (m)	6	Sand & silty sand
Transition layer 12	9	Start depth: 9.30 (m)	6	Sand & silty sand
		End depth: 9.46 (m)	4	Clay & silty clay
Transition layer 13	7	Start depth: 9.74 (m)	4	Clay & silty clay
		End depth: 9.86 (m)	5	Silty sand & sandy silt
Transition layer 14	9	Start depth: 10.86 (m)	5	Silty sand & sandy silt
		End depth: 11.02 (m)	4	Clay & silty clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.45	4.20	34.00	35.82	14.77
2	0.92	0.45	4.20	34.00	27.96	15.18
3	0.94	1.53	10.10	53.70	21.64	15.53
4	0.96	1.94	11.10	104.50	17.36	15.79
5	0.98	2.39	11.30	129.00	14.83	16.02
6	1.00	2.48	10.50	122.80	14.97	16.20
7	1.02	2.27	11.20	94.30	15.83	16.31
8	1.04	1.98	18.50	56.90	17.49	16.35
9	1.06	1.79	17.70	73.50	19.50	16.38
10	1.08	1.67	15.40	86.00	21.66	16.46
11	1.10	1.67	14.30	99.70	22.48	16.38
12	1.12	1.65	18.40	82.90	22.45	16.30
13	1.14	1.50	14.70	104.90	21.67	16.21
14	1.16	1.58	12.50	124.20	20.93	16.11
15	1.18	1.71	9.60	127.90	19.94	15.97
16	1.20	1.71	8.90	109.20	19.66	15.96
17	1.22	1.67	10.70	102.30	20.19	16.05
18	1.24	1.59	14.20	110.80	21.28	16.24
19	1.26	1.61	17.10	107.30	22.72	16.47
20	1.28	1.77	20.10	96.80	23.79	16.66
21	1.30	1.79	24.30	83.50	24.39	16.82
22	1.32	1.81	25.70	72.10	24.26	16.96
23	1.34	1.84	28.60	84.60	23.75	17.04
24	1.36	2.04	29.40	87.40	22.57	17.07
25	1.38	2.20	27.50	66.60	20.80	17.05
26	1.40	2.35	25.90	99.50	19.13	17.01
27	1.42	2.48	20.10	86.80	17.80	16.96
28	1.44	2.48	21.70	121.20	17.00	16.94
29	1.46	2.53	22.10	154.30	16.59	16.94
30	1.48	2.56	24.20	136.70	16.62	17.04
31	1.50	2.59	25.20	124.20	16.04	17.17
32	1.52	2.88	29.80	101.50	15.40	17.30
33	1.54	3.41	33.30	45.50	15.09	17.40
34	1.56	3.61	34.90	2.10	15.22	17.51
35	1.58	3.30	34.80	-5.40	15.58	17.57
36	1.60	3.09	39.40	7.30	16.85	17.61
37	1.62	2.94	39.20	20.60	18.54	17.64
38	1.64	2.66	42.10	44.20	20.16	17.65
39	1.66	2.60	43.70	47.90	20.48	17.62
40	1.68	2.40	41.60	53.70	21.32	17.62
41	1.70	2.79	36.00	-10.50	23.30	17.59
42	1.72	2.46	40.10	-18.90	25.89	17.53
43	1.74	1.62	43.10	-9.10	28.84	17.48
44	1.76	1.35	41.60	6.00	34.05	17.39
45	1.78	1.21	39.60	60.60	38.14	17.28
46	1.80	1.15	34.20	78.70	38.02	17.15
47	1.82	1.32	30.30	124.50	37.04	17.01
48	1.84	1.35	25.60	132.70	35.77	16.82

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.21	22.50	79.80	33.77	16.61
50	1.88	1.06	18.20	136.40	32.01	16.35
51	1.90	1.08	11.90	172.70	29.48	16.12
52	1.92	1.17	9.40	184.30	25.65	15.92
53	1.94	1.42	9.50	216.80	21.68	15.86
54	1.96	1.68	9.60	200.50	19.98	16.01
55	1.98	2.04	12.60	62.00	19.85	16.29
56	2.00	2.00	17.20	42.10	20.33	16.53
57	2.02	1.92	23.50	62.60	21.33	16.71
58	2.04	1.88	24.50	81.50	23.01	16.86
59	2.06	1.82	24.00	88.10	24.62	16.97
60	2.08	1.86	27.80	28.80	25.76	17.02
61	2.10	1.76	30.20	38.50	26.41	17.06
62	2.12	1.68	29.90	46.10	26.60	17.10
63	2.14	1.80	30.00	53.10	25.24	17.11
64	2.16	1.90	29.20	63.30	21.45	17.16
65	2.18	2.29	25.50	109.00	15.41	17.25
66	2.20	3.38	28.90	91.30	11.80	17.34
67	2.22	5.48	28.10	22.80	9.49	17.47
68	2.24	5.81	29.70	0.50	8.51	17.71
69	2.26	6.11	35.70	2.60	9.18	18.02
70	2.28	6.07	51.40	8.40	11.00	18.21
71	2.30	4.83	78.80	-1.40	13.00	18.35
72	2.32	3.84	71.40	-10.20	15.54	18.45
73	2.34	4.01	72.80	-5.90	17.18	18.51
74	2.36	3.68	75.00	11.60	18.00	18.49
75	2.38	4.82	78.70	15.10	16.69	18.52
76	2.40	3.88	77.10	123.60	13.11	18.57
77	2.42	5.43	71.60	231.30	8.61	18.68
78	2.44	9.09	61.80	426.20	6.13	18.77
79	2.46	14.16	69.50	52.90	4.54	18.97
80	2.48	14.38	80.60	49.10	3.59	19.10
81	2.50	15.04	115.20	11.50	3.67	19.30
82	2.52	14.37	99.40	4.30	4.44	19.42
83	2.54	13.57	130.80	-15.60	5.67	19.52
84	2.56	12.18	130.80	-15.60	7.08	19.55
85	2.58	9.86	148.30	-17.70	8.73	19.60
86	2.60	8.86	152.20	-26.60	10.72	19.57
87	2.62	8.86	152.20	-26.60	13.12	19.54
88	2.64	6.65	145.00	-26.00	15.68	19.46
89	2.66	5.65	145.60	-23.60	18.48	19.34
90	2.68	3.84	137.40	-24.10	22.29	19.17
91	2.70	3.32	118.80	-17.20	24.87	18.99
92	2.72	3.11	104.70	-15.50	26.67	18.79
93	2.74	3.15	82.10	-8.80	26.23	18.59
94	2.76	3.18	75.70	-9.80	25.85	18.39
95	2.78	2.99	64.80	-11.30	25.52	18.16
96	2.80	2.44	53.20	-13.20	25.96	17.92

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	2.15	41.70	-3.10	27.08	17.65
98	2.84	1.87	30.90	4.50	28.90	17.41
99	2.86	1.64	29.80	9.30	30.45	17.24
100	2.88	1.51	31.90	16.30	31.36	17.09
101	2.90	1.47	33.80	24.50	32.21	17.03
102	2.92	1.51	25.10	11.20	34.91	16.92
103	2.94	1.51	25.10	11.20	38.26	16.81
104	2.96	0.78	21.60	13.80	42.94	16.70
105	2.98	0.66	25.30	30.70	51.11	16.65
106	3.00	0.56	28.70	41.60	62.51	16.56
107	3.02	0.51	28.30	53.80	65.78	16.56
108	3.04	0.58	26.50	68.20	67.65	16.54
109	3.06	0.59	24.60	76.50	67.56	16.46
110	3.08	0.54	24.10	77.20	66.53	16.35
111	3.10	0.50	20.70	97.70	62.17	16.23
112	3.12	0.47	17.50	113.50	42.44	16.26
113	3.14	0.71	13.80	132.30	26.41	16.34
114	3.16	2.29	12.30	164.40	17.55	16.45
115	3.18	3.88	14.50	158.30	5.00	16.60
116	3.20	4.73	17.30	36.10	5.00	16.79
117	3.22	5.00	19.20	32.40	5.00	16.97
118	3.24	5.01	21.20	32.30	5.00	17.13
119	3.26	4.97	23.10	29.10	5.00	17.23
120	3.28	4.91	26.60	28.50	10.77	17.29
121	3.30	4.41	28.10	25.30	13.12	17.28
122	3.32	3.68	27.60	17.70	16.67	17.24
123	3.34	1.90	26.80	18.10	22.29	17.16
124	3.36	1.31	26.90	19.20	31.26	17.09
125	3.38	0.94	30.00	19.90	45.33	17.02
126	3.40	0.75	36.70	32.50	57.51	17.05
127	3.42	0.66	40.60	45.30	61.58	17.12
128	3.44	0.56	45.80	54.40	54.88	17.22
129	3.46	1.08	41.90	65.00	46.54	17.22
130	3.48	1.68	36.10	75.80	40.69	17.16
131	3.50	1.82	24.30	26.90	36.22	17.00
132	3.52	1.52	22.00	20.90	35.98	16.78
133	3.54	1.15	20.30	22.80	39.83	16.56
134	3.56	0.68	19.30	26.20	48.64	16.43
135	3.58	0.56	20.40	34.00	59.72	16.32
136	3.60	0.46	21.60	46.90	73.42	16.23
137	3.62	0.46	21.60	46.90	81.72	16.20
138	3.64	0.36	21.60	46.90	87.96	16.18
139	3.66	0.36	21.60	46.90	90.65	16.15
140	3.68	0.34	21.90	138.10	91.57	16.08
141	3.70	0.36	20.00	153.30	87.37	16.00
142	3.72	0.39	16.40	174.50	82.51	15.89
143	3.74	0.41	13.50	179.70	78.32	15.76
144	3.76	0.43	12.30	167.30	76.12	15.62

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.40	11.80	179.10	75.72	15.54
146	3.80	0.35	11.80	190.00	77.16	15.48
147	3.82	0.35	11.80	190.00	80.05	15.45
148	3.84	0.34	11.40	156.00	81.29	15.45
149	3.86	0.33	11.70	168.30	82.07	15.48
150	3.88	0.37	12.20	181.80	82.98	15.50
151	3.90	0.35	13.20	188.20	84.58	15.54
152	3.92	0.35	13.10	148.60	86.26	15.58
153	3.94	0.32	13.90	162.40	89.21	15.60
154	3.96	0.31	14.10	169.00	91.99	15.58
155	3.98	0.31	14.10	169.00	95.12	15.57
156	4.00	0.28	13.00	169.80	95.41	15.56
157	4.02	0.28	13.00	169.80	95.74	15.56
158	4.04	0.32	13.70	174.20	91.59	15.57
159	4.06	0.31	14.10	164.70	83.80	15.62
160	4.08	0.41	13.50	153.30	76.86	15.67
161	4.10	0.52	13.10	155.40	71.79	15.68
162	4.12	0.53	13.10	147.90	66.97	15.68
163	4.14	0.54	12.30	75.70	67.89	15.70
164	4.16	0.54	12.30	75.70	71.98	15.70
165	4.18	0.40	14.70	114.30	80.42	15.72
166	4.20	0.36	14.80	112.50	90.77	15.73
167	4.22	0.24	17.10	128.50	100.00	15.70
168	4.24	0.24	16.30	137.50	100.00	15.64
169	4.26	0.24	14.50	154.30	100.00	15.58
170	4.28	0.25	13.40	158.70	100.00	15.49
171	4.30	0.26	12.30	160.60	100.00	15.38
172	4.32	0.26	11.00	157.90	100.00	15.30
173	4.34	0.28	9.60	163.20	89.41	15.24
174	4.36	0.34	9.20	170.30	81.31	15.18
175	4.38	0.45	8.40	151.80	73.89	15.13
176	4.40	0.44	8.10	153.90	64.03	15.14
177	4.42	0.47	7.70	178.80	56.14	15.17
178	4.44	0.68	7.40	179.80	52.04	15.28
179	4.46	0.79	8.10	179.60	52.77	15.47
180	4.48	0.84	10.70	51.00	54.71	15.64
181	4.50	0.57	15.00	77.60	58.62	15.80
182	4.52	0.49	15.20	109.20	65.05	15.92
183	4.54	0.57	16.60	121.00	71.58	16.02
184	4.56	0.53	17.80	115.70	70.50	16.08
185	4.58	0.58	19.70	92.30	71.83	16.12
186	4.60	0.67	18.50	95.00	76.89	16.05
187	4.62	0.47	18.60	97.90	81.39	15.93
188	4.64	0.30	14.30	113.70	87.25	15.73
189	4.66	0.28	11.50	131.90	98.45	15.49
190	4.68	0.27	9.50	156.20	100.00	15.26
191	4.70	0.28	9.00	162.20	N/A	15.70
192	4.72	0.33	8.90	168.90	N/A	15.70

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	-7.43	8.60	169.90	N/A	15.70
194	4.76	0.37	7.90	156.50	N/A	15.70
195	4.78	0.40	8.30	145.70	N/A	15.70
196	4.80	0.43	8.50	139.00	76.86	15.22
197	4.82	0.44	9.90	118.30	76.42	15.31
198	4.84	0.42	11.20	116.10	76.75	15.37
199	4.86	0.45	11.20	120.20	77.54	15.43
200	4.88	0.43	10.90	117.80	77.23	15.45
201	4.90	0.44	11.10	124.80	74.72	15.48
202	4.92	0.47	10.70	136.00	73.58	15.49
203	4.94	0.53	11.70	140.10	69.75	15.50
204	4.96	0.50	11.30	162.80	63.33	15.58
205	4.98	0.60	10.10	130.50	56.08	15.70
206	5.00	0.83	12.40	101.70	51.03	15.76
207	5.02	1.06	13.10	43.90	47.13	15.86
208	5.04	1.04	12.50	30.80	43.82	16.06
209	5.06	1.04	14.30	38.80	41.25	16.16
210	5.08	1.29	18.30	42.80	39.73	16.24
211	5.10	1.38	16.60	12.90	37.90	16.36
212	5.12	1.45	16.90	17.90	36.31	16.45
213	5.14	1.59	18.50	21.00	35.63	16.46
214	5.16	1.55	19.10	18.00	36.08	16.48
215	5.18	1.47	18.40	15.50	37.89	16.53
216	5.20	1.34	18.70	15.70	41.19	16.53
217	5.22	1.16	21.70	23.80	46.87	16.52
218	5.24	0.97	21.30	25.60	52.12	16.53
219	5.26	0.66	23.20	42.90	54.78	16.55
220	5.28	0.83	23.70	76.80	55.18	16.53
221	5.30	1.08	22.70	99.90	54.52	16.52
222	5.32	1.09	20.00	40.70	49.50	16.55
223	5.34	1.03	20.30	44.40	46.68	16.55
224	5.36	1.27	21.40	17.70	46.50	16.53
225	5.38	1.22	21.10	19.80	47.62	16.51
226	5.40	1.09	20.80	21.20	49.44	16.46
227	5.42	0.91	19.20	20.90	54.45	16.40
228	5.44	0.74	18.30	41.20	60.97	16.31
229	5.46	0.63	19.90	62.30	67.75	16.23
230	5.48	0.55	18.90	79.70	73.49	16.19
231	5.50	0.55	18.90	79.70	79.75	16.10
232	5.52	0.55	18.90	79.70	84.27	16.00
233	5.54	0.38	14.80	133.70	68.41	16.05
234	5.56	0.38	14.80	133.70	57.79	16.08
235	5.58	1.30	15.20	113.40	49.13	16.08
236	5.60	1.30	15.40	53.70	43.09	16.14
237	5.62	1.38	14.00	35.90	39.82	16.27
238	5.64	1.26	14.60	33.10	42.77	16.36
239	5.66	1.13	20.40	39.70	47.48	16.45
240	5.68	0.98	23.50	55.30	54.64	16.54

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.76	25.40	69.90	61.80	16.63
242	5.72	0.67	26.90	84.50	64.02	16.70
243	5.74	0.71	27.80	121.40	58.89	16.80
244	5.76	1.03	29.40	137.10	50.52	16.91
245	5.78	1.56	30.00	90.80	42.50	16.98
246	5.80	1.87	28.30	46.50	36.20	17.01
247	5.82	2.11	25.60	29.50	32.02	16.99
248	5.84	2.19	23.40	25.20	29.94	16.91
249	5.86	2.18	21.20	20.50	29.02	16.83
250	5.88	2.04	20.00	22.80	28.92	16.77
251	5.90	1.98	20.10	22.80	29.67	16.71
252	5.92	1.98	20.30	23.90	31.10	16.64
253	5.94	1.77	19.30	19.50	33.25	16.62
254	5.96	1.55	17.40	17.30	35.81	16.63
255	5.98	1.40	21.00	28.30	36.96	16.65
256	6.00	1.35	23.00	42.00	34.83	16.78
257	6.02	1.76	23.10	53.60	32.50	16.92
258	6.04	2.58	27.70	60.30	29.87	17.03
259	6.06	2.58	27.70	60.30	27.42	17.11
260	6.08	2.58	27.70	60.30	23.78	17.21
261	6.10	2.58	27.70	60.30	21.78	17.24
262	6.12	3.91	27.70	60.30	20.05	17.28
263	6.14	3.91	27.70	60.30	18.53	17.30
264	6.16	3.91	27.70	60.30	14.83	17.24
265	6.18	3.91	27.70	60.30	5.00	17.13
266	6.20	5.79	13.30	20.40	5.00	17.02
267	6.22	6.48	12.50	16.30	5.00	16.94
268	6.24	6.87	13.90	18.60	5.00	16.99
269	6.26	7.09	17.60	14.10	5.00	17.17
270	6.28	6.96	29.20	19.10	5.00	17.42
271	6.30	7.38	25.70	17.50	5.00	17.57
272	6.32	7.40	35.90	20.80	5.00	17.73
273	6.34	7.60	30.60	18.30	5.00	17.75
274	6.36	7.62	36.80	19.70	5.00	17.78
275	6.38	7.86	30.80	17.40	5.00	17.70
276	6.40	7.80	30.10	18.30	5.00	17.65
277	6.42	8.05	23.60	17.00	5.00	17.55
278	6.44	7.97	23.20	16.80	5.00	17.48
279	6.46	7.98	24.40	21.60	5.00	17.42
280	6.48	8.07	22.90	16.80	5.00	17.46
281	6.50	8.13	23.30	18.40	5.00	17.49
282	6.52	8.47	27.20	21.80	5.00	17.51
283	6.54	8.89	25.50	21.20	5.00	17.50
284	6.56	9.18	25.20	22.00	4.67	17.54
285	6.58	10.13	20.90	17.00	4.35	17.56
286	6.60	10.34	25.00	17.40	4.21	17.60
287	6.62	10.21	28.00	26.20	4.22	17.66
288	6.64	10.13	29.20	21.30	4.55	17.76

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	9.88	31.50	23.70	4.88	17.82
290	6.68	9.78	33.30	28.30	5.00	17.88
291	6.70	9.59	33.50	20.80	5.00	17.91
292	6.72	9.31	37.60	22.90	5.00	17.89
293	6.74	9.12	33.60	21.80	5.00	17.87
294	6.76	9.15	30.40	20.70	5.00	17.84
295	6.78	9.10	30.90	21.60	5.00	17.78
296	6.80	9.08	30.30	23.10	5.00	17.73
297	6.82	9.02	28.80	26.10	5.00	17.68
298	6.84	9.00	27.20	27.00	5.00	17.65
299	6.86	8.93	24.80	18.00	5.00	17.66
300	6.88	8.44	27.50	18.40	5.00	17.69
301	6.90	8.19	32.90	25.10	5.00	17.72
302	6.92	7.94	33.80	26.00	5.00	17.74
303	6.94	7.68	31.90	21.10	5.00	17.73
304	6.96	7.56	29.90	22.60	5.00	17.68
305	6.98	7.48	27.70	22.80	5.00	17.60
306	7.00	7.43	27.10	22.10	5.00	17.50
307	7.02	7.44	24.00	23.40	5.00	17.46
308	7.04	7.37	20.90	23.20	5.00	17.37
309	7.06	7.25	25.50	27.20	5.00	17.28
310	7.08	7.18	18.40	23.90	5.00	17.22
311	7.10	7.36	18.70	23.60	5.00	17.20
312	7.12	7.50	18.10	24.90	5.00	17.10
313	7.14	7.63	19.30	27.60	5.00	17.14
314	7.16	7.48	17.10	26.50	5.00	17.17
315	7.18	7.28	21.30	27.90	5.00	17.19
316	7.20	7.15	21.20	25.80	5.00	17.17
317	7.22	7.23	19.90	25.20	5.00	17.19
318	7.24	7.38	18.10	24.30	5.00	17.15
319	7.26	7.53	18.70	29.40	5.00	17.12
320	7.28	7.41	18.00	23.40	5.00	17.06
321	7.30	7.03	18.40	27.20	5.00	17.03
322	7.32	6.87	16.00	29.50	5.00	16.96
323	7.34	6.76	16.10	26.00	5.00	16.90
324	7.36	6.66	14.20	27.20	5.00	16.84
325	7.38	6.71	14.30	27.10	5.00	16.81
326	7.40	6.90	14.80	28.40	5.00	16.77
327	7.42	7.14	13.80	29.60	5.00	16.73
328	7.44	7.06	13.00	30.20	5.00	16.70
329	7.46	6.85	11.90	26.70	5.00	16.67
330	7.48	6.77	12.50	29.20	5.00	16.69
331	7.50	6.63	13.50	34.60	5.00	16.69
332	7.52	6.45	15.30	31.90	5.00	16.72
333	7.54	6.48	13.50	30.10	5.00	16.75
334	7.56	6.45	13.70	29.90	5.00	16.75
335	7.58	6.19	14.50	29.30	5.00	16.72
336	7.60	6.20	13.80	29.20	5.00	16.74

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	6.11	14.10	28.50	5.00	16.72
338	7.64	5.88	14.80	27.00	5.00	16.71
339	7.66	5.71	13.20	24.90	5.00	16.69
340	7.68	5.69	14.30	30.30	5.00	16.64
341	7.70	5.79	12.70	30.90	5.00	16.57
342	7.72	5.89	11.60	31.00	5.00	16.53
343	7.74	5.99	10.70	30.30	5.00	16.46
344	7.76	6.09	10.80	29.70	5.00	16.42
345	7.78	6.09	10.80	29.70	5.00	16.40
346	7.80	6.00	10.50	31.50	5.00	16.41
347	7.82	5.92	10.60	31.80	5.00	16.45
348	7.84	5.88	11.40	31.50	5.00	16.46
349	7.86	5.83	12.50	31.70	5.00	16.49
350	7.88	5.84	11.80	33.40	5.00	16.49
351	7.90	5.88	11.70	35.40	5.00	16.46
352	7.92	5.72	10.90	32.50	5.00	16.41
353	7.94	5.65	10.10	31.20	5.00	16.35
354	7.96	5.63	10.20	32.40	5.00	16.28
355	7.98	5.54	9.00	32.00	5.00	16.26
356	8.00	5.34	9.20	32.00	5.00	16.28
357	8.02	4.66	10.50	30.90	5.00	16.30
358	8.04	4.42	12.00	32.50	5.00	16.31
359	8.06	4.29	12.00	32.20	5.00	16.31
360	8.08	4.32	10.20	32.20	5.00	16.30
361	8.10	4.43	10.00	32.40	5.00	16.23
362	8.12	4.51	9.90	30.50	5.00	16.17
363	8.14	4.43	9.20	33.80	5.00	16.11
364	8.16	4.27	9.10	34.60	5.00	16.05
365	8.18	4.14	8.10	34.20	5.00	16.01
366	8.20	4.05	7.70	33.40	5.00	16.00
367	8.22	3.98	8.90	33.00	5.00	16.03
368	8.24	3.92	9.30	33.00	5.00	16.08
369	8.26	3.96	10.30	28.60	5.00	16.16
370	8.28	3.89	10.20	36.70	5.00	16.26
371	8.30	3.86	11.30	35.20	5.00	16.34
372	8.32	3.81	13.40	36.00	5.00	16.40
373	8.34	3.70	13.40	33.10	5.00	16.37
374	8.36	3.59	14.10	37.30	5.00	16.30
375	8.38	3.62	8.70	35.90	5.00	16.16
376	8.40	3.57	7.90	38.20	5.00	16.00
377	8.42	3.60	7.30	34.10	5.00	15.81
378	8.44	3.47	6.90	36.80	5.00	15.76
379	8.46	3.12	7.60	35.50	5.00	15.74
380	8.48	2.92	7.40	35.30	5.00	15.69
381	8.50	2.70	8.10	38.20	5.00	15.64
382	8.52	2.50	6.40	35.70	5.00	15.58
383	8.54	2.30	6.40	38.00	5.00	15.53
384	8.56	2.10	6.60	38.40	5.00	15.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	1.74	7.20	39.90	26.40	15.43
386	8.60	1.64	6.50	43.70	29.87	15.47
387	8.62	1.48	7.40	39.70	34.63	15.57
388	8.64	1.29	8.90	44.70	39.44	15.65
389	8.66	1.09	11.50	55.80	45.97	15.78
390	8.68	0.93	12.00	65.20	54.37	15.93
391	8.70	0.83	14.70	77.40	64.03	16.11
392	8.72	0.69	18.00	85.30	74.91	16.25
393	8.74	0.64	23.50	87.50	87.60	16.34
394	8.76	0.50	25.90	106.80	100.00	16.38
395	8.78	0.39	25.80	138.10	100.00	16.42
396	8.80	0.39	24.00	198.90	100.00	16.41
397	8.82	0.56	23.10	222.30	96.59	16.36
398	8.84	0.69	21.70	198.60	89.40	16.29
399	8.86	0.65	18.60	100.00	83.89	16.23
400	8.88	0.61	16.80	99.60	83.28	16.16
401	8.90	0.59	16.90	102.30	86.57	16.09
402	8.92	0.56	17.70	100.60	89.42	16.03
403	8.94	0.52	17.50	99.00	86.26	16.04
404	8.96	0.50	16.00	130.10	70.01	16.17
405	8.98	0.73	16.10	157.80	47.38	16.35
406	9.00	1.52	18.50	120.00	33.80	16.45
407	9.02	3.00	17.30	40.40	24.98	16.51
408	9.04	3.46	14.70	38.70	5.00	16.52
409	9.06	3.83	11.80	45.00	5.00	16.48
410	9.08	3.92	11.30	43.30	5.00	16.38
411	9.10	4.12	12.20	45.90	5.00	16.30
412	9.12	4.09	10.50	45.30	5.00	16.26
413	9.14	4.06	10.20	45.80	5.00	16.20
414	9.16	4.11	9.70	47.00	5.00	16.12
415	9.18	4.16	8.10	46.00	5.00	16.09
416	9.20	4.10	9.00	47.90	5.00	16.07
417	9.22	3.97	9.20	43.40	5.00	16.05
418	9.24	3.81	9.90	47.50	5.00	16.08
419	9.26	3.65	9.00	46.60	5.00	16.07
420	9.28	3.55	9.80	47.30	5.00	16.08
421	9.30	3.59	9.20	47.60	5.00	16.04
422	9.32	3.66	9.60	46.50	5.00	16.03
423	9.34	3.28	8.90	45.60	5.00	16.00
424	9.36	2.59	9.60	48.00	5.00	15.99
425	9.38	2.59	9.60	48.00	5.00	15.92
426	9.40	2.59	9.60	48.00	26.59	15.87
427	9.42	1.29	9.60	48.00	30.17	15.82
428	9.44	1.29	9.60	48.00	34.73	15.76
429	9.46	1.29	9.60	48.00	40.81	15.69
430	9.48	1.29	9.60	48.00	40.84	15.69
431	9.50	1.29	9.60	48.00	40.87	15.69
432	9.52	1.29	9.60	48.00	40.90	15.69

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	1.29	9.60	48.00	45.30	15.65
434	9.56	1.29	9.60	48.00	50.78	15.59
435	9.58	0.57	9.60	48.00	57.73	15.54
436	9.60	0.57	9.60	48.00	60.04	16.16
437	9.62	0.57	9.60	48.00	60.07	16.57
438	9.64	1.76	41.70	38.80	53.36	16.91
439	9.66	1.80	39.70	91.40	47.72	17.16
440	9.68	1.90	37.20	57.10	44.60	17.35
441	9.70	1.97	32.40	59.50	44.35	17.24
442	9.72	1.66	30.90	37.60	44.86	17.15
443	9.74	1.52	25.60	46.10	45.63	17.10
444	9.76	1.49	29.30	68.50	43.84	17.14
445	9.78	1.63	32.00	126.00	35.45	17.22
446	9.80	2.44	35.80	90.50	29.47	17.27
447	9.82	4.01	28.60	56.80	24.88	17.24
448	9.84	3.89	22.30	21.90	21.22	17.12
449	9.86	3.64	18.60	23.70	18.75	16.89
450	9.88	3.43	14.50	29.60	5.00	16.65
451	9.90	3.26	12.40	34.80	5.00	16.45
452	9.92	3.23	11.50	42.20	5.00	16.33
453	9.94	3.35	10.40	49.70	5.00	16.27
454	9.96	3.68	12.20	49.70	5.00	16.27
455	9.98	4.18	10.30	47.50	5.00	16.30
456	10.00	4.47	11.30	51.30	5.00	16.35
457	10.02	4.56	11.70	54.70	5.00	16.38
458	10.04	4.55	11.70	50.70	5.00	16.43
459	10.06	4.54	12.80	54.70	5.00	16.44
460	10.08	4.54	12.70	52.30	5.00	16.41
461	10.10	4.49	11.90	53.30	5.00	16.37
462	10.12	4.34	10.40	55.60	5.00	16.30
463	10.14	4.17	9.60	54.90	5.00	16.22
464	10.16	4.16	9.70	55.30	5.00	16.19
465	10.18	4.44	9.50	56.10	5.00	16.22
466	10.20	4.63	10.30	55.50	5.00	16.26
467	10.22	4.67	11.50	56.90	5.00	16.32
468	10.24	4.76	11.00	57.60	5.00	16.36
469	10.26	5.18	11.40	57.40	5.00	16.39
470	10.28	5.13	11.10	58.10	5.00	16.41
471	10.30	4.96	11.60	55.90	5.00	16.39
472	10.32	4.91	12.00	53.50	5.00	16.36
473	10.34	5.07	9.90	56.30	5.00	16.34
474	10.36	5.15	10.10	57.80	5.00	16.31
475	10.38	5.03	10.30	57.70	5.00	16.24
476	10.40	4.87	10.00	57.80	5.00	16.22
477	10.42	4.70	9.30	57.10	5.00	16.18
478	10.44	4.45	9.20	57.00	5.00	16.11
479	10.46	4.12	9.40	58.70	5.00	16.12
480	10.48	3.57	8.30	56.40	5.00	16.19

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	3.07	11.80	58.40	5.00	16.24
482	10.52	3.16	13.90	56.80	5.00	16.30
483	10.54	2.84	12.80	56.10	5.00	16.35
484	10.56	2.73	14.20	61.60	5.00	16.40
485	10.58	3.03	11.90	59.70	5.00	16.37
486	10.60	3.12	14.90	56.90	5.00	16.32
487	10.62	2.91	12.10	60.20	5.00	16.25
488	10.64	2.62	10.30	59.60	5.00	16.20
489	10.66	2.41	10.90	59.80	5.00	16.08
490	10.68	2.21	10.60	64.30	25.23	16.03
491	10.70	2.25	10.30	65.20	26.02	16.03
492	10.72	2.29	10.60	65.50	26.23	16.05
493	10.74	2.31	11.10	60.10	25.85	16.09
494	10.76	2.35	11.50	61.70	25.23	16.16
495	10.78	2.48	12.10	61.90	24.54	16.23
496	10.80	2.73	13.30	63.20	23.94	16.24
497	10.82	2.79	13.10	58.70	5.00	16.22
498	10.84	2.66	11.60	56.00	5.00	16.14
499	10.86	2.56	9.80	61.90	5.00	16.02
500	10.88	2.42	8.20	63.90	5.00	15.89
501	10.90	2.07	8.50	64.60	26.38	15.83
502	10.92	1.99	8.60	64.50	28.58	15.84
503	10.94	1.86	10.50	71.90	31.45	15.88
504	10.96	1.77	11.30	76.40	34.07	15.96
505	10.98	1.61	11.30	81.30	38.07	16.09
506	11.00	1.50	13.00	87.60	43.44	16.26
507	11.02	1.31	17.00	104.80	50.57	16.45
508	11.04	1.12	22.60	119.90	59.69	16.72
509	11.06	0.98	28.40	147.30	69.31	16.91
510	11.08	0.87	40.00	207.60	78.39	17.02
511	11.10	0.82	40.60	247.00	85.72	17.09
512	11.12	0.74	39.00	266.10	91.07	17.12
513	11.14	0.71	38.40	271.80	92.78	17.03
514	11.16	0.69	36.50	298.20	92.95	16.91
515	11.18	0.68	28.70	322.90	90.91	16.76
516	11.20	0.69	24.00	320.60	87.98	16.58
517	11.22	0.69	18.90	321.20	84.05	16.39
518	11.24	0.69	17.90	314.60	80.36	16.26
519	11.26	0.71	16.90	328.30	76.50	16.18
520	11.28	0.76	16.40	319.40	73.07	16.19
521	11.30	0.83	16.40	300.60	70.53	16.24
522	11.32	0.92	18.40	255.50	69.28	16.34
523	11.34	0.93	20.20	189.50	68.73	16.48
524	11.36	0.94	23.50	179.90	69.65	16.67
525	11.38	0.98	26.90	196.60	71.47	16.83
526	11.40	1.00	33.80	227.90	73.36	16.99
527	11.42	1.00	37.00	198.30	73.37	17.15
528	11.44	0.99	40.50	199.40	73.51	17.27

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
529	11.46	1.15	44.60	181.40	72.96	17.32
530	11.48	1.14	44.10	178.70	71.61	17.34
531	11.50	1.14	41.20	157.50	69.97	17.35
532	11.52	1.17	39.50	149.40	69.46	17.31
533	11.54	1.17	39.70	162.60	68.92	17.28
534	11.56	1.16	38.40	119.10	68.49	17.25
535	11.58	1.16	37.80	80.60	68.24	17.25
536	11.60	1.17	37.30	75.30	68.10	17.25
537	11.62	1.21	38.70	56.70	67.60	17.30
538	11.64	1.21	40.00	44.80	66.90	17.35
539	11.66	1.29	44.10	68.10	66.19	17.44
540	11.68	1.34	46.20	73.40	66.17	17.52
541	11.70	1.39	49.80	76.70	65.75	17.58
542	11.72	1.36	52.90	97.30	65.45	17.63
543	11.74	1.38	51.90	115.10	64.85	17.63
544	11.76	1.41	51.80	139.00	64.13	17.62
545	11.78	1.42	46.70	151.40	62.27	17.58
546	11.80	1.44	45.00	162.30	60.09	17.52
547	11.82	1.52	43.00	176.30	58.10	17.46
548	11.84	1.56	39.10	191.50	57.00	17.41
549	11.86	1.55	37.50	183.40	56.78	17.37
550	11.88	1.49	38.40	207.90	57.60	17.33
551	11.90	1.37	37.90	216.80	59.78	17.29
552	11.92	1.30	37.20	225.30	62.41	17.25
553	11.94	1.19	36.20	219.30	64.77	17.21
554	11.96	1.15	35.20	211.00	66.50	17.15
555	11.98	1.14	35.10	229.20	68.06	17.07
556	12.00	1.09	30.50	211.00	68.20	16.99
557	12.02	1.04	29.10	249.20	67.14	16.91
558	12.04	1.05	26.10	277.70	64.20	16.82
559	12.06	1.11	24.20	314.00	59.61	16.77
560	12.08	1.29	23.70	353.40	54.43	16.72
561	12.10	1.48	21.20	313.60	50.39	16.73
562	12.12	1.61	20.50	289.80	47.72	16.79
563	12.14	1.68	24.10	255.60	48.29	16.84
564	12.16	1.69	27.20	245.90	48.35	16.93
565	12.18	1.33	29.10	230.80	50.76	16.99
566	12.20	1.67	29.50	230.80	49.69	17.05

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	13.30	0.00	13.30	1.00	0.065	1.38	0.047	1.00	1.00	2.000	Yes
2	0.92	13.60	0.00	13.60	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
3	0.94	13.91	0.00	13.91	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
4	0.96	14.23	0.00	14.23	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
5	0.98	14.55	0.00	14.55	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
6	1.00	14.87	0.00	14.87	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	15.20	0.00	15.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	15.52	0.00	15.52	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	15.85	0.00	15.85	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	16.18	0.00	16.18	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	16.51	0.00	16.51	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	16.83	0.00	16.83	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	17.16	0.00	17.16	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	17.48	0.00	17.48	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	17.80	0.00	17.80	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	18.12	0.00	18.12	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	18.44	0.00	18.44	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	18.77	0.00	18.77	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	19.09	0.00	19.09	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	19.43	0.00	19.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	19.76	0.00	19.76	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	20.10	0.00	20.10	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	20.44	0.00	20.44	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	20.79	0.00	20.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	21.13	0.00	21.13	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	21.47	0.00	21.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	21.81	0.00	21.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	22.14	0.00	22.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	22.48	0.00	22.48	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	22.82	0.00	22.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	23.17	0.00	23.17	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	23.51	0.00	23.51	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	23.86	0.00	23.86	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	24.21	0.00	24.21	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	24.56	0.00	24.56	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	24.92	0.00	24.92	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	25.27	0.00	25.27	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	25.62	0.00	25.62	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	25.97	0.00	25.97	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
40	1.68	26.33	0.00	26.33	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
41	1.70	26.68	0.00	26.68	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
42	1.72	27.03	0.00	27.03	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
43	1.74	27.38	0.00	27.38	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
44	1.76	27.73	0.00	27.73	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
45	1.78	28.07	0.00	28.07	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
46	1.80	28.41	0.00	28.41	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	28.76	0.00	28.76	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
48	1.84	29.09	0.00	29.09	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	29.42	0.00	29.42	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
50	1.88	29.75	0.00	29.75	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
51	1.90	30.07	0.00	30.07	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
52	1.92	30.39	0.00	30.39	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
53	1.94	30.71	0.00	30.71	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
54	1.96	31.03	0.00	31.03	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
55	1.98	31.35	0.00	31.35	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	31.69	0.00	31.69	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	32.02	0.00	32.02	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	32.36	0.00	32.36	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	32.70	0.00	32.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	33.04	0.00	33.04	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	33.38	0.00	33.38	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	33.72	0.00	33.72	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	34.06	0.00	34.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	34.41	0.00	34.41	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	34.75	0.00	34.75	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	35.10	0.00	35.10	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	35.45	0.00	35.45	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	35.80	0.00	35.80	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	36.16	0.00	36.16	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	36.53	0.00	36.53	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
71	2.30	36.89	0.00	36.89	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
72	2.32	37.26	0.00	37.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
73	2.34	37.63	0.00	37.63	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
74	2.36	38.00	0.00	38.00	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
75	2.38	38.37	0.00	38.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
76	2.40	38.74	0.00	38.74	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
77	2.42	39.12	0.00	39.12	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
78	2.44	39.49	0.00	39.49	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
79	2.46	39.87	0.00	39.87	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
80	2.48	40.25	0.00	40.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	40.64	0.00	40.64	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	41.03	0.00	41.03	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	41.42	0.00	41.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
84	2.56	41.81	0.00	41.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
85	2.58	42.20	0.00	42.20	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
86	2.60	42.59	0.00	42.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
87	2.62	42.98	0.00	42.98	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
88	2.64	43.37	0.00	43.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
89	2.66	43.76	0.00	43.76	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
90	2.68	44.14	0.00	44.14	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	44.52	0.00	44.52	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	44.90	0.00	44.90	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	45.27	0.00	45.27	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	45.64	0.00	45.64	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	46.00	0.00	46.00	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	46.36	0.00	46.36	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	46.71	0.00	46.71	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
98	2.84	47.06	0.00	47.06	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
99	2.86	47.41	0.00	47.41	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
100	2.88	47.75	0.00	47.75	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
101	2.90	48.09	0.00	48.09	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	48.43	0.00	48.43	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	48.76	0.00	48.76	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	49.10	0.00	49.10	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	49.43	0.00	49.43	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	49.76	0.00	49.76	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
107	3.02	50.09	0.00	50.09	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
108	3.04	50.42	0.00	50.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
109	3.06	50.75	0.00	50.75	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
110	3.08	51.08	0.00	51.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
111	3.10	51.40	0.00	51.40	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
112	3.12	51.73	0.00	51.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
113	3.14	52.05	0.00	52.05	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
114	3.16	52.38	0.00	52.38	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
115	3.18	52.72	0.00	52.72	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
116	3.20	53.05	0.00	53.05	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
117	3.22	53.39	0.00	53.39	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
118	3.24	53.73	0.00	53.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
119	3.26	54.08	0.00	54.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
120	3.28	54.42	0.00	54.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
121	3.30	54.77	0.00	54.77	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
122	3.32	55.11	0.00	55.11	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
123	3.34	55.46	0.00	55.46	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
124	3.36	55.80	0.00	55.80	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
125	3.38	56.14	0.00	56.14	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
126	3.40	56.48	0.00	56.48	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
127	3.42	56.82	0.00	56.82	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
128	3.44	57.17	0.00	57.17	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
129	3.46	57.51	0.00	57.51	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
130	3.48	57.86	0.00	57.86	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
131	3.50	58.20	0.00	58.20	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
132	3.52	58.53	0.00	58.53	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
133	3.54	58.86	0.00	58.86	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
134	3.56	59.19	0.00	59.19	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
135	3.58	59.52	0.00	59.52	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
136	3.60	59.84	0.00	59.84	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
137	3.62	60.17	0.00	60.17	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
138	3.64	60.49	0.00	60.49	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
139	3.66	60.81	0.00	60.81	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
140	3.68	61.13	0.00	61.13	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
141	3.70	61.45	0.00	61.45	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
142	3.72	61.77	0.00	61.77	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
143	3.74	62.09	0.00	62.09	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
144	3.76	62.40	0.00	62.40	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	62.71	0.00	62.71	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
146	3.80	63.02	0.00	63.02	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
147	3.82	63.33	0.00	63.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
148	3.84	63.64	0.00	63.64	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
149	3.86	63.95	0.00	63.95	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
150	3.88	64.26	0.00	64.26	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
151	3.90	64.57	0.00	64.57	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
152	3.92	64.88	0.00	64.88	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
153	3.94	65.19	0.00	65.19	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
154	3.96	65.50	0.00	65.50	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
155	3.98	65.82	0.00	65.82	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
156	4.00	66.13	0.00	66.13	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
157	4.02	66.44	0.00	66.44	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
158	4.04	66.75	0.00	66.75	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
159	4.06	67.06	0.00	67.06	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
160	4.08	67.37	0.00	67.37	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
161	4.10	67.69	0.00	67.69	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
162	4.12	68.00	0.00	68.00	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
163	4.14	68.32	0.00	68.32	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
164	4.16	68.63	0.00	68.63	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
165	4.18	68.94	0.00	68.94	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
166	4.20	69.26	0.00	69.26	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
167	4.22	69.57	0.00	69.57	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
168	4.24	69.89	0.00	69.89	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
169	4.26	70.20	0.00	70.20	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
170	4.28	70.51	0.00	70.51	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
171	4.30	70.82	0.00	70.82	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
172	4.32	71.12	0.00	71.12	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
173	4.34	71.43	0.00	71.43	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
174	4.36	71.73	0.00	71.73	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
175	4.38	72.03	0.00	72.03	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
176	4.40	72.33	0.00	72.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
177	4.42	72.64	0.00	72.64	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
178	4.44	72.94	0.00	72.94	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
179	4.46	73.25	0.00	73.25	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
180	4.48	73.57	0.00	73.57	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
181	4.50	73.88	0.00	73.88	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
182	4.52	74.20	0.00	74.20	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
183	4.54	74.52	0.00	74.52	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
184	4.56	74.84	0.00	74.84	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
185	4.58	75.16	0.00	75.16	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
186	4.60	75.49	0.00	75.49	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
187	4.62	75.80	0.00	75.80	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
188	4.64	76.12	0.00	76.12	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
189	4.66	76.43	0.00	76.43	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
190	4.68	76.73	0.00	76.73	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
191	4.70	77.05	0.00	77.05	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
192	4.72	77.36	0.00	77.36	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	77.68	0.00	77.68	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
194	4.76	77.99	0.00	77.99	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
195	4.78	78.30	0.00	78.30	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
196	4.80	78.61	0.00	78.61	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
197	4.82	78.91	0.00	78.91	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
198	4.84	79.22	0.00	79.22	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
199	4.86	79.53	0.00	79.53	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
200	4.88	79.84	0.00	79.84	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
201	4.90	80.15	0.20	79.95	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
202	4.92	80.46	0.39	80.07	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
203	4.94	80.77	0.59	80.18	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
204	4.96	81.08	0.78	80.30	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
205	4.98	81.39	0.98	80.41	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
206	5.00	81.71	1.18	80.53	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
207	5.02	82.03	1.37	80.65	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
208	5.04	82.35	1.57	80.78	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
209	5.06	82.67	1.77	80.91	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
210	5.08	83.00	1.96	81.03	0.96	0.064	1.38	0.047	1.00	1.00	0.047	No
211	5.10	83.32	2.16	81.17	0.96	0.064	1.38	0.047	1.00	1.00	0.047	No
212	5.12	83.65	2.35	81.30	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
213	5.14	83.98	2.55	81.43	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
214	5.16	84.31	2.75	81.56	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
215	5.18	84.64	2.94	81.70	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
216	5.20	84.97	3.14	81.83	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
217	5.22	85.30	3.34	81.97	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
218	5.24	85.63	3.53	82.10	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
219	5.26	85.96	3.73	82.24	0.96	0.065	1.38	0.048	1.00	1.00	0.048	No
220	5.28	86.29	3.92	82.37	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
221	5.30	86.63	4.12	82.51	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
222	5.32	86.96	4.32	82.64	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
223	5.34	87.29	4.51	82.77	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
224	5.36	87.62	4.71	82.91	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
225	5.38	87.95	4.91	83.04	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
226	5.40	88.28	5.10	83.18	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
227	5.42	88.61	5.30	83.31	0.96	0.067	1.38	0.048	1.00	1.00	0.048	No
228	5.44	88.93	5.49	83.44	0.96	0.067	1.38	0.048	1.00	1.00	0.048	No
229	5.46	89.26	5.69	83.57	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
230	5.48	89.58	5.89	83.69	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
231	5.50	89.90	6.08	83.82	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
232	5.52	90.22	6.28	83.94	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
233	5.54	90.54	6.47	84.07	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
234	5.56	90.86	6.67	84.19	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
235	5.58	91.19	6.87	84.32	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
236	5.60	91.51	7.06	84.45	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
237	5.62	91.83	7.26	84.57	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
238	5.64	92.16	7.46	84.71	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
239	5.66	92.49	7.65	84.84	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
240	5.68	92.82	7.85	84.97	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	5.70	93.15	8.04	85.11	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No
242	5.72	93.49	8.24	85.25	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No
243	5.74	93.82	8.44	85.39	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
244	5.76	94.16	8.63	85.53	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
245	5.78	94.50	8.83	85.67	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
246	5.80	94.84	9.03	85.82	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
247	5.82	95.18	9.22	85.96	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
248	5.84	95.52	9.42	86.10	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
249	5.86	95.86	9.61	86.24	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
250	5.88	96.19	9.81	86.38	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
251	5.90	96.53	10.01	86.52	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
252	5.92	96.86	10.20	86.66	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
253	5.94	97.19	10.40	86.79	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
254	5.96	97.52	10.59	86.93	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
255	5.98	97.86	10.79	87.07	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
256	6.00	98.19	10.99	87.20	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
257	6.02	98.53	11.18	87.35	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
258	6.04	98.87	11.38	87.49	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
259	6.06	99.21	11.58	87.64	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
260	6.08	99.56	11.77	87.79	0.96	0.071	1.38	0.051	1.00	1.00	2.000	Yes
261	6.10	99.90	11.97	87.93	0.96	0.071	1.38	0.051	1.00	1.00	2.000	Yes
262	6.12	100.25	12.16	88.08	0.96	0.071	1.38	0.051	1.00	1.00	2.000	Yes
263	6.14	100.59	12.36	88.23	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
264	6.16	100.94	12.56	88.38	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
265	6.18	101.28	12.75	88.53	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
266	6.20	101.62	12.95	88.67	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
267	6.22	101.96	13.15	88.82	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
268	6.24	102.30	13.34	88.96	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
269	6.26	102.64	13.54	89.11	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
270	6.28	102.99	13.73	89.26	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
271	6.30	103.34	13.93	89.41	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
272	6.32	103.70	14.13	89.57	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
273	6.34	104.05	14.32	89.73	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
274	6.36	104.41	14.52	89.89	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
275	6.38	104.76	14.72	90.05	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
276	6.40	105.12	14.91	90.20	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
277	6.42	105.47	15.11	90.36	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
278	6.44	105.82	15.30	90.51	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
279	6.46	106.16	15.50	90.67	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
280	6.48	106.51	15.70	90.82	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
281	6.50	106.86	15.89	90.97	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
282	6.52	107.21	16.09	91.13	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
283	6.54	107.56	16.28	91.28	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
284	6.56	107.91	16.48	91.43	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
285	6.58	108.27	16.68	91.59	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
286	6.60	108.62	16.87	91.74	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
287	6.62	108.97	17.07	91.90	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
288	6.64	109.33	17.27	92.06	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	109.68	17.46	92.22	0.95	0.074	1.38	0.053	1.00	1.00	0.053	No
290	6.68	110.04	17.66	92.38	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
291	6.70	110.40	17.85	92.54	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
292	6.72	110.76	18.05	92.71	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
293	6.74	111.11	18.25	92.87	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
294	6.76	111.47	18.44	93.03	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
295	6.78	111.83	18.64	93.19	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
296	6.80	112.18	18.84	93.35	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
297	6.82	112.53	19.03	93.50	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
298	6.84	112.89	19.23	93.66	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
299	6.86	113.24	19.42	93.82	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
300	6.88	113.59	19.62	93.97	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
301	6.90	113.95	19.82	94.13	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
302	6.92	114.30	20.01	94.29	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
303	6.94	114.66	20.21	94.45	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
304	6.96	115.01	20.40	94.61	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
305	6.98	115.36	20.60	94.76	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
306	7.00	115.71	20.80	94.92	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
307	7.02	116.06	20.99	95.07	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
308	7.04	116.41	21.19	95.22	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
309	7.06	116.76	21.39	95.37	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
310	7.08	117.10	21.58	95.52	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
311	7.10	117.44	21.78	95.67	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
312	7.12	117.79	21.97	95.81	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
313	7.14	118.13	22.17	95.96	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
314	7.16	118.47	22.37	96.11	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
315	7.18	118.82	22.56	96.25	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
316	7.20	119.16	22.76	96.40	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
317	7.22	119.50	22.96	96.55	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
318	7.24	119.85	23.15	96.69	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
319	7.26	120.19	23.35	96.84	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
320	7.28	120.53	23.54	96.99	0.95	0.076	1.38	0.056	1.00	1.00	0.056	No
321	7.30	120.87	23.74	97.13	0.95	0.076	1.38	0.056	1.00	1.00	0.056	No
322	7.32	121.21	23.94	97.27	0.95	0.077	1.38	0.056	1.00	1.00	0.056	No
323	7.34	121.55	24.13	97.42	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
324	7.36	121.88	24.33	97.56	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
325	7.38	122.22	24.53	97.70	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
326	7.40	122.56	24.72	97.84	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
327	7.42	122.89	24.92	97.97	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
328	7.44	123.22	25.11	98.11	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
329	7.46	123.56	25.31	98.25	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
330	7.48	123.89	25.51	98.39	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
331	7.50	124.23	25.70	98.52	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
332	7.52	124.56	25.90	98.66	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
333	7.54	124.90	26.09	98.80	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
334	7.56	125.23	26.29	98.94	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
335	7.58	125.56	26.49	99.08	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
336	7.60	125.90	26.68	99.22	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	126.23	26.88	99.35	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
338	7.64	126.57	27.08	99.49	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
339	7.66	126.90	27.27	99.63	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
340	7.68	127.23	27.47	99.77	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
341	7.70	127.57	27.66	99.90	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
342	7.72	127.90	27.86	100.04	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
343	7.74	128.23	28.06	100.17	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
344	7.76	128.55	28.25	100.30	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
345	7.78	128.88	28.45	100.43	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
346	7.80	129.21	28.65	100.57	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
347	7.82	129.54	28.84	100.70	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
348	7.84	129.87	29.04	100.83	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
349	7.86	130.20	29.23	100.96	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
350	7.88	130.53	29.43	101.10	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
351	7.90	130.86	29.63	101.23	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
352	7.92	131.19	29.82	101.36	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
353	7.94	131.51	30.02	101.49	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
354	7.96	131.84	30.21	101.62	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
355	7.98	132.16	30.41	101.75	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
356	8.00	132.49	30.61	101.88	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
357	8.02	132.82	30.80	102.01	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
358	8.04	133.14	31.00	102.14	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
359	8.06	133.47	31.20	102.27	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
360	8.08	133.79	31.39	102.40	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
361	8.10	134.12	31.59	102.53	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
362	8.12	134.44	31.78	102.66	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
363	8.14	134.76	31.98	102.78	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
364	8.16	135.08	32.18	102.91	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
365	8.18	135.40	32.37	103.03	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
366	8.20	135.72	32.57	103.16	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
367	8.22	136.05	32.77	103.28	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
368	8.24	136.37	32.96	103.41	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
369	8.26	136.69	33.16	103.53	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
370	8.28	137.02	33.35	103.66	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
371	8.30	137.34	33.55	103.79	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
372	8.32	137.67	33.75	103.92	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
373	8.34	138.00	33.94	104.05	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
374	8.36	138.32	34.14	104.18	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
375	8.38	138.65	34.34	104.31	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
376	8.40	138.97	34.53	104.44	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
377	8.42	139.28	34.73	104.56	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
378	8.44	139.60	34.92	104.67	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
379	8.46	139.91	35.12	104.79	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
380	8.48	140.23	35.32	104.91	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
381	8.50	140.54	35.51	105.03	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
382	8.52	140.85	35.71	105.14	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
383	8.54	141.16	35.90	105.26	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
384	8.56	141.47	36.10	105.37	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	141.78	36.30	105.48	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
386	8.60	142.09	36.49	105.60	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
387	8.62	142.40	36.69	105.71	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
388	8.64	142.71	36.89	105.83	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
389	8.66	143.03	37.08	105.95	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
390	8.68	143.35	37.28	106.07	0.93	0.082	1.38	0.059	1.00	1.00	2.000	Yes
391	8.70	143.67	37.47	106.19	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
392	8.72	143.99	37.67	106.32	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
393	8.74	144.32	37.87	106.45	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
394	8.76	144.65	38.06	106.59	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
395	8.78	144.98	38.26	106.72	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
396	8.80	145.31	38.46	106.85	0.93	0.082	1.38	0.059	1.00	1.00	0.059	No
397	8.82	145.63	38.65	106.98	0.93	0.082	1.38	0.060	1.00	1.00	0.060	No
398	8.84	145.96	38.85	107.11	0.93	0.082	1.38	0.060	1.00	1.00	0.060	No
399	8.86	146.28	39.04	107.24	0.93	0.082	1.38	0.060	1.00	1.00	0.060	No
400	8.88	146.61	39.24	107.37	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
401	8.90	146.93	39.44	107.49	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
402	8.92	147.25	39.63	107.62	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
403	8.94	147.57	39.83	107.74	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
404	8.96	147.89	40.02	107.87	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
405	8.98	148.22	40.22	108.00	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
406	9.00	148.55	40.42	108.13	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
407	9.02	148.88	40.61	108.27	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
408	9.04	149.21	40.81	108.40	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
409	9.06	149.54	41.01	108.53	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
410	9.08	149.87	41.20	108.66	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
411	9.10	150.19	41.40	108.79	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
412	9.12	150.52	41.59	108.92	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
413	9.14	150.84	41.79	109.05	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
414	9.16	151.16	41.99	109.18	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
415	9.18	151.49	42.18	109.30	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
416	9.20	151.81	42.38	109.43	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
417	9.22	152.13	42.58	109.55	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
418	9.24	152.45	42.77	109.68	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
419	9.26	152.77	42.97	109.80	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
420	9.28	153.09	43.16	109.93	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
421	9.30	153.41	43.36	110.05	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
422	9.32	153.73	43.56	110.18	0.92	0.083	1.38	0.060	1.00	1.00	2.000	Yes
423	9.34	154.05	43.75	110.30	0.92	0.083	1.38	0.061	1.00	1.00	2.000	Yes
424	9.36	154.37	43.95	110.42	0.92	0.083	1.38	0.061	1.00	1.00	2.000	Yes
425	9.38	154.69	44.15	110.55	0.92	0.083	1.38	0.061	1.00	1.00	2.000	Yes
426	9.40	155.01	44.34	110.67	0.92	0.083	1.38	0.061	1.00	1.00	2.000	Yes
427	9.42	155.33	44.54	110.79	0.92	0.083	1.38	0.061	1.00	1.00	2.000	Yes
428	9.44	155.64	44.73	110.91	0.92	0.084	1.38	0.061	1.00	1.00	2.000	Yes
429	9.46	155.95	44.93	111.03	0.92	0.084	1.38	0.061	1.00	1.00	2.000	Yes
430	9.48	156.27	45.13	111.14	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
431	9.50	156.58	45.32	111.26	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
432	9.52	156.90	45.52	111.38	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
433	9.54	157.21	45.71	111.49	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
434	9.56	157.52	45.91	111.61	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
435	9.58	157.83	46.11	111.72	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
436	9.60	158.16	46.30	111.85	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
437	9.62	158.49	46.50	111.99	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
438	9.64	158.82	46.70	112.13	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
439	9.66	159.17	46.89	112.28	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
440	9.68	159.52	47.09	112.43	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
441	9.70	159.86	47.28	112.58	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
442	9.72	160.20	47.48	112.72	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
443	9.74	160.54	47.68	112.87	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
444	9.76	160.89	47.87	113.01	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
445	9.78	161.23	48.07	113.16	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
446	9.80	161.58	48.27	113.31	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
447	9.82	161.92	48.46	113.46	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
448	9.84	162.26	48.66	113.61	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
449	9.86	162.60	48.85	113.75	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
450	9.88	162.94	49.05	113.89	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
451	9.90	163.26	49.25	114.02	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
452	9.92	163.59	49.44	114.15	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
453	9.94	163.92	49.64	114.28	0.91	0.084	1.38	0.061	1.00	1.00	0.061	No
454	9.96	164.24	49.83	114.41	0.91	0.085	1.38	0.061	1.00	1.00	0.061	No
455	9.98	164.57	50.03	114.54	0.91	0.085	1.38	0.061	1.00	1.00	0.061	No
456	10.00	164.89	50.23	114.67	0.90	0.085	1.38	0.061	1.00	1.00	0.061	No
457	10.02	165.22	50.42	114.80	0.90	0.085	1.38	0.061	1.00	1.00	0.061	No
458	10.04	165.55	50.62	114.93	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
459	10.06	165.88	50.82	115.06	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
460	10.08	166.21	51.01	115.20	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
461	10.10	166.54	51.21	115.33	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
462	10.12	166.86	51.40	115.46	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
463	10.14	167.19	51.60	115.59	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
464	10.16	167.51	51.80	115.71	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
465	10.18	167.83	51.99	115.84	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
466	10.20	168.16	52.19	115.97	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
467	10.22	168.49	52.39	116.10	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
468	10.24	168.81	52.58	116.23	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
469	10.26	169.14	52.78	116.36	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
470	10.28	169.47	52.97	116.49	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
471	10.30	169.80	53.17	116.63	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
472	10.32	170.12	53.37	116.76	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
473	10.34	170.45	53.56	116.89	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
474	10.36	170.78	53.76	117.02	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
475	10.38	171.10	53.96	117.15	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
476	10.40	171.43	54.15	117.27	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
477	10.42	171.75	54.35	117.40	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
478	10.44	172.07	54.54	117.53	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
479	10.46	172.39	54.74	117.65	0.90	0.085	1.38	0.062	1.00	1.00	0.062	No
480	10.48	172.72	54.94	117.78	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
481	10.50	173.04	55.13	117.91	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
482	10.52	173.37	55.33	118.04	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
483	10.54	173.70	55.52	118.17	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
484	10.56	174.02	55.72	118.30	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
485	10.58	174.35	55.92	118.43	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
486	10.60	174.68	56.11	118.56	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
487	10.62	175.00	56.31	118.69	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
488	10.64	175.33	56.51	118.82	0.89	0.085	1.38	0.062	1.00	1.00	0.062	No
489	10.66	175.65	56.70	118.95	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
490	10.68	175.97	56.90	119.07	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
491	10.70	176.29	57.09	119.19	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
492	10.72	176.61	57.29	119.32	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
493	10.74	176.93	57.49	119.45	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
494	10.76	177.25	57.68	119.57	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
495	10.78	177.58	57.88	119.70	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
496	10.80	177.90	58.08	119.83	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
497	10.82	178.23	58.27	119.96	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
498	10.84	178.55	58.47	120.08	0.89	0.086	1.38	0.062	1.00	1.00	0.062	No
499	10.86	178.87	58.66	120.21	0.89	0.086	1.38	0.062	1.00	1.00	2.000	Yes
500	10.88	179.19	58.86	120.33	0.89	0.086	1.38	0.062	1.00	1.00	2.000	Yes
501	10.90	179.51	59.06	120.45	0.89	0.086	1.38	0.062	1.00	1.00	2.000	Yes
502	10.92	179.82	59.25	120.57	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
503	10.94	180.14	59.45	120.69	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
504	10.96	180.46	59.64	120.81	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
505	10.98	180.78	59.84	120.94	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
506	11.00	181.11	60.04	121.07	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
507	11.02	181.44	60.23	121.20	0.88	0.086	1.38	0.062	1.00	1.00	2.000	Yes
508	11.04	181.77	60.43	121.34	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
509	11.06	182.11	60.63	121.48	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
510	11.08	182.45	60.82	121.63	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
511	11.10	182.79	61.02	121.77	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
512	11.12	183.13	61.21	121.92	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
513	11.14	183.47	61.41	122.06	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
514	11.16	183.81	61.61	122.20	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
515	11.18	184.15	61.80	122.34	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
516	11.20	184.48	62.00	122.48	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
517	11.22	184.81	62.20	122.61	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
518	11.24	185.13	62.39	122.74	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
519	11.26	185.46	62.59	122.87	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
520	11.28	185.78	62.78	123.00	0.88	0.086	1.38	0.062	1.00	1.00	0.062	No
521	11.30	186.10	62.98	123.12	0.88	0.086	1.38	0.063	1.00	1.00	0.063	No
522	11.32	186.43	63.18	123.25	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
523	11.34	186.76	63.37	123.39	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
524	11.36	187.09	63.57	123.52	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
525	11.38	187.43	63.77	123.67	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
526	11.40	187.77	63.96	123.81	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
527	11.42	188.11	64.16	123.96	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
528	11.44	188.46	64.35	124.10	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
529	11.46	188.80	64.55	124.26	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
530	11.48	189.15	64.75	124.41	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
531	11.50	189.50	64.94	124.56	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
532	11.52	189.84	65.14	124.71	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
533	11.54	190.19	65.33	124.86	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
534	11.56	190.54	65.53	125.00	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
535	11.58	190.88	65.73	125.15	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
536	11.60	191.23	65.92	125.30	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
537	11.62	191.57	66.12	125.45	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
538	11.64	191.92	66.32	125.60	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
539	11.66	192.27	66.51	125.76	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
540	11.68	192.62	66.71	125.91	0.87	0.086	1.38	0.063	1.00	1.00	0.063	No
541	11.70	192.97	66.90	126.07	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
542	11.72	193.32	67.10	126.22	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
543	11.74	193.67	67.30	126.38	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
544	11.76	194.03	67.49	126.53	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
545	11.78	194.38	67.69	126.69	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
546	11.80	194.73	67.89	126.84	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
547	11.82	195.08	68.08	127.00	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
548	11.84	195.43	68.28	127.15	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
549	11.86	195.77	68.47	127.30	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
550	11.88	196.12	68.67	127.45	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
551	11.90	196.47	68.87	127.60	0.86	0.086	1.38	0.063	1.00	1.00	0.063	No
552	11.92	196.81	69.06	127.75	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
553	11.94	197.16	69.26	127.90	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
554	11.96	197.50	69.45	128.04	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
555	11.98	197.84	69.65	128.19	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
556	12.00	198.18	69.85	128.33	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
557	12.02	198.52	70.04	128.47	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
558	12.04	198.85	70.24	128.61	0.86	0.086	1.38	0.062	1.00	1.00	0.062	No
559	12.06	199.19	70.44	128.75	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
560	12.08	199.52	70.63	128.89	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
561	12.10	199.86	70.83	129.03	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
562	12.12	200.19	71.02	129.17	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
563	12.14	200.53	71.22	129.31	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
564	12.16	200.87	71.42	129.45	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
565	12.18	201.21	71.61	129.60	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No
566	12.20	201.55	71.81	129.74	0.85	0.086	1.38	0.062	1.00	1.00	0.062	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.68	2.61	0.81	0.85	13.10	5.75	75.31	4.000	Yes	No	2.00
2	0.92	0.98	2.44	0.70	0.79	18.99	2.58	49.00	4.000	Yes	No	2.00
3	0.94	1.37	2.28	0.60	0.72	26.69	1.84	49.06	4.000	Yes	No	2.00
4	0.96	1.77	2.15	0.54	0.68	34.75	1.50	52.26	4.000	Yes	No	2.00
5	0.98	2.14	2.07	0.51	0.64	41.96	1.37	57.67	4.000	Yes	No	2.00
6	1.00	2.23	2.07	0.57	0.65	43.71	1.38	60.34	4.000	No	No	2.00
7	1.02	2.20	2.10	0.63	0.66	43.11	1.42	61.21	4.000	No	No	2.00
8	1.04	2.05	2.15	0.72	0.68	40.22	1.51	60.80	4.000	No	No	2.00
9	1.06	1.89	2.22	0.82	0.70	36.99	1.65	61.13	4.000	No	No	2.00
10	1.08	1.77	2.28	0.96	0.73	34.52	1.84	63.51	4.000	No	No	2.00
11	1.10	1.67	2.30	0.97	0.73	32.67	1.92	62.73	4.000	No	No	2.00
12	1.12	1.63	2.30	0.93	0.73	31.89	1.92	61.15	4.000	No	No	2.00
13	1.14	1.64	2.28	0.86	0.73	32.09	1.84	59.05	4.000	No	No	2.00
14	1.16	1.65	2.26	0.78	0.72	32.24	1.77	57.16	4.000	No	No	2.00
15	1.18	1.66	2.23	0.69	0.71	32.33	1.69	54.55	4.000	No	No	2.00
16	1.20	1.67	2.22	0.68	0.70	32.66	1.67	54.40	4.000	No	No	2.00
17	1.22	1.68	2.23	0.73	0.71	32.74	1.71	55.92	4.000	No	No	2.00
18	1.24	1.69	2.27	0.85	0.72	32.93	1.80	59.41	4.000	No	No	2.00
19	1.26	1.70	2.31	1.03	0.74	33.21	1.94	64.58	4.000	No	No	2.00
20	1.28	1.73	2.33	1.19	0.75	33.74	2.06	69.48	4.000	No	No	2.00
21	1.30	1.78	2.35	1.32	0.75	34.70	2.13	73.80	4.000	No	No	2.00
22	1.32	1.86	2.35	1.39	0.75	36.37	2.11	76.83	4.000	No	No	2.00
23	1.34	1.95	2.33	1.41	0.75	38.06	2.05	78.21	4.000	No	No	2.00
24	1.36	2.06	2.30	1.34	0.74	40.28	1.93	77.71	4.000	No	No	2.00
25	1.38	2.20	2.25	1.21	0.72	42.91	1.76	75.55	4.000	No	No	2.00
26	1.40	2.32	2.20	1.08	0.70	45.46	1.62	73.83	4.000	No	No	2.00
27	1.42	2.42	2.16	0.98	0.69	47.42	1.53	72.62	4.000	No	No	2.00
28	1.44	2.50	2.14	0.92	0.68	48.88	1.48	72.46	4.000	No	No	2.00
29	1.46	2.55	2.13	0.90	0.67	49.84	1.46	72.72	4.000	No	No	2.00
30	1.48	2.63	2.13	0.94	0.67	51.42	1.46	75.12	4.000	No	No	2.00
31	1.50	2.81	2.11	0.97	0.66	55.03	1.43	78.72	4.000	No	No	2.00
32	1.52	3.02	2.09	0.98	0.66	59.19	1.40	82.83	4.000	No	No	2.00
33	1.54	3.16	2.08	1.01	0.65	61.99	1.39	85.90	4.000	No	No	2.00
34	1.56	3.26	2.08	1.06	0.65	63.86	1.39	88.84	4.000	No	No	2.00
35	1.58	3.27	2.09	1.12	0.66	64.04	1.41	90.15	4.000	No	No	2.00
36	1.60	3.12	2.13	1.23	0.68	61.08	1.47	90.00	4.000	No	No	2.00
37	1.62	2.92	2.19	1.38	0.70	57.14	1.58	90.36	4.000	No	No	2.00
38	1.64	2.74	2.23	1.52	0.71	53.63	1.71	91.50	4.000	No	No	2.00
39	1.66	2.68	2.24	1.53	0.72	52.44	1.73	90.89	4.000	Yes	No	2.00
40	1.68	2.59	2.27	1.59	0.73	50.54	1.81	91.39	4.000	Yes	No	2.00
41	1.70	2.38	2.32	1.74	0.75	46.40	2.01	93.06	4.000	Yes	No	2.00
42	1.72	2.13	2.39	1.93	0.77	41.42	2.31	95.60	4.000	Yes	No	2.00
43	1.74	1.89	2.46	2.15	0.80	36.73	2.70	99.33	4.000	Yes	No	2.00
44	1.76	1.56	2.57	2.59	0.84	30.31	4.54	137.49	4.000	Yes	No	2.00
45	1.78	1.34	2.66	2.88	0.88	25.88	7.71	199.52	4.000	Yes	No	2.00
46	1.80	1.29	2.65	2.72	0.87	24.87	7.60	188.95	4.000	No	No	2.00
47	1.82	1.26	2.63	2.47	0.87	24.37	6.73	163.89	4.000	Yes	No	2.00
48	1.84	1.24	2.61	2.17	0.86	23.80	5.71	135.96	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	1.22	2.57	1.82	0.84	23.56	4.37	102.90	4.000	Yes	No	2.00
50	1.88	1.19	2.53	1.50	0.83	23.00	3.41	78.33	4.000	Yes	No	2.00
51	1.90	1.21	2.47	1.21	0.81	23.34	2.80	65.29	4.000	Yes	No	2.00
52	1.92	1.31	2.38	0.92	0.77	25.27	2.28	57.57	4.000	Yes	No	2.00
53	1.94	1.50	2.28	0.72	0.73	29.09	1.84	53.57	4.000	Yes	No	2.00
54	1.96	1.68	2.23	0.71	0.71	32.64	1.69	55.19	4.000	Yes	No	2.00
55	1.98	1.83	2.23	0.80	0.71	35.53	1.68	59.69	4.000	No	No	2.00
56	2.00	1.92	2.24	0.93	0.72	37.26	1.72	64.09	4.000	No	No	2.00
57	2.02	1.94	2.27	1.06	0.73	37.74	1.81	68.24	4.000	No	No	2.00
58	2.04	1.91	2.31	1.25	0.75	36.98	1.98	73.06	4.000	No	No	2.00
59	2.06	1.86	2.36	1.42	0.76	36.04	2.15	77.63	4.000	No	No	2.00
60	2.08	1.81	2.38	1.54	0.77	35.07	2.29	80.37	4.000	No	No	2.00
61	2.10	1.79	2.40	1.61	0.78	34.73	2.37	82.45	4.000	No	No	2.00
62	2.12	1.81	2.40	1.66	0.78	35.00	2.40	83.94	4.000	No	No	2.00
63	2.14	1.90	2.37	1.56	0.77	36.76	2.23	81.87	4.000	No	No	2.00
64	2.16	2.22	2.27	1.31	0.73	43.19	1.82	78.59	4.000	No	No	2.00
65	2.18	2.98	2.09	0.96	0.66	58.19	1.40	81.46	4.000	No	No	2.00
66	2.20	3.78	1.96	0.75	0.61	70.88	1.27	90.33	4.000	No	No	2.00
67	2.22	4.62	1.86	0.65	0.58	82.93	1.21	100.34	4.000	No	No	2.00
68	2.24	5.37	1.82	0.65	0.56	94.33	1.17	110.54	4.000	No	No	2.00
69	2.26	5.66	1.85	0.80	0.57	100.03	1.20	119.97	4.000	No	No	2.00
70	2.28	5.33	1.92	1.01	0.60	96.46	1.25	120.89	4.000	No	No	2.00
71	2.30	4.97	2.00	1.26	0.63	92.18	1.31	120.63	4.000	No	No	2.00
72	2.32	4.49	2.09	1.57	0.67	85.44	1.41	120.10	4.000	No	No	2.00
73	2.34	4.24	2.14	1.79	0.69	81.73	1.49	122.04	4.000	No	No	2.00
74	2.36	4.05	2.17	1.87	0.70	78.35	1.54	121.01	4.000	No	No	2.00
75	2.38	4.38	2.13	1.73	0.68	82.92	1.46	121.48	4.000	No	No	2.00
76	2.40	5.41	2.01	1.36	0.63	97.41	1.31	127.81	4.000	No	No	2.00
77	2.42	7.51	1.82	0.96	0.56	125.98	1.18	148.23	4.000	No	No	2.00
78	2.44	9.42	1.70	0.77	0.52	150.66	1.00	150.66	4.000	No	No	2.00
79	2.46	11.65	1.61	0.69	0.48	179.71	1.00	179.71	4.000	No	No	2.00
80	2.48	13.43	1.55	0.64	0.46	202.05	1.00	202.05	4.000	No	No	2.00
81	2.50	14.31	1.56	0.69	0.46	214.84	1.00	214.84	4.000	No	No	2.00
82	2.52	13.91	1.60	0.80	0.48	211.45	1.00	211.45	4.000	No	No	2.00
83	2.54	13.00	1.68	0.96	0.51	201.58	1.00	201.58	4.000	No	No	2.00
84	2.56	11.76	1.75	1.13	0.54	186.05	1.08	201.60	4.000	No	No	2.00
85	2.58	10.66	1.83	1.35	0.57	172.19	1.18	203.49	4.000	No	No	2.00
86	2.60	9.28	1.91	1.58	0.60	153.24	1.25	190.92	4.000	No	No	2.00
87	2.62	7.97	2.01	1.88	0.64	134.91	1.31	177.06	4.000	No	No	2.00
88	2.64	6.77	2.10	2.18	0.67	117.12	1.41	165.44	4.000	No	No	2.00
89	2.66	5.66	2.18	2.49	0.70	100.06	1.58	157.79	4.000	No	No	2.00
90	2.68	4.51	2.29	2.92	0.75	81.97	1.90	155.85	4.000	No	No	2.00
91	2.70	3.81	2.36	3.12	0.77	70.18	2.18	153.25	4.000	No	No	2.00
92	2.72	3.32	2.41	3.17	0.79	61.41	2.41	147.83	4.000	No	No	2.00
93	2.74	3.15	2.40	2.87	0.79	57.68	2.35	135.56	4.000	No	No	2.00
94	2.76	2.97	2.39	2.60	0.78	53.94	2.30	124.19	4.000	No	No	2.00
95	2.78	2.78	2.38	2.32	0.78	49.91	2.26	112.87	4.000	No	No	2.00
96	2.80	2.52	2.39	2.15	0.78	45.10	2.32	104.48	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	2.22	2.42	2.03	0.79	39.61	2.46	97.49	4.000	Yes	No	2.00
98	2.84	1.92	2.46	2.00	0.81	34.46	2.71	93.48	4.000	Yes	No	2.00
99	2.86	1.73	2.49	2.00	0.82	31.06	2.94	91.43	4.000	Yes	No	2.00
100	2.88	1.60	2.52	1.95	0.83	28.73	3.10	89.06	4.000	Yes	No	2.00
101	2.90	1.53	2.53	1.96	0.84	27.40	3.51	96.05	4.000	No	No	2.00
102	2.92	1.36	2.59	2.10	0.86	24.44	5.09	124.49	4.000	No	No	2.00
103	2.94	1.19	2.66	2.30	0.89	21.54	7.83	168.61	4.000	No	No	2.00
104	2.96	1.01	2.75	2.62	0.92	18.47	5.21	96.18	4.000	No	Yes	2.00
105	2.98	0.81	2.89	3.39	0.97	15.00	7.00	104.98	4.000	No	Yes	2.00
106	3.00	0.62	3.06	4.54	1.00	11.35	9.82	111.47	4.000	No	Yes	2.00
107	3.02	0.59	3.10	4.95	1.00	10.63	10.70	113.76	4.000	No	Yes	2.00
108	3.04	0.57	3.13	5.14	1.00	10.16	11.21	113.89	4.000	No	Yes	2.00
109	3.06	0.55	3.13	4.94	1.00	9.90	11.18	110.71	4.000	No	Yes	2.00
110	3.08	0.55	3.11	4.57	1.00	9.71	10.90	105.84	4.000	No	Yes	2.00
111	3.10	0.57	3.05	3.85	1.00	10.17	9.73	99.00	4.000	No	Yes	2.00
112	3.12	0.92	2.74	2.04	0.92	15.87	5.11	81.02	4.000	Yes	Yes	2.00
113	3.14	1.59	2.40	1.02	0.79	25.69	2.37	60.95	4.000	Yes	No	2.00
114	3.16	2.44	2.16	0.63	0.70	37.25	1.52	56.46	4.000	Yes	No	2.00
115	3.18	3.34	1.99	0.47	0.63	49.08	1.00	49.08	4.000	Yes	No	2.00
116	3.20	4.20	1.88	0.41	0.59	60.05	1.00	60.05	4.000	Yes	No	2.00
117	3.22	4.73	1.84	0.41	0.58	66.82	1.00	66.82	4.000	Yes	No	2.00
118	3.24	4.93	1.84	0.44	0.58	69.45	1.00	69.45	4.000	Yes	No	2.00
119	3.26	4.86	1.87	0.49	0.59	68.71	1.00	68.71	4.000	Yes	No	2.00
120	3.28	4.60	1.92	0.56	0.61	65.41	1.25	81.58	4.000	Yes	No	2.00
121	3.30	3.98	2.01	0.67	0.64	57.45	1.31	75.42	4.000	Yes	No	2.00
122	3.32	3.24	2.13	0.85	0.69	47.86	1.46	70.04	4.000	Yes	No	2.00
123	3.34	2.45	2.29	1.16	0.75	37.19	1.90	70.72	4.000	Yes	No	2.00
124	3.36	1.72	2.51	1.78	0.83	27.03	3.05	82.59	4.000	Yes	No	2.00
125	3.38	1.12	2.79	3.03	0.94	18.25	5.71	104.21	4.000	Yes	Yes	2.00
126	3.40	0.85	2.99	4.53	1.00	14.06	8.54	120.05	4.000	Yes	Yes	2.00
127	3.42	0.81	3.05	5.21	1.00	13.18	9.58	126.24	4.000	No	Yes	2.00
128	3.44	0.95	2.95	4.48	1.00	15.69	7.89	123.85	4.000	No	Yes	2.00
129	3.46	1.17	2.81	3.40	0.95	18.76	5.97	112.02	4.000	No	Yes	2.00
130	3.48	1.34	2.70	2.66	0.91	21.03	4.75	99.99	4.000	No	Yes	2.00
131	3.50	1.46	2.62	2.07	0.88	22.42	6.05	135.67	4.000	No	No	2.00
132	3.52	1.38	2.61	1.85	0.87	21.00	5.87	123.28	4.000	No	No	2.00
133	3.54	1.15	2.69	1.95	0.90	17.60	9.46	166.57	4.000	No	No	2.00
134	3.56	0.88	2.85	2.53	0.96	13.58	6.44	87.41	4.000	No	Yes	2.00
135	3.58	0.67	3.02	3.38	1.00	10.25	9.10	93.22	4.000	No	Yes	2.00
136	3.60	0.51	3.21	4.63	1.00	7.55	12.86	97.01	4.000	No	Yes	2.00
137	3.62	0.45	3.31	5.53	1.00	6.42	15.39	98.80	4.000	No	Yes	2.00
138	3.64	0.41	3.38	6.26	1.00	5.72	17.44	99.70	4.000	No	Yes	2.00
139	3.66	0.39	3.41	6.51	1.00	5.39	18.36	99.02	4.000	No	Yes	2.00
140	3.68	0.38	3.42	6.41	1.00	5.18	18.68	96.77	4.000	No	Yes	2.00
141	3.70	0.39	3.37	5.64	1.00	5.39	17.24	93.00	4.000	No	Yes	2.00
142	3.72	0.41	3.32	4.81	1.00	5.66	15.64	88.50	4.000	No	Yes	2.00
143	3.74	0.42	3.27	4.09	1.00	5.82	14.33	83.46	4.000	No	Yes	2.00
144	3.76	0.42	3.24	3.63	1.00	5.80	13.66	79.26	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.42	3.23	3.44	1.00	5.67	13.54	76.83	4.000	No	Yes	2.00
146	3.80	0.40	3.25	3.46	1.00	5.42	13.97	75.77	4.000	No	Yes	2.00
147	3.82	0.39	3.29	3.64	1.00	5.08	14.87	75.55	4.000	No	Yes	2.00
148	3.84	0.38	3.30	3.73	1.00	4.96	15.26	75.69	4.000	No	Yes	2.00
149	3.86	0.38	3.31	3.83	1.00	4.92	15.51	76.30	4.000	No	Yes	2.00
150	3.88	0.38	3.32	3.94	1.00	4.87	15.80	76.85	4.000	No	Yes	2.00
151	3.90	0.37	3.34	4.15	1.00	4.78	16.32	78.01	4.000	No	Yes	2.00
152	3.92	0.37	3.36	4.37	1.00	4.69	16.87	79.10	4.000	No	Yes	2.00
153	3.94	0.36	3.39	4.69	1.00	4.48	17.86	79.97	4.000	No	Yes	2.00
154	3.96	0.34	3.43	4.91	1.00	4.24	18.83	79.83	4.000	No	Yes	2.00
155	3.98	0.33	3.46	5.18	1.00	4.00	19.95	79.71	4.000	No	Yes	2.00
156	4.00	0.33	3.46	5.18	1.00	3.96	20.05	79.47	4.000	No	Yes	2.00
157	4.02	0.33	3.47	5.20	1.00	3.93	20.17	79.33	4.000	No	Yes	2.00
158	4.04	0.35	3.42	4.78	1.00	4.22	18.69	78.79	4.000	No	Yes	2.00
159	4.06	0.39	3.33	4.12	1.00	4.88	16.06	78.35	4.000	No	Yes	2.00
160	4.08	0.44	3.25	3.58	1.00	5.60	13.88	77.74	4.000	No	Yes	2.00
161	4.10	0.49	3.18	3.17	1.00	6.17	12.38	76.40	4.000	No	Yes	2.00
162	4.12	0.53	3.12	2.79	1.00	6.78	11.02	74.73	4.000	No	Yes	2.00
163	4.14	0.52	3.13	2.87	1.00	6.68	11.28	75.29	4.000	No	Yes	2.00
164	4.16	0.49	3.19	3.18	1.00	6.15	12.44	76.50	4.000	No	Yes	2.00
165	4.18	0.43	3.29	3.92	1.00	5.27	14.98	78.98	4.000	No	Yes	2.00
166	4.20	0.37	3.41	4.92	1.00	4.41	18.40	81.14	4.000	No	Yes	2.00
167	4.22	0.32	3.55	6.23	1.00	3.57	23.04	82.25	4.000	No	Yes	2.00
168	4.24	0.29	3.62	6.92	1.00	3.15	25.93	81.60	4.000	No	Yes	2.00
169	4.26	0.27	3.66	7.32	1.00	2.87	28.05	80.38	4.000	No	Yes	2.00
170	4.28	0.28	3.63	6.58	1.00	2.91	26.62	77.45	4.000	No	Yes	2.00
171	4.30	0.28	3.59	5.71	1.00	3.01	24.65	74.12	4.000	No	Yes	2.00
172	4.32	0.30	3.51	4.75	1.00	3.28	21.73	71.34	4.000	No	Yes	2.00
173	4.34	0.34	3.40	3.70	1.00	3.82	17.93	68.52	4.000	No	Yes	2.00
174	4.36	0.38	3.30	2.99	1.00	4.32	15.26	65.93	4.000	No	Yes	2.00
175	4.38	0.42	3.21	2.44	1.00	4.89	12.99	63.60	4.000	No	Yes	2.00
176	4.40	0.51	3.08	1.88	1.00	5.99	10.22	61.23	4.000	No	Yes	2.00
177	4.42	0.60	2.96	1.52	1.00	7.20	8.20	59.04	4.000	No	Yes	2.00
178	4.44	0.67	2.90	1.41	0.99	8.17	7.22	58.93	4.000	No	Yes	2.00
179	4.46	0.69	2.91	1.58	1.00	8.44	7.39	62.36	4.000	No	Yes	2.00
180	4.48	0.69	2.94	1.82	1.00	8.44	7.85	66.24	4.000	No	Yes	2.00
181	4.50	0.67	3.00	2.20	1.00	8.07	8.82	71.14	4.000	No	Yes	2.00
182	4.52	0.61	3.09	2.79	1.00	7.28	10.50	76.44	4.000	No	Yes	2.00
183	4.54	0.56	3.18	3.44	1.00	6.57	12.32	80.94	4.000	No	Yes	2.00
184	4.56	0.59	3.17	3.44	1.00	6.82	12.01	81.96	4.000	No	Yes	2.00
185	4.58	0.58	3.18	3.61	1.00	6.72	12.39	83.28	4.000	No	Yes	2.00
186	4.60	0.53	3.25	3.95	1.00	5.97	13.89	82.92	4.000	No	Yes	2.00
187	4.62	0.48	3.30	4.13	1.00	5.28	15.29	80.76	4.000	No	Yes	2.00
188	4.64	0.42	3.37	4.26	1.00	4.47	17.20	76.83	4.000	No	Yes	2.00
189	4.66	0.34	3.50	4.79	1.00	3.44	21.17	72.83	4.000	No	Yes	2.00
190	4.68	0.31	3.52	4.47	1.00	3.10	21.98	68.14	4.000	No	Yes	2.00
191	4.70	-1.23	N/A	-0.73	1.00	-1.00	1.00	N/A	4.000	No	No	2.00
192	4.72	-1.21	N/A	-0.68	1.00	-1.00	1.00	N/A	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	-1.18	N/A	-0.68	1.00	-1.00	1.00	N/A	4.000	No	No	2.00
194	4.76	-1.15	N/A	-0.69	1.00	-1.00	1.00	N/A	4.000	No	No	2.00
195	4.78	-1.13	N/A	-0.71	1.00	-1.00	1.00	N/A	4.000	No	No	2.00
196	4.80	0.44	3.25	2.56	1.00	4.56	13.88	63.24	4.000	No	Yes	2.00
197	4.82	0.45	3.24	2.64	1.00	4.71	13.75	64.76	4.000	No	Yes	2.00
198	4.84	0.46	3.25	2.74	1.00	4.76	13.85	65.94	4.000	No	Yes	2.00
199	4.86	0.46	3.26	2.87	1.00	4.76	14.09	67.12	4.000	No	Yes	2.00
200	4.88	0.46	3.25	2.87	1.00	4.81	14.00	67.37	4.000	No	Yes	2.00
201	4.90	0.49	3.22	2.73	1.00	5.09	13.24	67.37	0.243	No	Yes	2.00
202	4.92	0.50	3.21	2.67	1.00	5.22	12.90	67.28	0.249	No	Yes	2.00
203	4.94	0.53	3.16	2.43	1.00	5.64	11.80	66.50	0.269	No	Yes	2.00
204	4.96	0.61	3.07	2.13	1.00	6.58	10.04	66.09	0.314	No	Yes	2.00
205	4.98	0.72	2.96	1.82	1.00	7.99	8.19	65.42	0.381	No	Yes	2.00
206	5.00	0.82	2.88	1.60	0.99	9.17	6.98	64.01	0.437	No	Yes	2.00
207	5.02	0.93	2.82	1.48	0.96	10.39	6.10	63.38	0.496	No	Yes	2.00
208	5.04	1.06	2.76	1.44	0.94	11.95	5.39	64.42	0.570	No	Yes	2.00
209	5.06	1.17	2.71	1.38	0.92	13.18	4.86	64.13	0.629	No	Yes	2.00
210	5.08	1.25	2.69	1.35	0.91	14.07	9.35	131.55	0.263	No	No	2.00
211	5.10	1.35	2.65	1.33	0.90	15.32	7.48	114.65	0.198	No	No	2.00
212	5.12	1.46	2.62	1.30	0.89	16.46	6.13	100.86	0.158	No	No	2.00
213	5.14	1.49	2.61	1.27	0.88	16.84	5.60	94.37	0.142	No	No	2.00
214	5.16	1.48	2.61	1.31	0.89	16.72	5.95	99.43	0.154	No	No	2.00
215	5.18	1.42	2.65	1.44	0.90	16.05	7.48	120.11	0.217	No	No	2.00
216	5.20	1.30	2.71	1.63	0.92	14.63	4.85	70.97	0.698	No	Yes	2.00
217	5.22	1.12	2.82	1.99	0.96	12.58	6.04	76.00	0.600	No	Yes	2.00
218	5.24	1.00	2.90	2.38	1.00	11.12	7.23	80.47	0.531	No	Yes	2.00
219	5.26	0.95	2.94	2.60	1.00	10.52	7.87	82.80	0.502	No	Yes	2.00
220	5.28	0.94	2.95	2.60	1.00	10.35	7.97	82.41	0.493	No	Yes	2.00
221	5.30	0.95	2.94	2.54	1.00	10.48	7.81	81.79	0.500	No	Yes	2.00
222	5.32	1.07	2.86	2.19	0.98	11.87	6.63	78.71	0.566	No	Yes	2.00
223	5.34	1.15	2.81	1.99	0.96	12.70	6.00	76.24	0.606	No	Yes	2.00
224	5.36	1.15	2.81	1.96	0.96	12.67	5.96	75.54	0.604	No	Yes	2.00
225	5.38	1.11	2.83	2.01	0.97	12.23	6.21	75.95	0.584	No	Yes	2.00
226	5.40	1.05	2.86	2.09	0.98	11.54	6.62	76.36	0.551	No	Yes	2.00
227	5.42	0.93	2.94	2.37	1.00	10.05	7.79	78.24	0.479	No	Yes	2.00
228	5.44	0.79	3.04	2.75	1.00	8.46	9.42	79.67	0.403	No	Yes	2.00
229	5.46	0.69	3.13	3.18	1.00	7.17	11.24	80.53	0.342	No	Yes	2.00
230	5.48	0.62	3.21	3.59	1.00	6.31	12.88	81.27	0.301	No	Yes	2.00
231	5.50	0.55	3.28	3.99	1.00	5.46	14.77	80.66	0.260	No	Yes	2.00
232	5.52	0.50	3.34	4.22	1.00	4.88	16.21	79.09	0.233	No	Yes	2.00
233	5.54	0.65	3.14	2.95	1.00	6.66	11.42	76.09	0.318	No	Yes	2.00
234	5.56	0.80	2.99	2.23	1.00	8.42	8.61	72.45	0.401	No	Yes	2.00
235	5.58	0.96	2.85	1.70	0.98	10.31	6.55	67.46	0.492	No	Yes	2.00
236	5.60	1.14	2.75	1.42	0.94	12.24	5.24	64.12	0.584	No	Yes	2.00
237	5.62	1.28	2.69	1.33	0.92	13.89	9.45	131.31	0.262	No	No	2.00
238	5.64	1.22	2.74	1.56	0.94	13.16	5.17	68.06	0.628	No	Yes	2.00
239	5.66	1.11	2.83	1.92	0.97	11.96	6.18	73.85	0.570	No	Yes	2.00
240	5.68	0.97	2.94	2.52	1.00	10.36	7.83	81.15	0.494	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.87	3.05	3.21	1.00	9.07	9.64	87.43	0.433	No	Yes	2.00
242	5.72	0.85	3.08	3.52	1.00	8.86	10.22	90.56	0.423	No	Yes	2.00
243	5.74	0.96	3.01	3.20	1.00	10.20	8.89	90.65	0.487	No	Yes	2.00
244	5.76	1.19	2.88	2.61	0.99	12.73	6.86	87.38	4.000	Yes	Yes	2.00
245	5.78	1.47	2.74	2.05	0.94	15.88	5.12	81.28	4.000	Yes	Yes	2.00
246	5.80	1.76	2.62	1.64	0.89	19.10	6.04	115.28	4.000	Yes	No	2.00
247	5.82	1.99	2.53	1.36	0.86	21.51	3.41	73.36	4.000	Yes	No	2.00
248	5.84	2.08	2.48	1.19	0.84	22.49	2.87	64.45	4.000	Yes	No	2.00
249	5.86	2.10	2.46	1.10	0.83	22.65	2.73	61.86	4.000	Yes	No	2.00
250	5.88	2.08	2.46	1.06	0.83	22.32	2.72	60.62	0.101	No	No	2.00
251	5.90	1.99	2.48	1.06	0.84	21.36	2.83	60.36	4.000	Yes	No	2.00
252	5.92	1.87	2.51	1.10	0.85	19.96	2.98	59.52	4.000	Yes	No	2.00
253	5.94	1.74	2.56	1.20	0.87	18.53	4.06	75.29	4.000	Yes	No	2.00
254	5.96	1.61	2.61	1.33	0.89	17.14	5.74	98.35	4.000	Yes	No	2.00
255	5.98	1.57	2.63	1.41	0.90	16.66	6.66	110.86	4.000	Yes	No	2.00
256	6.00	1.73	2.59	1.37	0.88	18.41	5.05	92.90	4.000	Yes	No	2.00
257	6.02	1.94	2.54	1.33	0.86	20.65	3.65	75.45	4.000	Yes	No	2.00
258	6.04	2.18	2.48	1.24	0.84	23.19	2.85	66.20	4.000	Yes	No	2.00
259	6.06	2.42	2.42	1.15	0.82	25.82	2.51	64.73	4.000	Yes	No	2.00
260	6.08	2.85	2.33	1.01	0.78	30.39	2.06	62.54	4.000	Yes	No	2.00
261	6.10	3.12	2.28	0.92	0.76	33.18	1.85	61.44	4.000	Yes	No	2.00
262	6.12	3.38	2.23	0.84	0.74	35.96	1.70	61.02	4.000	Yes	No	2.00
263	6.14	3.65	2.19	0.78	0.73	38.73	1.58	61.22	4.000	Yes	No	2.00
264	6.16	4.29	2.07	0.59	0.68	45.39	1.37	62.39	4.000	Yes	No	2.00
265	6.18	4.81	1.98	0.46	0.65	50.66	1.00	50.66	4.000	Yes	No	2.00
266	6.20	5.40	1.88	0.36	0.61	56.69	1.00	56.69	4.000	Yes	No	2.00
267	6.22	6.03	1.80	0.29	0.58	63.18	1.00	63.18	4.000	Yes	No	2.00
268	6.24	6.64	1.75	0.26	0.56	69.43	1.00	69.43	4.000	Yes	No	2.00
269	6.26	6.96	1.75	0.29	0.56	72.71	1.00	72.71	0.116	No	No	2.00
270	6.28	7.14	1.77	0.35	0.57	74.66	1.00	74.66	0.119	No	No	2.00
271	6.30	7.29	1.78	0.39	0.57	76.17	1.00	76.17	0.121	No	No	2.00
272	6.32	7.39	1.80	0.43	0.58	77.28	1.00	77.28	0.123	No	No	2.00
273	6.34	7.57	1.79	0.43	0.58	79.05	1.00	79.05	0.126	No	No	2.00
274	6.36	7.66	1.79	0.43	0.58	79.85	1.00	79.85	0.127	No	No	2.00
275	6.38	7.79	1.76	0.40	0.57	81.05	1.00	81.05	0.130	No	No	2.00
276	6.40	7.86	1.75	0.37	0.56	81.70	1.00	81.70	0.131	No	No	2.00
277	6.42	7.93	1.73	0.34	0.55	82.28	1.00	82.28	0.132	No	No	2.00
278	6.44	7.97	1.71	0.32	0.55	82.60	1.00	82.60	0.132	No	No	2.00
279	6.46	8.04	1.70	0.30	0.54	83.17	1.00	83.17	0.134	No	No	2.00
280	6.48	8.13	1.70	0.30	0.54	83.98	1.00	83.98	0.135	No	No	2.00
281	6.50	8.31	1.69	0.30	0.54	85.81	1.00	85.81	0.139	No	No	2.00
282	6.52	8.55	1.67	0.29	0.53	88.19	1.00	88.19	0.144	No	No	2.00
283	6.54	8.96	1.64	0.28	0.52	92.30	1.00	92.30	0.153	No	No	2.00
284	6.56	9.41	1.62	0.27	0.51	96.73	1.00	96.73	0.164	No	No	2.00
285	6.58	9.75	1.60	0.26	0.50	100.18	1.00	100.18	0.173	No	No	2.00
286	6.60	10.00	1.59	0.26	0.50	102.61	1.00	102.61	0.180	No	No	2.00
287	6.62	10.14	1.59	0.27	0.50	103.96	1.00	103.96	0.184	No	No	2.00
288	6.64	10.07	1.61	0.30	0.51	103.23	1.00	103.23	0.182	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	9.92	1.63	0.32	0.52	101.63	1.00	101.63	0.178	No	No	2.00
290	6.68	9.74	1.65	0.34	0.53	99.76	1.00	99.76	0.172	No	No	2.00
291	6.70	9.54	1.67	0.36	0.53	97.65	1.00	97.65	0.167	No	No	2.00
292	6.72	9.39	1.68	0.36	0.54	96.07	1.00	96.07	0.162	No	No	2.00
293	6.74	9.26	1.69	0.36	0.54	94.59	1.00	94.59	0.159	No	No	2.00
294	6.76	9.16	1.69	0.36	0.54	93.47	1.00	93.47	0.156	No	No	2.00
295	6.78	9.10	1.68	0.34	0.54	92.76	1.00	92.76	0.154	No	No	2.00
296	6.80	9.07	1.68	0.33	0.53	92.40	1.00	92.40	0.153	No	No	2.00
297	6.82	9.03	1.67	0.32	0.53	91.87	1.00	91.87	0.152	No	No	2.00
298	6.84	8.90	1.68	0.32	0.53	90.43	1.00	90.43	0.149	No	No	2.00
299	6.86	8.72	1.69	0.33	0.54	88.55	1.00	88.55	0.145	No	No	2.00
300	6.88	8.50	1.71	0.35	0.55	86.30	1.00	86.30	0.140	No	No	2.00
301	6.90	8.24	1.74	0.37	0.56	83.55	1.00	83.55	0.134	No	No	2.00
302	6.92	7.96	1.76	0.40	0.57	80.70	1.00	80.70	0.129	No	No	2.00
303	6.94	7.77	1.78	0.41	0.57	78.69	1.00	78.69	0.125	No	No	2.00
304	6.96	7.62	1.78	0.40	0.58	77.06	1.00	77.06	0.123	No	No	2.00
305	6.98	7.52	1.78	0.38	0.57	75.95	1.00	75.95	0.121	No	No	2.00
306	7.00	7.46	1.77	0.35	0.57	75.23	1.00	75.23	0.120	No	No	2.00
307	7.02	7.40	1.77	0.34	0.57	74.52	1.00	74.52	0.118	No	No	2.00
308	7.04	7.34	1.76	0.32	0.57	73.82	1.00	73.82	0.117	No	No	2.00
309	7.06	7.32	1.75	0.30	0.56	73.60	1.00	73.60	0.117	No	No	2.00
310	7.08	7.34	1.74	0.28	0.56	73.64	1.00	73.64	0.117	No	No	2.00
311	7.10	7.39	1.73	0.28	0.56	74.10	1.00	74.10	0.118	No	No	2.00
312	7.12	7.44	1.71	0.25	0.55	74.48	1.00	74.48	0.118	No	No	2.00
313	7.14	7.45	1.72	0.26	0.55	74.61	1.00	74.61	0.119	No	No	2.00
314	7.16	7.41	1.73	0.27	0.55	74.12	1.00	74.12	0.118	No	No	2.00
315	7.18	7.36	1.73	0.27	0.56	73.52	1.00	73.52	0.117	No	No	2.00
316	7.20	7.31	1.74	0.27	0.56	72.93	1.00	72.93	0.116	No	No	2.00
317	7.22	7.32	1.74	0.28	0.56	72.98	1.00	72.98	0.116	No	No	2.00
318	7.24	7.34	1.73	0.27	0.56	73.18	1.00	73.18	0.116	No	No	2.00
319	7.26	7.32	1.73	0.26	0.56	72.88	1.00	72.88	0.116	No	No	2.00
320	7.28	7.25	1.73	0.25	0.56	72.09	1.00	72.09	0.115	No	No	2.00
321	7.30	7.13	1.73	0.25	0.56	70.78	1.00	70.78	0.113	No	No	2.00
322	7.32	6.95	1.74	0.24	0.56	68.98	1.00	68.98	0.111	No	No	1.99
323	7.34	6.81	1.74	0.24	0.56	67.50	1.00	67.50	0.109	No	No	1.95
324	7.36	6.78	1.74	0.23	0.56	67.17	1.00	67.17	0.108	No	No	1.94
325	7.38	6.84	1.73	0.22	0.56	67.63	1.00	67.63	0.109	No	No	1.95
326	7.40	6.90	1.72	0.21	0.55	68.17	1.00	68.17	0.109	No	No	1.96
327	7.42	6.94	1.71	0.20	0.55	68.49	1.00	68.49	0.110	No	No	1.96
328	7.44	6.95	1.71	0.19	0.55	68.55	1.00	68.55	0.110	No	No	1.96
329	7.46	6.89	1.71	0.19	0.55	67.97	1.00	67.97	0.109	No	No	1.95
330	7.48	6.76	1.73	0.20	0.56	66.55	1.00	66.55	0.107	No	No	1.91
331	7.50	6.64	1.74	0.20	0.56	65.35	1.00	65.35	0.106	No	No	1.89
332	7.52	6.56	1.75	0.21	0.56	64.48	1.00	64.48	0.105	No	No	1.87
333	7.54	6.45	1.76	0.22	0.57	63.29	1.00	63.29	0.104	No	No	1.84
334	7.56	6.36	1.77	0.23	0.57	62.37	1.00	62.37	0.103	No	No	1.82
335	7.58	6.29	1.78	0.23	0.58	61.64	1.00	61.64	0.102	No	No	1.80
336	7.60	6.17	1.79	0.23	0.58	60.40	1.00	60.40	0.100	No	No	1.78

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	6.02	1.80	0.24	0.59	58.87	1.00	58.87	0.099	No	No	1.75
338	7.64	5.92	1.81	0.24	0.59	57.82	1.00	57.82	0.098	No	No	1.73
339	7.66	5.84	1.82	0.24	0.59	56.97	1.00	56.97	0.097	No	No	1.72
340	7.68	5.80	1.82	0.23	0.59	56.47	1.00	56.47	0.097	No	No	1.71
341	7.70	5.82	1.81	0.22	0.59	56.64	1.00	56.64	0.097	No	No	1.71
342	7.72	5.90	1.79	0.21	0.58	57.36	1.00	57.36	0.098	No	No	1.72
343	7.74	5.98	1.78	0.19	0.58	58.10	1.00	58.10	0.098	No	No	1.73
344	7.76	6.02	1.77	0.18	0.57	58.46	1.00	58.46	0.099	No	No	1.73
345	7.78	6.02	1.77	0.18	0.57	58.48	1.00	58.48	0.099	No	No	1.73
346	7.80	6.00	1.77	0.18	0.58	58.22	1.00	58.22	0.098	No	No	1.72
347	7.82	5.95	1.78	0.19	0.58	57.65	1.00	57.65	0.098	No	No	1.71
348	7.84	5.90	1.79	0.20	0.58	57.10	1.00	57.10	0.097	No	No	1.70
349	7.86	5.88	1.79	0.20	0.58	56.82	1.00	56.82	0.097	No	No	1.70
350	7.88	5.84	1.80	0.20	0.59	56.38	1.00	56.38	0.097	No	No	1.69
351	7.90	5.79	1.80	0.20	0.59	55.87	1.00	55.87	0.096	No	No	1.68
352	7.92	5.75	1.80	0.19	0.59	55.44	1.00	55.44	0.096	No	No	1.67
353	7.94	5.69	1.80	0.19	0.59	54.81	1.00	54.81	0.095	No	No	1.66
354	7.96	5.58	1.80	0.18	0.59	53.70	1.00	53.70	0.094	No	No	1.64
355	7.98	5.37	1.83	0.19	0.60	51.56	1.00	51.56	0.093	No	No	1.61
356	8.00	5.12	1.86	0.20	0.61	49.10	1.00	49.10	0.091	No	No	1.58
357	8.02	4.86	1.89	0.22	0.62	46.42	1.00	46.42	0.089	No	No	1.54
358	8.04	4.61	1.92	0.24	0.63	43.98	1.00	43.98	0.087	No	No	1.50
359	8.06	4.43	1.95	0.25	0.64	42.14	1.00	42.14	0.085	No	No	1.47
360	8.08	4.40	1.95	0.25	0.64	41.82	1.00	41.82	0.085	No	No	1.47
361	8.10	4.40	1.94	0.24	0.64	41.79	1.00	41.79	0.085	No	No	1.47
362	8.12	4.40	1.94	0.23	0.64	41.72	1.00	41.72	0.085	No	No	1.46
363	8.14	4.36	1.94	0.22	0.64	41.33	1.00	41.33	0.084	No	No	1.46
364	8.16	4.29	1.94	0.21	0.64	40.56	1.00	40.56	0.084	No	No	1.44
365	8.18	4.18	1.95	0.21	0.64	39.48	1.00	39.48	0.083	No	No	1.43
366	8.20	4.08	1.97	0.22	0.65	38.46	1.00	38.46	0.082	No	No	1.41
367	8.22	4.02	1.98	0.23	0.65	37.81	1.00	37.81	0.081	No	No	1.40
368	8.24	3.97	1.99	0.24	0.66	37.28	1.00	37.28	0.081	No	No	1.39
369	8.26	3.93	2.01	0.26	0.67	36.87	1.00	36.87	0.081	No	No	1.39
370	8.28	3.89	2.03	0.29	0.67	36.49	1.00	36.49	0.080	No	No	1.38
371	8.30	3.85	2.04	0.32	0.68	36.03	1.00	36.03	0.080	No	No	1.37
372	8.32	3.78	2.07	0.34	0.69	35.28	1.00	35.28	0.079	No	No	1.36
373	8.34	3.72	2.07	0.34	0.69	34.73	1.00	34.73	0.079	No	No	1.35
374	8.36	3.67	2.07	0.33	0.69	34.14	1.00	34.14	0.078	No	No	1.34
375	8.38	3.62	2.06	0.30	0.69	33.71	1.00	33.71	0.078	No	No	1.33
376	8.40	3.58	2.05	0.26	0.68	33.24	1.00	33.24	0.078	No	No	1.33
377	8.42	3.48	2.05	0.23	0.68	32.29	1.00	32.29	0.077	No	No	1.31
378	8.44	3.34	2.06	0.23	0.69	30.90	1.00	30.90	4.000	Yes	No	2.00
379	8.46	3.17	2.10	0.25	0.70	29.18	1.00	29.18	4.000	Yes	No	2.00
380	8.48	2.95	2.13	0.26	0.71	27.03	1.00	27.03	4.000	Yes	No	2.00
381	8.50	2.71	2.18	0.28	0.73	24.74	1.00	24.74	4.000	Yes	No	2.00
382	8.52	2.51	2.22	0.29	0.75	22.75	1.00	22.75	4.000	Yes	No	2.00
383	8.54	2.27	2.28	0.33	0.77	20.45	1.00	20.45	4.000	Yes	No	2.00
384	8.56	2.06	2.33	0.34	0.79	18.39	1.00	18.39	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	1.86	2.40	0.40	0.82	16.39	2.37	38.87	4.000	Yes	No	2.00
386	8.60	1.66	2.48	0.48	0.85	14.42	2.86	41.18	4.000	Yes	No	2.00
387	8.62	1.45	2.58	0.63	0.89	12.46	4.91	61.14	4.000	Yes	No	2.00
388	8.64	1.29	2.68	0.81	0.92	10.90	9.03	98.37	4.000	Yes	No	2.00
389	8.66	1.13	2.80	1.10	0.97	9.35	5.85	54.69	4.000	Yes	Yes	2.00
390	8.68	0.98	2.94	1.56	1.00	7.86	7.77	61.03	4.000	Yes	Yes	2.00
391	8.70	0.85	3.08	2.26	1.00	6.65	10.23	67.95	0.317	No	Yes	2.00
392	8.72	0.73	3.22	3.19	1.00	5.56	13.30	73.88	0.265	No	Yes	2.00
393	8.74	0.63	3.38	4.45	1.00	4.55	17.32	78.81	0.217	No	Yes	2.00
394	8.76	0.54	3.51	5.87	1.00	3.75	21.83	81.81	0.179	No	Yes	2.00
395	8.78	0.52	3.56	6.46	1.00	3.55	23.48	83.27	0.169	No	Yes	2.00
396	8.80	0.54	3.53	6.16	1.00	3.66	22.57	82.69	0.175	No	Yes	2.00
397	8.82	0.57	3.48	5.39	1.00	3.93	20.48	80.47	0.187	No	Yes	2.00
398	8.84	0.61	3.40	4.50	1.00	4.33	17.93	77.60	0.206	No	Yes	2.00
399	8.86	0.65	3.33	3.88	1.00	4.67	16.09	75.20	0.223	No	Yes	2.00
400	8.88	0.64	3.33	3.70	1.00	4.62	15.89	73.47	0.220	No	Yes	2.00
401	8.90	0.60	3.36	3.82	1.00	4.26	16.97	72.25	0.203	No	Yes	2.00
402	8.92	0.58	3.40	3.96	1.00	3.98	17.94	71.47	0.190	No	Yes	2.00
403	8.94	0.60	3.36	3.71	1.00	4.22	16.87	71.11	0.201	No	Yes	2.00
404	8.96	0.79	3.16	2.68	1.00	5.93	11.87	70.38	0.283	No	Yes	2.00
405	8.98	1.27	2.82	1.52	0.98	10.43	6.16	64.22	4.000	Yes	Yes	2.00
406	9.00	1.86	2.57	0.97	0.88	15.95	4.38	69.88	4.000	Yes	No	2.00
407	9.02	2.52	2.36	0.66	0.80	22.21	2.20	48.79	4.000	Yes	No	2.00
408	9.04	3.16	2.21	0.49	0.75	28.22	1.00	28.22	4.000	Yes	No	2.00
409	9.06	3.67	2.11	0.38	0.71	33.14	1.00	33.14	4.000	Yes	No	2.00
410	9.08	3.89	2.06	0.32	0.69	35.21	1.00	35.21	4.000	Yes	No	2.00
411	9.10	4.01	2.03	0.29	0.68	36.34	1.00	36.34	4.000	Yes	No	2.00
412	9.12	4.07	2.01	0.28	0.67	36.83	1.00	36.83	0.081	No	No	1.34
413	9.14	4.12	2.00	0.26	0.67	37.26	1.00	37.26	0.081	No	No	1.35
414	9.16	4.11	1.99	0.24	0.66	37.20	1.00	37.20	0.081	No	No	1.35
415	9.18	4.09	1.99	0.23	0.66	36.93	1.00	36.93	0.081	No	No	1.34
416	9.20	4.04	2.00	0.24	0.67	36.43	1.00	36.43	0.080	No	No	1.33
417	9.22	3.95	2.01	0.24	0.67	35.54	1.00	35.54	0.080	No	No	1.32
418	9.24	3.83	2.03	0.26	0.68	34.35	1.00	34.35	0.079	No	No	1.30
419	9.26	3.72	2.05	0.26	0.69	33.35	1.00	33.35	0.078	No	No	1.29
420	9.28	3.66	2.06	0.27	0.69	32.74	1.00	32.74	0.077	No	No	1.28
421	9.30	3.55	2.08	0.27	0.70	31.70	1.00	31.70	4.000	Yes	No	2.00
422	9.32	3.34	2.11	0.30	0.71	29.65	1.00	29.65	4.000	Yes	No	2.00
423	9.34	3.15	2.15	0.31	0.72	27.82	1.00	27.82	4.000	Yes	No	2.00
424	9.36	2.95	2.19	0.34	0.74	25.90	1.00	25.90	4.000	Yes	No	2.00
425	9.38	2.48	2.29	0.41	0.78	21.42	1.00	21.42	4.000	Yes	No	2.00
426	9.40	2.08	2.40	0.50	0.82	17.68	2.40	42.39	4.000	Yes	No	2.00
427	9.42	1.82	2.49	0.58	0.85	15.24	2.90	44.19	4.000	Yes	No	2.00
428	9.44	1.56	2.59	0.68	0.89	12.81	4.98	63.72	4.000	Yes	No	2.00
429	9.46	1.30	2.71	0.84	0.94	10.39	4.78	49.61	4.000	Yes	Yes	2.00
430	9.48	1.30	2.71	0.84	0.94	10.37	4.78	49.61	0.495	No	Yes	2.00
431	9.50	1.30	2.71	0.84	0.94	10.36	4.79	49.61	0.494	No	Yes	2.00
432	9.52	1.30	2.71	0.84	0.94	10.35	4.79	49.61	0.494	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	1.16	2.79	0.96	0.97	9.00	5.70	51.36	0.429	No	Yes	2.00
434	9.56	1.01	2.88	1.12	1.00	7.67	6.92	53.08	0.366	No	Yes	2.00
435	9.58	0.87	2.99	1.35	1.00	6.36	8.59	54.69	0.304	No	Yes	2.00
436	9.60	0.96	3.02	1.99	1.00	7.19	9.18	65.99	0.343	No	Yes	2.00
437	9.62	1.07	3.02	2.43	1.00	8.10	9.19	74.39	0.386	No	Yes	2.00
438	9.64	1.33	2.92	2.35	1.00	10.46	7.53	78.74	0.499	No	Yes	2.00
439	9.66	1.61	2.83	2.21	0.98	12.95	6.23	80.72	0.618	No	Yes	2.00
440	9.68	1.83	2.78	2.18	0.96	14.90	5.55	82.77	0.711	No	Yes	2.00
441	9.70	1.78	2.77	2.05	0.96	14.46	5.50	79.54	0.690	No	Yes	2.00
442	9.72	1.72	2.78	2.00	0.96	13.87	5.61	77.81	0.662	No	Yes	2.00
443	9.74	1.66	2.79	2.00	0.97	13.37	5.78	77.22	4.000	Yes	Yes	2.00
444	9.76	1.76	2.76	1.92	0.96	14.22	5.39	76.71	4.000	Yes	Yes	2.00
445	9.78	2.23	2.60	1.46	0.90	18.50	5.47	101.30	4.000	Yes	No	2.00
446	9.80	2.70	2.47	1.16	0.85	22.82	2.80	63.80	4.000	Yes	No	2.00
447	9.82	3.13	2.36	0.92	0.81	26.77	2.18	58.46	4.000	Yes	No	2.00
448	9.84	3.49	2.26	0.72	0.77	30.08	1.80	54.12	4.000	Yes	No	2.00
449	9.86	3.65	2.19	0.55	0.74	31.61	1.60	50.45	4.000	Yes	No	2.00
450	9.88	3.50	2.18	0.48	0.74	30.18	1.00	30.18	0.075	No	No	1.23
451	9.90	3.39	2.17	0.42	0.73	29.20	1.00	29.20	0.074	No	No	1.21
452	9.92	3.40	2.16	0.38	0.73	29.26	1.00	29.26	0.074	No	No	1.21
453	9.94	3.55	2.12	0.34	0.71	30.65	1.00	30.65	0.076	No	No	1.23
454	9.96	3.79	2.08	0.31	0.70	32.88	1.00	32.88	0.077	No	No	1.26
455	9.98	4.06	2.04	0.29	0.68	35.32	1.00	35.32	0.079	No	No	1.29
456	10.00	4.30	2.01	0.28	0.67	37.52	1.00	37.52	0.081	No	No	1.32
457	10.02	4.47	1.99	0.27	0.66	39.09	1.00	39.09	0.083	No	No	1.34
458	10.04	4.54	1.98	0.28	0.66	39.71	1.00	39.71	0.083	No	No	1.35
459	10.06	4.54	1.99	0.28	0.66	39.71	1.00	39.71	0.083	No	No	1.35
460	10.08	4.50	1.99	0.27	0.66	39.28	1.00	39.28	0.083	No	No	1.34
461	10.10	4.43	1.99	0.27	0.67	38.56	1.00	38.56	0.082	No	No	1.33
462	10.12	4.35	2.00	0.26	0.67	37.85	1.00	37.85	0.082	No	No	1.32
463	10.14	4.33	1.99	0.25	0.67	37.64	1.00	37.64	0.081	No	No	1.32
464	10.16	4.36	1.98	0.24	0.66	37.87	1.00	37.87	0.082	No	No	1.32
465	10.18	4.42	1.98	0.24	0.66	38.45	1.00	38.45	0.082	No	No	1.33
466	10.20	4.54	1.97	0.24	0.66	39.50	1.00	39.50	0.083	No	No	1.34
467	10.22	4.74	1.95	0.23	0.65	41.34	1.00	41.34	0.084	No	No	1.37
468	10.24	4.88	1.93	0.23	0.64	42.57	1.00	42.57	0.085	No	No	1.38
469	10.26	4.95	1.93	0.24	0.64	43.16	1.00	43.16	0.086	No	No	1.39
470	10.28	5.00	1.92	0.24	0.64	43.56	1.00	43.56	0.086	No	No	1.40
471	10.30	5.06	1.92	0.23	0.64	44.12	1.00	44.12	0.087	No	No	1.40
472	10.32	5.05	1.91	0.22	0.64	44.04	1.00	44.04	0.087	No	No	1.40
473	10.34	5.03	1.91	0.22	0.64	43.83	1.00	43.83	0.087	No	No	1.40
474	10.36	5.02	1.91	0.22	0.64	43.63	1.00	43.63	0.086	No	No	1.40
475	10.38	4.97	1.91	0.21	0.64	43.22	1.00	43.22	0.086	No	No	1.39
476	10.40	4.85	1.92	0.21	0.64	42.03	1.00	42.03	0.085	No	No	1.37
477	10.42	4.64	1.95	0.22	0.65	40.10	1.00	40.10	0.083	No	No	1.35
478	10.44	4.35	1.98	0.22	0.66	37.38	1.00	37.38	0.081	No	No	1.31
479	10.46	3.99	2.03	0.25	0.68	34.03	1.00	34.03	0.078	No	No	1.26
480	10.48	3.68	2.10	0.30	0.71	31.15	1.00	31.15	0.076	No	No	1.23

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	10.50	3.36	2.16	0.35	0.73	28.17	1.00	28.17	0.073	No	No	1.18
482	10.52	3.08	2.23	0.42	0.76	25.60	1.00	25.60	0.071	No	No	1.15
483	10.54	2.98	2.26	0.46	0.77	24.58	1.00	24.58	0.070	No	No	1.14
484	10.56	2.99	2.27	0.48	0.77	24.62	1.00	24.62	0.071	No	No	1.14
485	10.58	2.94	2.27	0.48	0.77	24.15	1.00	24.15	0.070	No	No	1.13
486	10.60	2.89	2.28	0.47	0.78	23.74	1.00	23.74	0.070	No	No	1.12
487	10.62	2.83	2.28	0.45	0.78	23.15	1.00	23.15	0.069	No	No	1.12
488	10.64	2.66	2.31	0.47	0.79	21.64	1.00	21.64	0.068	No	No	1.10
489	10.66	2.49	2.34	0.47	0.80	20.09	1.00	20.09	0.067	No	No	1.07
490	10.68	2.37	2.37	0.48	0.81	18.96	2.23	42.21	0.085	No	No	1.37
491	10.70	2.30	2.39	0.50	0.82	18.38	2.32	42.72	0.086	No	No	1.38
492	10.72	2.29	2.40	0.51	0.82	18.27	2.35	42.94	0.086	No	No	1.38
493	10.74	2.35	2.39	0.51	0.82	18.72	2.30	43.11	0.086	No	No	1.38
494	10.76	2.44	2.37	0.52	0.81	19.54	2.23	43.51	0.086	No	No	1.39
495	10.78	2.54	2.35	0.52	0.81	20.41	2.14	43.77	0.086	No	No	1.39
496	10.80	2.61	2.34	0.51	0.80	21.02	2.08	43.65	0.086	No	No	1.39
497	10.82	2.65	2.32	0.48	0.79	21.37	1.00	21.37	0.068	No	No	1.09
498	10.84	2.64	2.31	0.45	0.79	21.27	1.00	21.27	0.068	No	No	1.09
499	10.86	2.51	2.33	0.44	0.80	20.09	1.00	20.09	4.000	Yes	No	2.00
500	10.88	2.35	2.36	0.43	0.81	18.66	1.00	18.66	4.000	Yes	No	2.00
501	10.90	2.19	2.40	0.45	0.82	17.23	2.37	40.84	4.000	Yes	No	2.00
502	10.92	2.04	2.45	0.51	0.84	15.82	2.67	42.22	4.000	Yes	No	2.00
503	10.94	1.87	2.52	0.59	0.87	14.36	3.14	45.09	4.000	Yes	No	2.00
504	10.96	1.76	2.57	0.69	0.89	13.34	4.55	60.73	4.000	Yes	No	2.00
505	10.98	1.63	2.65	0.87	0.92	12.11	7.64	92.60	4.000	Yes	No	2.00
506	11.00	1.48	2.75	1.16	0.96	10.79	5.31	57.29	4.000	Yes	Yes	2.00
507	11.02	1.32	2.88	1.62	1.00	9.40	6.87	64.64	4.000	Yes	Yes	2.00
508	11.04	1.18	3.02	2.43	1.00	8.21	9.09	74.67	0.392	No	Yes	2.00
509	11.06	1.05	3.15	3.44	1.00	7.12	11.68	83.14	0.340	No	Yes	2.00
510	11.08	0.94	3.27	4.51	1.00	6.22	14.35	89.20	0.297	No	Yes	2.00
511	11.10	0.86	3.35	5.48	1.00	5.58	16.69	93.16	0.266	No	Yes	2.00
512	11.12	0.81	3.42	6.21	1.00	5.14	18.51	95.13	0.245	No	Yes	2.00
513	11.14	0.78	3.43	6.18	1.00	4.86	19.11	92.80	0.232	No	Yes	2.00
514	11.16	0.75	3.44	5.86	1.00	4.65	19.17	89.15	0.222	No	Yes	2.00
515	11.18	0.74	3.41	5.23	1.00	4.58	18.45	84.44	0.218	No	Yes	2.00
516	11.20	0.74	3.38	4.53	1.00	4.55	17.45	79.29	0.217	No	Yes	2.00
517	11.22	0.75	3.34	3.79	1.00	4.58	16.14	73.96	0.219	No	Yes	2.00
518	11.24	0.76	3.29	3.26	1.00	4.70	14.96	70.31	0.224	No	Yes	2.00
519	11.26	0.79	3.24	2.86	1.00	4.92	13.77	67.82	0.235	No	Yes	2.00
520	11.28	0.84	3.20	2.65	1.00	5.28	12.75	67.37	0.252	No	Yes	2.00
521	11.30	0.88	3.17	2.55	1.00	5.64	12.02	67.74	0.269	No	Yes	2.00
522	11.32	0.92	3.15	2.59	1.00	5.95	11.67	69.42	0.284	No	Yes	2.00
523	11.34	0.96	3.14	2.73	1.00	6.27	11.51	72.14	0.299	No	Yes	2.00
524	11.36	0.99	3.16	3.05	1.00	6.51	11.77	76.64	0.311	No	Yes	2.00
525	11.38	1.01	3.18	3.46	1.00	6.61	12.29	81.27	0.315	No	Yes	2.00
526	11.40	1.02	3.20	3.90	1.00	6.70	12.84	86.02	0.320	No	Yes	2.00
527	11.42	1.06	3.20	4.19	1.00	7.04	12.84	90.41	0.336	No	Yes	2.00
528	11.44	1.09	3.21	4.43	1.00	7.28	12.88	93.82	0.347	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
529	11.46	1.12	3.20	4.46	1.00	7.48	12.72	95.11	0.357	No	Yes	2.00
530	11.48	1.15	3.18	4.37	1.00	7.73	12.33	95.31	0.369	No	Yes	2.00
531	11.50	1.18	3.16	4.20	1.00	7.99	11.86	94.79	0.381	No	Yes	2.00
532	11.52	1.18	3.15	4.08	1.00	7.98	11.72	93.46	0.380	No	Yes	2.00
533	11.54	1.18	3.15	3.96	1.00	7.96	11.57	92.08	0.380	No	Yes	2.00
534	11.56	1.19	3.14	3.87	1.00	7.97	11.44	91.19	0.380	No	Yes	2.00
535	11.58	1.19	3.14	3.84	1.00	7.99	11.38	90.94	0.381	No	Yes	2.00
536	11.60	1.20	3.14	3.82	1.00	8.02	11.34	90.92	0.383	No	Yes	2.00
537	11.62	1.22	3.13	3.85	1.00	8.20	11.20	91.87	0.391	No	Yes	2.00
538	11.64	1.26	3.12	3.88	1.00	8.48	11.00	93.25	0.404	No	Yes	2.00
539	11.66	1.30	3.11	3.95	1.00	8.82	10.81	95.35	0.421	No	Yes	2.00
540	11.68	1.33	3.11	4.09	1.00	9.06	10.80	97.84	0.432	No	Yes	2.00
541	11.70	1.37	3.10	4.16	1.00	9.33	10.69	99.76	0.445	No	Yes	2.00
542	11.72	1.39	3.10	4.21	1.00	9.52	10.61	100.94	0.454	No	Yes	2.00
543	11.74	1.41	3.09	4.15	1.00	9.65	10.44	100.79	0.460	No	Yes	2.00
544	11.76	1.42	3.08	4.04	1.00	9.73	10.25	99.71	0.464	No	Yes	2.00
545	11.78	1.46	3.06	3.77	1.00	9.98	9.76	97.37	0.476	No	Yes	2.00
546	11.80	1.50	3.02	3.47	1.00	10.26	9.19	94.34	0.490	No	Yes	2.00
547	11.82	1.53	2.99	3.18	1.00	10.48	8.69	91.03	0.500	No	Yes	2.00
548	11.84	1.54	2.98	3.02	1.00	10.59	8.41	89.06	0.505	No	Yes	2.00
549	11.86	1.53	2.97	2.93	1.00	10.49	8.36	87.64	0.500	No	Yes	2.00
550	11.88	1.49	2.99	2.94	1.00	10.14	8.56	86.85	0.484	No	Yes	2.00
551	11.90	1.42	3.02	3.07	1.00	9.55	9.11	87.04	0.456	No	Yes	2.00
552	11.92	1.34	3.06	3.25	1.00	8.92	9.80	87.38	0.425	No	Yes	2.00
553	11.94	1.27	3.09	3.39	1.00	8.38	10.42	87.33	0.400	No	Yes	2.00
554	11.96	1.21	3.11	3.44	1.00	7.91	10.89	86.22	0.378	No	Yes	2.00
555	11.98	1.16	3.14	3.46	1.00	7.49	11.32	84.86	0.357	No	Yes	2.00
556	12.00	1.13	3.14	3.34	1.00	7.28	11.36	82.73	0.347	No	Yes	2.00
557	12.02	1.13	3.12	3.12	1.00	7.24	11.07	80.12	0.345	No	Yes	2.00
558	12.04	1.16	3.08	2.77	1.00	7.49	10.27	76.96	0.358	No	Yes	2.00
559	12.06	1.25	3.02	2.38	1.00	8.13	9.07	73.72	0.388	No	Yes	2.00
560	12.08	1.36	2.94	1.99	1.00	9.01	7.78	70.15	0.430	No	Yes	2.00
561	12.10	1.49	2.87	1.77	1.00	9.97	6.83	68.14	0.476	No	Yes	2.00
562	12.12	1.60	2.83	1.67	0.99	10.85	6.23	67.62	0.518	No	Yes	2.00
563	12.14	1.60	2.84	1.74	1.00	10.85	6.36	69.00	0.518	No	Yes	2.00
564	12.16	1.64	2.84	1.82	1.00	11.10	6.37	70.73	0.530	No	Yes	2.00
565	12.18	1.58	2.88	2.02	1.00	10.63	6.92	73.56	0.507	No	Yes	2.00
566	12.20	1.64	2.86	2.01	1.00	11.12	6.67	74.20	0.530	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	1.99	0.00	0.00	0.02	0.00
7.34	1.95	0.00	0.00	0.02	0.00	7.36	1.94	0.00	0.00	0.02	0.00
7.38	1.95	0.00	0.00	0.02	0.00	7.40	1.96	0.00	0.00	0.02	0.00
7.42	1.96	0.00	0.00	0.02	0.00	7.44	1.96	0.00	0.00	0.02	0.00
7.46	1.95	0.00	0.00	0.02	0.00	7.48	1.91	0.00	0.00	0.02	0.00
7.50	1.89	0.00	0.00	0.02	0.00	7.52	1.87	0.00	0.00	0.02	0.00
7.54	1.84	0.00	0.00	0.02	0.00	7.56	1.82	0.00	0.00	0.02	0.00
7.58	1.80	0.00	0.00	0.02	0.00	7.60	1.78	0.00	0.00	0.02	0.00
7.62	1.75	0.00	0.00	0.02	0.00	7.64	1.73	0.00	0.00	0.02	0.00
7.66	1.72	0.00	0.00	0.02	0.00	7.68	1.71	0.00	0.00	0.02	0.00
7.70	1.71	0.00	0.00	0.02	0.00	7.72	1.72	0.00	0.00	0.02	0.00
7.74	1.73	0.00	0.00	0.02	0.00	7.76	1.73	0.00	0.00	0.02	0.00
7.78	1.73	0.00	0.00	0.02	0.00	7.80	1.72	0.00	0.00	0.02	0.00
7.82	1.71	0.00	0.00	0.02	0.00	7.84	1.70	0.00	0.00	0.02	0.00
7.86	1.70	0.00	0.00	0.02	0.00	7.88	1.69	0.00	0.00	0.02	0.00
7.90	1.68	0.00	0.00	0.02	0.00	7.92	1.67	0.00	0.00	0.02	0.00
7.94	1.66	0.00	0.00	0.02	0.00	7.96	1.64	0.00	0.00	0.02	0.00
7.98	1.61	0.00	0.00	0.02	0.00	8.00	1.58	0.00	0.00	0.02	0.00
8.02	1.54	0.00	0.00	0.02	0.00	8.04	1.50	0.00	0.00	0.02	0.00
8.06	1.47	0.00	0.00	0.02	0.00	8.08	1.47	0.00	0.00	0.02	0.00
8.10	1.47	0.00	0.00	0.02	0.00	8.12	1.46	0.00	0.00	0.02	0.00
8.14	1.46	0.00	0.00	0.02	0.00	8.16	1.44	0.00	0.00	0.02	0.00
8.18	1.43	0.00	0.00	0.02	0.00	8.20	1.41	0.00	0.00	0.02	0.00
8.22	1.40	0.00	0.00	0.02	0.00	8.24	1.39	0.00	0.00	0.02	0.00
8.26	1.39	0.00	0.00	0.02	0.00	8.28	1.38	0.00	0.00	0.02	0.00
8.30	1.37	0.00	0.00	0.02	0.00	8.32	1.36	0.00	0.00	0.02	0.00
8.34	1.35	0.00	0.00	0.02	0.00	8.36	1.34	0.00	0.00	0.02	0.00
8.38	1.33	0.00	0.00	0.02	0.00	8.40	1.33	0.00	0.00	0.02	0.00
8.42	1.31	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	1.34	0.00	0.00	0.02	0.00
9.14	1.35	0.00	0.00	0.02	0.00	9.16	1.35	0.00	0.00	0.02	0.00
9.18	1.34	0.00	0.00	0.02	0.00	9.20	1.33	0.00	0.00	0.02	0.00
9.22	1.32	0.00	0.00	0.02	0.00	9.24	1.30	0.00	0.00	0.02	0.00
9.26	1.29	0.00	0.00	0.02	0.00	9.28	1.28	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	2.00	0.00	0.00	0.02	0.00
9.42	2.00	0.00	0.00	0.02	0.00	9.44	2.00	0.00	0.00	0.02	0.00
9.46	2.00	0.00	0.00	0.02	0.00	9.48	2.00	0.00	0.00	0.02	0.00
9.50	2.00	0.00	0.00	0.02	0.00	9.52	2.00	0.00	0.00	0.02	0.00
9.54	2.00	0.00	0.00	0.02	0.00	9.56	2.00	0.00	0.00	0.02	0.00
9.58	2.00	0.00	0.00	0.02	0.00	9.60	2.00	0.00	0.00	0.02	0.00
9.62	2.00	0.00	0.00	0.02	0.00	9.64	2.00	0.00	0.00	0.02	0.00
9.66	2.00	0.00	0.00	0.02	0.00	9.68	2.00	0.00	0.00	0.02	0.00
9.70	2.00	0.00	0.00	0.02	0.00	9.72	2.00	0.00	0.00	0.02	0.00
9.74	2.00	0.00	0.00	0.02	0.00	9.76	2.00	0.00	0.00	0.02	0.00
9.78	2.00	0.00	0.00	0.02	0.00	9.80	2.00	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	2.00	0.00	0.00	0.02	0.00	9.88	1.23	0.00	0.00	0.02	0.00
9.90	1.21	0.00	0.00	0.02	0.00	9.92	1.21	0.00	0.00	0.02	0.00
9.94	1.23	0.00	0.00	0.02	0.00	9.96	1.26	0.00	0.00	0.02	0.00
9.98	1.29	0.00	0.00	0.02	0.00	10.00	1.32	0.00	0.00	0.02	0.00
10.02	1.34	0.00	0.00	0.02	0.00	10.04	1.35	0.00	0.00	0.02	0.00
10.06	1.35	0.00	0.00	0.02	0.00	10.08	1.34	0.00	0.00	0.02	0.00
10.10	1.33	0.00	0.00	0.02	0.00	10.12	1.32	0.00	0.00	0.02	0.00
10.14	1.32	0.00	0.00	0.02	0.00	10.16	1.32	0.00	0.00	0.02	0.00
10.18	1.33	0.00	0.00	0.02	0.00	10.20	1.34	0.00	0.00	0.02	0.00
10.22	1.37	0.00	0.00	0.02	0.00	10.24	1.38	0.00	0.00	0.02	0.00
10.26	1.39	0.00	0.00	0.02	0.00	10.28	1.40	0.00	0.00	0.02	0.00
10.30	1.40	0.00	0.00	0.02	0.00	10.32	1.40	0.00	0.00	0.02	0.00
10.34	1.40	0.00	0.00	0.02	0.00	10.36	1.40	0.00	0.00	0.02	0.00
10.38	1.39	0.00	0.00	0.02	0.00	10.40	1.37	0.00	0.00	0.02	0.00
10.42	1.35	0.00	0.00	0.02	0.00	10.44	1.31	0.00	0.00	0.02	0.00
10.46	1.26	0.00	0.00	0.02	0.00	10.48	1.23	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.50	1.18	0.00	0.00	0.02	0.00	10.52	1.15	0.00	0.00	0.02	0.00
10.54	1.14	0.00	0.00	0.02	0.00	10.56	1.14	0.00	0.00	0.02	0.00
10.58	1.13	0.00	0.00	0.02	0.00	10.60	1.12	0.00	0.00	0.02	0.00
10.62	1.12	0.00	0.00	0.02	0.00	10.64	1.10	0.00	0.00	0.02	0.00
10.66	1.07	0.00	0.00	0.02	0.00	10.68	1.37	0.00	0.00	0.02	0.00
10.70	1.38	0.00	0.00	0.02	0.00	10.72	1.38	0.00	0.00	0.02	0.00
10.74	1.38	0.00	0.00	0.02	0.00	10.76	1.39	0.00	0.00	0.02	0.00
10.78	1.39	0.00	0.00	0.02	0.00	10.80	1.39	0.00	0.00	0.02	0.00
10.82	1.09	0.00	0.00	0.02	0.00	10.84	1.09	0.00	0.00	0.02	0.00
10.86	2.00	0.00	0.00	0.02	0.00	10.88	2.00	0.00	0.00	0.02	0.00
10.90	2.00	0.00	0.00	0.02	0.00	10.92	2.00	0.00	0.00	0.02	0.00
10.94	2.00	0.00	0.00	0.02	0.00	10.96	2.00	0.00	0.00	0.02	0.00
10.98	2.00	0.00	0.00	0.02	0.00	11.00	2.00	0.00	0.00	0.02	0.00
11.02	2.00	0.00	0.00	0.02	0.00	11.04	2.00	0.00	0.00	0.02	0.00
11.06	2.00	0.00	0.00	0.02	0.00	11.08	2.00	0.00	0.00	0.02	0.00
11.10	2.00	0.00	0.00	0.02	0.00	11.12	2.00	0.00	0.00	0.02	0.00
11.14	2.00	0.00	0.00	0.02	0.00	11.16	2.00	0.00	0.00	0.02	0.00
11.18	2.00	0.00	0.00	0.02	0.00	11.20	2.00	0.00	0.00	0.02	0.00
11.22	2.00	0.00	0.00	0.02	0.00	11.24	2.00	0.00	0.00	0.02	0.00
11.26	2.00	0.00	0.00	0.02	0.00	11.28	2.00	0.00	0.00	0.02	0.00
11.30	2.00	0.00	0.00	0.02	0.00	11.32	2.00	0.00	0.00	0.02	0.00
11.34	2.00	0.00	0.00	0.02	0.00	11.36	2.00	0.00	0.00	0.02	0.00
11.38	2.00	0.00	0.00	0.02	0.00	11.40	2.00	0.00	0.00	0.02	0.00
11.42	2.00	0.00	0.00	0.02	0.00	11.44	2.00	0.00	0.00	0.02	0.00
11.46	2.00	0.00	0.00	0.02	0.00	11.48	2.00	0.00	0.00	0.02	0.00
11.50	2.00	0.00	0.00	0.02	0.00	11.52	2.00	0.00	0.00	0.02	0.00
11.54	2.00	0.00	0.00	0.02	0.00	11.56	2.00	0.00	0.00	0.02	0.00
11.58	2.00	0.00	0.00	0.02	0.00	11.60	2.00	0.00	0.00	0.02	0.00
11.62	2.00	0.00	0.00	0.02	0.00	11.64	2.00	0.00	0.00	0.02	0.00
11.66	2.00	0.00	0.00	0.02	0.00	11.68	2.00	0.00	0.00	0.02	0.00
11.70	2.00	0.00	0.00	0.02	0.00	11.72	2.00	0.00	0.00	0.02	0.00
11.74	2.00	0.00	0.00	0.02	0.00	11.76	2.00	0.00	0.00	0.02	0.00
11.78	2.00	0.00	0.00	0.02	0.00	11.80	2.00	0.00	0.00	0.02	0.00
11.82	2.00	0.00	0.00	0.02	0.00	11.84	2.00	0.00	0.00	0.02	0.00
11.86	2.00	0.00	0.00	0.02	0.00	11.88	2.00	0.00	0.00	0.02	0.00
11.90	2.00	0.00	0.00	0.02	0.00	11.92	2.00	0.00	0.00	0.02	0.00
11.94	2.00	0.00	0.00	0.02	0.00	11.96	2.00	0.00	0.00	0.02	0.00
11.98	2.00	0.00	0.00	0.02	0.00	12.00	2.00	0.00	0.00	0.02	0.00
12.02	2.00	0.00	0.00	0.02	0.00	12.04	2.00	0.00	0.00	0.02	0.00
12.06	2.00	0.00	0.00	0.02	0.00	12.08	2.00	0.00	0.00	0.02	0.00
12.10	2.00	0.00	0.00	0.02	0.00	12.12	2.00	0.00	0.00	0.02	0.00
12.14	2.00	0.00	0.00	0.02	0.00	12.16	2.00	0.00	0.00	0.02	0.00
12.18	2.00	0.00	0.00	0.02	0.00	12.20	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

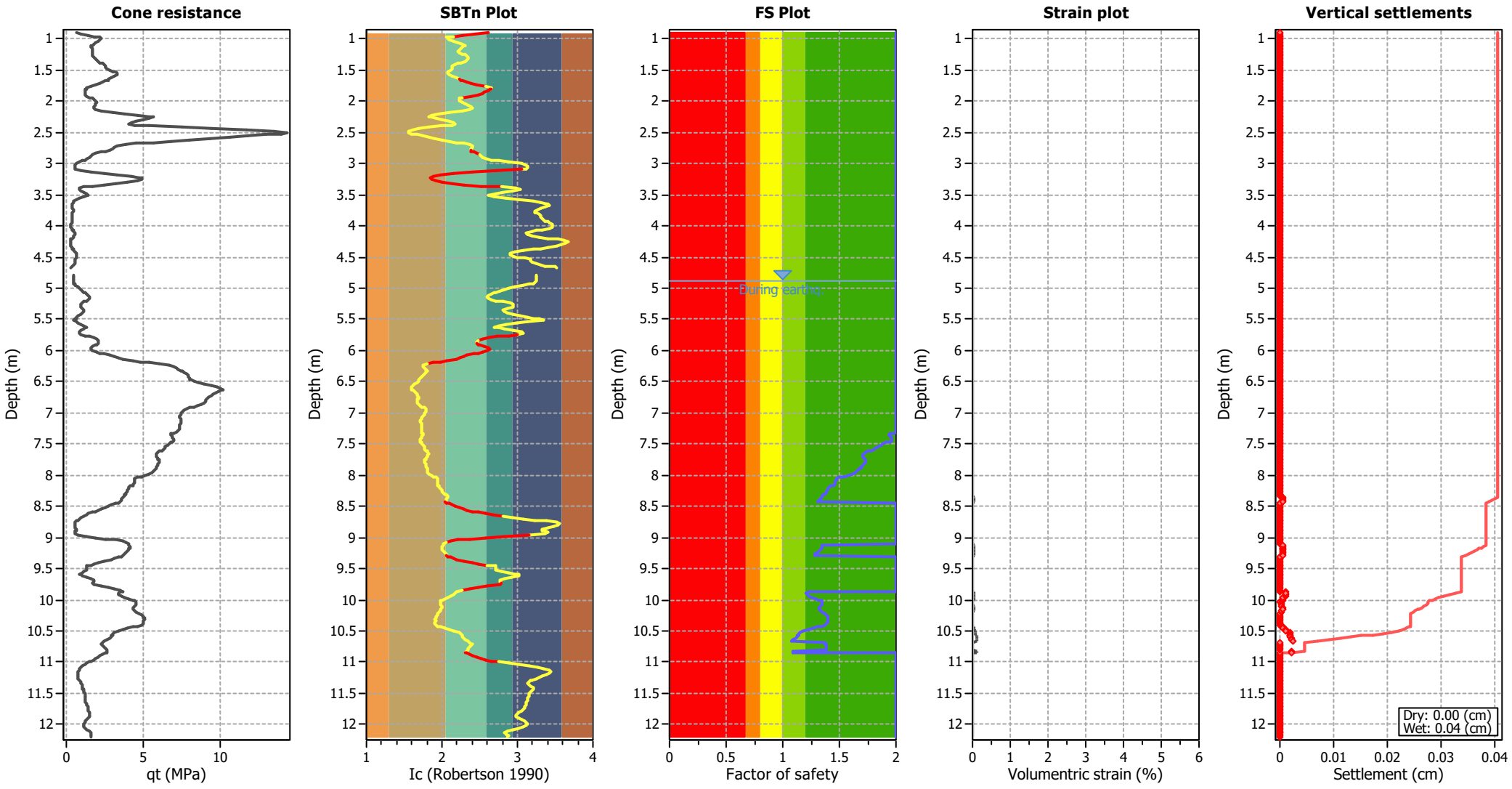
Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

This software is licensed to: Chritina Matthews

CPT name: CWLP CPT-4CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.88	67.37	2.00	0.00	0.73	0.00	4.90	67.37	2.00	0.00	0.73	0.00
4.92	67.28	2.00	0.00	0.73	0.00	4.94	66.50	2.00	0.00	0.73	0.00
4.96	66.09	2.00	0.00	0.72	0.00	4.98	65.42	2.00	0.00	0.72	0.00
5.00	64.01	2.00	0.00	0.72	0.00	5.02	63.38	2.00	0.00	0.72	0.00
5.04	64.42	2.00	0.00	0.72	0.00	5.06	64.13	2.00	0.00	0.72	0.00
5.08	131.55	2.00	0.00	0.72	0.00	5.10	114.65	2.00	0.00	0.72	0.00
5.12	100.86	2.00	0.00	0.72	0.00	5.14	94.37	2.00	0.00	0.71	0.00
5.16	99.43	2.00	0.00	0.71	0.00	5.18	120.11	2.00	0.00	0.71	0.00
5.20	70.97	2.00	0.00	0.71	0.00	5.22	76.00	2.00	0.00	0.71	0.00
5.24	80.47	2.00	0.00	0.71	0.00	5.26	82.80	2.00	0.00	0.71	0.00
5.28	82.41	2.00	0.00	0.71	0.00	5.30	81.79	2.00	0.00	0.71	0.00
5.32	78.71	2.00	0.00	0.70	0.00	5.34	76.24	2.00	0.00	0.70	0.00
5.36	75.54	2.00	0.00	0.70	0.00	5.38	75.95	2.00	0.00	0.70	0.00
5.40	76.36	2.00	0.00	0.70	0.00	5.42	78.24	2.00	0.00	0.70	0.00
5.44	79.67	2.00	0.00	0.70	0.00	5.46	80.53	2.00	0.00	0.70	0.00
5.48	81.27	2.00	0.00	0.70	0.00	5.50	80.66	2.00	0.00	0.69	0.00
5.52	79.09	2.00	0.00	0.69	0.00	5.54	76.09	2.00	0.00	0.69	0.00
5.56	72.45	2.00	0.00	0.69	0.00	5.58	67.46	2.00	0.00	0.69	0.00
5.60	64.12	2.00	0.00	0.69	0.00	5.62	131.31	2.00	0.00	0.69	0.00
5.64	68.06	2.00	0.00	0.69	0.00	5.66	73.85	2.00	0.00	0.69	0.00
5.68	81.15	2.00	0.00	0.68	0.00	5.70	87.43	2.00	0.00	0.68	0.00
5.72	90.56	2.00	0.00	0.68	0.00	5.74	90.65	2.00	0.00	0.68	0.00
5.76	87.38	2.00	0.00	0.68	0.00	5.78	81.28	2.00	0.00	0.68	0.00
5.80	115.28	2.00	0.00	0.68	0.00	5.82	73.36	2.00	0.00	0.68	0.00
5.84	64.45	2.00	0.00	0.68	0.00	5.86	61.86	2.00	0.00	0.67	0.00
5.88	60.62	2.00	0.00	0.67	0.00	5.90	60.36	2.00	0.00	0.67	0.00
5.92	59.52	2.00	0.00	0.67	0.00	5.94	75.29	2.00	0.00	0.67	0.00
5.96	98.35	2.00	0.00	0.67	0.00	5.98	110.86	2.00	0.00	0.67	0.00
6.00	92.90	2.00	0.00	0.67	0.00	6.02	75.45	2.00	0.00	0.67	0.00
6.04	66.20	2.00	0.00	0.66	0.00	6.06	64.73	2.00	0.00	0.66	0.00
6.08	62.54	2.00	0.00	0.66	0.00	6.10	61.44	2.00	0.00	0.66	0.00
6.12	61.02	2.00	0.00	0.66	0.00	6.14	61.22	2.00	0.00	0.66	0.00
6.16	62.39	2.00	0.00	0.66	0.00	6.18	50.66	2.00	0.00	0.66	0.00
6.20	56.69	2.00	0.00	0.66	0.00	6.22	63.18	2.00	0.00	0.65	0.00
6.24	69.43	2.00	0.00	0.65	0.00	6.26	72.71	2.00	0.00	0.65	0.00
6.28	74.66	2.00	0.00	0.65	0.00	6.30	76.17	2.00	0.00	0.65	0.00
6.32	77.28	2.00	0.00	0.65	0.00	6.34	79.05	2.00	0.00	0.65	0.00
6.36	79.85	2.00	0.00	0.65	0.00	6.38	81.05	2.00	0.00	0.65	0.00
6.40	81.70	2.00	0.00	0.64	0.00	6.42	82.28	2.00	0.00	0.64	0.00
6.44	82.60	2.00	0.00	0.64	0.00	6.46	83.17	2.00	0.00	0.64	0.00
6.48	83.98	2.00	0.00	0.64	0.00	6.50	85.81	2.00	0.00	0.64	0.00
6.52	88.19	2.00	0.00	0.64	0.00	6.54	92.30	2.00	0.00	0.64	0.00
6.56	96.73	2.00	0.00	0.64	0.00	6.58	100.18	2.00	0.00	0.63	0.00
6.60	102.61	2.00	0.00	0.63	0.00	6.62	103.96	2.00	0.00	0.63	0.00
6.64	103.23	2.00	0.00	0.63	0.00	6.66	101.63	2.00	0.00	0.63	0.00
6.68	99.76	2.00	0.00	0.63	0.00	6.70	97.65	2.00	0.00	0.63	0.00
6.72	96.07	2.00	0.00	0.63	0.00	6.74	94.59	2.00	0.00	0.63	0.00
6.76	93.47	2.00	0.00	0.62	0.00	6.78	92.76	2.00	0.00	0.62	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.80	92.40	2.00	0.00	0.62	0.00	6.82	91.87	2.00	0.00	0.62	0.00
6.84	90.43	2.00	0.00	0.62	0.00	6.86	88.55	2.00	0.00	0.62	0.00
6.88	86.30	2.00	0.00	0.62	0.00	6.90	83.55	2.00	0.00	0.62	0.00
6.92	80.70	2.00	0.00	0.62	0.00	6.94	78.69	2.00	0.00	0.61	0.00
6.96	77.06	2.00	0.00	0.61	0.00	6.98	75.95	2.00	0.00	0.61	0.00
7.00	75.23	2.00	0.00	0.61	0.00	7.02	74.52	2.00	0.00	0.61	0.00
7.04	73.82	2.00	0.00	0.61	0.00	7.06	73.60	2.00	0.00	0.61	0.00
7.08	73.64	2.00	0.00	0.61	0.00	7.10	74.10	2.00	0.00	0.61	0.00
7.12	74.48	2.00	0.00	0.60	0.00	7.14	74.61	2.00	0.00	0.60	0.00
7.16	74.12	2.00	0.00	0.60	0.00	7.18	73.52	2.00	0.00	0.60	0.00
7.20	72.93	2.00	0.00	0.60	0.00	7.22	72.98	2.00	0.00	0.60	0.00
7.24	73.18	2.00	0.00	0.60	0.00	7.26	72.88	2.00	0.00	0.60	0.00
7.28	72.09	2.00	0.00	0.60	0.00	7.30	70.78	2.00	0.00	0.59	0.00
7.32	68.98	1.99	0.00	0.59	0.00	7.34	67.50	1.95	0.00	0.59	0.00
7.36	67.17	1.94	0.00	0.59	0.00	7.38	67.63	1.95	0.00	0.59	0.00
7.40	68.17	1.96	0.00	0.59	0.00	7.42	68.49	1.96	0.00	0.59	0.00
7.44	68.55	1.96	0.00	0.59	0.00	7.46	67.97	1.95	0.00	0.59	0.00
7.48	66.55	1.91	0.00	0.58	0.00	7.50	65.35	1.89	0.00	0.58	0.00
7.52	64.48	1.87	0.00	0.58	0.00	7.54	63.29	1.84	0.00	0.58	0.00
7.56	62.37	1.82	0.00	0.58	0.00	7.58	61.64	1.80	0.00	0.58	0.00
7.60	60.40	1.78	0.00	0.58	0.00	7.62	58.87	1.75	0.00	0.58	0.00
7.64	57.82	1.73	0.00	0.58	0.00	7.66	56.97	1.72	0.00	0.57	0.00
7.68	56.47	1.71	0.00	0.57	0.00	7.70	56.64	1.71	0.00	0.57	0.00
7.72	57.36	1.72	0.00	0.57	0.00	7.74	58.10	1.73	0.00	0.57	0.00
7.76	58.46	1.73	0.00	0.57	0.00	7.78	58.48	1.73	0.00	0.57	0.00
7.80	58.22	1.72	0.00	0.57	0.00	7.82	57.65	1.71	0.00	0.57	0.00
7.84	57.10	1.70	0.00	0.56	0.00	7.86	56.82	1.70	0.00	0.56	0.00
7.88	56.38	1.69	0.00	0.56	0.00	7.90	55.87	1.68	0.00	0.56	0.00
7.92	55.44	1.67	0.00	0.56	0.00	7.94	54.81	1.66	0.00	0.56	0.00
7.96	53.70	1.64	0.00	0.56	0.00	7.98	51.56	1.61	0.00	0.56	0.00
8.00	49.10	1.58	0.00	0.56	0.00	8.02	46.42	1.54	0.00	0.55	0.00
8.04	43.98	1.50	0.00	0.55	0.00	8.06	42.14	1.47	0.00	0.55	0.00
8.08	41.82	1.47	0.00	0.55	0.00	8.10	41.79	1.47	0.00	0.55	0.00
8.12	41.72	1.46	0.00	0.55	0.00	8.14	41.33	1.46	0.00	0.55	0.00
8.16	40.56	1.44	0.00	0.55	0.00	8.18	39.48	1.43	0.00	0.55	0.00
8.20	38.46	1.41	0.00	0.54	0.00	8.22	37.81	1.40	0.00	0.54	0.00
8.24	37.28	1.39	0.00	0.54	0.00	8.26	36.87	1.39	0.00	0.54	0.00
8.28	36.49	1.38	0.00	0.54	0.00	8.30	36.03	1.37	0.00	0.54	0.00
8.32	35.28	1.36	0.00	0.54	0.00	8.34	34.73	1.35	0.00	0.54	0.00
8.36	34.14	1.34	0.03	0.54	0.00	8.38	33.71	1.33	0.03	0.53	0.00
8.40	33.24	1.33	0.03	0.53	0.00	8.42	32.29	1.31	0.03	0.53	0.00
8.44	30.90	2.00	0.00	0.53	0.00	8.46	29.18	2.00	0.00	0.53	0.00
8.48	27.03	2.00	0.00	0.53	0.00	8.50	24.74	2.00	0.00	0.53	0.00
8.52	22.75	2.00	0.00	0.53	0.00	8.54	20.45	2.00	0.00	0.53	0.00
8.56	18.39	2.00	0.00	0.52	0.00	8.58	38.87	2.00	0.00	0.52	0.00
8.60	41.18	2.00	0.00	0.52	0.00	8.62	61.14	2.00	0.00	0.52	0.00
8.64	98.37	2.00	0.00	0.52	0.00	8.66	54.69	2.00	0.00	0.52	0.00
8.68	61.03	2.00	0.00	0.52	0.00	8.70	67.95	2.00	0.00	0.52	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.72	73.88	2.00	0.00	0.52	0.00	8.74	78.81	2.00	0.00	0.51	0.00
8.76	81.81	2.00	0.00	0.51	0.00	8.78	83.27	2.00	0.00	0.51	0.00
8.80	82.69	2.00	0.00	0.51	0.00	8.82	80.47	2.00	0.00	0.51	0.00
8.84	77.60	2.00	0.00	0.51	0.00	8.86	75.20	2.00	0.00	0.51	0.00
8.88	73.47	2.00	0.00	0.51	0.00	8.90	72.25	2.00	0.00	0.51	0.00
8.92	71.47	2.00	0.00	0.50	0.00	8.94	71.11	2.00	0.00	0.50	0.00
8.96	70.38	2.00	0.00	0.50	0.00	8.98	64.22	2.00	0.00	0.50	0.00
9.00	69.88	2.00	0.00	0.50	0.00	9.02	48.79	2.00	0.00	0.50	0.00
9.04	28.22	2.00	0.00	0.50	0.00	9.06	33.14	2.00	0.00	0.50	0.00
9.08	35.21	2.00	0.00	0.50	0.00	9.10	36.34	2.00	0.00	0.49	0.00
9.12	36.83	1.34	0.02	0.49	0.00	9.14	37.26	1.35	0.02	0.49	0.00
9.16	37.20	1.35	0.02	0.49	0.00	9.18	36.93	1.34	0.02	0.49	0.00
9.20	36.43	1.33	0.02	0.49	0.00	9.22	35.54	1.32	0.02	0.49	0.00
9.24	34.35	1.30	0.03	0.49	0.00	9.26	33.35	1.29	0.03	0.49	0.00
9.28	32.74	1.28	0.03	0.48	0.00	9.30	31.70	2.00	0.00	0.48	0.00
9.32	29.65	2.00	0.00	0.48	0.00	9.34	27.82	2.00	0.00	0.48	0.00
9.36	25.90	2.00	0.00	0.48	0.00	9.38	21.42	2.00	0.00	0.48	0.00
9.40	42.39	2.00	0.00	0.48	0.00	9.42	44.19	2.00	0.00	0.48	0.00
9.44	63.72	2.00	0.00	0.48	0.00	9.46	49.61	2.00	0.00	0.47	0.00
9.48	49.61	2.00	0.00	0.47	0.00	9.50	49.61	2.00	0.00	0.47	0.00
9.52	49.61	2.00	0.00	0.47	0.00	9.54	51.36	2.00	0.00	0.47	0.00
9.56	53.08	2.00	0.00	0.47	0.00	9.58	54.69	2.00	0.00	0.47	0.00
9.60	65.99	2.00	0.00	0.47	0.00	9.62	74.39	2.00	0.00	0.47	0.00
9.64	78.74	2.00	0.00	0.46	0.00	9.66	80.72	2.00	0.00	0.46	0.00
9.68	82.77	2.00	0.00	0.46	0.00	9.70	79.54	2.00	0.00	0.46	0.00
9.72	77.81	2.00	0.00	0.46	0.00	9.74	77.22	2.00	0.00	0.46	0.00
9.76	76.71	2.00	0.00	0.46	0.00	9.78	101.30	2.00	0.00	0.46	0.00
9.80	63.80	2.00	0.00	0.46	0.00	9.82	58.46	2.00	0.00	0.45	0.00
9.84	54.12	2.00	0.00	0.45	0.00	9.86	50.45	2.00	0.00	0.45	0.00
9.88	30.18	1.23	0.05	0.45	0.00	9.90	29.20	1.21	0.06	0.45	0.00
9.92	29.26	1.21	0.06	0.45	0.00	9.94	30.65	1.23	0.05	0.45	0.00
9.96	32.88	1.26	0.03	0.45	0.00	9.98	35.32	1.29	0.03	0.45	0.00
10.00	37.52	1.32	0.02	0.44	0.00	10.02	39.09	1.34	0.02	0.44	0.00
10.04	39.71	1.35	0.00	0.44	0.00	10.06	39.71	1.35	0.02	0.44	0.00
10.08	39.28	1.34	0.02	0.44	0.00	10.10	38.56	1.33	0.02	0.44	0.00
10.12	37.85	1.32	0.02	0.44	0.00	10.14	37.64	1.32	0.02	0.44	0.00
10.16	37.87	1.32	0.02	0.44	0.00	10.18	38.45	1.33	0.02	0.43	0.00
10.20	39.50	1.34	0.02	0.43	0.00	10.22	41.34	1.37	0.00	0.43	0.00
10.24	42.57	1.38	0.00	0.43	0.00	10.26	43.16	1.39	0.00	0.43	0.00
10.28	43.56	1.40	0.00	0.43	0.00	10.30	44.12	1.40	0.00	0.43	0.00
10.32	44.04	1.40	0.00	0.43	0.00	10.34	43.83	1.40	0.00	0.43	0.00
10.36	43.63	1.40	0.00	0.42	0.00	10.38	43.22	1.39	0.00	0.42	0.00
10.40	42.03	1.37	0.00	0.42	0.00	10.42	40.10	1.35	0.02	0.42	0.00
10.44	37.38	1.31	0.02	0.42	0.00	10.46	34.03	1.26	0.03	0.42	0.00
10.48	31.15	1.23	0.05	0.42	0.00	10.50	28.17	1.18	0.06	0.42	0.00
10.52	25.60	1.15	0.09	0.42	0.00	10.54	24.58	1.14	0.10	0.41	0.00
10.56	24.62	1.14	0.09	0.41	0.00	10.58	24.15	1.13	0.10	0.41	0.00
10.60	23.74	1.12	0.10	0.41	0.00	10.62	23.15	1.12	0.10	0.41	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.64	21.64	1.10	0.11	0.41	0.00	10.66	20.09	1.07	0.12	0.41	0.00
10.68	42.21	1.37	0.00	0.41	0.00	10.70	42.72	1.38	0.00	0.41	0.00
10.72	42.94	1.38	0.00	0.40	0.00	10.74	43.11	1.38	0.00	0.40	0.00
10.76	43.51	1.39	0.00	0.40	0.00	10.78	43.77	1.39	0.00	0.40	0.00
10.80	43.65	1.39	0.00	0.40	0.00	10.82	21.37	1.09	0.11	0.40	0.00
10.84	21.27	1.09	0.11	0.40	0.00	10.86	20.09	2.00	0.00	0.40	0.00
10.88	18.66	2.00	0.00	0.40	0.00	10.90	40.84	2.00	0.00	0.39	0.00
10.92	42.22	2.00	0.00	0.39	0.00	10.94	45.09	2.00	0.00	0.39	0.00
10.96	60.73	2.00	0.00	0.39	0.00	10.98	92.60	2.00	0.00	0.39	0.00
11.00	57.29	2.00	0.00	0.39	0.00	11.02	64.64	2.00	0.00	0.39	0.00
11.04	74.67	2.00	0.00	0.39	0.00	11.06	83.14	2.00	0.00	0.39	0.00
11.08	89.20	2.00	0.00	0.38	0.00	11.10	93.16	2.00	0.00	0.38	0.00
11.12	95.13	2.00	0.00	0.38	0.00	11.14	92.80	2.00	0.00	0.38	0.00
11.16	89.15	2.00	0.00	0.38	0.00	11.18	84.44	2.00	0.00	0.38	0.00
11.20	79.29	2.00	0.00	0.38	0.00	11.22	73.96	2.00	0.00	0.38	0.00
11.24	70.31	2.00	0.00	0.38	0.00	11.26	67.82	2.00	0.00	0.37	0.00
11.28	67.37	2.00	0.00	0.37	0.00	11.30	67.74	2.00	0.00	0.37	0.00
11.32	69.42	2.00	0.00	0.37	0.00	11.34	72.14	2.00	0.00	0.37	0.00
11.36	76.64	2.00	0.00	0.37	0.00	11.38	81.27	2.00	0.00	0.37	0.00
11.40	86.02	2.00	0.00	0.37	0.00	11.42	90.41	2.00	0.00	0.37	0.00
11.44	93.82	2.00	0.00	0.36	0.00	11.46	95.11	2.00	0.00	0.36	0.00
11.48	95.31	2.00	0.00	0.36	0.00	11.50	94.79	2.00	0.00	0.36	0.00
11.52	93.46	2.00	0.00	0.36	0.00	11.54	92.08	2.00	0.00	0.36	0.00
11.56	91.19	2.00	0.00	0.36	0.00	11.58	90.94	2.00	0.00	0.36	0.00
11.60	90.92	2.00	0.00	0.36	0.00	11.62	91.87	2.00	0.00	0.35	0.00
11.64	93.25	2.00	0.00	0.35	0.00	11.66	95.35	2.00	0.00	0.35	0.00
11.68	97.84	2.00	0.00	0.35	0.00	11.70	99.76	2.00	0.00	0.35	0.00
11.72	100.94	2.00	0.00	0.35	0.00	11.74	100.79	2.00	0.00	0.35	0.00
11.76	99.71	2.00	0.00	0.35	0.00	11.78	97.37	2.00	0.00	0.35	0.00
11.80	94.34	2.00	0.00	0.34	0.00	11.82	91.03	2.00	0.00	0.34	0.00
11.84	89.06	2.00	0.00	0.34	0.00	11.86	87.64	2.00	0.00	0.34	0.00
11.88	86.85	2.00	0.00	0.34	0.00	11.90	87.04	2.00	0.00	0.34	0.00
11.92	87.38	2.00	0.00	0.34	0.00	11.94	87.33	2.00	0.00	0.34	0.00
11.96	86.22	2.00	0.00	0.34	0.00	11.98	84.86	2.00	0.00	0.33	0.00
12.00	82.73	2.00	0.00	0.33	0.00	12.02	80.12	2.00	0.00	0.33	0.00
12.04	76.96	2.00	0.00	0.33	0.00	12.06	73.72	2.00	0.00	0.33	0.00
12.08	70.15	2.00	0.00	0.33	0.00	12.10	68.14	2.00	0.00	0.33	0.00
12.12	67.62	2.00	0.00	0.33	0.00	12.14	69.00	2.00	0.00	0.33	0.00
12.16	70.73	2.00	0.00	0.32	0.00	12.18	73.56	2.00	0.00	0.32	0.00
12.20	74.20	2.00	0.00	0.32	0.00						

Total estimated settlement: 0.04

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.68	13.10	3.83	50.24	2.61	0.40	0.70
0.92	0.98	18.99	2.58	49.00	2.44	0.05	0.62
0.94	1.37	26.69	1.84	49.06	2.28	0.05	0.62
0.96	1.77	34.75	1.50	52.26	2.15	0.06	0.63
0.98	2.14	41.96	1.37	57.67	2.07	0.09	0.65
1.00	2.23	43.71	1.38	60.34	2.07	0.12	0.66
1.02	2.20	43.11	1.42	61.21	2.10	0.12	0.66
1.04	2.05	40.22	1.51	60.80	2.15	0.12	0.66
1.06	1.89	36.99	1.65	61.13	2.22	0.12	0.66
1.08	1.77	34.52	1.84	63.51	2.28	0.15	0.67
1.10	1.67	32.67	1.92	62.73	2.30	0.14	0.66
1.12	1.63	31.89	1.92	61.15	2.30	0.12	0.66
1.14	1.64	32.09	1.84	59.05	2.28	0.10	0.65
1.16	1.65	32.24	1.77	57.16	2.26	0.09	0.65
1.18	1.66	32.33	1.69	54.55	2.23	0.07	0.64
1.20	1.67	32.66	1.67	54.40	2.22	0.07	0.64
1.22	1.68	32.74	1.71	55.92	2.23	0.08	0.64
1.24	1.69	32.93	1.80	59.41	2.27	0.11	0.65
1.26	1.70	33.21	1.94	64.58	2.31	0.16	0.67
1.28	1.73	33.74	2.06	69.48	2.33	0.24	0.68
1.30	1.78	34.70	2.13	73.80	2.35	0.35	0.69
1.32	1.86	36.37	2.11	76.83	2.35	0.45	0.70
1.34	1.95	38.06	2.05	78.21	2.33	0.50	0.70
1.36	2.06	40.28	1.93	77.71	2.30	0.48	0.70
1.38	2.20	42.91	1.76	75.55	2.25	0.40	0.70
1.40	2.32	45.46	1.62	73.83	2.20	0.35	0.69
1.42	2.42	47.42	1.53	72.62	2.16	0.32	0.69
1.44	2.50	48.88	1.48	72.46	2.14	0.31	0.69
1.46	2.55	49.84	1.46	72.72	2.13	0.32	0.69
1.48	2.63	51.42	1.46	75.12	2.13	0.39	0.70
1.50	2.81	55.03	1.43	78.72	2.11	0.52	0.70
1.52	3.02	59.19	1.40	82.83	2.09	0.71	0.71
1.54	3.16	61.99	1.39	85.90	2.08	0.72	0.72
1.56	3.26	63.86	1.39	88.84	2.08	0.73	0.73
1.58	3.27	64.04	1.41	90.15	2.09	0.73	0.73
1.60	3.12	61.08	1.47	90.00	2.13	0.73	0.73
1.62	2.92	57.14	1.58	90.36	2.19	0.73	0.73
1.64	2.74	53.63	1.71	91.50	2.23	0.73	0.73
1.66	2.68	52.44	1.73	90.89	2.24	0.73	0.73
1.68	2.59	50.54	1.81	91.39	2.27	0.73	0.73
1.70	2.38	46.40	2.01	93.06	2.32	0.73	0.73
1.72	2.13	41.42	2.31	95.60	2.39	0.74	0.74
1.74	1.89	36.73	2.70	99.33	2.46	0.75	0.75
1.76	1.56	30.31	3.52	106.84	2.57	0.81	0.81
1.78	1.34	25.88	4.26	110.23	2.66	0.89	0.89
1.80	1.29	24.87	4.24	105.39	2.65	0.87	0.87
1.82	1.26	24.37	4.06	98.84	2.63	0.85	0.85
1.84	1.24	23.80	3.83	91.08	2.61	0.81	0.81

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.22	23.56	3.48	81.95	2.57	0.75	0.75
1.88	1.19	23.00	3.19	73.29	2.53	0.51	0.70
1.90	1.21	23.34	2.80	65.29	2.47	0.17	0.67
1.92	1.31	25.27	2.28	57.57	2.38	0.09	0.65
1.94	1.50	29.09	1.84	53.57	2.28	0.07	0.64
1.96	1.68	32.64	1.69	55.19	2.23	0.08	0.64
1.98	1.83	35.53	1.68	59.69	2.23	0.11	0.66
2.00	1.92	37.26	1.72	64.09	2.24	0.16	0.67
2.02	1.94	37.74	1.81	68.24	2.27	0.22	0.68
2.04	1.91	36.98	1.98	73.06	2.31	0.33	0.69
2.06	1.86	36.04	2.15	77.63	2.36	0.48	0.70
2.08	1.81	35.07	2.29	80.37	2.38	0.60	0.71
2.10	1.79	34.73	2.37	82.45	2.40	0.71	0.71
2.12	1.81	35.00	2.40	83.94	2.40	0.72	0.72
2.14	1.90	36.76	2.23	81.87	2.37	0.68	0.71
2.16	2.22	43.19	1.82	78.59	2.27	0.52	0.70
2.18	2.98	58.19	1.40	81.46	2.09	0.66	0.71
2.20	3.78	70.88	1.27	90.33	1.96	0.73	0.73
2.22	4.62	82.93	1.21	100.34	1.86	0.75	0.75
2.24	5.37	94.33	1.17	110.54	1.82	0.77	0.77
2.26	5.66	100.03	1.20	119.97	1.85	0.78	0.78
2.28	5.33	96.46	1.25	120.89	1.92	0.78	0.78
2.30	4.97	92.18	1.31	120.63	2.00	0.78	0.78
2.32	4.49	85.44	1.41	120.10	2.09	0.78	0.78
2.34	4.24	81.73	1.49	122.04	2.14	0.79	0.79
2.36	4.05	78.35	1.54	121.01	2.17	0.78	0.78
2.38	4.38	82.92	1.46	121.48	2.13	0.79	0.79
2.40	5.41	97.41	1.31	127.81	2.01	0.80	0.80
2.42	7.51	125.98	1.18	148.23	1.82	0.82	0.82
2.44	9.42	150.66	1.00	150.66	1.70	0.83	0.83
2.46	11.65	179.71	1.00	179.71	1.61	0.86	0.86
2.48	13.43	202.05	1.00	202.05	1.55	0.89	0.89
2.50	14.31	214.84	1.00	214.84	1.56	0.90	0.90
2.52	13.91	211.45	1.00	211.45	1.60	0.90	0.90
2.54	13.00	201.58	1.00	201.58	1.68	0.89	0.89
2.56	11.76	186.05	1.08	201.60	1.75	0.89	0.89
2.58	10.66	172.19	1.18	203.49	1.83	0.89	0.89
2.60	9.28	153.24	1.25	190.92	1.91	0.88	0.88
2.62	7.97	134.91	1.31	177.06	2.01	0.86	0.86
2.64	6.77	117.12	1.41	165.44	2.10	0.85	0.85
2.66	5.66	100.06	1.58	157.79	2.18	0.84	0.84
2.68	4.51	81.97	1.90	155.85	2.29	0.83	0.83
2.70	3.81	70.18	2.18	153.25	2.36	0.83	0.83
2.72	3.32	61.41	2.41	147.83	2.41	0.82	0.82
2.74	3.15	57.68	2.35	135.56	2.40	0.81	0.81
2.76	2.97	53.94	2.30	124.19	2.39	0.79	0.79
2.78	2.78	49.91	2.26	112.87	2.38	0.77	0.77
2.80	2.52	45.10	2.32	104.48	2.39	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	2.22	39.61	2.46	97.49	2.42	0.74	0.74
2.84	1.92	34.46	2.71	93.48	2.46	0.74	0.74
2.86	1.73	31.06	2.94	91.43	2.49	0.73	0.73
2.88	1.60	28.73	3.08	88.60	2.52	0.73	0.73
2.90	1.53	27.40	3.22	88.20	2.53	0.74	0.74
2.92	1.36	24.44	3.67	89.76	2.59	0.79	0.79
2.94	1.19	21.54	4.28	92.25	2.66	0.85	0.85
2.96	1.01	18.47	5.21	96.18	2.75	0.74	0.74
2.98	0.81	15.00	7.00	104.98	2.89	0.76	0.76
3.00	0.62	11.35	9.82	111.47	3.06	0.58	0.83
3.02	0.59	10.63	10.70	113.76	3.10	0.56	0.77
3.04	0.57	10.16	11.21	113.89	3.13	0.53	0.73
3.06	0.55	9.90	11.18	110.71	3.13	0.48	0.71
3.08	0.55	9.71	10.90	105.84	3.11	0.47	0.69
3.10	0.57	10.17	9.73	99.00	3.05	0.40	0.73
3.12	0.92	15.87	5.11	81.02	2.74	0.64	0.71
3.14	1.59	25.69	2.37	60.95	2.40	0.12	0.66
3.16	2.44	37.25	1.52	56.46	2.16	0.09	0.65
3.18	3.34	49.08	1.00	49.08	1.99	0.05	0.62
3.20	4.20	60.05	1.00	60.05	1.88	0.11	0.66
3.22	4.73	66.82	1.00	66.82	1.84	0.20	0.68
3.24	4.93	69.45	1.00	69.45	1.84	0.24	0.68
3.26	4.86	68.71	1.00	68.71	1.87	0.23	0.68
3.28	4.60	65.41	1.25	81.58	1.92	0.67	0.71
3.30	3.98	57.45	1.31	75.42	2.01	0.40	0.70
3.32	3.24	47.86	1.46	70.04	2.13	0.26	0.68
3.34	2.45	37.19	1.90	70.72	2.29	0.27	0.69
3.36	1.72	27.03	3.07	82.95	2.51	0.71	0.71
3.38	1.12	18.25	5.71	104.21	2.79	0.76	0.76
3.40	0.85	14.06	8.54	120.05	2.99	0.78	0.78
3.42	0.81	13.18	9.58	126.24	3.05	0.71	0.94
3.44	0.95	15.69	7.89	123.85	2.95	0.79	0.79
3.46	1.17	18.76	5.97	112.02	2.81	0.77	0.77
3.48	1.34	21.03	4.75	99.99	2.70	0.75	0.75
3.50	1.46	22.42	3.91	87.56	2.62	0.81	0.81
3.52	1.38	21.00	3.86	81.14	2.61	0.79	0.79
3.54	1.15	17.60	4.58	80.70	2.69	0.85	0.85
3.56	0.88	13.58	6.44	87.41	2.85	0.72	0.72
3.58	0.67	10.25	9.10	93.22	3.02	0.34	0.73
3.60	0.51	7.55	12.86	97.01	3.21	0.36	0.54
3.62	0.45	6.42	15.39	98.80	3.31	0.36	0.46
3.64	0.41	5.72	17.44	99.70	3.38	0.36	0.41
3.66	0.39	5.39	18.36	99.02	3.41	0.36	0.39
3.68	0.38	5.18	18.68	96.77	3.42	0.36	0.37
3.70	0.39	5.39	17.24	93.00	3.37	0.33	0.39
3.72	0.41	5.66	15.64	88.50	3.32	0.27	0.40
3.74	0.42	5.82	14.33	83.46	3.27	0.22	0.42
3.76	0.42	5.80	13.66	79.26	3.24	0.20	0.41

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.42	5.67	13.54	76.83	3.23	0.19	0.41
3.80	0.40	5.42	13.97	75.77	3.25	0.19	0.39
3.82	0.39	5.08	14.87	75.55	3.29	0.19	0.36
3.84	0.38	4.96	15.26	75.69	3.30	0.18	0.35
3.86	0.38	4.92	15.51	76.30	3.31	0.18	0.35
3.88	0.38	4.87	15.80	76.85	3.32	0.19	0.35
3.90	0.37	4.78	16.32	78.01	3.34	0.20	0.34
3.92	0.37	4.69	16.87	79.10	3.36	0.20	0.33
3.94	0.36	4.48	17.86	79.97	3.39	0.21	0.32
3.96	0.34	4.24	18.83	79.83	3.43	0.22	0.30
3.98	0.33	4.00	19.95	79.71	3.46	0.21	0.29
4.00	0.33	3.96	20.05	79.47	3.46	0.20	0.28
4.02	0.33	3.93	20.17	79.33	3.47	0.20	0.28
4.04	0.35	4.22	18.69	78.79	3.42	0.21	0.30
4.06	0.39	4.88	16.06	78.35	3.33	0.21	0.35
4.08	0.44	5.60	13.88	77.74	3.25	0.20	0.40
4.10	0.49	6.17	12.38	76.40	3.18	0.19	0.44
4.12	0.53	6.78	11.02	74.73	3.12	0.19	0.48
4.14	0.52	6.68	11.28	75.29	3.13	0.18	0.48
4.16	0.49	6.15	12.44	76.50	3.19	0.18	0.44
4.18	0.43	5.27	14.98	78.98	3.29	0.21	0.38
4.20	0.37	4.41	18.40	81.14	3.41	0.21	0.31
4.22	0.32	3.57	23.04	82.25	3.55	0.25	0.26
4.24	0.29	3.15	25.93	81.60	3.62	0.23	0.22
4.26	0.27	2.87	28.05	80.38	3.66	0.21	0.20
4.28	0.28	2.91	26.62	77.45	3.63	0.19	0.21
4.30	0.28	3.01	24.65	74.12	3.59	0.17	0.21
4.32	0.30	3.28	21.73	71.34	3.51	0.15	0.23
4.34	0.34	3.82	17.93	68.52	3.40	0.13	0.27
4.36	0.38	4.32	15.26	65.93	3.30	0.13	0.31
4.38	0.42	4.89	12.99	63.60	3.21	0.12	0.35
4.40	0.51	5.99	10.22	61.23	3.08	0.11	0.43
4.42	0.60	7.20	8.20	59.04	2.96	0.10	0.65
4.44	0.67	8.17	7.22	58.93	2.90	0.10	0.65
4.46	0.69	8.44	7.39	62.36	2.91	0.14	0.66
4.48	0.69	8.44	7.85	66.24	2.94	0.19	0.67
4.50	0.67	8.07	8.82	71.14	3.00	0.20	0.58
4.52	0.61	7.28	10.50	76.44	3.09	0.20	0.52
4.54	0.56	6.57	12.32	80.94	3.18	0.22	0.47
4.56	0.59	6.82	12.01	81.96	3.17	0.24	0.49
4.58	0.58	6.72	12.39	83.28	3.18	0.26	0.48
4.60	0.53	5.97	13.89	82.92	3.25	0.25	0.43
4.62	0.48	5.28	15.29	80.76	3.30	0.25	0.38
4.64	0.42	4.47	17.20	76.83	3.37	0.19	0.32
4.66	0.34	3.44	21.17	72.83	3.50	0.15	0.25
4.68	0.31	3.10	21.98	68.14	3.52	0.12	0.22
4.70	-1.23	-1.00	1.00	-1.00	-1.00	0.00	0.00
4.72	-1.21	-1.00	1.00	-1.00	-1.00	0.00	0.00

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	-1.18	-1.00	1.00	-1.00	-1.00	0.00	0.00
4.76	-1.15	-1.00	1.00	-1.00	-1.00	0.00	0.00
4.78	-1.13	-1.00	1.00	-1.00	-1.00	0.00	0.00
4.80	0.44	4.56	13.88	63.24	3.25	0.11	0.33
4.82	0.45	4.71	13.75	64.76	3.24	0.13	0.34
4.84	0.46	4.76	13.85	65.94	3.25	0.14	0.34
4.86	0.46	4.76	14.09	67.12	3.26	0.14	0.34
4.88	0.46	4.81	14.00	67.37	3.25	0.14	0.34
4.90	0.49	5.09	13.24	67.37	3.22	0.14	0.36
4.92	0.50	5.22	12.90	67.28	3.21	0.13	0.37
4.94	0.53	5.64	11.80	66.50	3.16	0.15	0.40
4.96	0.61	6.58	10.04	66.09	3.07	0.14	0.47
4.98	0.72	7.99	8.19	65.42	2.96	0.18	0.67
5.00	0.82	9.17	6.98	64.01	2.88	0.16	0.67
5.02	0.93	10.39	6.10	63.38	2.82	0.15	0.67
5.04	1.06	11.95	5.39	64.42	2.76	0.16	0.67
5.06	1.17	13.18	4.86	64.13	2.71	0.16	0.67
5.08	1.25	14.07	4.57	64.22	2.69	0.80	0.80
5.10	1.35	15.32	4.21	64.56	2.65	0.77	0.77
5.12	1.46	16.46	3.92	64.57	2.62	0.75	0.75
5.14	1.49	16.84	3.80	63.99	2.61	0.74	0.74
5.16	1.48	16.72	3.88	64.90	2.61	0.75	0.75
5.18	1.42	16.05	4.21	67.64	2.65	0.78	0.78
5.20	1.30	14.63	4.85	70.97	2.71	0.28	0.69
5.22	1.12	12.58	6.04	76.00	2.82	0.42	0.70
5.24	1.00	11.12	7.23	80.47	2.90	0.61	0.71
5.26	0.95	10.52	7.87	82.80	2.94	0.71	0.71
5.28	0.94	10.35	7.97	82.41	2.95	0.71	0.71
5.30	0.95	10.48	7.81	81.79	2.94	0.68	0.71
5.32	1.07	11.87	6.63	78.71	2.86	0.52	0.70
5.34	1.15	12.70	6.00	76.24	2.81	0.43	0.70
5.36	1.15	12.67	5.96	75.54	2.81	0.40	0.70
5.38	1.11	12.23	6.21	75.95	2.83	0.42	0.70
5.40	1.05	11.54	6.62	76.36	2.86	0.43	0.70
5.42	0.93	10.05	7.79	78.24	2.94	0.50	0.70
5.44	0.79	8.46	9.42	79.67	3.04	0.22	0.60
5.46	0.69	7.17	11.24	80.53	3.13	0.24	0.51
5.48	0.62	6.31	12.88	81.27	3.21	0.23	0.45
5.50	0.55	5.46	14.77	80.66	3.28	0.23	0.39
5.52	0.50	4.88	16.21	79.09	3.34	0.23	0.35
5.54	0.65	6.66	11.42	76.09	3.14	0.18	0.48
5.56	0.80	8.42	8.61	72.45	2.99	0.31	0.69
5.58	0.96	10.31	6.55	67.46	2.85	0.21	0.68
5.60	1.14	12.24	5.24	64.12	2.75	0.16	0.67
5.62	1.28	13.89	4.58	63.67	2.69	0.80	0.80
5.64	1.22	13.16	5.17	68.06	2.74	0.22	0.68
5.66	1.11	11.96	6.18	73.85	2.83	0.35	0.69
5.68	0.97	10.36	7.83	81.15	2.94	0.64	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.87	9.07	9.64	87.43	3.05	0.30	0.65
5.72	0.85	8.86	10.22	90.56	3.08	0.32	0.63
5.74	0.96	10.20	8.89	90.65	3.01	0.33	0.73
5.76	1.19	12.73	6.86	87.38	2.88	0.72	0.72
5.78	1.47	15.88	5.12	81.28	2.74	0.65	0.71
5.80	1.76	19.10	3.90	74.52	2.62	0.78	0.78
5.82	1.99	21.51	3.19	68.58	2.53	0.34	0.69
5.84	2.08	22.49	2.87	64.45	2.48	0.16	0.67
5.86	2.10	22.65	2.73	61.86	2.46	0.13	0.66
5.88	2.08	22.32	2.72	60.62	2.46	0.12	0.66
5.90	1.99	21.36	2.83	60.36	2.48	0.12	0.66
5.92	1.87	19.96	3.04	60.73	2.51	0.11	0.66
5.94	1.74	18.53	3.39	62.81	2.56	0.39	0.70
5.96	1.61	17.14	3.83	65.68	2.61	0.74	0.74
5.98	1.57	16.66	4.04	67.31	2.63	0.77	0.77
6.00	1.73	18.41	3.66	67.41	2.59	0.73	0.73
6.02	1.94	20.65	3.27	67.44	2.54	0.40	0.70
6.04	2.18	23.19	2.85	66.20	2.48	0.19	0.67
6.06	2.42	25.82	2.51	64.73	2.42	0.17	0.67
6.08	2.85	30.39	2.06	62.54	2.33	0.14	0.66
6.10	3.12	33.18	1.85	61.44	2.28	0.13	0.66
6.12	3.38	35.96	1.70	61.02	2.23	0.12	0.66
6.14	3.65	38.73	1.58	61.22	2.19	0.12	0.66
6.16	4.29	45.39	1.37	62.39	2.07	0.14	0.66
6.18	4.81	50.66	1.00	50.66	1.98	0.06	0.63
6.20	5.40	56.69	1.00	56.69	1.88	0.09	0.65
6.22	6.03	63.18	1.00	63.18	1.80	0.15	0.67
6.24	6.64	69.43	1.00	69.43	1.75	0.24	0.68
6.26	6.96	72.71	1.00	72.71	1.75	0.32	0.69
6.28	7.14	74.66	1.00	74.66	1.77	0.37	0.69
6.30	7.29	76.17	1.00	76.17	1.78	0.42	0.70
6.32	7.39	77.28	1.00	77.28	1.80	0.47	0.70
6.34	7.57	79.05	1.00	79.05	1.79	0.54	0.70
6.36	7.66	79.85	1.00	79.85	1.79	0.58	0.71
6.38	7.79	81.05	1.00	81.05	1.76	0.64	0.71
6.40	7.86	81.70	1.00	81.70	1.75	0.67	0.71
6.42	7.93	82.28	1.00	82.28	1.73	0.71	0.71
6.44	7.97	82.60	1.00	82.60	1.71	0.71	0.71
6.46	8.04	83.17	1.00	83.17	1.70	0.71	0.71
6.48	8.13	83.98	1.00	83.98	1.70	0.72	0.72
6.50	8.31	85.81	1.00	85.81	1.69	0.72	0.72
6.52	8.55	88.19	1.00	88.19	1.67	0.72	0.72
6.54	8.96	92.30	1.00	92.30	1.64	0.73	0.73
6.56	9.41	96.73	1.00	96.73	1.62	0.74	0.74
6.58	9.75	100.18	1.00	100.18	1.60	0.75	0.75
6.60	10.00	102.61	1.00	102.61	1.59	0.75	0.75
6.62	10.14	103.96	1.00	103.96	1.59	0.76	0.76
6.64	10.07	103.23	1.00	103.23	1.61	0.75	0.75

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	9.92	101.63	1.00	101.63	1.63	0.75	0.75
6.68	9.74	99.76	1.00	99.76	1.65	0.75	0.75
6.70	9.54	97.65	1.00	97.65	1.67	0.74	0.74
6.72	9.39	96.07	1.00	96.07	1.68	0.74	0.74
6.74	9.26	94.59	1.00	94.59	1.69	0.74	0.74
6.76	9.16	93.47	1.00	93.47	1.69	0.74	0.74
6.78	9.10	92.76	1.00	92.76	1.68	0.73	0.73
6.80	9.07	92.40	1.00	92.40	1.68	0.73	0.73
6.82	9.03	91.87	1.00	91.87	1.67	0.73	0.73
6.84	8.90	90.43	1.00	90.43	1.68	0.73	0.73
6.86	8.72	88.55	1.00	88.55	1.69	0.73	0.73
6.88	8.50	86.30	1.00	86.30	1.71	0.72	0.72
6.90	8.24	83.55	1.00	83.55	1.74	0.71	0.71
6.92	7.96	80.70	1.00	80.70	1.76	0.62	0.71
6.94	7.77	78.69	1.00	78.69	1.78	0.52	0.70
6.96	7.62	77.06	1.00	77.06	1.78	0.46	0.70
6.98	7.52	75.95	1.00	75.95	1.78	0.42	0.70
7.00	7.46	75.23	1.00	75.23	1.77	0.39	0.70
7.02	7.40	74.52	1.00	74.52	1.77	0.37	0.69
7.04	7.34	73.82	1.00	73.82	1.76	0.35	0.69
7.06	7.32	73.60	1.00	73.60	1.75	0.34	0.69
7.08	7.34	73.64	1.00	73.64	1.74	0.34	0.69
7.10	7.39	74.10	1.00	74.10	1.73	0.36	0.69
7.12	7.44	74.48	1.00	74.48	1.71	0.37	0.69
7.14	7.45	74.61	1.00	74.61	1.72	0.37	0.69
7.16	7.41	74.12	1.00	74.12	1.73	0.36	0.69
7.18	7.36	73.52	1.00	73.52	1.73	0.34	0.69
7.20	7.31	72.93	1.00	72.93	1.74	0.32	0.69
7.22	7.32	72.98	1.00	72.98	1.74	0.33	0.69
7.24	7.34	73.18	1.00	73.18	1.73	0.33	0.69
7.26	7.32	72.88	1.00	72.88	1.73	0.32	0.69
7.28	7.25	72.09	1.00	72.09	1.73	0.30	0.69
7.30	7.13	70.78	1.00	70.78	1.73	0.27	0.69
7.32	6.95	68.98	1.00	68.98	1.74	0.23	0.68
7.34	6.81	67.50	1.00	67.50	1.74	0.21	0.68
7.36	6.78	67.17	1.00	67.17	1.74	0.20	0.68
7.38	6.84	67.63	1.00	67.63	1.73	0.21	0.68
7.40	6.90	68.17	1.00	68.17	1.72	0.22	0.68
7.42	6.94	68.49	1.00	68.49	1.71	0.23	0.68
7.44	6.95	68.55	1.00	68.55	1.71	0.23	0.68
7.46	6.89	67.97	1.00	67.97	1.71	0.22	0.68
7.48	6.76	66.55	1.00	66.55	1.73	0.19	0.67
7.50	6.64	65.35	1.00	65.35	1.74	0.17	0.67
7.52	6.56	64.48	1.00	64.48	1.75	0.16	0.67
7.54	6.45	63.29	1.00	63.29	1.76	0.15	0.67
7.56	6.36	62.37	1.00	62.37	1.77	0.14	0.66
7.58	6.29	61.64	1.00	61.64	1.78	0.13	0.66
7.60	6.17	60.40	1.00	60.40	1.79	0.12	0.66

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	6.02	58.87	1.00	58.87	1.80	0.10	0.65
7.64	5.92	57.82	1.00	57.82	1.81	0.10	0.65
7.66	5.84	56.97	1.00	56.97	1.82	0.09	0.65
7.68	5.80	56.47	1.00	56.47	1.82	0.09	0.65
7.70	5.82	56.64	1.00	56.64	1.81	0.09	0.65
7.72	5.90	57.36	1.00	57.36	1.79	0.09	0.65
7.74	5.98	58.10	1.00	58.10	1.78	0.10	0.65
7.76	6.02	58.46	1.00	58.46	1.77	0.10	0.65
7.78	6.02	58.48	1.00	58.48	1.77	0.10	0.65
7.80	6.00	58.22	1.00	58.22	1.77	0.10	0.65
7.82	5.95	57.65	1.00	57.65	1.78	0.09	0.65
7.84	5.90	57.10	1.00	57.10	1.79	0.09	0.65
7.86	5.88	56.82	1.00	56.82	1.79	0.09	0.65
7.88	5.84	56.38	1.00	56.38	1.80	0.09	0.65
7.90	5.79	55.87	1.00	55.87	1.80	0.08	0.64
7.92	5.75	55.44	1.00	55.44	1.80	0.08	0.64
7.94	5.69	54.81	1.00	54.81	1.80	0.08	0.64
7.96	5.58	53.70	1.00	53.70	1.80	0.07	0.64
7.98	5.37	51.56	1.00	51.56	1.83	0.06	0.63
8.00	5.12	49.10	1.00	49.10	1.86	0.05	0.62
8.02	4.86	46.42	1.00	46.42	1.89	0.04	0.62
8.04	4.61	43.98	1.00	43.98	1.92	0.03	0.62
8.06	4.43	42.14	1.00	42.14	1.95	0.03	0.62
8.08	4.40	41.82	1.00	41.82	1.95	0.03	0.62
8.10	4.40	41.79	1.00	41.79	1.94	0.03	0.62
8.12	4.40	41.72	1.00	41.72	1.94	0.03	0.62
8.14	4.36	41.33	1.00	41.33	1.94	0.03	0.62
8.16	4.29	40.56	1.00	40.56	1.94	0.03	0.62
8.18	4.18	39.48	1.00	39.48	1.95	0.03	0.62
8.20	4.08	38.46	1.00	38.46	1.97	0.03	0.62
8.22	4.02	37.81	1.00	37.81	1.98	0.02	0.62
8.24	3.97	37.28	1.00	37.28	1.99	0.02	0.62
8.26	3.93	36.87	1.00	36.87	2.01	0.02	0.62
8.28	3.89	36.49	1.00	36.49	2.03	0.02	0.62
8.30	3.85	36.03	1.00	36.03	2.04	0.02	0.62
8.32	3.78	35.28	1.00	35.28	2.07	0.02	0.62
8.34	3.72	34.73	1.00	34.73	2.07	0.02	0.62
8.36	3.67	34.14	1.00	34.14	2.07	0.02	0.62
8.38	3.62	33.71	1.00	33.71	2.06	0.02	0.62
8.40	3.58	33.24	1.00	33.24	2.05	0.02	0.62
8.42	3.48	32.29	1.00	32.29	2.05	0.02	0.62
8.44	3.34	30.90	1.00	30.90	2.06	0.02	0.62
8.46	3.17	29.18	1.00	29.18	2.10	0.02	0.62
8.48	2.95	27.03	1.00	27.03	2.13	0.02	0.62
8.50	2.71	24.74	1.00	24.74	2.18	0.02	0.62
8.52	2.51	22.75	1.00	22.75	2.22	0.02	0.62
8.54	2.27	20.45	1.00	20.45	2.28	0.02	0.62
8.56	2.06	18.39	1.00	18.39	2.33	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	1.86	16.39	2.37	38.87	2.40	0.03	0.62
8.60	1.66	14.42	2.86	41.18	2.48	0.03	0.62
8.62	1.45	12.46	3.62	45.16	2.58	0.12	0.66
8.64	1.29	10.90	4.51	49.12	2.68	0.75	0.75
8.66	1.13	9.35	5.85	54.69	2.80	0.07	0.64
8.68	0.98	7.86	7.77	61.03	2.94	0.12	0.66
8.70	0.85	6.65	10.23	67.95	3.08	0.14	0.47
8.72	0.73	5.56	13.30	73.88	3.22	0.17	0.40
8.74	0.63	4.55	17.32	78.81	3.38	0.22	0.33
8.76	0.54	3.75	21.83	81.81	3.51	0.24	0.27
8.78	0.52	3.55	23.48	83.27	3.56	0.24	0.25
8.80	0.54	3.66	22.57	82.69	3.53	0.22	0.26
8.82	0.57	3.93	20.48	80.47	3.48	0.22	0.28
8.84	0.61	4.33	17.93	77.60	3.40	0.20	0.31
8.86	0.65	4.67	16.09	75.20	3.33	0.17	0.33
8.88	0.64	4.62	15.89	73.47	3.33	0.16	0.33
8.90	0.60	4.26	16.97	72.25	3.36	0.16	0.30
8.92	0.58	3.98	17.94	71.47	3.40	0.16	0.28
8.94	0.60	4.22	16.87	71.11	3.36	0.16	0.30
8.96	0.79	5.93	11.87	70.38	3.16	0.15	0.42
8.98	1.27	10.43	6.16	64.22	2.82	0.16	0.67
9.00	1.86	15.95	3.48	55.53	2.57	0.25	0.68
9.02	2.52	22.21	2.20	48.79	2.36	0.05	0.62
9.04	3.16	28.22	1.00	28.22	2.21	0.02	0.62
9.06	3.67	33.14	1.00	33.14	2.11	0.02	0.62
9.08	3.89	35.21	1.00	35.21	2.06	0.02	0.62
9.10	4.01	36.34	1.00	36.34	2.03	0.02	0.62
9.12	4.07	36.83	1.00	36.83	2.01	0.02	0.62
9.14	4.12	37.26	1.00	37.26	2.00	0.02	0.62
9.16	4.11	37.20	1.00	37.20	1.99	0.02	0.62
9.18	4.09	36.93	1.00	36.93	1.99	0.02	0.62
9.20	4.04	36.43	1.00	36.43	2.00	0.02	0.62
9.22	3.95	35.54	1.00	35.54	2.01	0.02	0.62
9.24	3.83	34.35	1.00	34.35	2.03	0.02	0.62
9.26	3.72	33.35	1.00	33.35	2.05	0.02	0.62
9.28	3.66	32.74	1.00	32.74	2.06	0.02	0.62
9.30	3.55	31.70	1.00	31.70	2.08	0.02	0.62
9.32	3.34	29.65	1.00	29.65	2.11	0.02	0.62
9.34	3.15	27.82	1.00	27.82	2.15	0.02	0.62
9.36	2.95	25.90	1.00	25.90	2.19	0.02	0.62
9.38	2.48	21.42	1.00	21.42	2.29	0.02	0.62
9.40	2.08	17.68	2.40	42.39	2.40	0.03	0.62
9.42	1.82	15.24	2.90	44.19	2.49	0.04	0.62
9.44	1.56	12.81	3.64	46.65	2.59	0.15	0.67
9.46	1.30	10.39	4.78	49.61	2.71	0.05	0.62
9.48	1.30	10.37	4.78	49.61	2.71	0.05	0.62
9.50	1.30	10.36	4.79	49.61	2.71	0.05	0.62
9.52	1.30	10.35	4.79	49.61	2.71	0.05	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	1.16	9.00	5.70	51.36	2.79	0.06	0.63
9.56	1.01	7.67	6.92	53.08	2.88	0.07	0.64
9.58	0.87	6.36	8.59	54.69	2.99	0.07	0.64
9.60	0.96	7.19	9.18	65.99	3.02	0.09	0.51
9.62	1.07	8.10	9.19	74.39	3.02	0.09	0.58
9.64	1.33	10.46	7.53	78.74	2.92	0.53	0.70
9.66	1.61	12.95	6.23	80.72	2.83	0.62	0.71
9.68	1.83	14.90	5.55	82.77	2.78	0.71	0.71
9.70	1.78	14.46	5.50	79.54	2.77	0.56	0.71
9.72	1.72	13.87	5.61	77.81	2.78	0.49	0.70
9.74	1.66	13.37	5.78	77.22	2.79	0.46	0.70
9.76	1.76	14.22	5.39	76.71	2.76	0.44	0.70
9.78	2.23	18.50	3.77	69.73	2.60	0.75	0.75
9.80	2.70	22.82	2.80	63.80	2.47	0.15	0.67
9.82	3.13	26.77	2.18	58.46	2.36	0.10	0.65
9.84	3.49	30.08	1.80	54.12	2.26	0.07	0.64
9.86	3.65	31.61	1.60	50.45	2.19	0.05	0.63
9.88	3.50	30.18	1.00	30.18	2.18	0.02	0.62
9.90	3.39	29.20	1.00	29.20	2.17	0.02	0.62
9.92	3.40	29.26	1.00	29.26	2.16	0.02	0.62
9.94	3.55	30.65	1.00	30.65	2.12	0.02	0.62
9.96	3.79	32.88	1.00	32.88	2.08	0.02	0.62
9.98	4.06	35.32	1.00	35.32	2.04	0.02	0.62
10.00	4.30	37.52	1.00	37.52	2.01	0.02	0.62
10.02	4.47	39.09	1.00	39.09	1.99	0.03	0.62
10.04	4.54	39.71	1.00	39.71	1.98	0.03	0.62
10.06	4.54	39.71	1.00	39.71	1.99	0.03	0.62
10.08	4.50	39.28	1.00	39.28	1.99	0.03	0.62
10.10	4.43	38.56	1.00	38.56	1.99	0.03	0.62
10.12	4.35	37.85	1.00	37.85	2.00	0.02	0.62
10.14	4.33	37.64	1.00	37.64	1.99	0.02	0.62
10.16	4.36	37.87	1.00	37.87	1.98	0.02	0.62
10.18	4.42	38.45	1.00	38.45	1.98	0.03	0.62
10.20	4.54	39.50	1.00	39.50	1.97	0.03	0.62
10.22	4.74	41.34	1.00	41.34	1.95	0.03	0.62
10.24	4.88	42.57	1.00	42.57	1.93	0.03	0.62
10.26	4.95	43.16	1.00	43.16	1.93	0.03	0.62
10.28	5.00	43.56	1.00	43.56	1.92	0.03	0.62
10.30	5.06	44.12	1.00	44.12	1.92	0.04	0.62
10.32	5.05	44.04	1.00	44.04	1.91	0.04	0.62
10.34	5.03	43.83	1.00	43.83	1.91	0.03	0.62
10.36	5.02	43.63	1.00	43.63	1.91	0.03	0.62
10.38	4.97	43.22	1.00	43.22	1.91	0.03	0.62
10.40	4.85	42.03	1.00	42.03	1.92	0.03	0.62
10.42	4.64	40.10	1.00	40.10	1.95	0.03	0.62
10.44	4.35	37.38	1.00	37.38	1.98	0.02	0.62
10.46	3.99	34.03	1.00	34.03	2.03	0.02	0.62
10.48	3.68	31.15	1.00	31.15	2.10	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	3.36	28.17	1.00	28.17	2.16	0.02	0.62
10.52	3.08	25.60	1.00	25.60	2.23	0.02	0.62
10.54	2.98	24.58	1.00	24.58	2.26	0.02	0.62
10.56	2.99	24.62	1.00	24.62	2.27	0.02	0.62
10.58	2.94	24.15	1.00	24.15	2.27	0.02	0.62
10.60	2.89	23.74	1.00	23.74	2.28	0.02	0.62
10.62	2.83	23.15	1.00	23.15	2.28	0.02	0.62
10.64	2.66	21.64	1.00	21.64	2.31	0.02	0.62
10.66	2.49	20.09	1.00	20.09	2.34	0.02	0.62
10.68	2.37	18.96	2.23	42.21	2.37	0.03	0.62
10.70	2.30	18.38	2.32	42.72	2.39	0.03	0.62
10.72	2.29	18.27	2.35	42.94	2.40	0.03	0.62
10.74	2.35	18.72	2.30	43.11	2.39	0.03	0.62
10.76	2.44	19.54	2.23	43.51	2.37	0.03	0.62
10.78	2.54	20.41	2.14	43.77	2.35	0.03	0.62
10.80	2.61	21.02	2.08	43.65	2.34	0.03	0.62
10.82	2.65	21.37	1.00	21.37	2.32	0.02	0.62
10.84	2.64	21.27	1.00	21.27	2.31	0.02	0.62
10.86	2.51	20.09	1.00	20.09	2.33	0.02	0.62
10.88	2.35	18.66	1.00	18.66	2.36	0.02	0.62
10.90	2.19	17.23	2.37	40.84	2.40	0.03	0.62
10.92	2.04	15.82	2.67	42.22	2.45	0.03	0.62
10.94	1.87	14.36	3.10	44.48	2.52	0.04	0.62
10.96	1.76	13.34	3.53	47.08	2.57	0.12	0.66
10.98	1.63	12.11	4.25	51.44	2.65	0.73	0.73
11.00	1.48	10.79	5.31	57.29	2.75	0.09	0.65
11.02	1.32	9.40	6.87	64.64	2.88	0.16	0.67
11.04	1.18	8.21	9.09	74.67	3.02	0.19	0.59
11.06	1.05	7.12	11.68	83.14	3.15	0.23	0.51
11.08	0.94	6.22	14.35	89.20	3.27	0.33	0.44
11.10	0.86	5.58	16.69	93.16	3.35	0.33	0.40
11.12	0.81	5.14	18.51	95.13	3.42	0.32	0.37
11.14	0.78	4.86	19.11	92.80	3.43	0.31	0.35
11.16	0.75	4.65	19.17	89.15	3.44	0.30	0.33
11.18	0.74	4.58	18.45	84.44	3.41	0.23	0.33
11.20	0.74	4.55	17.45	79.29	3.38	0.20	0.32
11.22	0.75	4.58	16.14	73.96	3.34	0.15	0.33
11.24	0.76	4.70	14.96	70.31	3.29	0.15	0.34
11.26	0.79	4.92	13.77	67.82	3.24	0.14	0.35
11.28	0.84	5.28	12.75	67.37	3.20	0.13	0.38
11.30	0.88	5.64	12.02	67.74	3.17	0.13	0.40
11.32	0.92	5.95	11.67	69.42	3.15	0.15	0.43
11.34	0.96	6.27	11.51	72.14	3.14	0.16	0.45
11.36	0.99	6.51	11.77	76.64	3.16	0.19	0.47
11.38	1.01	6.61	12.29	81.27	3.18	0.22	0.47
11.40	1.02	6.70	12.84	86.02	3.20	0.27	0.48
11.42	1.06	7.04	12.84	90.41	3.20	0.30	0.50
11.44	1.09	7.28	12.88	93.82	3.21	0.33	0.52

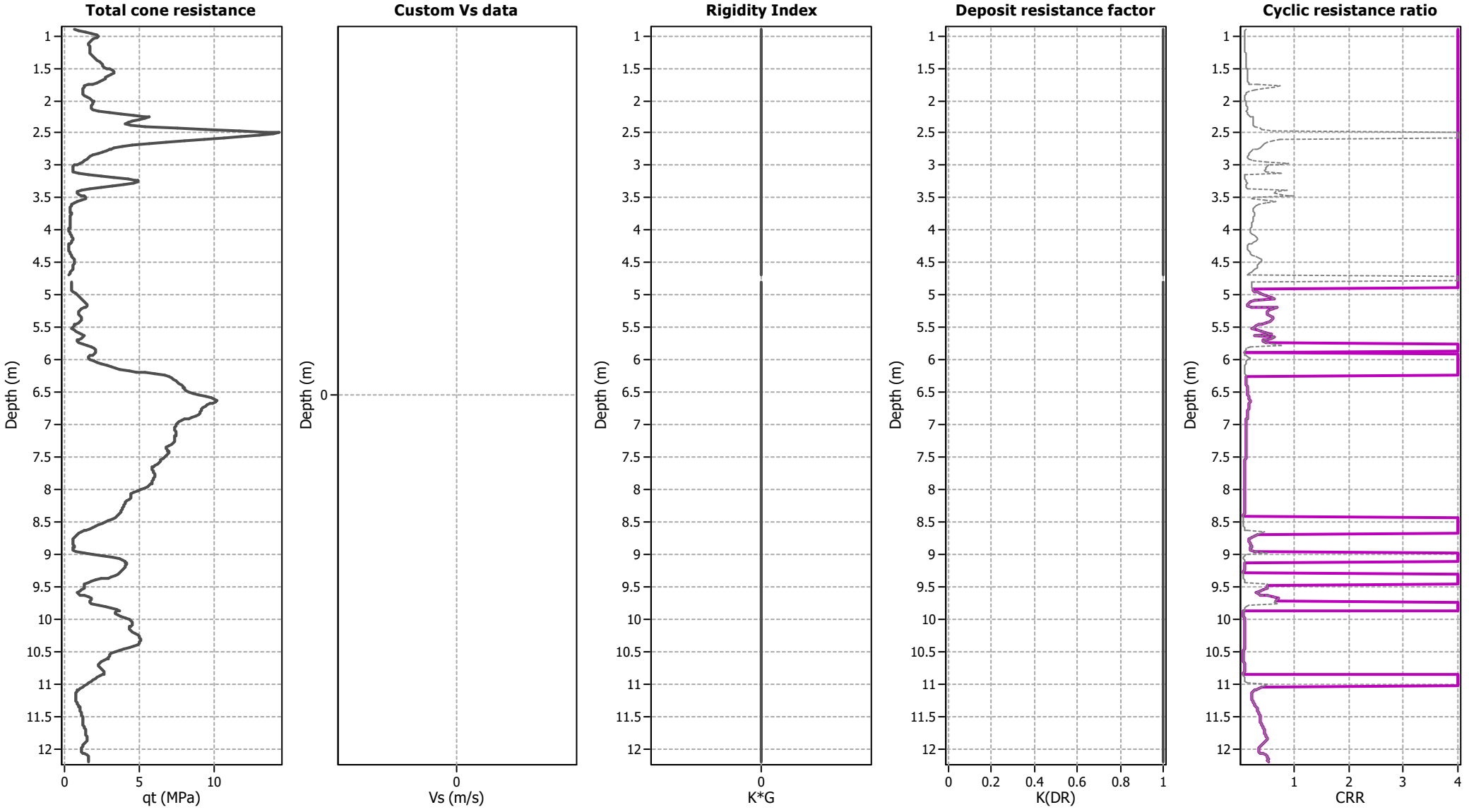
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.46	1.12	7.48	12.72	95.11	3.20	0.36	0.53
11.48	1.15	7.73	12.33	95.31	3.18	0.35	0.55
11.50	1.18	7.99	11.86	94.79	3.16	0.33	0.57
11.52	1.18	7.98	11.72	93.46	3.15	0.32	0.57
11.54	1.18	7.96	11.57	92.08	3.15	0.32	0.57
11.56	1.19	7.97	11.44	91.19	3.14	0.31	0.57
11.58	1.19	7.99	11.38	90.94	3.14	0.30	0.57
11.60	1.20	8.02	11.34	90.92	3.14	0.30	0.57
11.62	1.22	8.20	11.20	91.87	3.13	0.31	0.59
11.64	1.26	8.48	11.00	93.25	3.12	0.32	0.61
11.66	1.30	8.82	10.81	95.35	3.11	0.35	0.63
11.68	1.33	9.06	10.80	97.84	3.11	0.37	0.65
11.70	1.37	9.33	10.69	99.76	3.10	0.40	0.67
11.72	1.39	9.52	10.61	100.94	3.10	0.42	0.68
11.74	1.41	9.65	10.44	100.79	3.09	0.41	0.69
11.76	1.42	9.73	10.25	99.71	3.08	0.41	0.69
11.78	1.46	9.98	9.76	97.37	3.06	0.37	0.71
11.80	1.50	10.26	9.19	94.34	3.02	0.35	0.73
11.82	1.53	10.48	8.69	91.03	2.99	0.73	0.73
11.84	1.54	10.59	8.41	89.06	2.98	0.73	0.73
11.86	1.53	10.49	8.36	87.64	2.97	0.72	0.72
11.88	1.49	10.14	8.56	86.85	2.99	0.72	0.72
11.90	1.42	9.55	9.11	87.04	3.02	0.30	0.68
11.92	1.34	8.92	9.80	87.38	3.06	0.29	0.64
11.94	1.27	8.38	10.42	87.33	3.09	0.28	0.60
11.96	1.21	7.91	10.89	86.22	3.11	0.27	0.57
11.98	1.16	7.49	11.32	84.86	3.14	0.27	0.54
12.00	1.13	7.28	11.36	82.73	3.14	0.24	0.52
12.02	1.13	7.24	11.07	80.12	3.12	0.23	0.52
12.04	1.16	7.49	10.27	76.96	3.08	0.20	0.54
12.06	1.25	8.13	9.07	73.72	3.02	0.19	0.58
12.08	1.36	9.01	7.78	70.15	2.94	0.26	0.68
12.10	1.49	9.97	6.83	68.14	2.87	0.22	0.68
12.12	1.60	10.85	6.23	67.62	2.83	0.21	0.68
12.14	1.60	10.85	6.36	69.00	2.84	0.23	0.68
12.16	1.64	11.10	6.37	70.73	2.84	0.27	0.69
12.18	1.58	10.63	6.92	73.56	2.88	0.34	0.69
12.20	1.64	11.12	6.67	74.20	2.86	0.36	0.69

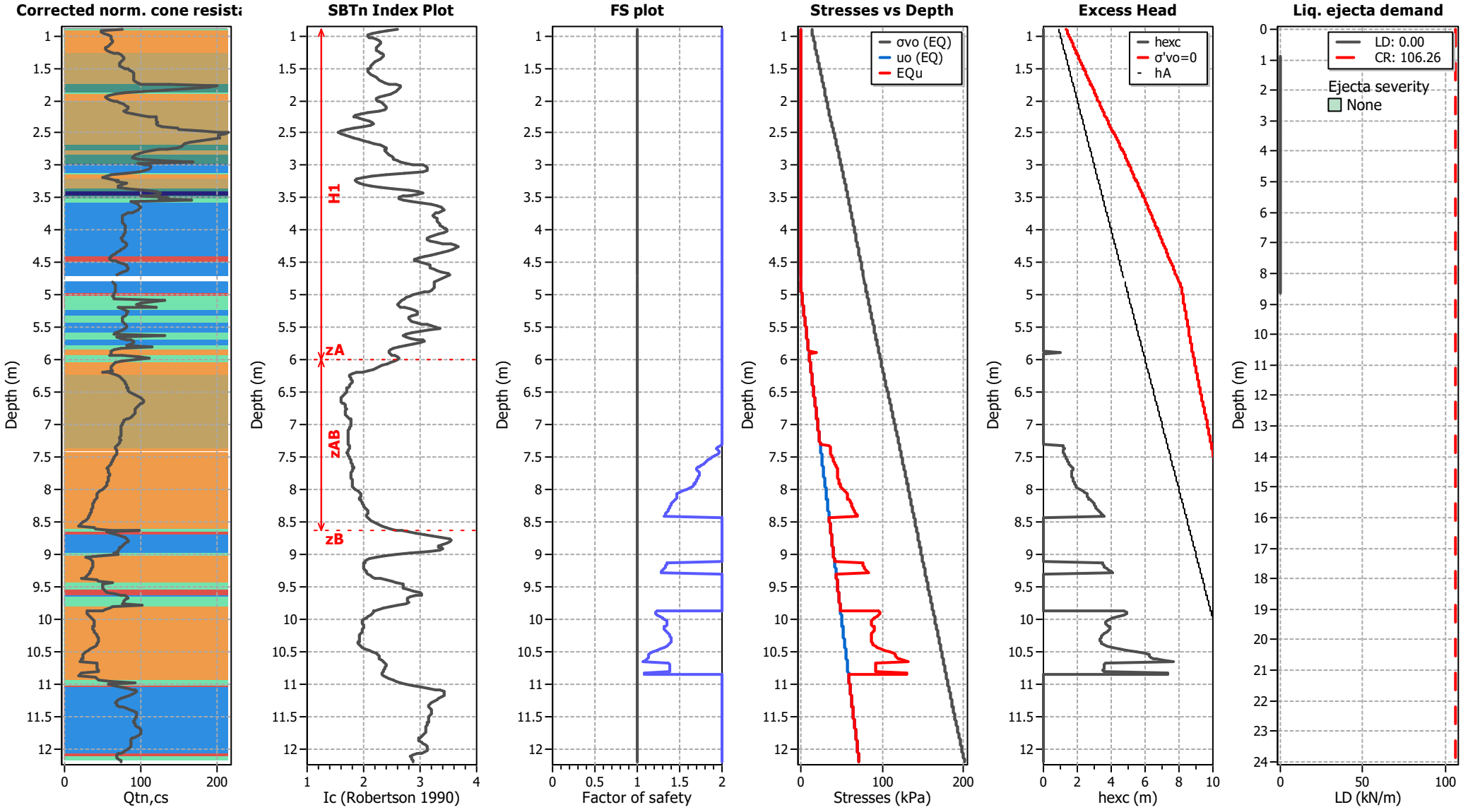
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
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Springfield, Illinois
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LIQUEFACTION ANALYSIS REPORT

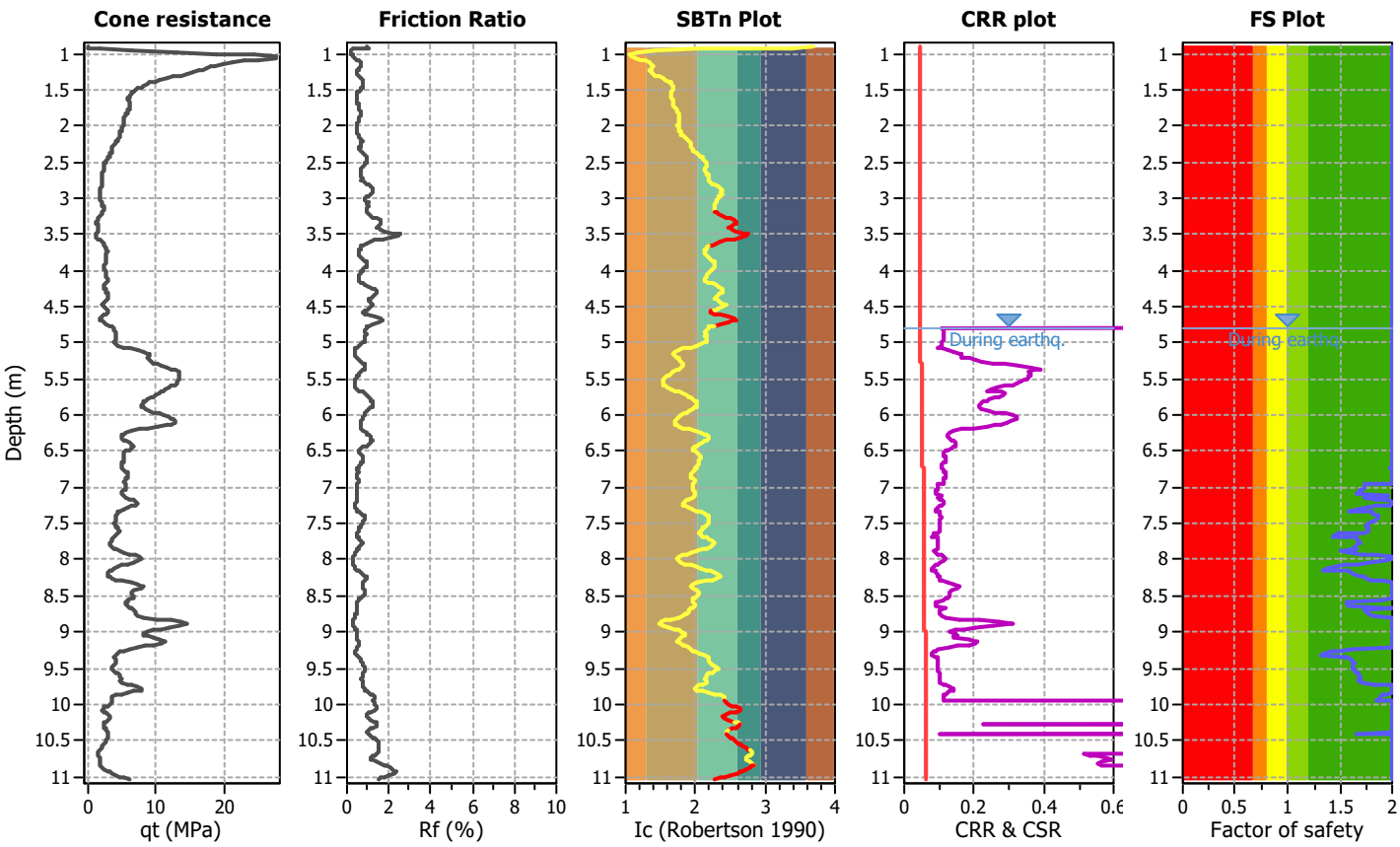
Project title : CWLP Liquefaction Analysis

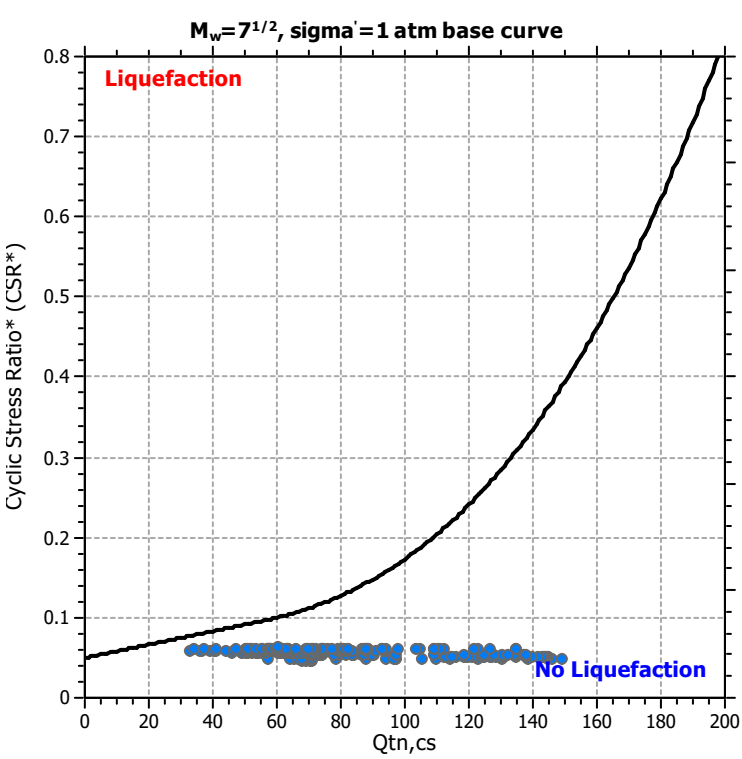
Location : East Lake Shore Drive, Springfield, Illinois

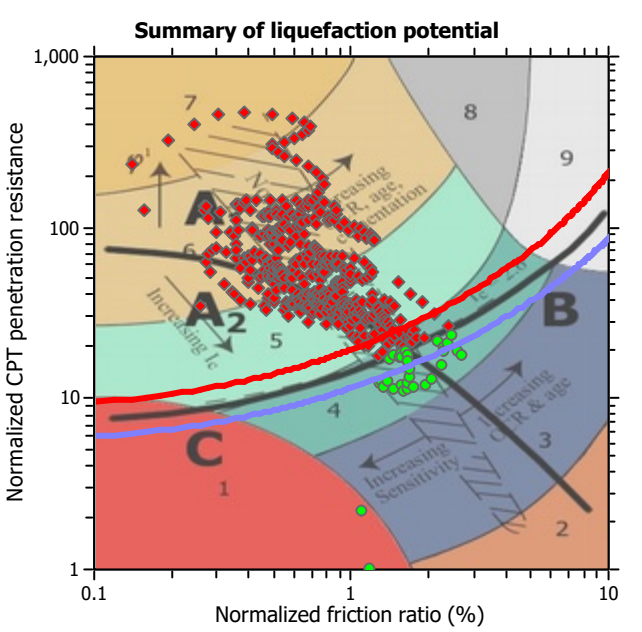
CPT file : CWLP CPT-1CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	4.79 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.79 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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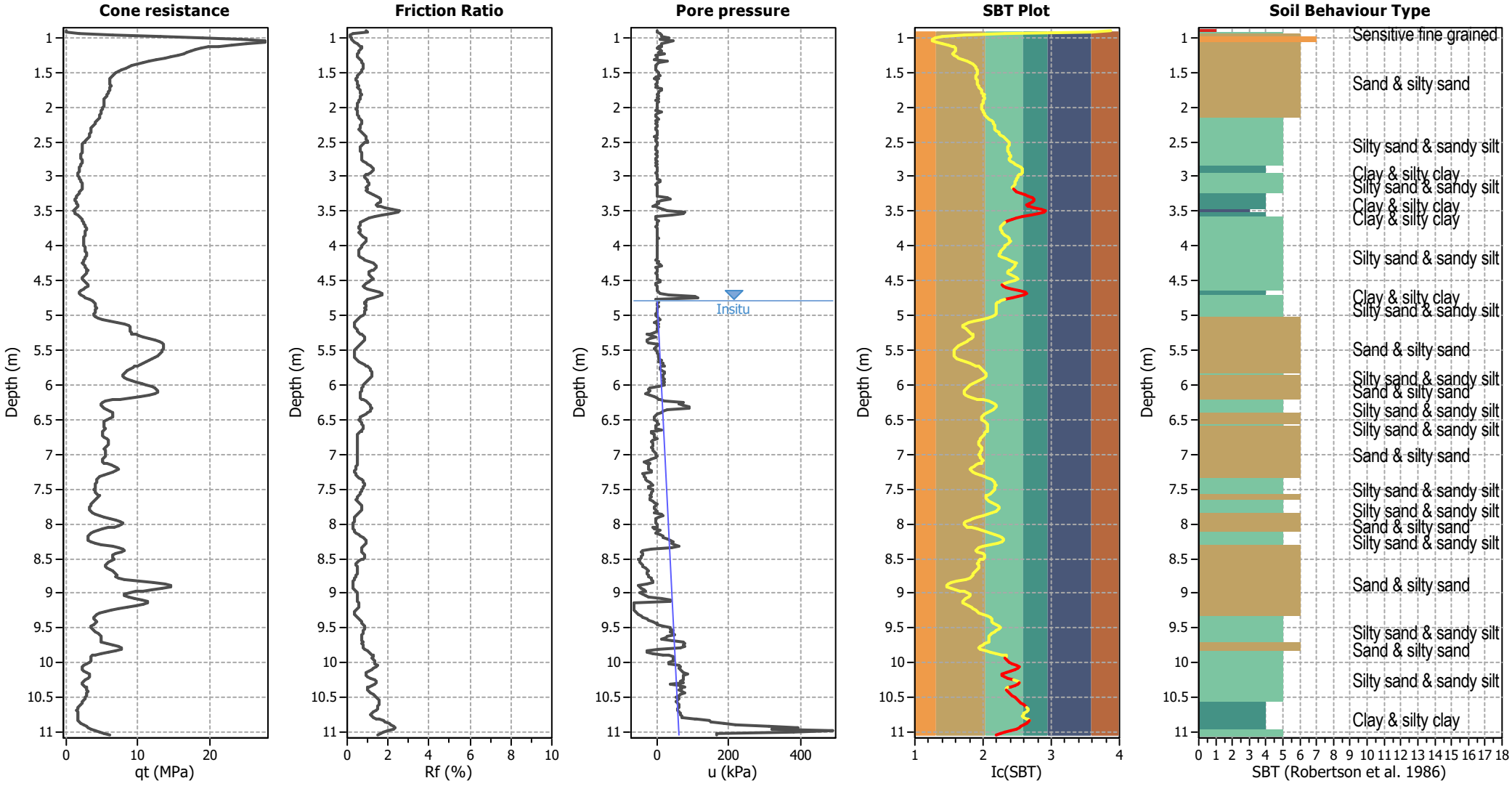
CPT name: CWLP CPT-1CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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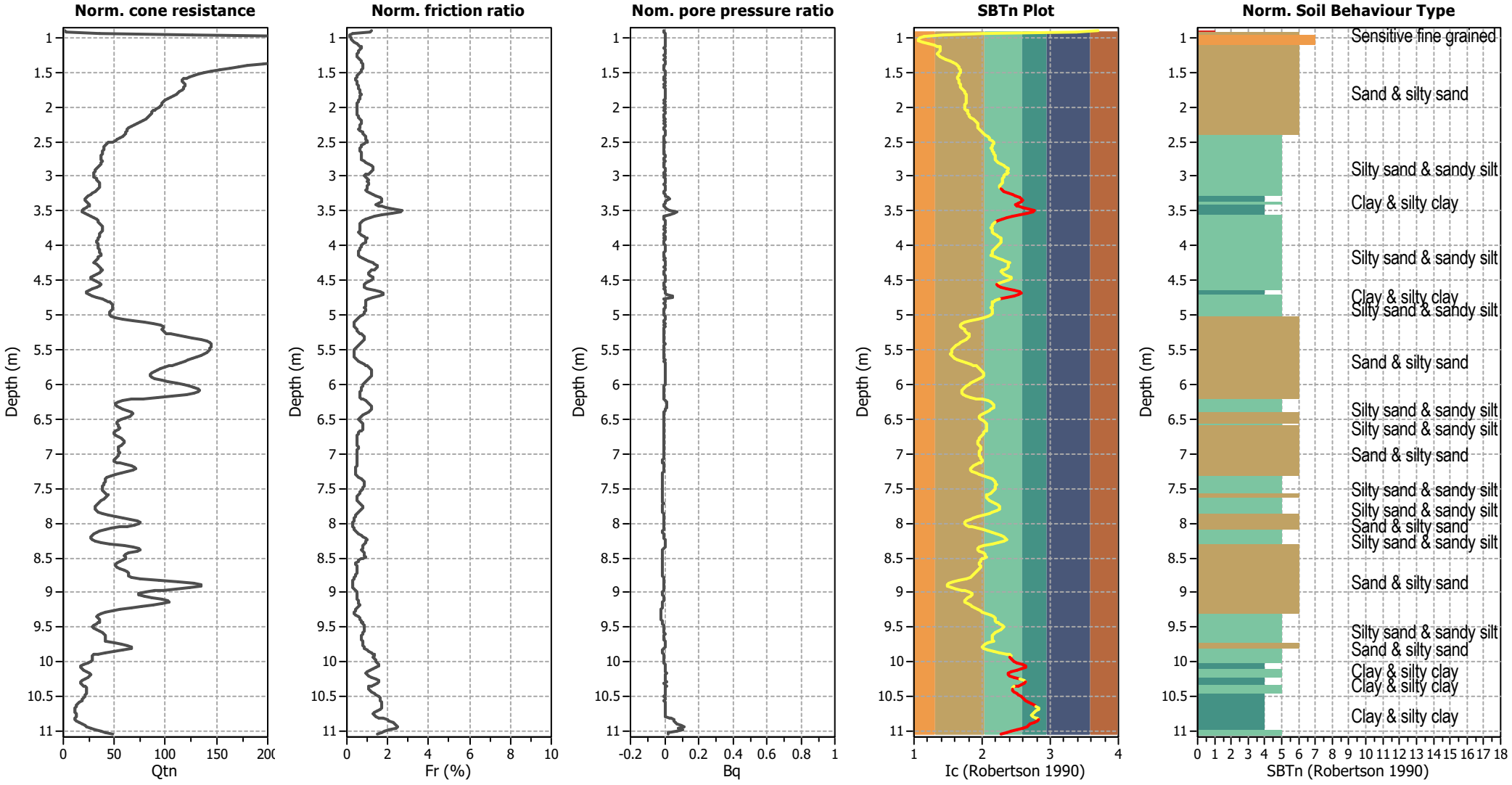
CPT name: CWLP CPT-1CCR

CPT basic interpretation plots (normalized)



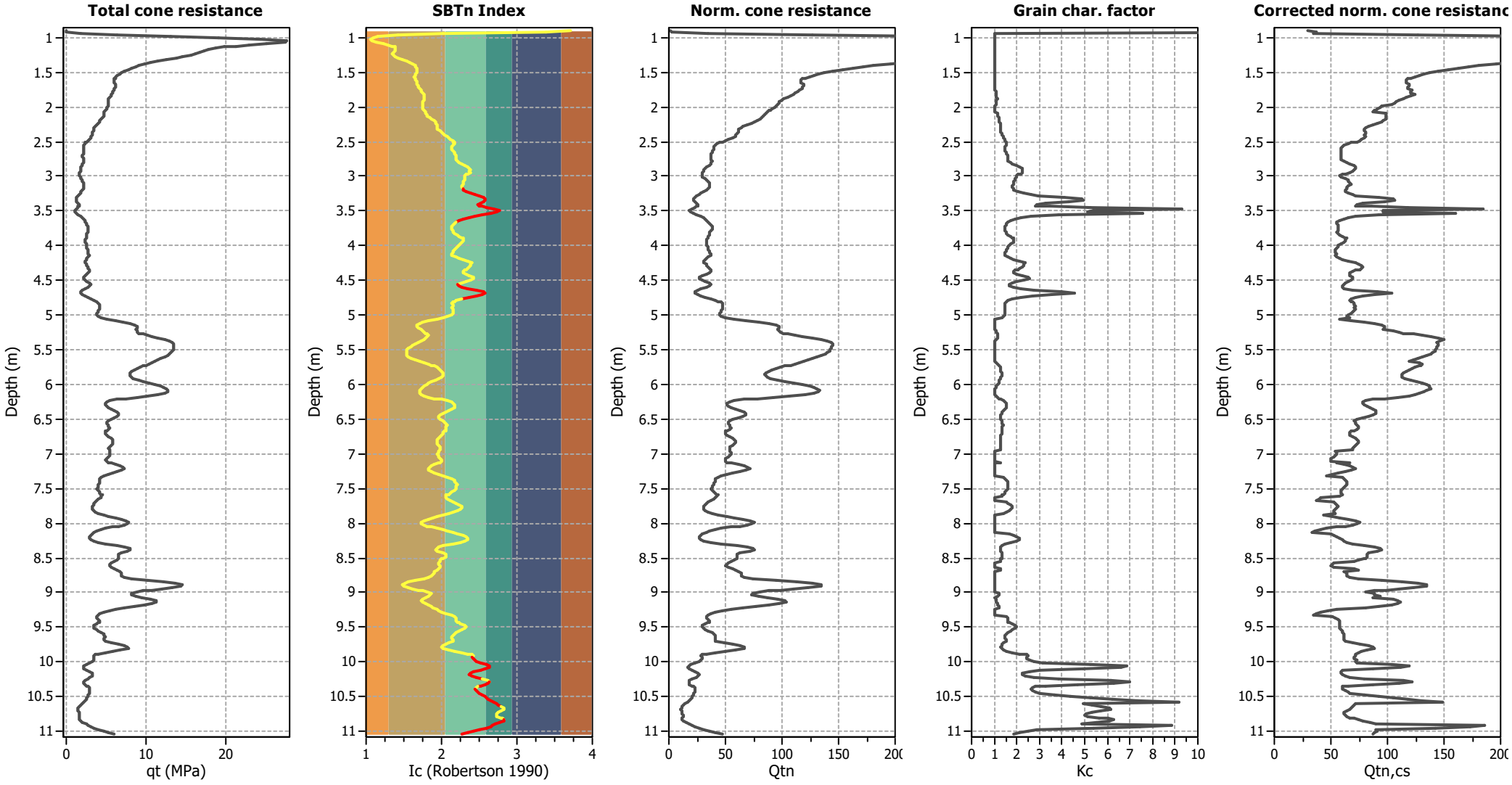
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

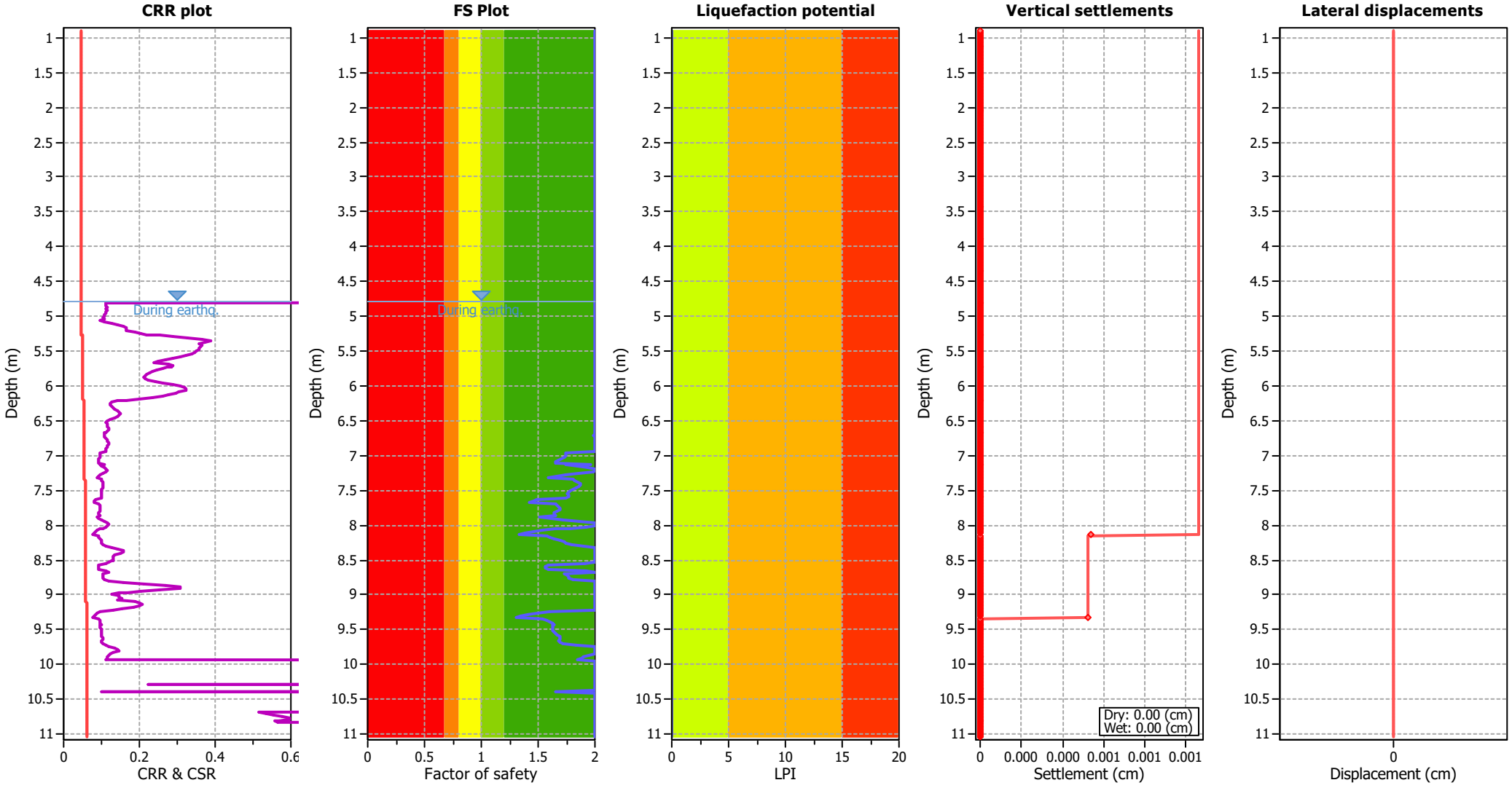
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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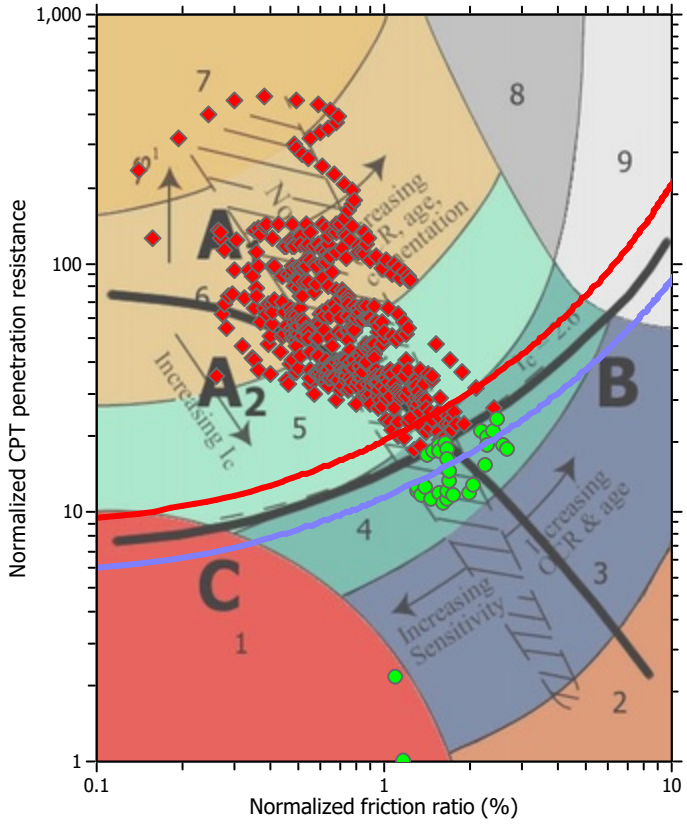
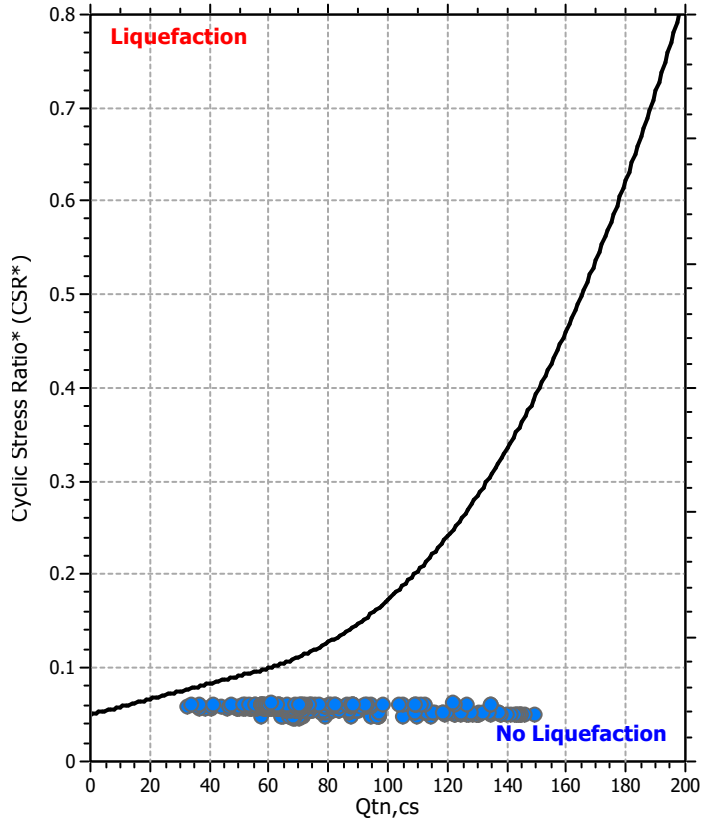
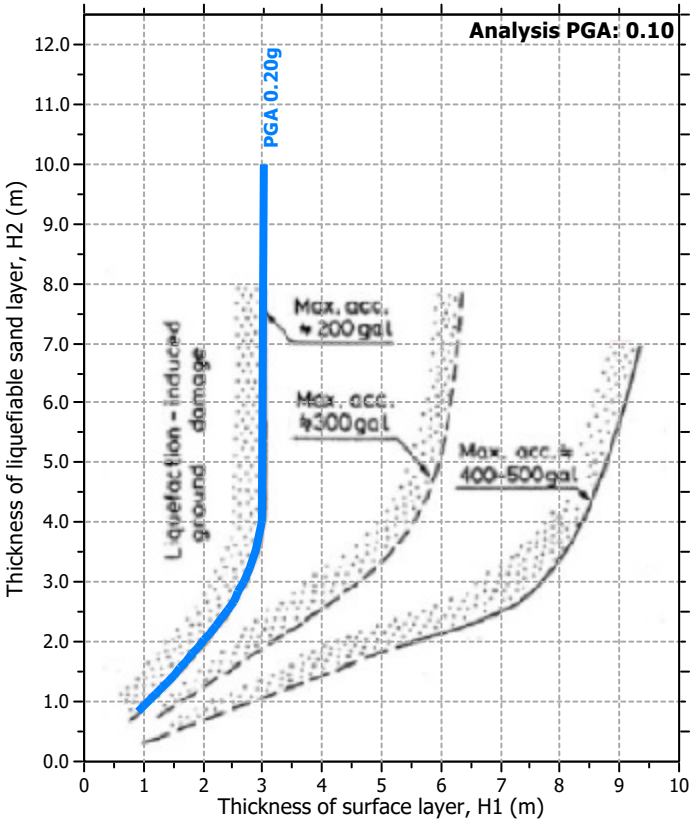
CPT name: CWLP CPT-1CCR

Liquefaction analysis summary plots



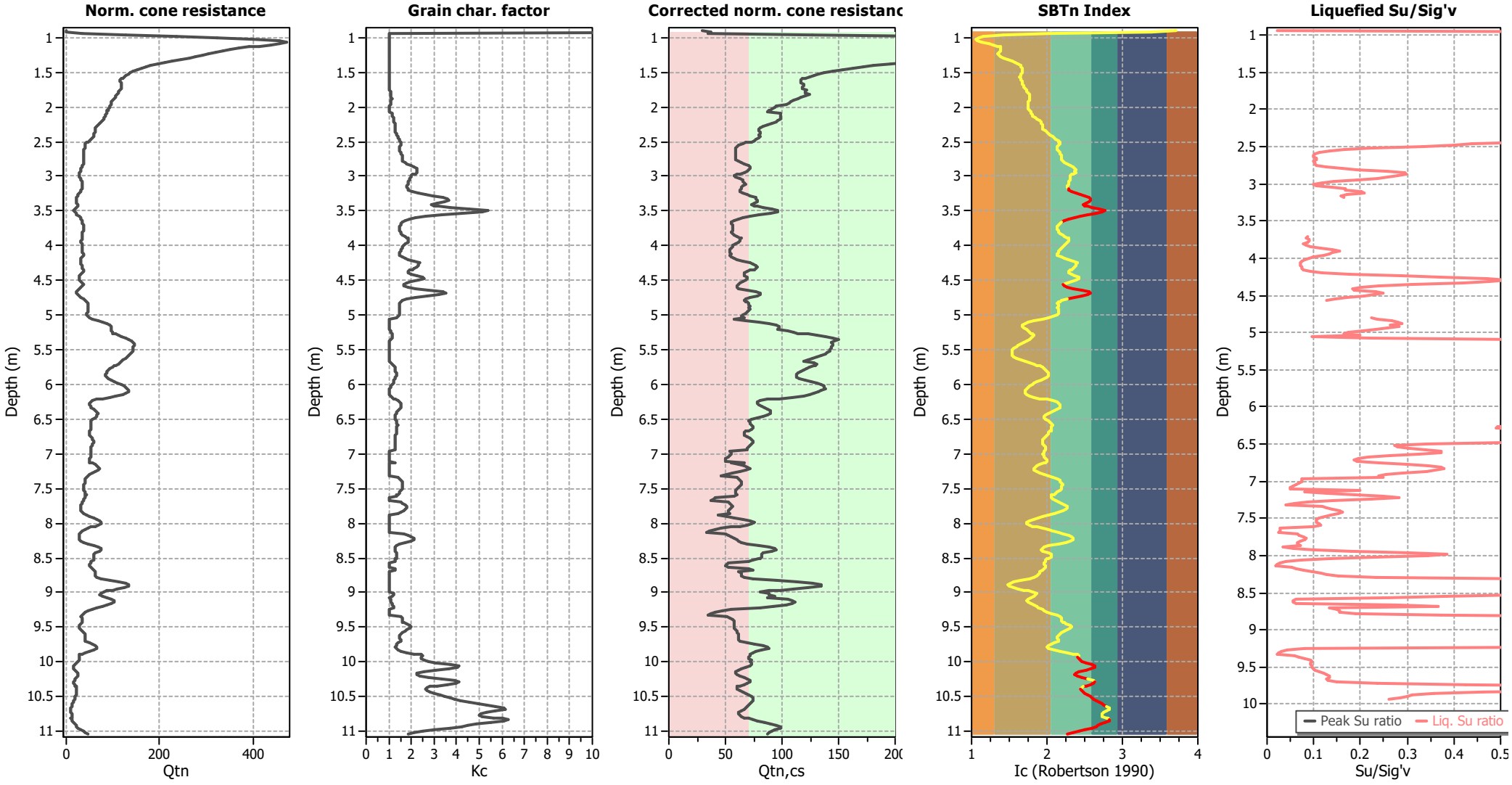




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

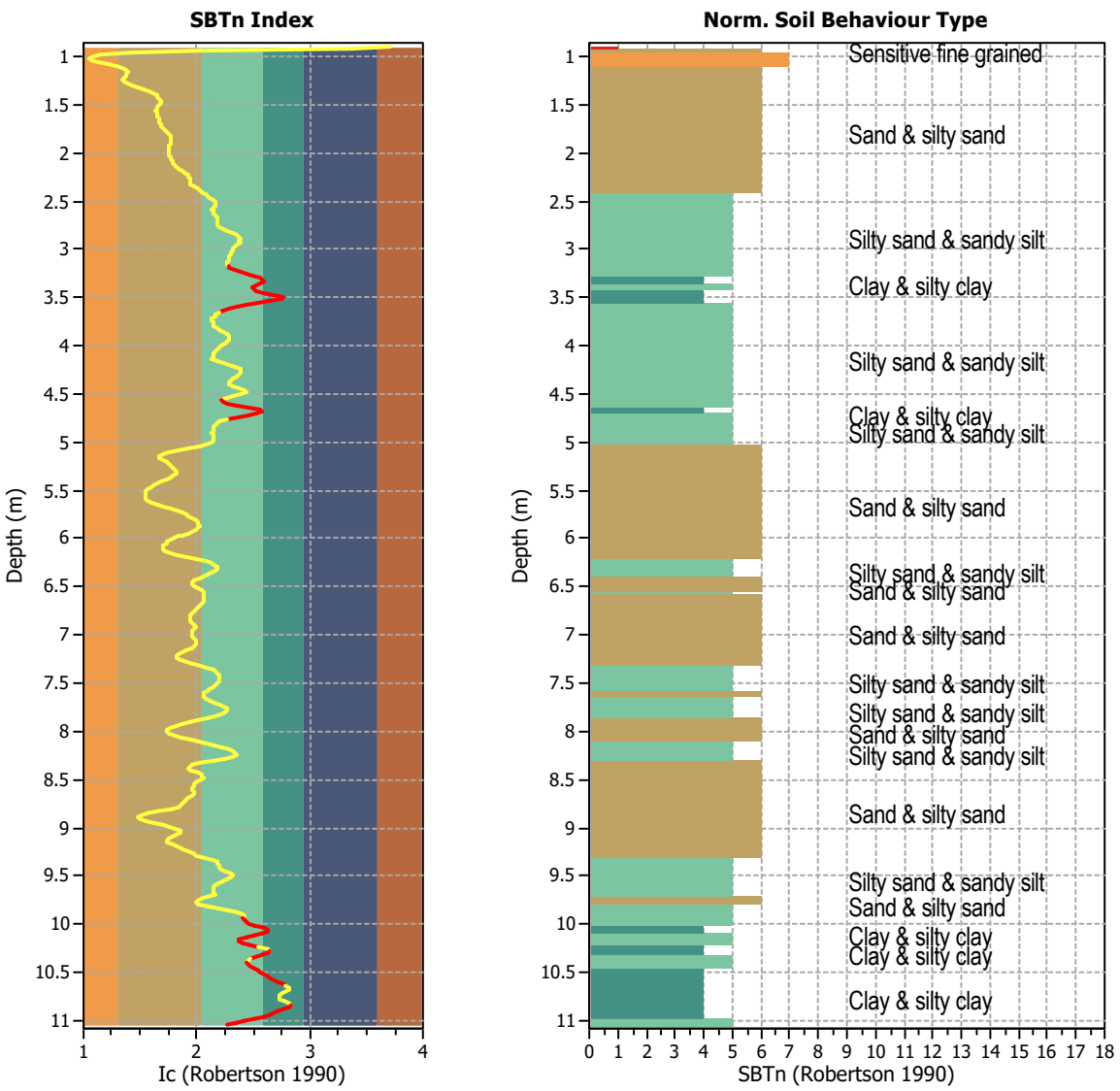
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.79 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.79 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	2

General statistics	
Total points in CPT file:	508
Total points excluded:	82
Exclusion percentage:	16.14%
Number of layers detected:	12

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	7	Start depth: 3.20 (m)	5	Silty sand & sandy silt
		End depth: 3.32 (m)	4	Clay & silty clay
Transition layer 2	4	Start depth: 3.34 (m)	4	Clay & silty clay
		End depth: 3.40 (m)	5	Silty sand & sandy silt
Transition layer 3	5	Start depth: 3.42 (m)	5	Silty sand & sandy silt
		End depth: 3.50 (m)	4	Clay & silty clay
Transition layer 4	10	Start depth: 3.50 (m)	4	Clay & silty clay
		End depth: 3.68 (m)	5	Silty sand & sandy silt
Transition layer 5	6	Start depth: 4.58 (m)	5	Silty sand & sandy silt
		End depth: 4.68 (m)	4	Clay & silty clay
Transition layer 6	6	Start depth: 4.68 (m)	4	Clay & silty clay
		End depth: 4.78 (m)	5	Silty sand & sandy silt
Transition layer 7	6	Start depth: 9.96 (m)	5	Silty sand & sandy silt
		End depth: 10.06 (m)	4	Clay & silty clay
Transition layer 8	5	Start depth: 10.08 (m)	4	Clay & silty clay
		End depth: 10.16 (m)	5	Silty sand & sandy silt
Transition layer 9	5	Start depth: 10.18 (m)	5	Silty sand & sandy silt
		End depth: 10.26 (m)	4	Clay & silty clay
Transition layer 10	5	Start depth: 10.30 (m)	4	Clay & silty clay
		End depth: 10.38 (m)	5	Silty sand & sandy silt
Transition layer 11	13	Start depth: 10.42 (m)	5	Silty sand & sandy silt
		End depth: 10.66 (m)	4	Clay & silty clay
Transition layer 12	10	Start depth: 10.86 (m)	4	Clay & silty clay
		End depth: 11.04 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.00	0.30	-0.20	100.00	13.73
2	0.92	0.00	0.30	-0.20	87.72	13.73
3	0.94	0.30	1.80	9.80	5.00	14.97
4	0.96	0.30	3.40	12.80	1.88	16.36
5	0.98	8.37	17.30	14.70	0.00	17.34
6	1.00	23.22	27.60	32.10	0.00	18.27
7	1.02	33.70	42.60	7.90	0.00	18.91
8	1.04	29.89	93.40	44.80	0.00	19.36
9	1.06	26.91	116.70	30.50	0.00	19.62
10	1.08	24.71	139.00	13.90	0.00	19.77
11	1.10	22.76	136.50	13.90	0.33	19.84
12	1.12	21.54	137.10	5.90	0.85	19.84
13	1.14	19.14	147.30	13.20	1.25	19.80
14	1.16	18.36	134.50	-0.70	1.35	19.69
15	1.18	17.56	133.60	8.40	1.34	19.56
16	1.20	17.39	83.60	13.90	1.25	19.43
17	1.22	17.31	78.30	4.20	1.09	19.28
18	1.24	16.20	92.80	20.60	0.88	19.10
19	1.26	15.76	74.20	-3.70	1.06	19.04
20	1.28	14.94	70.90	1.30	1.41	19.00
21	1.30	13.82	69.70	0.30	1.80	18.97
22	1.32	12.57	71.70	-8.70	2.49	18.96
23	1.34	11.91	90.40	29.00	3.27	18.94
24	1.36	9.97	83.40	5.00	4.01	18.90
25	1.38	9.51	74.50	1.10	4.66	18.86
26	1.40	9.31	67.50	-3.40	5.14	18.75
27	1.42	8.93	67.10	-3.00	5.33	18.66
28	1.44	8.16	65.10	-2.50	5.52	18.54
29	1.46	7.77	60.70	-3.40	5.74	18.42
30	1.48	7.21	48.70	2.10	5.80	18.26
31	1.50	6.89	41.30	5.40	5.68	18.09
32	1.52	6.71	35.40	5.90	5.36	17.88
33	1.54	6.45	33.70	8.40	5.20	17.72
34	1.56	6.39	27.70	-1.10	5.00	17.60
35	1.58	5.99	26.60	4.60	5.00	17.51
36	1.60	6.09	25.60	-5.30	5.00	17.47
37	1.62	5.87	26.00	-0.60	5.00	17.49
38	1.64	6.00	29.20	0.60	5.00	17.53
39	1.66	6.16	29.80	0.10	5.00	17.57
40	1.68	5.99	32.30	-1.00	5.67	17.65
41	1.70	6.40	29.80	1.00	5.91	17.73
42	1.72	6.36	35.80	-3.10	5.92	17.69
43	1.74	6.17	40.30	12.60	6.26	17.78
44	1.76	5.88	25.00	11.70	6.65	17.82
45	1.78	5.92	44.60	6.10	6.79	17.79
46	1.80	5.87	37.50	4.50	7.06	17.79
47	1.82	5.84	32.80	2.30	7.56	17.87
48	1.84	5.59	41.20	6.80	7.50	17.78

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	5.52	38.90	2.00	7.55	17.72
50	1.88	5.33	31.10	4.80	7.62	17.65
51	1.90	5.24	28.50	-0.80	7.43	17.55
52	1.92	5.19	24.00	4.90	7.27	17.47
53	1.94	5.26	28.30	-0.20	7.24	17.45
54	1.96	5.40	30.00	1.20	7.13	17.39
55	1.98	5.27	27.60	0.10	5.00	17.37
56	2.00	5.17	22.60	-0.30	5.00	17.31
57	2.02	5.13	21.00	2.00	5.00	17.24
58	2.04	4.99	23.00	-2.00	5.00	17.25
59	2.06	4.89	22.70	-0.20	5.00	17.26
60	2.08	4.80	29.40	11.60	5.00	17.25
61	2.10	4.78	24.30	0.10	7.95	17.26
62	2.12	4.81	21.00	-1.80	8.25	17.28
63	2.14	4.88	24.10	-2.50	8.49	17.30
64	2.16	4.50	25.10	-0.60	8.95	17.35
65	2.18	4.57	32.10	3.80	9.65	17.42
66	2.20	4.35	30.40	-0.90	10.35	17.44
67	2.22	4.20	30.80	0.30	10.86	17.44
68	2.24	3.97	28.40	-2.60	11.11	17.34
69	2.26	3.82	26.60	0.40	11.30	17.22
70	2.28	3.70	22.50	0.50	11.42	17.10
71	2.30	3.45	18.40	-1.90	11.50	17.01
72	2.32	3.42	19.50	-3.10	11.65	16.95
73	2.34	3.48	21.10	0.90	12.22	17.04
74	2.36	3.37	21.40	2.80	13.09	17.18
75	2.38	3.57	31.30	2.80	13.53	17.20
76	2.40	3.27	33.10	0.00	14.21	17.24
77	2.42	3.17	23.40	-5.20	15.18	17.34
78	2.44	3.07	26.80	-0.20	15.78	17.29
79	2.46	3.03	34.70	-2.10	16.32	17.20
80	2.48	2.85	26.90	-1.50	17.22	17.17
81	2.50	2.47	24.70	-0.20	17.85	17.08
82	2.52	2.40	22.30	1.60	17.79	16.86
83	2.54	2.30	18.70	-0.20	17.84	16.69
84	2.56	2.28	14.70	-0.40	17.44	16.55
85	2.58	2.27	14.00	-1.30	17.07	16.43
86	2.60	2.28	14.30	-1.10	16.91	16.37
87	2.62	2.28	14.30	-1.10	17.08	16.37
88	2.64	2.23	14.70	-0.40	17.36	16.38
89	2.66	2.20	14.70	-0.10	17.88	16.42
90	2.68	2.17	14.80	-1.10	18.28	16.42
91	2.70	2.14	17.40	1.60	18.45	16.41
92	2.72	2.11	15.00	0.70	18.66	16.42
93	2.74	2.12	13.70	-1.60	18.45	16.43
94	2.76	2.17	15.90	-1.50	18.58	16.47
95	2.78	2.34	14.90	1.10	19.18	16.60
96	2.80	2.23	20.00	-0.90	20.33	16.73

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	2.22	24.40	-0.30	21.39	16.81
98	2.84	1.96	24.80	-1.10	23.12	16.89
99	2.86	1.92	23.40	-0.10	24.39	16.89
100	2.88	1.84	24.60	0.30	25.37	16.85
101	2.90	1.75	22.40	0.50	25.63	16.80
102	2.92	1.74	21.50	1.50	25.24	16.74
103	2.94	1.77	21.10	-1.50	25.63	16.60
104	2.96	1.92	17.60	-0.50	24.63	16.49
105	2.98	1.36	13.70	1.30	23.86	16.40
106	3.00	1.86	13.70	1.30	23.14	16.33
107	3.02	1.83	14.80	-0.20	23.01	16.39
108	3.04	1.89	15.90	1.40	22.71	16.62
109	3.06	2.14	21.00	9.70	22.72	16.74
110	3.08	2.12	28.60	7.90	22.07	16.78
111	3.10	2.23	22.40	0.80	22.06	16.91
112	3.12	2.28	17.20	-1.80	22.01	16.93
113	3.14	2.33	26.70	1.30	21.28	16.85
114	3.16	2.27	22.80	1.20	21.24	16.82
115	3.18	2.24	20.40	1.30	21.99	16.81
116	3.20	2.16	19.30	2.30	22.15	16.70
117	3.22	1.93	17.90	-0.50	23.59	16.67
118	3.24	1.93	17.90	-0.50	25.82	16.66
119	3.26	1.58	22.30	0.70	28.28	16.66
120	3.28	1.40	22.60	0.80	30.51	16.67
121	3.30	1.38	22.50	28.00	33.36	16.66
122	3.32	1.33	20.90	38.10	34.60	16.63
123	3.34	1.25	21.10	11.90	34.67	16.66
124	3.36	1.27	21.00	0.10	33.67	16.72
125	3.38	1.45	24.50	6.30	31.74	16.74
126	3.40	1.76	26.80	-1.40	30.04	16.77
127	3.42	1.87	20.30	-11.00	30.74	16.84
128	3.44	1.81	21.70	-3.50	32.17	16.89
129	3.46	1.26	28.00	4.00	35.15	16.89
130	3.48	1.20	30.60	19.40	39.68	16.89
131	3.50	1.06	31.20	30.20	43.89	16.90
132	3.52	0.97	26.50	78.20	42.62	16.93
133	3.54	1.13	27.30	75.60	37.99	16.97
134	3.56	1.53	30.30	41.10	32.83	16.94
135	3.58	2.12	28.50	-3.20	28.14	16.92
136	3.60	2.19	20.30	-2.60	24.72	16.87
137	3.62	2.34	17.90	-1.40	22.19	16.79
138	3.64	2.28	17.30	4.70	20.24	16.64
139	3.66	2.44	19.50	0.40	18.87	16.55
140	3.68	2.66	14.40	0.60	18.11	16.53
141	3.70	2.70	12.60	1.00	17.65	16.61
142	3.72	2.77	15.60	-2.00	17.00	16.60
143	3.74	2.90	21.90	1.80	16.95	16.64
144	3.76	2.87	17.70	-0.20	17.12	16.65

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	2.88	17.10	0.50	17.38	16.64
146	3.80	2.63	13.20	0.90	17.45	16.54
147	3.82	2.58	15.10	-0.50	18.32	16.62
148	3.84	2.53	15.70	-0.30	19.25	16.72
149	3.86	2.63	24.20	0.00	20.36	16.85
150	3.88	2.67	25.10	6.00	21.33	16.96
151	3.90	2.48	24.90	-0.40	21.82	17.01
152	3.92	2.45	25.70	2.80	21.79	16.96
153	3.94	2.49	21.30	-0.40	21.99	16.93
154	3.96	2.47	19.10	-0.50	21.66	16.88
155	3.98	2.49	22.70	-0.30	20.68	16.78
156	4.00	2.51	20.10	0.20	19.85	16.71
157	4.02	2.66	16.30	0.60	19.23	16.66
158	4.04	2.74	14.60	0.70	18.57	16.60
159	4.06	2.70	14.60	0.30	17.95	16.57
160	4.08	2.73	18.00	0.30	17.59	16.56
161	4.10	2.82	17.10	-0.10	17.37	16.57
162	4.12	2.89	15.00	-0.20	17.16	16.60
163	4.14	2.95	14.80	-0.70	16.80	16.58
164	4.16	2.99	16.20	-0.50	18.69	16.65
165	4.18	2.94	16.10	1.50	20.31	16.78
166	4.20	1.82	24.40	-1.40	22.11	16.91
167	4.22	2.39	26.40	7.20	24.14	17.07
168	4.24	2.46	28.40	1.80	26.19	17.24
169	4.26	2.56	34.00	9.20	25.67	17.41
170	4.28	2.62	37.70	12.50	25.71	17.53
171	4.30	2.74	45.10	-3.20	25.33	17.60
172	4.32	2.88	42.90	0.50	24.50	17.62
173	4.34	2.96	37.50	1.10	23.57	17.62
174	4.36	3.11	34.70	1.50	22.52	17.52
175	4.38	3.15	34.40	-0.70	21.95	17.41
176	4.40	2.96	28.90	-2.30	22.17	17.31
177	4.42	2.74	26.50	-0.30	23.21	17.21
178	4.44	2.41	25.60	1.10	25.23	17.10
179	4.46	2.15	25.40	0.50	27.42	17.10
180	4.48	1.80	27.20	1.50	27.76	17.13
181	4.50	2.03	32.10	9.10	25.86	17.15
182	4.52	2.71	29.70	7.90	23.37	17.18
183	4.54	3.31	24.80	-1.10	21.12	17.18
184	4.56	3.49	24.10	-1.20	19.70	17.14
185	4.58	3.14	23.40	-0.30	19.94	17.07
186	4.60	2.78	24.40	0.20	21.63	17.01
187	4.62	2.29	23.70	-0.30	24.58	16.96
188	4.64	2.05	22.00	1.20	29.06	17.08
189	4.66	1.82	24.70	4.50	33.15	17.14
190	4.68	1.69	41.20	10.70	34.11	17.24
191	4.70	1.64	37.80	33.00	32.22	17.39
192	4.72	2.30	37.00	105.10	28.95	17.47

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	3.10	38.50	115.70	25.09	17.44
194	4.76	3.31	28.40	-3.60	21.26	17.47
195	4.78	3.40	29.80	2.60	18.96	17.48
196	4.80	4.04	32.30	4.80	18.31	17.56
197	4.82	4.12	33.50	3.40	17.59	17.60
198	4.84	4.13	47.00	0.20	17.15	17.66
199	4.86	4.17	31.20	2.80	17.22	17.69
200	4.88	4.23	37.30	5.60	17.26	17.71
201	4.90	4.16	36.40	1.20	16.85	17.66
202	4.92	4.22	36.50	0.80	17.24	17.71
203	4.94	4.21	38.10	1.40	17.30	17.66
204	4.96	4.10	39.10	0.60	17.29	17.60
205	4.98	3.89	30.60	-1.60	17.37	17.52
206	5.00	3.83	28.40	-1.50	16.63	17.41
207	5.02	3.72	27.10	3.10	15.24	17.30
208	5.04	4.29	22.80	6.30	13.64	17.31
209	5.06	4.90	24.00	9.20	5.00	17.32
210	5.08	5.77	27.30	-0.60	5.00	17.38
211	5.10	7.31	23.00	-5.50	5.00	17.47
212	5.12	8.62	27.00	6.10	5.00	17.62
213	5.14	9.40	26.00	1.50	5.00	17.69
214	5.16	9.23	36.10	5.50	5.00	17.83
215	5.18	8.83	33.40	1.90	5.00	17.97
216	5.20	8.67	39.00	2.60	5.00	18.12
217	5.22	8.61	48.90	-0.60	7.09	18.21
218	5.24	8.89	51.80	-4.80	7.47	18.36
219	5.26	9.51	53.50	-17.00	7.82	18.50
220	5.28	9.51	62.30	-25.60	8.32	18.75
221	5.30	9.64	71.70	-13.90	8.50	18.95
222	5.32	10.71	112.90	-2.30	8.44	19.12
223	5.34	11.53	110.50	-20.10	8.00	19.23
224	5.36	12.83	110.40	-27.60	7.42	19.30
225	5.38	13.31	97.70	-26.50	6.66	19.26
226	5.40	13.50	91.40	-23.00	5.95	19.19
227	5.42	13.37	88.70	6.80	5.21	19.05
228	5.44	13.58	76.90	-0.30	4.67	18.91
229	5.46	13.63	53.00	-4.10	4.24	18.78
230	5.48	13.43	51.20	-5.40	3.80	18.64
231	5.50	13.35	53.40	-0.80	3.48	18.53
232	5.52	13.38	52.00	1.10	3.47	18.50
233	5.54	13.38	49.70	2.80	3.51	18.48
234	5.56	13.16	47.20	3.50	3.45	18.40
235	5.58	12.79	47.20	3.50	3.50	18.34
236	5.60	12.39	38.90	6.50	3.80	18.34
237	5.62	12.06	42.30	6.00	4.36	18.40
238	5.64	11.41	50.50	14.20	5.00	18.52
239	5.66	11.05	62.70	6.70	6.31	18.71
240	5.68	10.79	77.90	18.60	7.56	18.89

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	10.42	90.70	16.40	8.66	19.01
242	5.72	10.12	100.50	20.10	9.66	19.08
243	5.74	9.56	96.80	12.30	10.54	19.12
244	5.76	9.17	98.00	9.80	11.23	19.12
245	5.78	8.87	100.40	11.00	11.91	19.11
246	5.80	8.58	97.50	15.10	12.58	19.11
247	5.82	8.23	101.50	19.70	13.08	19.10
248	5.84	8.00	103.10	22.20	13.39	19.07
249	5.86	7.86	97.00	18.80	13.56	19.05
250	5.88	7.83	92.50	17.00	13.38	19.03
251	5.90	8.04	92.70	17.10	12.75	19.00
252	5.92	8.38	93.60	20.20	12.00	18.98
253	5.94	8.86	85.00	15.50	10.81	18.99
254	5.96	9.36	85.10	23.40	9.72	19.00
255	5.98	10.92	84.50	17.50	8.89	19.05
256	6.00	11.30	86.20	20.30	8.09	19.09
257	6.02	11.93	102.90	6.30	7.36	19.11
258	6.04	12.48	90.50	-18.40	6.98	19.13
259	6.06	12.71	85.00	-23.40	6.70	19.14
260	6.08	12.93	86.00	-20.20	6.31	19.10
261	6.10	12.99	89.10	-22.30	6.16	19.05
262	6.12	12.94	84.30	-30.60	6.25	18.97
263	6.14	12.20	73.30	-19.30	6.62	18.86
264	6.16	10.69	61.10	-7.80	7.45	18.69
265	6.18	9.05	55.80	1.40	8.73	18.50
266	6.20	6.75	50.90	4.30	10.56	18.34
267	6.22	5.91	48.80	10.10	12.81	18.23
268	6.24	5.44	49.60	22.00	15.13	18.16
269	6.26	5.08	51.30	75.00	16.62	18.13
270	6.28	4.78	51.40	60.00	17.56	18.15
271	6.30	4.61	51.50	74.20	18.18	18.21
272	6.32	4.95	55.70	88.70	18.32	18.30
273	6.34	5.23	64.30	88.00	17.90	18.39
274	6.36	5.69	72.20	28.50	16.97	18.47
275	6.38	6.05	70.80	18.30	15.77	18.53
276	6.40	6.49	66.50	13.60	14.60	18.51
277	6.42	7.16	63.70	2.00	13.56	18.42
278	6.44	6.89	53.90	-4.50	12.56	18.24
279	6.46	6.46	43.70	-4.80	11.96	18.03
280	6.48	5.99	27.70	-7.00	11.93	17.81
281	6.50	5.61	27.10	-5.30	12.48	17.66
282	6.52	5.25	30.00	1.30	13.27	17.62
283	6.54	4.76	35.30	2.60	14.15	17.72
284	6.56	4.98	41.00	5.40	14.67	17.81
285	6.58	5.49	43.00	-1.80	14.93	17.89
286	6.60	5.63	41.70	-3.70	14.72	17.93
287	6.62	5.52	42.50	-2.30	14.46	17.91
288	6.64	5.36	40.80	14.00	14.54	17.85

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	5.21	37.20	-9.40	14.56	17.73
290	6.68	4.91	33.20	-14.90	14.20	17.58
291	6.70	4.73	24.70	-14.10	13.65	17.46
292	6.72	4.97	22.60	-7.00	13.24	17.39
293	6.74	5.25	24.90	-7.30	12.83	17.36
294	6.76	5.28	28.20	-6.80	12.34	17.45
295	6.78	5.34	29.80	1.60	11.94	17.54
296	6.80	6.07	32.30	-9.00	11.65	17.58
297	6.82	6.28	31.30	-15.20	11.41	17.60
298	6.84	6.12	29.50	-11.80	11.27	17.59
299	6.86	5.81	28.90	-11.00	11.54	17.57
300	6.88	5.57	28.90	-12.70	11.90	17.53
301	6.90	5.43	30.30	-14.60	12.36	17.50
302	6.92	5.37	27.50	-12.60	12.62	17.49
303	6.94	5.20	27.80	-9.20	12.31	17.48
304	6.96	5.38	28.80	-5.90	5.00	17.42
305	6.98	5.96	26.60	-3.10	5.00	17.39
306	7.00	5.65	23.20	-3.00	5.00	17.38
307	7.02	5.51	23.20	0.10	5.00	17.36
308	7.04	5.20	27.30	-4.30	5.00	17.33
309	7.06	5.03	26.70	-15.30	5.00	17.30
310	7.08	5.26	24.40	-22.30	5.00	17.28
311	7.10	4.74	21.10	-34.00	5.00	17.29
312	7.12	5.00	22.00	-26.30	12.46	17.37
313	7.14	5.33	28.30	-18.60	5.00	17.48
314	7.16	6.18	33.90	-21.80	5.00	17.59
315	7.18	7.20	33.30	-23.80	5.00	17.68
316	7.20	7.76	30.20	-24.40	5.00	17.69
317	7.22	7.37	30.10	-21.80	5.00	17.66
318	7.24	7.06	27.80	-15.70	5.00	17.54
319	7.26	7.06	27.80	-15.70	5.00	17.40
320	7.28	5.79	20.60	-38.20	5.00	17.28
321	7.30	5.00	17.70	-36.20	5.00	17.23
322	7.32	4.29	22.10	-35.30	5.00	17.21
323	7.34	4.41	25.90	-32.50	15.38	17.31
324	7.36	4.52	30.10	-30.50	17.06	17.44
325	7.38	4.26	33.60	-26.40	17.93	17.54
326	7.40	4.03	35.90	-20.20	18.42	17.61
327	7.42	4.05	35.90	-16.80	18.97	17.63
328	7.44	4.38	36.00	-11.50	19.07	17.60
329	7.46	4.17	34.50	-22.30	18.86	17.53
330	7.48	3.97	29.10	-21.30	18.76	17.46
331	7.50	3.84	26.80	-9.00	18.64	17.38
332	7.52	3.76	27.30	-11.90	17.81	17.34
333	7.54	4.07	26.50	-13.50	17.09	17.32
334	7.56	4.67	27.80	-15.30	16.33	17.31
335	7.58	4.56	25.60	-19.60	15.54	17.31
336	7.60	4.56	24.00	-19.10	14.80	17.26

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	4.63	25.70	-16.70	14.63	17.14
338	7.64	4.65	20.30	-19.30	5.00	17.01
339	7.66	4.13	15.80	-19.00	5.00	16.92
340	7.68	3.75	15.10	-11.20	5.00	16.89
341	7.70	3.61	18.00	-4.90	17.50	16.93
342	7.72	3.50	25.40	0.90	18.89	17.02
343	7.74	3.64	25.30	-3.80	20.23	17.10
344	7.76	3.40	25.20	-8.60	21.08	17.15
345	7.78	3.12	24.50	-7.70	21.09	17.12
346	7.80	3.22	23.50	-2.90	20.64	17.05
347	7.82	3.36	22.40	0.20	19.44	16.98
348	7.84	3.66	18.20	-7.90	17.62	16.94
349	7.86	3.97	17.30	11.50	15.81	16.96
350	7.88	4.44	18.90	18.10	5.00	17.03
351	7.90	5.02	22.10	4.40	5.00	17.14
352	7.92	6.47	23.80	-2.50	5.00	17.26
353	7.94	7.10	23.00	-4.20	5.00	17.40
354	7.96	7.79	24.00	-4.70	5.00	17.43
355	7.98	8.33	28.10	-3.50	5.00	17.39
356	8.00	8.31	22.40	-0.10	5.00	17.32
357	8.02	8.05	17.90	2.50	5.00	17.20
358	8.04	6.41	16.90	3.00	5.00	17.01
359	8.06	5.47	15.20	-12.20	5.00	16.87
360	8.08	4.87	15.70	-8.10	5.00	16.76
361	8.10	4.38	15.30	8.80	5.00	16.68
362	8.12	3.92	14.70	-0.50	5.00	16.65
363	8.14	3.43	14.50	-1.40	5.00	16.68
364	8.16	3.05	16.30	8.20	19.59	16.77
365	8.18	3.17	19.90	18.10	21.77	16.88
366	8.20	2.97	24.70	18.10	23.37	17.02
367	8.22	2.92	25.90	29.20	24.22	17.17
368	8.24	3.02	28.40	36.30	24.46	17.30
369	8.26	3.18	31.90	46.30	23.03	17.43
370	8.28	3.58	34.00	40.90	20.51	17.65
371	8.30	4.45	37.20	50.40	17.32	17.91
372	8.32	5.92	48.70	59.80	13.63	18.18
373	8.34	7.84	59.90	39.70	12.08	18.36
374	8.36	10.50	65.60	-15.30	11.36	18.47
375	8.38	8.29	61.80	-40.10	11.06	18.47
376	8.40	7.35	58.10	-41.10	11.64	18.43
377	8.42	6.58	45.90	-37.20	13.49	18.36
378	8.44	6.16	55.20	-38.80	14.36	18.36
379	8.46	6.06	58.50	-41.40	14.35	18.34
380	8.48	6.87	66.40	-44.30	14.48	18.37
381	8.50	7.21	53.90	-48.40	13.70	18.27
382	8.52	6.68	52.60	-52.40	12.80	18.10
383	8.54	6.45	30.20	-48.60	12.23	17.85
384	8.56	6.03	24.00	-46.50	12.26	17.63

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	5.57	24.50	-42.80	5.00	17.38
386	8.60	5.26	24.20	-40.40	5.00	17.32
387	8.62	5.54	23.60	-38.90	5.00	17.39
388	8.64	5.62	25.10	-32.00	5.00	17.48
389	8.66	5.88	31.80	-27.40	11.76	17.60
390	8.68	6.47	34.20	-24.00	11.20	17.69
391	8.70	7.20	36.30	-25.10	5.00	17.74
392	8.72	7.32	32.50	-26.60	5.00	17.74
393	8.74	7.19	30.00	-24.90	5.00	17.68
394	8.76	6.70	30.00	-23.80	5.00	17.57
395	8.78	6.76	25.10	-16.80	5.00	17.56
396	8.80	7.14	22.90	-14.30	5.00	17.66
397	8.82	8.65	28.90	-12.10	5.00	17.80
398	8.84	11.56	37.00	-12.30	3.83	17.98
399	8.86	17.09	37.40	-28.80	3.00	18.12
400	8.88	16.38	41.10	-50.50	2.65	18.21
401	8.90	14.80	36.80	-48.20	2.72	18.23
402	8.92	12.83	38.90	-42.70	3.60	18.24
403	8.94	11.49	40.60	-36.60	4.74	18.25
404	8.96	11.08	45.60	-30.30	5.00	18.23
405	8.98	9.81	49.40	-33.70	5.00	18.18
406	9.00	8.57	42.10	-45.50	5.00	18.13
407	9.02	7.88	36.00	-38.60	9.37	18.09
408	9.04	7.19	38.30	-32.90	9.28	18.06
409	9.06	7.46	43.50	-23.30	8.54	18.15
410	9.08	9.70	44.00	14.80	5.00	18.28
411	9.10	11.76	54.40	38.70	7.26	18.49
412	9.12	11.76	54.40	38.70	6.86	18.62
413	9.14	12.22	75.10	-62.50	6.97	18.67
414	9.16	11.19	69.80	-63.20	7.71	18.63
415	9.18	10.21	56.90	-62.50	8.68	18.55
416	9.20	8.32	50.80	-62.30	9.48	18.27
417	9.22	7.14	40.60	-63.10	10.20	17.90
418	9.24	6.16	22.50	-62.70	5.00	17.53
419	9.26	5.33	13.20	-59.20	5.00	17.14
420	9.28	4.62	13.50	-56.40	5.00	16.77
421	9.30	3.93	15.00	-51.20	5.00	16.68
422	9.32	3.83	15.60	-44.40	5.00	16.82
423	9.34	3.85	18.90	-39.90	18.20	16.97
424	9.36	3.80	25.30	-25.80	18.67	17.14
425	9.38	3.92	27.20	-22.70	18.71	17.30
426	9.40	4.34	29.80	-10.00	18.80	17.41
427	9.42	4.67	31.60	-2.90	19.19	17.44
428	9.44	4.38	30.90	-0.30	19.80	17.42
429	9.46	3.63	29.50	0.90	21.00	17.38
430	9.48	3.26	25.50	18.50	22.80	17.34
431	9.50	3.19	27.90	36.20	23.24	17.34
432	9.52	3.20	30.80	36.50	22.58	17.38

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	4.06	31.10	46.40	21.47	17.45
434	9.56	4.26	32.70	37.80	20.25	17.54
435	9.58	4.44	32.30	44.20	18.71	17.61
436	9.60	4.65	36.10	48.30	17.92	17.65
437	9.62	5.01	36.20	28.10	17.32	17.67
438	9.64	5.16	35.00	24.90	17.10	17.66
439	9.66	5.01	33.10	14.10	17.14	17.64
440	9.68	4.62	30.20	41.10	17.48	17.66
441	9.70	4.49	33.60	73.40	17.67	17.76
442	9.72	4.79	39.90	79.40	15.51	17.96
443	9.74	5.62	49.00	75.00	14.31	18.21
444	9.76	9.20	58.40	79.80	13.44	18.40
445	9.78	8.60	69.00	66.70	12.95	18.55
446	9.80	8.04	70.20	7.10	13.26	18.60
447	9.82	7.40	70.20	-27.00	15.53	18.55
448	9.84	5.70	64.50	-26.80	18.25	18.42
449	9.86	4.58	56.20	-9.10	21.25	18.25
450	9.88	3.57	50.80	17.10	24.50	18.05
451	9.90	3.42	43.50	32.50	26.87	17.91
452	9.92	3.29	38.30	46.40	27.59	17.84
453	9.94	3.32	44.80	46.10	26.75	17.83
454	9.96	3.80	46.10	46.60	27.06	17.86
455	9.98	4.04	47.70	45.00	28.03	17.88
456	10.00	3.37	48.40	33.80	29.04	17.80
457	10.02	2.86	44.50	33.30	31.41	17.67
458	10.04	2.40	33.70	63.20	35.12	17.50
459	10.06	2.09	30.10	65.40	37.19	17.31
460	10.08	1.91	28.50	62.70	36.90	17.15
461	10.10	2.08	26.70	64.10	34.63	17.10
462	10.12	2.45	24.80	68.90	31.17	17.14
463	10.14	2.94	24.80	75.20	27.75	17.23
464	10.16	3.46	29.90	86.70	25.51	17.33
465	10.18	3.76	33.70	75.00	25.34	17.42
466	10.20	3.67	34.00	72.10	26.61	17.49
467	10.22	2.95	34.60	74.20	29.20	17.51
468	10.24	2.56	36.20	72.90	32.81	17.48
469	10.26	2.23	37.50	64.00	36.38	17.41
470	10.28	2.06	35.20	74.90	37.35	17.35
471	10.30	2.18	30.90	38.30	36.53	17.29
472	10.32	2.44	27.40	64.10	34.28	17.24
473	10.34	2.63	27.70	78.70	31.67	17.21
474	10.36	2.81	28.20	66.60	29.51	17.21
475	10.38	2.92	28.10	68.50	28.58	17.25
476	10.40	3.09	28.20	60.80	28.32	17.30
477	10.42	3.01	29.90	68.90	28.78	17.37
478	10.44	2.97	33.10	77.10	29.66	17.45
479	10.46	2.90	37.70	65.90	31.10	17.52
480	10.48	2.84	39.50	63.50	32.45	17.58

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	2.75	40.50	52.50	33.80	17.61
482	10.52	2.67	40.40	62.50	35.11	17.60
483	10.54	2.56	40.00	58.70	36.39	17.54
484	10.56	2.37	38.00	54.80	37.69	17.46
485	10.58	2.21	33.90	58.00	39.57	17.34
486	10.60	2.04	30.10	63.00	41.61	17.20
487	10.62	1.74	26.90	61.80	43.58	17.06
488	10.64	1.64	25.50	62.20	45.44	16.92
489	10.66	1.55	24.20	58.30	47.15	16.80
490	10.68	1.49	20.70	59.20	47.37	16.71
491	10.70	1.47	20.00	61.30	45.43	16.65
492	10.72	1.53	19.30	65.10	43.54	16.61
493	10.74	1.87	18.90	67.20	42.39	16.63
494	10.76	1.84	19.90	69.20	41.89	16.69
495	10.78	1.76	20.90	68.80	42.55	16.76
496	10.80	1.71	24.40	107.70	44.90	16.83
497	10.82	1.55	25.90	112.00	46.78	16.94
498	10.84	1.54	27.40	146.20	48.04	17.10
499	10.86	1.71	31.80	152.00	47.00	17.26
500	10.88	1.87	39.80	185.20	44.43	17.64
501	10.90	2.29	43.70	220.80	41.13	17.94
502	10.92	3.13	77.80	312.50	39.25	18.18
503	10.94	3.45	77.90	390.40	37.84	18.36
504	10.96	3.29	81.30	318.60	35.33	18.51
505	10.98	3.23	84.40	488.90	30.83	18.60
506	11.00	4.16	78.70	381.50	27.31	18.69
507	11.02	6.12	87.10	167.90	24.53	18.75
508	11.04	6.57	93.20	167.90	21.65	18.84

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.93	0.00	12.93	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.26	0.00	13.26	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	13.61	0.00	13.61	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	13.97	0.00	13.97	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	14.35	0.00	14.35	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	14.74	0.00	14.74	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	15.13	0.00	15.13	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.53	0.00	15.53	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.92	0.00	15.92	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	16.32	0.00	16.32	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	16.72	0.00	16.72	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	17.11	0.00	17.11	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	17.50	0.00	17.50	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.89	0.00	17.89	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	18.28	0.00	18.28	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	18.66	0.00	18.66	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	19.04	0.00	19.04	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	19.42	0.00	19.42	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	19.80	0.00	19.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	20.18	0.00	20.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	20.56	0.00	20.56	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	20.93	0.00	20.93	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	21.31	0.00	21.31	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	21.69	0.00	21.69	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	22.06	0.00	22.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	22.43	0.00	22.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	22.80	0.00	22.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	23.16	0.00	23.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	23.53	0.00	23.53	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	23.88	0.00	23.88	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	24.24	0.00	24.24	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	24.59	0.00	24.59	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	24.94	0.00	24.94	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	25.29	0.00	25.29	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	25.64	0.00	25.64	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	25.99	0.00	25.99	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	26.34	0.00	26.34	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	26.69	0.00	26.69	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	27.05	0.00	27.05	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	27.40	0.00	27.40	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	27.76	0.00	27.76	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	28.11	0.00	28.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	28.47	0.00	28.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	28.83	0.00	28.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	29.18	0.00	29.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	29.54	0.00	29.54	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	29.89	0.00	29.89	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	30.25	0.00	30.25	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	30.60	0.00	30.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	30.95	0.00	30.95	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	31.30	0.00	31.30	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	31.64	0.00	31.64	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	31.99	0.00	31.99	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	32.34	0.00	32.34	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	32.68	0.00	32.68	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	33.03	0.00	33.03	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	33.37	0.00	33.37	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	33.72	0.00	33.72	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	34.06	0.00	34.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	34.41	0.00	34.41	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	34.75	0.00	34.75	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	35.10	0.00	35.10	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	35.45	0.00	35.45	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	35.80	0.00	35.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	36.15	0.00	36.15	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	36.49	0.00	36.49	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	36.84	0.00	36.84	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	37.18	0.00	37.18	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
71	2.30	37.52	0.00	37.52	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
72	2.32	37.86	0.00	37.86	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
73	2.34	38.20	0.00	38.20	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
74	2.36	38.54	0.00	38.54	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
75	2.38	38.89	0.00	38.89	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
76	2.40	39.23	0.00	39.23	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
77	2.42	39.58	0.00	39.58	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
78	2.44	39.92	0.00	39.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
79	2.46	40.27	0.00	40.27	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
80	2.48	40.61	0.00	40.61	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	40.95	0.00	40.95	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	41.29	0.00	41.29	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	41.63	0.00	41.63	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
84	2.56	41.96	0.00	41.96	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
85	2.58	42.28	0.00	42.28	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
86	2.60	42.61	0.00	42.61	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
87	2.62	42.94	0.00	42.94	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
88	2.64	43.27	0.00	43.27	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
89	2.66	43.60	0.00	43.60	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
90	2.68	43.92	0.00	43.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	44.25	0.00	44.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	44.58	0.00	44.58	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	44.91	0.00	44.91	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	45.24	0.00	45.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	45.57	0.00	45.57	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	45.91	0.00	45.91	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	46.24	0.00	46.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
98	2.84	46.58	0.00	46.58	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
99	2.86	46.92	0.00	46.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
100	2.88	47.25	0.00	47.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
101	2.90	47.59	0.00	47.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	47.92	0.00	47.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	48.26	0.00	48.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	48.59	0.00	48.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	48.91	0.00	48.91	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	49.24	0.00	49.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
107	3.02	49.57	0.00	49.57	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
108	3.04	49.90	0.00	49.90	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
109	3.06	50.24	0.00	50.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
110	3.08	50.57	0.00	50.57	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
111	3.10	50.91	0.00	50.91	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
112	3.12	51.25	0.00	51.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
113	3.14	51.59	0.00	51.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
114	3.16	51.92	0.00	51.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
115	3.18	52.26	0.00	52.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
116	3.20	52.59	0.00	52.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
117	3.22	52.93	0.00	52.93	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
118	3.24	53.26	0.00	53.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
119	3.26	53.59	0.00	53.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
120	3.28	53.93	0.00	53.93	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
121	3.30	54.26	0.00	54.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
122	3.32	54.59	0.00	54.59	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
123	3.34	54.92	0.00	54.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
124	3.36	55.26	0.00	55.26	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
125	3.38	55.59	0.00	55.59	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
126	3.40	55.93	0.00	55.93	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
127	3.42	56.27	0.00	56.27	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
128	3.44	56.60	0.00	56.60	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
129	3.46	56.94	0.00	56.94	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
130	3.48	57.28	0.00	57.28	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
131	3.50	57.62	0.00	57.62	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
132	3.52	57.96	0.00	57.96	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
133	3.54	58.30	0.00	58.30	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
134	3.56	58.63	0.00	58.63	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
135	3.58	58.97	0.00	58.97	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
136	3.60	59.31	0.00	59.31	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
137	3.62	59.65	0.00	59.65	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
138	3.64	59.98	0.00	59.98	0.98	0.063	1.38	0.046	1.00	1.00	2.000	Yes
139	3.66	60.31	0.00	60.31	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
140	3.68	60.64	0.00	60.64	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
141	3.70	60.97	0.00	60.97	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
142	3.72	61.30	0.00	61.30	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
143	3.74	61.64	0.00	61.64	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
144	3.76	61.97	0.00	61.97	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	62.30	0.00	62.30	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
146	3.80	62.63	0.00	62.63	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
147	3.82	62.97	0.00	62.97	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
148	3.84	63.30	0.00	63.30	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
149	3.86	63.64	0.00	63.64	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
150	3.88	63.98	0.00	63.98	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
151	3.90	64.32	0.00	64.32	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
152	3.92	64.66	0.00	64.66	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
153	3.94	65.00	0.00	65.00	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
154	3.96	65.33	0.00	65.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
155	3.98	65.67	0.00	65.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
156	4.00	66.00	0.00	66.00	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
157	4.02	66.34	0.00	66.34	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
158	4.04	66.67	0.00	66.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
159	4.06	67.00	0.00	67.00	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
160	4.08	67.33	0.00	67.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
161	4.10	67.66	0.00	67.66	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
162	4.12	67.99	0.00	67.99	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
163	4.14	68.33	0.00	68.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
164	4.16	68.66	0.00	68.66	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
165	4.18	68.99	0.00	68.99	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
166	4.20	69.33	0.00	69.33	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
167	4.22	69.67	0.00	69.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
168	4.24	70.02	0.00	70.02	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
169	4.26	70.37	0.00	70.37	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
170	4.28	70.72	0.00	70.72	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
171	4.30	71.07	0.00	71.07	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
172	4.32	71.42	0.00	71.42	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
173	4.34	71.77	0.00	71.77	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
174	4.36	72.13	0.00	72.13	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
175	4.38	72.47	0.00	72.47	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
176	4.40	72.82	0.00	72.82	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
177	4.42	73.16	0.00	73.16	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
178	4.44	73.51	0.00	73.51	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
179	4.46	73.85	0.00	73.85	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
180	4.48	74.19	0.00	74.19	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
181	4.50	74.53	0.00	74.53	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
182	4.52	74.88	0.00	74.88	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
183	4.54	75.22	0.00	75.22	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
184	4.56	75.56	0.00	75.56	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
185	4.58	75.90	0.00	75.90	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
186	4.60	76.24	0.00	76.24	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
187	4.62	76.58	0.00	76.58	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
188	4.64	76.93	0.00	76.93	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
189	4.66	77.27	0.00	77.27	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
190	4.68	77.61	0.00	77.61	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
191	4.70	77.96	0.00	77.96	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
192	4.72	78.31	0.00	78.31	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	78.66	0.00	78.66	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
194	4.76	79.01	0.00	79.01	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
195	4.78	79.36	0.00	79.36	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
196	4.80	79.71	0.10	79.61	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
197	4.82	80.06	0.29	79.77	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
198	4.84	80.41	0.49	79.92	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
199	4.86	80.77	0.69	80.08	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
200	4.88	81.12	0.88	80.24	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
201	4.90	81.48	1.08	80.40	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
202	4.92	81.83	1.28	80.55	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
203	4.94	82.18	1.47	80.71	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
204	4.96	82.54	1.67	80.87	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
205	4.98	82.89	1.86	81.02	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
206	5.00	83.23	2.06	81.17	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
207	5.02	83.58	2.26	81.32	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
208	5.04	83.93	2.45	81.47	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
209	5.06	84.27	2.65	81.62	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
210	5.08	84.62	2.84	81.78	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
211	5.10	84.97	3.04	81.93	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
212	5.12	85.32	3.24	82.08	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
213	5.14	85.68	3.43	82.24	0.96	0.065	1.38	0.047	1.00	1.00	0.047	No
214	5.16	86.03	3.63	82.40	0.96	0.065	1.38	0.048	1.00	1.00	0.048	No
215	5.18	86.39	3.83	82.57	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
216	5.20	86.75	4.02	82.73	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
217	5.22	87.12	4.22	82.90	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
218	5.24	87.49	4.41	83.07	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
219	5.26	87.86	4.61	83.24	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
220	5.28	88.23	4.81	83.42	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
221	5.30	88.61	5.00	83.61	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
222	5.32	88.99	5.20	83.79	0.96	0.066	1.38	0.048	1.00	1.00	0.048	No
223	5.34	89.38	5.40	83.98	0.96	0.067	1.38	0.048	1.00	1.00	0.048	No
224	5.36	89.76	5.59	84.17	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
225	5.38	90.15	5.79	84.36	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
226	5.40	90.53	5.98	84.55	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
227	5.42	90.91	6.18	84.73	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
228	5.44	91.29	6.38	84.91	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
229	5.46	91.67	6.57	85.09	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
230	5.48	92.04	6.77	85.27	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
231	5.50	92.41	6.97	85.44	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
232	5.52	92.78	7.16	85.62	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
233	5.54	93.15	7.36	85.79	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
234	5.56	93.52	7.55	85.96	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
235	5.58	93.88	7.75	86.13	0.96	0.068	1.38	0.049	1.00	1.00	0.049	No
236	5.60	94.25	7.95	86.31	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No
237	5.62	94.62	8.14	86.48	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No
238	5.64	94.99	8.34	86.65	0.96	0.068	1.38	0.050	1.00	1.00	0.050	No
239	5.66	95.36	8.53	86.83	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
240	5.68	95.74	8.73	87.01	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	96.12	8.93	87.19	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
242	5.72	96.50	9.12	87.38	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
243	5.74	96.89	9.32	87.57	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
244	5.76	97.27	9.52	87.75	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
245	5.78	97.65	9.71	87.94	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
246	5.80	98.03	9.91	88.12	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
247	5.82	98.41	10.10	88.31	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
248	5.84	98.80	10.30	88.50	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
249	5.86	99.18	10.50	88.68	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
250	5.88	99.56	10.69	88.86	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
251	5.90	99.94	10.89	89.05	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
252	5.92	100.32	11.09	89.23	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
253	5.94	100.70	11.28	89.42	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
254	5.96	101.08	11.48	89.60	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
255	5.98	101.46	11.67	89.78	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
256	6.00	101.84	11.87	89.97	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
257	6.02	102.22	12.07	90.16	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
258	6.04	102.60	12.26	90.34	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
259	6.06	102.99	12.46	90.53	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
260	6.08	103.37	12.65	90.71	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
261	6.10	103.75	12.85	90.90	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
262	6.12	104.13	13.05	91.08	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
263	6.14	104.51	13.24	91.26	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
264	6.16	104.88	13.44	91.44	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
265	6.18	105.25	13.64	91.61	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
266	6.20	105.62	13.83	91.79	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
267	6.22	105.98	14.03	91.95	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
268	6.24	106.35	14.22	92.12	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
269	6.26	106.71	14.42	92.29	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
270	6.28	107.07	14.62	92.45	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
271	6.30	107.43	14.81	92.62	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
272	6.32	107.80	15.01	92.79	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
273	6.34	108.17	15.21	92.96	0.95	0.072	1.38	0.052	1.00	1.00	0.052	No
274	6.36	108.54	15.40	93.14	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
275	6.38	108.91	15.60	93.31	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
276	6.40	109.28	15.79	93.48	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
277	6.42	109.65	15.99	93.66	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
278	6.44	110.01	16.19	93.83	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
279	6.46	110.37	16.38	93.99	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
280	6.48	110.73	16.58	94.15	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
281	6.50	111.08	16.78	94.31	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
282	6.52	111.43	16.97	94.46	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
283	6.54	111.79	17.17	94.62	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
284	6.56	112.15	17.36	94.78	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
285	6.58	112.50	17.56	94.94	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
286	6.60	112.86	17.76	95.11	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
287	6.62	113.22	17.95	95.27	0.95	0.074	1.38	0.053	1.00	1.00	0.053	No
288	6.64	113.58	18.15	95.43	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	113.93	18.34	95.59	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
290	6.68	114.28	18.54	95.74	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
291	6.70	114.63	18.74	95.90	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
292	6.72	114.98	18.93	96.05	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
293	6.74	115.33	19.13	96.20	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
294	6.76	115.68	19.33	96.35	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
295	6.78	116.03	19.52	96.51	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
296	6.80	116.38	19.72	96.66	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
297	6.82	116.73	19.91	96.82	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
298	6.84	117.08	20.11	96.97	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
299	6.86	117.43	20.31	97.13	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
300	6.88	117.78	20.50	97.28	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
301	6.90	118.13	20.70	97.44	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
302	6.92	118.48	20.90	97.59	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
303	6.94	118.83	21.09	97.74	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
304	6.96	119.18	21.29	97.89	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
305	6.98	119.53	21.48	98.05	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
306	7.00	119.88	21.68	98.20	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
307	7.02	120.23	21.88	98.35	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
308	7.04	120.57	22.07	98.50	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
309	7.06	120.92	22.27	98.65	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
310	7.08	121.26	22.46	98.80	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
311	7.10	121.61	22.66	98.95	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
312	7.12	121.96	22.86	99.10	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
313	7.14	122.31	23.05	99.25	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
314	7.16	122.66	23.25	99.41	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
315	7.18	123.01	23.45	99.57	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
316	7.20	123.37	23.64	99.72	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
317	7.22	123.72	23.84	99.88	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
318	7.24	124.07	24.03	100.03	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
319	7.26	124.42	24.23	100.19	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
320	7.28	124.76	24.43	100.34	0.95	0.076	1.38	0.056	1.00	1.00	0.056	No
321	7.30	125.11	24.62	100.48	0.95	0.077	1.38	0.056	1.00	1.00	0.056	No
322	7.32	125.45	24.82	100.63	0.95	0.077	1.38	0.056	1.00	1.00	0.056	No
323	7.34	125.80	25.02	100.78	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
324	7.36	126.15	25.21	100.93	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
325	7.38	126.50	25.41	101.09	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
326	7.40	126.85	25.60	101.24	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
327	7.42	127.20	25.80	101.40	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
328	7.44	127.55	26.00	101.56	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
329	7.46	127.90	26.19	101.71	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
330	7.48	128.25	26.39	101.86	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
331	7.50	128.60	26.59	102.02	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
332	7.52	128.95	26.78	102.17	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
333	7.54	129.29	26.98	102.32	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
334	7.56	129.64	27.17	102.47	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
335	7.58	129.99	27.37	102.62	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
336	7.60	130.33	27.57	102.77	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	130.67	27.76	102.91	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
338	7.64	131.01	27.96	103.06	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
339	7.66	131.35	28.15	103.20	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
340	7.68	131.69	28.35	103.34	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
341	7.70	132.03	28.55	103.48	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
342	7.72	132.37	28.74	103.63	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
343	7.74	132.71	28.94	103.77	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
344	7.76	133.06	29.14	103.92	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
345	7.78	133.40	29.33	104.07	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
346	7.80	133.74	29.53	104.21	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
347	7.82	134.08	29.72	104.35	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
348	7.84	134.42	29.92	104.50	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
349	7.86	134.76	30.12	104.64	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
350	7.88	135.10	30.31	104.78	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
351	7.90	135.44	30.51	104.93	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
352	7.92	135.78	30.71	105.08	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
353	7.94	136.13	30.90	105.23	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
354	7.96	136.48	31.10	105.38	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
355	7.98	136.83	31.29	105.54	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
356	8.00	137.18	31.49	105.69	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
357	8.02	137.52	31.69	105.83	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
358	8.04	137.86	31.88	105.98	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
359	8.06	138.20	32.08	106.12	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
360	8.08	138.53	32.27	106.26	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
361	8.10	138.87	32.47	106.39	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
362	8.12	139.20	32.67	106.53	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
363	8.14	139.53	32.86	106.67	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
364	8.16	139.87	33.06	106.81	0.94	0.080	1.38	0.058	1.00	1.00	0.058	No
365	8.18	140.21	33.26	106.95	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
366	8.20	140.55	33.45	107.09	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
367	8.22	140.89	33.65	107.24	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
368	8.24	141.24	33.84	107.39	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
369	8.26	141.58	34.04	107.54	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
370	8.28	141.94	34.24	107.70	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
371	8.30	142.30	34.43	107.86	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
372	8.32	142.66	34.63	108.03	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
373	8.34	143.03	34.83	108.20	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
374	8.36	143.40	35.02	108.37	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
375	8.38	143.76	35.22	108.55	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
376	8.40	144.13	35.41	108.72	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
377	8.42	144.50	35.61	108.89	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
378	8.44	144.87	35.81	109.06	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
379	8.46	145.23	36.00	109.23	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
380	8.48	145.60	36.20	109.40	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
381	8.50	145.97	36.40	109.57	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
382	8.52	146.33	36.59	109.74	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
383	8.54	146.69	36.79	109.90	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
384	8.56	147.04	36.98	110.06	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
385	8.58	147.39	37.18	110.21	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
386	8.60	147.73	37.38	110.36	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
387	8.62	148.08	37.57	110.51	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
388	8.64	148.43	37.77	110.66	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
389	8.66	148.78	37.96	110.82	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
390	8.68	149.14	38.16	110.98	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
391	8.70	149.49	38.36	111.13	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
392	8.72	149.85	38.55	111.29	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
393	8.74	150.20	38.75	111.45	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
394	8.76	150.55	38.95	111.60	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
395	8.78	150.90	39.14	111.76	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
396	8.80	151.25	39.34	111.92	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
397	8.82	151.61	39.53	112.08	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
398	8.84	151.97	39.73	112.24	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
399	8.86	152.33	39.93	112.41	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
400	8.88	152.70	40.12	112.57	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
401	8.90	153.06	40.32	112.74	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
402	8.92	153.43	40.52	112.91	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
403	8.94	153.79	40.71	113.08	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
404	8.96	154.16	40.91	113.25	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
405	8.98	154.52	41.10	113.42	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
406	9.00	154.88	41.30	113.58	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
407	9.02	155.24	41.50	113.75	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
408	9.04	155.61	41.69	113.91	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
409	9.06	155.97	41.89	114.08	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
410	9.08	156.33	42.08	114.25	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
411	9.10	156.70	42.28	114.42	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
412	9.12	157.08	42.48	114.60	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
413	9.14	157.45	42.67	114.78	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
414	9.16	157.82	42.87	114.95	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
415	9.18	158.19	43.07	115.13	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
416	9.20	158.56	43.26	115.30	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
417	9.22	158.92	43.46	115.46	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
418	9.24	159.27	43.65	115.61	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
419	9.26	159.61	43.85	115.76	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
420	9.28	159.95	44.05	115.90	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
421	9.30	160.28	44.24	116.04	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
422	9.32	160.62	44.44	116.18	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
423	9.34	160.96	44.64	116.32	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
424	9.36	161.30	44.83	116.47	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
425	9.38	161.64	45.03	116.62	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
426	9.40	161.99	45.22	116.77	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
427	9.42	162.34	45.42	116.92	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
428	9.44	162.69	45.62	117.07	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
429	9.46	163.04	45.81	117.22	0.92	0.083	1.38	0.060	1.00	1.00	0.060	No
430	9.48	163.38	46.01	117.37	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
431	9.50	163.73	46.21	117.53	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
432	9.52	164.08	46.40	117.68	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
433	9.54	164.43	46.60	117.83	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
434	9.56	164.78	46.79	117.98	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
435	9.58	165.13	46.99	118.14	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
436	9.60	165.48	47.19	118.30	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
437	9.62	165.84	47.38	118.45	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
438	9.64	166.19	47.58	118.61	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
439	9.66	166.54	47.77	118.77	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
440	9.68	166.90	47.97	118.92	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
441	9.70	167.25	48.17	119.08	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
442	9.72	167.61	48.36	119.25	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
443	9.74	167.97	48.56	119.41	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
444	9.76	168.34	48.76	119.59	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
445	9.78	168.71	48.95	119.76	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
446	9.80	169.09	49.15	119.94	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
447	9.82	169.46	49.34	120.11	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
448	9.84	169.82	49.54	120.28	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
449	9.86	170.19	49.74	120.45	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
450	9.88	170.55	49.93	120.62	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
451	9.90	170.91	50.13	120.78	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
452	9.92	171.27	50.33	120.94	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
453	9.94	171.62	50.52	121.10	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
454	9.96	171.98	50.72	121.26	0.91	0.083	1.38	0.061	1.00	1.00	2.000	Yes
455	9.98	172.34	50.91	121.42	0.91	0.084	1.38	0.061	1.00	1.00	2.000	Yes
456	10.00	172.69	51.11	121.58	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
457	10.02	173.05	51.31	121.74	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
458	10.04	173.40	51.50	121.89	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
459	10.06	173.74	51.70	122.04	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
460	10.08	174.09	51.89	122.19	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
461	10.10	174.43	52.09	122.34	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
462	10.12	174.77	52.29	122.48	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
463	10.14	175.12	52.48	122.63	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
464	10.16	175.46	52.68	122.78	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
465	10.18	175.81	52.88	122.93	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
466	10.20	176.16	53.07	123.09	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
467	10.22	176.51	53.27	123.24	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
468	10.24	176.86	53.46	123.40	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
469	10.26	177.21	53.66	123.55	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
470	10.28	177.55	53.86	123.70	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
471	10.30	177.90	54.05	123.85	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
472	10.32	178.25	54.25	124.00	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
473	10.34	178.59	54.45	124.14	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
474	10.36	178.93	54.64	124.29	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
475	10.38	179.28	54.84	124.44	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
476	10.40	179.62	55.03	124.59	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
477	10.42	179.97	55.23	124.74	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
478	10.44	180.32	55.43	124.89	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
479	10.46	180.67	55.62	125.05	0.90	0.084	1.38	0.061	1.00	1.00	2.000	Yes
480	10.48	181.02	55.82	125.20	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
481	10.50	181.38	56.02	125.36	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
482	10.52	181.73	56.21	125.52	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
483	10.54	182.08	56.41	125.67	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
484	10.56	182.43	56.60	125.82	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
485	10.58	182.77	56.80	125.97	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
486	10.60	183.12	57.00	126.12	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
487	10.62	183.46	57.19	126.27	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
488	10.64	183.80	57.39	126.41	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
489	10.66	184.13	57.58	126.55	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
490	10.68	184.47	57.78	126.69	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
491	10.70	184.80	57.98	126.82	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
492	10.72	185.13	58.17	126.96	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
493	10.74	185.47	58.37	127.10	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
494	10.76	185.80	58.57	127.23	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
495	10.78	186.13	58.76	127.37	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
496	10.80	186.47	58.96	127.51	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
497	10.82	186.81	59.15	127.66	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
498	10.84	187.15	59.35	127.80	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
499	10.86	187.50	59.55	127.95	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
500	10.88	187.85	59.74	128.11	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
501	10.90	188.21	59.94	128.27	0.89	0.084	1.38	0.061	1.00	1.00	2.000	Yes
502	10.92	188.57	60.14	128.44	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
503	10.94	188.94	60.33	128.61	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
504	10.96	189.31	60.53	128.78	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
505	10.98	189.68	60.72	128.96	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
506	11.00	190.06	60.92	129.13	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
507	11.02	190.43	61.12	129.31	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
508	11.04	190.81	61.31	129.49	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.06	3.70	1.18	1.00	1.00	29.91	29.97	4.000	No	Yes	2.00
2	0.92	0.12	3.38	1.11	1.00	2.18	17.36	37.78	4.000	No	Yes	2.00
3	0.94	1.80	2.03	0.26	0.63	35.19	1.00	35.19	4.000	No	No	2.00
4	0.96	6.44	1.43	0.16	0.40	126.86	1.00	126.86	4.000	No	No	2.00
5	0.98	13.18	1.16	0.14	0.30	235.45	1.00	235.45	4.000	No	No	2.00
6	1.00	19.10	1.09	0.19	0.27	320.97	1.00	320.97	4.000	No	No	2.00
7	1.02	24.42	1.06	0.24	0.26	399.36	1.00	399.36	4.000	No	No	2.00
8	1.04	27.69	1.07	0.30	0.26	454.83	1.00	454.83	4.000	No	No	2.00
9	1.06	27.60	1.13	0.38	0.29	470.45	1.00	470.45	4.000	No	No	2.00
10	1.08	25.17	1.22	0.50	0.32	455.09	1.00	455.09	4.000	No	No	2.00
11	1.10	23.02	1.29	0.59	0.35	434.97	1.00	434.97	4.000	No	No	2.00
12	1.12	21.30	1.34	0.65	0.37	412.64	1.00	412.64	4.000	No	No	2.00
13	1.14	19.87	1.38	0.69	0.38	390.84	1.00	390.84	4.000	No	No	2.00
14	1.16	18.80	1.39	0.68	0.39	368.66	1.00	368.66	4.000	No	No	2.00
15	1.18	17.95	1.38	0.64	0.39	349.05	1.00	349.05	4.000	No	No	2.00
16	1.20	17.37	1.38	0.60	0.38	333.42	1.00	333.42	4.000	No	No	2.00
17	1.22	16.85	1.36	0.55	0.38	318.19	1.00	318.19	4.000	No	No	2.00
18	1.24	16.32	1.34	0.49	0.37	302.68	1.00	302.68	4.000	No	No	2.00
19	1.26	15.61	1.36	0.50	0.38	290.25	1.00	290.25	4.000	No	No	2.00
20	1.28	14.66	1.39	0.52	0.39	275.59	1.00	275.59	4.000	No	No	2.00
21	1.30	13.80	1.42	0.55	0.40	262.47	1.00	262.47	4.000	No	No	2.00
22	1.32	12.64	1.48	0.61	0.42	246.29	1.00	246.29	4.000	No	No	2.00
23	1.34	11.56	1.53	0.68	0.44	227.71	1.00	227.71	4.000	No	No	2.00
24	1.36	10.66	1.58	0.73	0.46	209.91	1.00	209.91	4.000	No	No	2.00
25	1.38	9.93	1.62	0.77	0.48	195.56	1.00	195.56	4.000	No	No	2.00
26	1.40	9.18	1.65	0.78	0.49	180.75	1.00	180.75	4.000	No	No	2.00
27	1.42	8.74	1.66	0.77	0.49	172.06	1.00	172.06	4.000	No	No	2.00
28	1.44	8.28	1.67	0.75	0.50	162.94	1.00	162.94	4.000	No	No	2.00
29	1.46	7.79	1.68	0.73	0.50	153.36	1.00	153.36	4.000	No	No	2.00
30	1.48	7.35	1.68	0.69	0.50	144.60	1.00	144.60	4.000	No	No	2.00
31	1.50	7.01	1.68	0.63	0.50	137.81	1.00	137.81	4.000	No	No	2.00
32	1.52	6.73	1.66	0.56	0.49	132.36	1.00	132.36	4.000	No	No	2.00
33	1.54	6.49	1.65	0.51	0.49	127.57	1.00	127.57	4.000	No	No	2.00
34	1.56	6.33	1.64	0.47	0.49	124.09	1.00	124.09	4.000	No	No	2.00
35	1.58	6.16	1.64	0.46	0.49	120.16	1.00	120.16	4.000	No	No	2.00
36	1.60	6.07	1.65	0.45	0.49	117.84	1.00	117.84	4.000	No	No	2.00
37	1.62	6.02	1.66	0.46	0.49	116.72	1.00	116.72	4.000	No	No	2.00
38	1.64	6.02	1.67	0.48	0.50	116.56	1.00	116.56	4.000	No	No	2.00
39	1.66	6.08	1.67	0.49	0.50	117.16	1.00	117.16	4.000	No	No	2.00
40	1.68	6.18	1.68	0.51	0.50	118.72	1.00	118.72	4.000	No	No	2.00
41	1.70	6.22	1.69	0.54	0.51	119.42	1.00	119.42	4.000	No	No	2.00
42	1.72	6.16	1.69	0.53	0.51	117.64	1.00	117.64	4.000	No	No	2.00
43	1.74	6.15	1.71	0.57	0.52	117.67	1.00	117.97	4.000	No	No	2.00
44	1.76	6.04	1.73	0.61	0.52	116.02	1.04	121.20	4.000	No	No	2.00
45	1.78	5.94	1.74	0.61	0.53	113.70	1.06	120.37	4.000	No	No	2.00
46	1.80	5.82	1.75	0.63	0.53	111.44	1.08	120.59	4.000	No	No	2.00
47	1.82	5.75	1.77	0.68	0.54	110.63	1.12	123.84	4.000	No	No	2.00
48	1.84	5.63	1.77	0.65	0.54	107.54	1.12	119.92	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	5.51	1.77	0.63	0.54	104.60	1.12	117.05	4.000	No	No	2.00
50	1.88	5.37	1.78	0.61	0.54	101.63	1.12	114.19	4.000	No	No	2.00
51	1.90	5.31	1.77	0.57	0.54	99.41	1.11	110.44	4.000	No	No	2.00
52	1.92	5.28	1.76	0.54	0.54	98.02	1.10	107.70	4.000	No	No	2.00
53	1.94	5.27	1.76	0.53	0.53	96.95	1.10	106.34	4.000	No	No	2.00
54	1.96	5.26	1.75	0.51	0.53	95.91	1.09	104.36	4.000	No	No	2.00
55	1.98	5.25	1.75	0.50	0.53	95.09	1.00	95.09	4.000	No	No	2.00
56	2.00	5.19	1.75	0.48	0.53	93.52	1.00	93.52	4.000	No	No	2.00
57	2.02	5.09	1.75	0.46	0.53	91.19	1.00	91.19	4.000	No	No	2.00
58	2.04	5.00	1.76	0.48	0.54	89.56	1.00	89.56	4.000	No	No	2.00
59	2.06	4.92	1.78	0.49	0.54	88.13	1.00	88.13	4.000	No	No	2.00
60	2.08	4.85	1.79	0.50	0.55	86.80	1.00	86.80	4.000	No	No	2.00
61	2.10	4.83	1.79	0.51	0.55	86.13	1.14	98.49	4.000	No	No	2.00
62	2.12	4.75	1.81	0.53	0.55	84.76	1.16	98.28	4.000	No	No	2.00
63	2.14	4.71	1.82	0.54	0.56	83.85	1.17	98.20	4.000	No	No	2.00
64	2.16	4.62	1.84	0.58	0.57	82.56	1.19	98.29	4.000	No	No	2.00
65	2.18	4.50	1.87	0.64	0.58	80.91	1.21	98.29	4.000	No	No	2.00
66	2.20	4.32	1.90	0.69	0.59	78.13	1.24	96.54	4.000	No	No	2.00
67	2.22	4.18	1.92	0.72	0.60	75.85	1.25	94.77	4.000	No	No	2.00
68	2.24	4.01	1.93	0.70	0.60	72.55	1.26	91.14	4.000	No	No	2.00
69	2.26	3.83	1.94	0.67	0.61	69.08	1.26	87.12	4.000	No	No	2.00
70	2.28	3.67	1.94	0.63	0.61	66.01	1.26	83.45	4.000	No	No	2.00
71	2.30	3.57	1.94	0.61	0.61	63.94	1.27	80.97	4.000	No	No	2.00
72	2.32	3.48	1.95	0.60	0.61	62.09	1.27	78.88	4.000	No	No	2.00
73	2.34	3.46	1.97	0.65	0.62	61.79	1.29	79.45	4.000	No	No	2.00
74	2.36	3.42	2.01	0.75	0.63	61.54	1.31	80.72	4.000	No	No	2.00
75	2.38	3.37	2.02	0.78	0.64	60.66	1.33	80.42	4.000	No	No	2.00
76	2.40	3.29	2.05	0.84	0.65	59.35	1.35	80.12	4.000	No	No	2.00
77	2.42	3.22	2.08	0.94	0.66	58.49	1.39	81.27	4.000	No	No	2.00
78	2.44	3.08	2.10	0.95	0.67	55.92	1.42	79.25	4.000	No	No	2.00
79	2.46	2.92	2.12	0.95	0.68	53.01	1.44	76.58	4.000	No	No	2.00
80	2.48	2.77	2.15	0.99	0.69	50.47	1.50	75.48	4.000	No	No	2.00
81	2.50	2.61	2.17	0.99	0.70	47.68	1.53	73.16	4.000	No	No	2.00
82	2.52	2.46	2.16	0.89	0.69	44.55	1.53	68.19	4.000	No	No	2.00
83	2.54	2.35	2.16	0.82	0.70	42.21	1.53	64.75	4.000	No	No	2.00
84	2.56	2.31	2.15	0.74	0.69	41.11	1.51	62.02	4.000	No	No	2.00
85	2.58	2.28	2.14	0.68	0.69	40.29	1.49	59.88	4.000	No	No	2.00
86	2.60	2.27	2.14	0.65	0.68	39.77	1.48	58.73	4.000	No	No	2.00
87	2.62	2.25	2.14	0.65	0.69	39.34	1.49	58.51	4.000	No	No	2.00
88	2.64	2.23	2.15	0.66	0.69	38.89	1.50	58.48	4.000	No	No	2.00
89	2.66	2.21	2.17	0.70	0.70	38.40	1.54	59.01	4.000	No	No	2.00
90	2.68	2.17	2.18	0.72	0.70	37.72	1.56	58.98	4.000	No	No	2.00
91	2.70	2.15	2.18	0.72	0.70	37.18	1.57	58.55	4.000	No	No	2.00
92	2.72	2.14	2.19	0.73	0.71	36.94	1.59	58.74	4.000	No	No	2.00
93	2.74	2.18	2.18	0.72	0.70	37.28	1.57	58.70	4.000	No	No	2.00
94	2.76	2.19	2.19	0.74	0.71	37.43	1.58	59.28	4.000	No	No	2.00
95	2.78	2.22	2.21	0.82	0.71	37.85	1.63	61.61	4.000	No	No	2.00
96	2.80	2.18	2.24	0.94	0.73	37.48	1.72	64.49	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	2.13	2.27	1.03	0.74	36.74	1.81	66.65	4.000	No	No	2.00
98	2.84	2.03	2.32	1.18	0.76	35.28	1.99	70.10	4.000	No	No	2.00
99	2.86	1.94	2.35	1.26	0.77	33.73	2.13	71.74	4.000	No	No	2.00
100	2.88	1.84	2.37	1.30	0.78	32.07	2.24	71.93	4.000	No	No	2.00
101	2.90	1.80	2.38	1.29	0.78	31.27	2.28	71.14	4.000	No	No	2.00
102	2.92	1.80	2.37	1.22	0.78	31.02	2.23	69.09	4.000	No	No	2.00
103	2.94	1.71	2.38	1.16	0.78	29.22	2.28	66.49	4.000	No	No	2.00
104	2.96	1.73	2.36	1.04	0.77	29.25	2.15	63.03	4.000	No	No	2.00
105	2.98	1.75	2.34	0.95	0.76	29.23	2.07	60.41	4.000	No	No	2.00
106	3.00	1.77	2.32	0.88	0.76	29.33	1.99	58.32	4.000	No	No	2.00
107	3.02	1.82	2.31	0.90	0.76	29.92	1.97	59.08	4.000	No	No	2.00
108	3.04	1.97	2.31	0.98	0.75	32.26	1.94	62.73	4.000	No	No	2.00
109	3.06	2.04	2.31	1.03	0.75	33.31	1.94	64.78	4.000	No	No	2.00
110	3.08	2.13	2.29	1.01	0.75	34.49	1.88	64.80	4.000	No	No	2.00
111	3.10	2.22	2.29	1.07	0.75	35.77	1.88	67.20	4.000	No	No	2.00
112	3.12	2.25	2.29	1.07	0.75	36.01	1.87	67.45	4.000	No	No	2.00
113	3.14	2.27	2.27	0.99	0.74	36.05	1.80	65.04	4.000	No	No	2.00
114	3.16	2.26	2.26	0.97	0.74	35.65	1.80	64.19	4.000	No	No	2.00
115	3.18	2.19	2.29	1.00	0.75	34.53	1.87	64.63	4.000	No	No	2.00
116	3.20	2.11	2.29	0.96	0.75	33.13	1.89	62.52	4.000	Yes	No	2.00
117	3.22	1.97	2.33	1.02	0.76	31.05	2.04	63.28	4.000	Yes	No	2.00
118	3.24	1.80	2.39	1.14	0.78	28.58	2.30	65.71	4.000	Yes	No	2.00
119	3.26	1.65	2.44	1.30	0.81	26.30	2.63	69.06	4.000	Yes	No	2.00
120	3.28	1.53	2.50	1.44	0.83	24.51	2.95	72.34	4.000	Yes	No	2.00
121	3.30	1.39	2.56	1.64	0.85	22.45	4.13	92.67	4.000	Yes	No	2.00
122	3.32	1.33	2.58	1.70	0.86	21.41	4.89	104.69	4.000	Yes	No	2.00
123	3.34	1.34	2.59	1.71	0.86	21.47	4.93	105.93	4.000	Yes	No	2.00
124	3.36	1.41	2.56	1.68	0.85	22.48	4.31	96.84	4.000	Yes	No	2.00
125	3.38	1.52	2.52	1.55	0.84	23.89	3.28	78.28	4.000	Yes	No	2.00
126	3.40	1.63	2.49	1.45	0.82	25.36	2.88	73.06	4.000	Yes	No	2.00
127	3.42	1.63	2.50	1.54	0.83	25.29	2.83	71.53	4.000	Yes	No	2.00
128	3.44	1.58	2.53	1.68	0.84	24.51	3.49	85.44	4.000	Yes	No	2.00
129	3.46	1.44	2.60	1.91	0.87	22.48	5.26	118.26	4.000	Yes	No	2.00
130	3.48	1.26	2.69	2.29	0.90	19.89	9.30	184.90	4.000	Yes	No	2.00
131	3.50	1.13	2.76	2.68	0.93	17.88	5.41	96.69	4.000	Yes	Yes	2.00
132	3.52	1.18	2.74	2.59	0.92	18.62	5.14	95.74	4.000	Yes	Yes	2.00
133	3.54	1.37	2.65	2.19	0.89	21.16	7.57	160.17	4.000	Yes	No	2.00
134	3.56	1.59	2.55	1.73	0.85	24.10	3.83	92.29	4.000	Yes	No	2.00
135	3.58	1.87	2.44	1.38	0.81	27.63	2.61	71.99	4.000	Yes	No	2.00
136	3.60	2.09	2.36	1.12	0.78	30.46	2.17	65.98	4.000	Yes	No	2.00
137	3.62	2.27	2.29	0.93	0.75	32.56	1.89	61.58	4.000	Yes	No	2.00
138	3.64	2.38	2.24	0.77	0.73	33.62	1.71	57.57	4.000	Yes	No	2.00
139	3.66	2.48	2.20	0.67	0.72	34.69	1.61	55.68	4.000	Yes	No	2.00
140	3.68	2.57	2.17	0.63	0.71	35.62	1.55	55.27	4.000	Yes	No	2.00
141	3.70	2.69	2.16	0.64	0.70	37.12	1.52	56.50	4.000	No	No	2.00
142	3.72	2.78	2.14	0.60	0.69	38.05	1.48	56.40	4.000	No	No	2.00
143	3.74	2.83	2.14	0.61	0.69	38.53	1.48	57.01	4.000	No	No	2.00
144	3.76	2.81	2.14	0.62	0.70	38.23	1.49	56.95	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	2.77	2.15	0.63	0.70	37.61	1.50	56.59	4.000	No	No	2.00
146	3.80	2.70	2.15	0.60	0.70	36.46	1.51	55.02	4.000	No	No	2.00
147	3.82	2.65	2.18	0.66	0.71	35.82	1.57	56.08	4.000	No	No	2.00
148	3.84	2.61	2.21	0.73	0.72	35.28	1.63	57.62	4.000	No	No	2.00
149	3.86	2.58	2.24	0.84	0.73	34.92	1.72	60.15	4.000	No	No	2.00
150	3.88	2.55	2.27	0.93	0.75	34.59	1.81	62.57	4.000	No	No	2.00
151	3.90	2.54	2.28	0.98	0.75	34.42	1.85	63.83	4.000	No	No	2.00
152	3.92	2.51	2.28	0.95	0.75	33.85	1.85	62.68	4.000	No	No	2.00
153	3.94	2.48	2.29	0.94	0.75	33.23	1.87	62.19	4.000	No	No	2.00
154	3.96	2.48	2.28	0.90	0.75	33.13	1.84	60.95	4.000	No	No	2.00
155	3.98	2.52	2.25	0.81	0.74	33.44	1.75	58.54	4.000	No	No	2.00
156	4.00	2.57	2.23	0.74	0.73	33.85	1.68	56.89	4.000	No	No	2.00
157	4.02	2.62	2.21	0.69	0.72	34.22	1.63	55.84	4.000	No	No	2.00
158	4.04	2.67	2.19	0.64	0.72	34.64	1.58	54.84	4.000	No	No	2.00
159	4.06	2.73	2.17	0.61	0.71	35.24	1.54	54.31	4.000	No	No	2.00
160	4.08	2.78	2.16	0.59	0.71	35.66	1.52	54.13	4.000	No	No	2.00
161	4.10	2.82	2.15	0.58	0.70	36.05	1.50	54.24	4.000	No	No	2.00
162	4.12	2.88	2.14	0.58	0.70	36.66	1.49	54.69	4.000	No	No	2.00
163	4.14	2.92	2.13	0.56	0.70	37.01	1.47	54.45	4.000	No	No	2.00
164	4.16	2.72	2.19	0.65	0.72	34.58	1.59	55.06	4.000	No	No	2.00
165	4.18	2.62	2.24	0.77	0.74	33.39	1.72	57.37	4.000	No	No	2.00
166	4.20	2.52	2.29	0.91	0.76	32.23	1.88	60.69	4.000	No	No	2.00
167	4.22	2.43	2.34	1.09	0.78	31.21	2.10	65.49	4.000	No	No	2.00
168	4.24	2.37	2.39	1.31	0.80	30.48	2.35	71.49	4.000	No	No	2.00
169	4.26	2.55	2.38	1.38	0.79	32.73	2.28	74.64	4.000	No	No	2.00
170	4.28	2.65	2.38	1.46	0.79	33.90	2.28	77.44	4.000	No	No	2.00
171	4.30	2.75	2.37	1.47	0.79	35.04	2.24	78.43	4.000	No	No	2.00
172	4.32	2.86	2.35	1.42	0.78	36.22	2.14	77.54	4.000	No	No	2.00
173	4.34	2.97	2.33	1.34	0.77	37.33	2.04	75.98	4.000	No	No	2.00
174	4.36	3.01	2.30	1.21	0.76	37.61	1.92	72.38	4.000	No	No	2.00
175	4.38	2.98	2.28	1.11	0.76	37.03	1.87	69.17	4.000	No	No	2.00
176	4.40	2.87	2.29	1.07	0.76	35.53	1.89	67.13	4.000	No	No	2.00
177	4.42	2.68	2.32	1.08	0.77	33.07	2.00	66.03	4.000	No	No	2.00
178	4.44	2.41	2.37	1.14	0.79	29.74	2.23	66.20	4.000	No	No	2.00
179	4.46	2.23	2.42	1.27	0.81	27.47	2.51	68.86	4.000	No	No	2.00
180	4.48	2.22	2.43	1.30	0.81	27.32	2.55	69.76	4.000	No	No	2.00
181	4.50	2.40	2.39	1.20	0.80	29.33	2.30	67.58	4.000	No	No	2.00
182	4.52	2.67	2.32	1.06	0.77	32.36	2.01	65.16	4.000	No	No	2.00
183	4.54	2.94	2.26	0.94	0.75	35.32	1.79	63.20	4.000	No	No	2.00
184	4.56	3.09	2.22	0.84	0.73	36.85	1.67	61.49	4.000	No	No	2.00
185	4.58	3.00	2.23	0.82	0.74	35.74	1.69	60.31	4.000	Yes	No	2.00
186	4.60	2.75	2.28	0.88	0.75	32.72	1.84	60.09	4.000	Yes	No	2.00
187	4.62	2.42	2.35	1.01	0.79	28.78	2.15	61.87	4.000	Yes	No	2.00
188	4.64	2.13	2.46	1.33	0.83	25.42	2.74	69.53	4.000	Yes	No	2.00
189	4.66	1.90	2.55	1.64	0.86	22.75	4.00	91.09	4.000	Yes	No	2.00
190	4.68	1.91	2.57	1.78	0.87	22.75	4.58	104.11	4.000	Yes	No	2.00
191	4.70	2.12	2.53	1.75	0.85	25.23	3.51	88.62	4.000	Yes	No	2.00
192	4.72	2.42	2.46	1.56	0.83	28.58	2.72	77.78	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	2.76	2.37	1.28	0.79	32.33	2.21	71.46	4.000	Yes	No	2.00
194	4.76	3.24	2.27	1.05	0.75	37.59	1.80	67.76	4.000	Yes	No	2.00
195	4.78	3.60	2.20	0.92	0.73	41.49	1.61	66.86	4.000	Yes	No	2.00
196	4.80	3.80	2.18	0.92	0.72	43.67	1.57	68.34	0.110	No	No	2.00
197	4.82	3.97	2.16	0.89	0.71	45.52	1.52	69.11	0.111	No	No	2.00
198	4.84	4.14	2.14	0.89	0.71	47.33	1.49	70.57	0.113	No	No	2.00
199	4.86	4.16	2.15	0.91	0.71	47.54	1.50	71.09	0.113	No	No	2.00
200	4.88	4.18	2.15	0.92	0.71	47.72	1.50	71.48	0.114	No	No	2.00
201	4.90	4.20	2.13	0.87	0.70	47.80	1.47	70.44	0.113	No	No	2.00
202	4.92	4.18	2.15	0.91	0.71	47.61	1.50	71.26	0.114	No	No	2.00
203	4.94	4.12	2.15	0.90	0.71	46.76	1.50	70.16	0.112	No	No	2.00
204	4.96	4.05	2.15	0.87	0.71	45.95	1.50	68.90	0.110	No	No	2.00
205	4.98	3.95	2.15	0.84	0.71	44.74	1.50	67.32	0.108	No	No	2.00
206	5.00	3.97	2.13	0.76	0.70	44.76	1.46	65.43	0.106	No	No	2.00
207	5.02	4.13	2.08	0.66	0.68	46.37	1.39	64.56	0.105	No	No	2.00
208	5.04	4.50	2.03	0.59	0.66	50.39	1.33	67.00	0.108	No	No	2.00
209	5.06	5.20	1.93	0.49	0.63	57.80	1.00	57.80	0.098	No	No	2.00
210	5.08	6.18	1.83	0.41	0.59	68.24	1.00	68.24	0.110	No	No	2.00
211	5.10	7.20	1.75	0.36	0.56	79.05	1.00	79.05	0.126	No	No	2.00
212	5.12	8.07	1.70	0.35	0.54	88.24	1.00	88.24	0.144	No	No	2.00
213	5.14	8.68	1.67	0.34	0.53	94.66	1.00	94.66	0.159	No	No	2.00
214	5.16	8.95	1.67	0.36	0.53	97.58	1.00	97.58	0.166	No	No	2.00
215	5.18	8.95	1.70	0.41	0.54	97.64	1.00	97.64	0.167	No	No	2.00
216	5.20	8.85	1.74	0.48	0.55	96.69	1.00	96.69	0.164	No	No	2.00
217	5.22	8.90	1.75	0.51	0.56	97.31	1.08	105.54	0.189	No	No	2.00
218	5.24	9.04	1.77	0.57	0.57	98.82	1.11	110.07	0.204	No	No	2.00
219	5.26	9.23	1.79	0.63	0.57	100.97	1.14	114.67	0.220	No	No	2.00
220	5.28	9.65	1.81	0.74	0.58	105.67	1.16	122.88	0.253	No	No	2.00
221	5.30	10.18	1.82	0.81	0.58	111.41	1.17	130.53	0.287	No	No	2.00
222	5.32	10.84	1.81	0.87	0.58	118.54	1.17	138.56	0.327	No	No	2.00
223	5.34	11.60	1.79	0.87	0.58	126.57	1.15	145.11	0.364	No	No	2.00
224	5.36	12.37	1.77	0.85	0.56	134.62	1.11	149.44	0.390	No	No	2.00
225	5.38	12.91	1.73	0.78	0.55	139.90	1.05	146.40	0.372	No	No	2.00
226	5.40	13.32	1.69	0.70	0.54	143.84	1.00	143.84	0.357	No	No	2.00
227	5.42	13.48	1.65	0.61	0.52	145.01	1.00	145.01	0.364	No	No	2.00
228	5.44	13.50	1.62	0.54	0.51	144.81	1.00	144.81	0.362	No	No	2.00
229	5.46	13.47	1.59	0.48	0.50	144.08	1.00	144.08	0.358	No	No	2.00
230	5.48	13.48	1.56	0.43	0.49	143.69	1.00	143.69	0.356	No	No	2.00
231	5.50	13.43	1.54	0.39	0.48	142.91	1.00	142.91	0.351	No	No	2.00
232	5.52	13.34	1.54	0.38	0.48	141.77	1.00	141.77	0.345	No	No	2.00
233	5.54	13.21	1.55	0.38	0.48	140.29	1.00	140.29	0.337	No	No	2.00
234	5.56	13.02	1.54	0.36	0.48	138.06	1.00	138.06	0.325	No	No	2.00
235	5.58	12.76	1.55	0.36	0.48	135.14	1.00	135.14	0.310	No	No	2.00
236	5.60	12.36	1.56	0.37	0.49	130.98	1.00	130.98	0.289	No	No	2.00
237	5.62	11.94	1.60	0.41	0.50	126.61	1.00	126.61	0.269	No	No	2.00
238	5.64	11.54	1.65	0.48	0.52	122.58	1.00	122.58	0.251	No	No	2.00
239	5.66	11.15	1.71	0.59	0.54	118.69	1.01	119.64	0.239	No	No	2.00
240	5.68	10.76	1.77	0.72	0.57	114.81	1.12	128.54	0.278	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	10.39	1.82	0.83	0.59	111.01	1.18	130.84	0.288	No	No	2.00
242	5.72	10.02	1.87	0.94	0.61	107.07	1.22	130.12	0.285	No	No	2.00
243	5.74	9.63	1.91	1.02	0.62	102.98	1.24	127.80	0.274	No	No	2.00
244	5.76	9.26	1.93	1.08	0.63	99.02	1.26	124.70	0.260	No	No	2.00
245	5.78	8.88	1.96	1.13	0.64	94.92	1.28	121.25	0.246	No	No	2.00
246	5.80	8.57	1.99	1.18	0.65	91.57	1.30	118.69	0.235	No	No	2.00
247	5.82	8.31	2.00	1.22	0.66	88.72	1.31	116.34	0.226	No	No	2.00
248	5.84	8.10	2.02	1.23	0.66	86.42	1.32	114.18	0.218	No	No	2.00
249	5.86	8.00	2.02	1.23	0.66	85.16	1.33	112.99	0.214	No	No	2.00
250	5.88	8.03	2.02	1.21	0.66	85.35	1.32	112.73	0.213	No	No	2.00
251	5.90	8.20	1.99	1.14	0.65	86.97	1.30	113.18	0.215	No	No	2.00
252	5.92	8.50	1.96	1.07	0.64	89.94	1.28	115.12	0.222	No	No	2.00
253	5.94	9.12	1.92	0.98	0.62	96.20	1.25	120.09	0.241	No	No	2.00
254	5.96	9.77	1.87	0.90	0.61	102.80	1.22	125.14	0.262	No	No	2.00
255	5.98	10.48	1.84	0.86	0.59	110.01	1.19	130.71	0.288	No	No	2.00
256	6.00	11.20	1.80	0.81	0.58	117.33	1.15	135.08	0.309	No	No	2.00
257	6.02	11.87	1.76	0.76	0.57	124.06	1.11	137.19	0.320	No	No	2.00
258	6.04	12.27	1.74	0.74	0.56	128.03	1.08	137.74	0.323	No	No	2.00
259	6.06	12.61	1.73	0.73	0.55	131.34	1.05	137.91	0.324	No	No	2.00
260	6.08	12.81	1.71	0.68	0.55	133.20	1.01	134.29	0.305	No	No	2.00
261	6.10	12.75	1.70	0.66	0.54	132.42	1.00	132.42	0.296	No	No	2.00
262	6.12	12.35	1.71	0.64	0.55	128.08	1.00	128.26	0.276	No	No	2.00
263	6.14	11.57	1.73	0.63	0.55	119.92	1.04	124.94	0.261	No	No	2.00
264	6.16	10.33	1.77	0.64	0.57	106.93	1.11	118.88	0.236	No	No	2.00
265	6.18	8.92	1.83	0.66	0.59	92.33	1.18	109.10	0.201	No	No	2.00
266	6.20	7.57	1.91	0.71	0.62	78.33	1.24	97.25	0.166	No	No	2.00
267	6.22	6.45	2.00	0.81	0.66	66.72	1.30	86.94	0.141	No	No	2.00
268	6.24	5.60	2.08	0.92	0.69	57.86	1.39	80.27	0.128	No	No	2.00
269	6.26	5.17	2.13	1.00	0.71	53.39	1.46	78.00	0.124	No	No	2.00
270	6.28	4.98	2.16	1.06	0.72	51.39	1.52	77.92	0.124	No	No	2.00
271	6.30	4.94	2.18	1.13	0.72	50.94	1.56	79.29	0.126	No	No	2.00
272	6.32	5.06	2.18	1.19	0.73	52.15	1.57	81.67	0.131	No	No	2.00
273	6.34	5.32	2.17	1.21	0.72	54.71	1.54	84.12	0.135	No	No	2.00
274	6.36	5.69	2.14	1.18	0.71	58.49	1.48	86.60	0.140	No	No	2.00
275	6.38	6.13	2.10	1.12	0.70	62.93	1.42	89.17	0.146	No	No	2.00
276	6.40	6.46	2.06	1.03	0.68	66.19	1.37	90.37	0.149	No	No	2.00
277	6.42	6.61	2.02	0.92	0.67	67.62	1.33	89.71	0.147	No	No	2.00
278	6.44	6.60	1.99	0.79	0.65	67.32	1.30	87.22	0.142	No	No	2.00
279	6.46	6.42	1.96	0.68	0.64	65.38	1.28	83.60	0.134	No	No	2.00
280	6.48	6.04	1.96	0.62	0.64	61.35	1.28	78.41	0.125	No	No	2.00
281	6.50	5.61	1.98	0.60	0.65	56.91	1.29	73.60	0.117	No	No	2.00
282	6.52	5.32	2.01	0.62	0.66	53.84	1.32	70.91	0.113	No	No	2.00
283	6.54	5.22	2.04	0.69	0.68	52.80	1.35	71.16	0.114	No	No	2.00
284	6.56	5.22	2.06	0.75	0.68	52.80	1.37	72.22	0.115	No	No	2.00
285	6.58	5.28	2.07	0.79	0.69	53.29	1.38	73.47	0.117	No	No	2.00
286	6.60	5.40	2.06	0.79	0.68	54.46	1.37	74.61	0.119	No	No	2.00
287	6.62	5.44	2.05	0.77	0.68	54.84	1.36	74.58	0.119	No	No	2.00
288	6.64	5.32	2.06	0.75	0.68	53.57	1.36	72.99	0.116	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	5.14	2.06	0.71	0.68	51.65	1.36	70.42	0.112	No	No	2.00
290	6.68	5.03	2.04	0.64	0.68	50.45	1.35	68.08	0.109	No	No	2.00
291	6.70	5.01	2.03	0.58	0.67	50.15	1.33	66.69	0.108	No	No	2.00
292	6.72	5.03	2.01	0.54	0.66	50.21	1.32	66.10	0.107	No	No	1.99
293	6.74	5.11	2.00	0.52	0.66	51.04	1.30	66.54	0.107	No	No	1.99
294	6.76	5.38	1.98	0.52	0.65	53.71	1.29	69.24	0.111	No	No	2.00
295	6.78	5.64	1.96	0.53	0.65	56.29	1.28	71.95	0.115	No	No	2.00
296	6.80	5.82	1.95	0.53	0.64	57.98	1.27	73.66	0.117	No	No	2.00
297	6.82	5.92	1.94	0.52	0.64	58.99	1.26	74.56	0.119	No	No	2.00
298	6.84	5.97	1.94	0.52	0.64	59.37	1.26	74.84	0.119	No	No	2.00
299	6.86	5.84	1.95	0.52	0.64	58.02	1.27	73.55	0.117	No	No	2.00
300	6.88	5.66	1.96	0.52	0.64	56.14	1.28	71.70	0.114	No	No	2.00
301	6.90	5.47	1.98	0.54	0.65	54.23	1.29	69.96	0.112	No	No	2.00
302	6.92	5.39	1.99	0.54	0.66	53.32	1.30	69.18	0.111	No	No	2.00
303	6.94	5.47	1.98	0.53	0.65	54.05	1.29	69.64	0.111	No	No	2.00
304	6.96	5.51	1.96	0.50	0.65	54.43	1.00	54.43	0.095	No	No	1.74
305	6.98	5.54	1.95	0.48	0.64	54.65	1.00	54.65	0.095	No	No	1.74
306	7.00	5.54	1.95	0.48	0.64	54.58	1.00	54.58	0.095	No	No	1.74
307	7.02	5.47	1.96	0.47	0.64	53.81	1.00	53.81	0.094	No	No	1.73
308	7.04	5.33	1.97	0.48	0.65	52.35	1.00	52.35	0.093	No	No	1.70
309	7.06	5.14	1.99	0.49	0.66	50.45	1.00	50.45	0.092	No	No	1.68
310	7.08	5.04	2.00	0.49	0.66	49.37	1.00	49.37	0.091	No	No	1.66
311	7.10	5.07	2.00	0.50	0.66	49.58	1.00	49.58	0.091	No	No	1.66
312	7.12	5.30	1.98	0.50	0.65	51.83	1.29	67.01	0.108	No	No	1.96
313	7.14	5.69	1.95	0.50	0.64	55.64	1.00	55.64	0.096	No	No	1.74
314	7.16	6.29	1.91	0.48	0.63	61.60	1.00	61.60	0.102	No	No	1.84
315	7.18	6.76	1.87	0.47	0.61	66.25	1.00	66.25	0.107	No	No	1.94
316	7.20	7.11	1.84	0.44	0.60	69.63	1.00	69.63	0.111	No	No	2.00
317	7.22	7.29	1.82	0.42	0.59	71.32	1.00	71.32	0.114	No	No	2.00
318	7.24	7.00	1.83	0.40	0.60	68.43	1.00	68.43	0.110	No	No	1.98
319	7.26	6.45	1.86	0.39	0.61	62.88	1.00	62.88	0.103	No	No	1.86
320	7.28	5.84	1.91	0.41	0.63	56.71	1.00	56.71	0.097	No	No	1.75
321	7.30	5.30	1.96	0.44	0.65	51.39	1.00	51.39	0.093	No	No	1.67
322	7.32	4.80	2.02	0.50	0.67	46.30	1.00	46.30	0.089	No	No	1.59
323	7.34	4.49	2.09	0.59	0.69	43.24	1.40	60.47	0.101	No	No	1.80
324	7.36	4.30	2.14	0.71	0.72	41.29	1.49	61.36	0.101	No	No	1.82
325	7.38	4.25	2.17	0.78	0.73	40.77	1.54	62.76	0.103	No	No	1.84
326	7.40	4.24	2.18	0.83	0.73	40.66	1.57	63.94	0.104	No	No	1.87
327	7.42	4.17	2.20	0.87	0.74	39.92	1.61	64.34	0.105	No	No	1.87
328	7.44	4.12	2.20	0.86	0.74	39.30	1.62	63.66	0.104	No	No	1.86
329	7.46	4.08	2.20	0.82	0.74	38.88	1.60	62.38	0.103	No	No	1.83
330	7.48	4.02	2.19	0.79	0.74	38.27	1.60	61.13	0.101	No	No	1.80
331	7.50	3.96	2.19	0.75	0.73	37.61	1.59	59.72	0.100	No	No	1.78
332	7.52	4.06	2.16	0.70	0.72	38.55	1.53	59.07	0.099	No	No	1.76
333	7.54	4.18	2.14	0.66	0.72	39.67	1.49	59.02	0.099	No	No	1.76
334	7.56	4.32	2.12	0.63	0.71	41.03	1.45	59.29	0.099	No	No	1.76
335	7.58	4.49	2.09	0.59	0.70	42.69	1.41	60.01	0.100	No	No	1.78
336	7.60	4.61	2.07	0.55	0.69	43.78	1.37	60.12	0.100	No	No	1.78

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	4.50	2.06	0.51	0.69	42.69	1.37	58.33	0.098	No	No	1.74
338	7.64	4.34	2.06	0.48	0.69	41.06	1.00	41.06	0.084	No	No	1.49
339	7.66	4.15	2.08	0.47	0.69	39.18	1.00	39.18	0.083	No	No	1.46
340	7.68	3.93	2.11	0.50	0.71	36.93	1.00	36.93	0.081	No	No	1.43
341	7.70	3.73	2.15	0.55	0.72	34.93	1.51	52.83	0.094	No	No	1.65
342	7.72	3.58	2.20	0.63	0.74	33.47	1.61	53.77	0.094	No	No	1.66
343	7.74	3.46	2.24	0.71	0.75	32.21	1.71	55.13	0.096	No	No	1.68
344	7.76	3.38	2.26	0.76	0.76	31.41	1.79	56.09	0.096	No	No	1.70
345	7.78	3.35	2.26	0.75	0.76	31.11	1.79	55.58	0.096	No	No	1.69
346	7.80	3.35	2.25	0.71	0.76	31.10	1.75	54.33	0.095	No	No	1.67
347	7.82	3.47	2.21	0.64	0.74	32.17	1.65	53.02	0.094	No	No	1.65
348	7.84	3.73	2.16	0.56	0.72	34.71	1.52	52.75	0.094	No	No	1.64
349	7.86	4.09	2.10	0.50	0.70	38.17	1.42	54.16	0.095	No	No	1.66
350	7.88	4.71	2.02	0.44	0.67	44.18	1.00	44.18	0.087	No	No	1.52
351	7.90	5.40	1.95	0.40	0.64	50.82	1.00	50.82	0.092	No	No	1.61
352	7.92	6.17	1.88	0.37	0.62	58.19	1.00	58.19	0.098	No	No	1.72
353	7.94	6.94	1.82	0.36	0.60	65.67	1.00	65.67	0.106	No	No	1.86
354	7.96	7.60	1.77	0.33	0.58	72.01	1.00	72.01	0.115	No	No	2.00
355	7.98	7.92	1.74	0.30	0.56	75.02	1.00	75.02	0.119	No	No	2.00
356	8.00	7.78	1.74	0.29	0.57	73.64	1.00	73.64	0.117	No	No	2.00
357	8.02	7.31	1.76	0.28	0.57	69.08	1.00	69.08	0.111	No	No	1.92
358	8.04	6.62	1.80	0.27	0.59	62.34	1.00	62.34	0.103	No	No	1.78
359	8.06	5.84	1.86	0.28	0.61	54.69	1.00	54.69	0.095	No	No	1.65
360	8.08	5.01	1.94	0.32	0.64	46.65	1.00	46.65	0.089	No	No	1.54
361	8.10	4.41	2.01	0.35	0.67	40.84	1.00	40.84	0.084	No	No	1.46
362	8.12	3.93	2.08	0.40	0.70	36.13	1.00	36.13	0.080	No	No	1.39
363	8.14	3.59	2.15	0.47	0.72	32.82	1.00	32.82	0.077	No	No	1.34
364	8.16	3.31	2.22	0.57	0.75	30.07	1.66	49.90	0.092	No	No	1.58
365	8.18	3.11	2.28	0.68	0.77	28.11	1.85	52.00	0.093	No	No	1.61
366	8.20	3.03	2.32	0.80	0.79	27.30	2.01	54.96	0.095	No	No	1.65
367	8.22	3.06	2.34	0.90	0.80	27.51	2.11	57.98	0.098	No	No	1.69
368	8.24	3.14	2.35	0.97	0.80	28.26	2.14	60.35	0.100	No	No	1.73
369	8.26	3.44	2.31	0.96	0.78	31.04	1.98	61.38	0.102	No	No	1.75
370	8.28	4.04	2.24	0.92	0.76	36.72	1.74	63.72	0.104	No	No	1.79
371	8.30	5.00	2.15	0.87	0.72	45.84	1.50	68.83	0.110	No	No	1.90
372	8.32	6.46	2.02	0.78	0.67	59.75	1.33	79.43	0.127	No	No	2.00
373	8.34	7.40	1.97	0.75	0.65	68.65	1.28	88.01	0.143	No	No	2.00
374	8.36	7.98	1.94	0.75	0.64	74.09	1.26	93.55	0.156	No	No	2.00
375	8.38	8.11	1.93	0.73	0.64	75.24	1.25	94.42	0.158	No	No	2.00
376	8.40	7.77	1.95	0.75	0.65	71.92	1.27	91.35	0.151	No	No	2.00
377	8.42	6.88	2.02	0.83	0.67	63.35	1.32	83.92	0.135	No	No	2.00
378	8.44	6.60	2.05	0.88	0.69	60.55	1.36	82.09	0.131	No	No	2.00
379	8.46	6.57	2.05	0.87	0.69	60.20	1.36	81.59	0.131	No	No	2.00
380	8.48	6.59	2.05	0.89	0.69	60.31	1.36	82.04	0.131	No	No	2.00
381	8.50	6.64	2.03	0.81	0.68	60.83	1.33	81.00	0.129	No	No	2.00
382	8.52	6.64	1.99	0.70	0.66	60.77	1.30	79.16	0.126	No	No	2.00
383	8.54	6.38	1.97	0.59	0.66	58.31	1.29	75.00	0.119	No	No	2.00
384	8.56	5.99	1.97	0.53	0.66	54.62	1.29	70.30	0.112	No	No	1.91

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	5.76	1.96	0.45	0.65	52.46	1.00	52.46	0.093	No	No	1.59
386	8.60	5.60	1.97	0.45	0.65	50.86	1.00	50.86	0.092	No	No	1.57
387	8.62	5.57	1.98	0.48	0.66	50.52	1.00	50.52	0.092	No	No	1.56
388	8.64	5.75	1.98	0.50	0.66	52.18	1.00	52.18	0.093	No	No	1.58
389	8.66	6.14	1.95	0.50	0.65	55.77	1.27	71.02	0.113	No	No	1.92
390	8.68	6.50	1.93	0.50	0.64	59.08	1.26	74.36	0.118	No	No	2.00
391	8.70	6.81	1.91	0.49	0.63	61.99	1.00	61.99	0.102	No	No	1.73
392	8.72	6.97	1.89	0.48	0.63	63.48	1.00	63.48	0.104	No	No	1.76
393	8.74	7.03	1.88	0.45	0.62	63.99	1.00	63.99	0.104	No	No	1.77
394	8.76	7.02	1.86	0.41	0.61	63.87	1.00	63.87	0.104	No	No	1.77
395	8.78	7.28	1.83	0.38	0.60	66.34	1.00	66.34	0.107	No	No	1.81
396	8.80	8.16	1.78	0.36	0.58	74.59	1.00	74.59	0.119	No	No	2.00
397	8.82	10.24	1.65	0.30	0.53	94.31	1.00	94.31	0.158	No	No	2.00
398	8.84	12.16	1.57	0.28	0.50	112.57	1.00	112.57	0.213	No	No	2.00
399	8.86	13.69	1.51	0.27	0.48	127.11	1.00	127.11	0.271	No	No	2.00
400	8.88	14.53	1.49	0.27	0.47	134.98	1.00	134.98	0.309	No	No	2.00
401	8.90	14.51	1.49	0.27	0.47	134.70	1.00	134.70	0.307	No	No	2.00
402	8.92	13.31	1.55	0.31	0.50	123.03	1.00	123.03	0.253	No	No	2.00
403	8.94	12.00	1.62	0.36	0.52	110.34	1.00	110.34	0.205	No	No	2.00
404	8.96	10.75	1.70	0.41	0.55	98.34	1.00	98.34	0.168	No	No	2.00
405	8.98	9.76	1.75	0.44	0.57	88.87	1.00	88.87	0.145	No	No	2.00
406	9.00	8.90	1.81	0.48	0.59	80.66	1.00	80.66	0.129	No	No	2.00
407	9.02	8.18	1.86	0.52	0.61	73.76	1.21	88.93	0.145	No	No	2.00
408	9.04	8.16	1.85	0.51	0.61	73.51	1.20	88.40	0.144	No	No	2.00
409	9.06	8.80	1.82	0.50	0.60	79.43	1.17	93.20	0.155	No	No	2.00
410	9.08	9.57	1.79	0.50	0.59	86.62	1.00	86.62	0.140	No	No	2.00
411	9.10	10.58	1.76	0.52	0.58	95.89	1.10	105.29	0.189	No	No	2.00
412	9.12	11.32	1.74	0.53	0.57	102.73	1.07	109.44	0.202	No	No	2.00
413	9.14	11.42	1.74	0.55	0.57	103.52	1.07	111.23	0.208	No	No	2.00
414	9.16	10.73	1.78	0.58	0.59	96.91	1.13	109.41	0.202	No	No	2.00
415	9.18	9.80	1.83	0.61	0.60	88.13	1.18	103.94	0.184	No	No	2.00
416	9.20	8.59	1.86	0.57	0.62	76.85	1.21	92.94	0.155	No	No	2.00
417	9.22	7.42	1.89	0.51	0.63	66.01	1.23	81.29	0.130	No	No	2.00
418	9.24	6.30	1.94	0.46	0.64	55.68	1.00	55.68	0.096	No	No	1.61
419	9.26	5.43	1.97	0.40	0.66	47.61	1.00	47.61	0.090	No	No	1.50
420	9.28	4.76	2.00	0.35	0.67	41.53	1.00	41.53	0.085	No	No	1.41
421	9.30	4.30	2.06	0.37	0.69	37.23	1.00	37.23	0.081	No	No	1.35
422	9.32	4.00	2.13	0.46	0.72	34.34	1.00	34.34	0.079	No	No	1.31
423	9.34	3.86	2.18	0.55	0.74	32.97	1.56	51.35	0.093	No	No	1.54
424	9.36	3.94	2.19	0.62	0.74	33.64	1.59	53.51	0.094	No	No	1.57
425	9.38	4.11	2.19	0.67	0.74	35.11	1.59	55.92	0.096	No	No	1.60
426	9.40	4.22	2.19	0.71	0.74	36.01	1.60	57.62	0.098	No	No	1.63
427	9.42	4.18	2.21	0.74	0.75	35.65	1.63	58.08	0.098	No	No	1.64
428	9.44	4.05	2.22	0.76	0.76	34.43	1.68	57.71	0.098	No	No	1.63
429	9.46	3.82	2.26	0.79	0.77	32.31	1.78	57.46	0.098	No	No	1.62
430	9.48	3.53	2.31	0.86	0.79	29.63	1.95	57.85	0.098	No	No	1.63
431	9.50	3.47	2.32	0.88	0.79	29.04	2.00	58.06	0.098	No	No	1.63
432	9.52	3.60	2.30	0.86	0.79	30.16	1.93	58.21	0.098	No	No	1.63

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	3.84	2.27	0.84	0.77	32.27	1.82	58.80	0.099	No	No	1.64
434	9.56	4.13	2.24	0.82	0.76	34.88	1.71	59.75	0.100	No	No	1.66
435	9.58	4.49	2.19	0.78	0.74	38.10	1.59	60.72	0.101	No	No	1.67
436	9.60	4.71	2.17	0.76	0.73	40.03	1.54	61.61	0.102	No	No	1.69
437	9.62	4.86	2.15	0.74	0.73	41.35	1.50	62.07	0.102	No	No	1.69
438	9.64	4.90	2.14	0.72	0.72	41.64	1.49	61.96	0.102	No	No	1.69
439	9.66	4.86	2.14	0.72	0.73	41.31	1.49	61.57	0.102	No	No	1.68
440	9.68	4.82	2.15	0.74	0.73	40.87	1.51	61.76	0.102	No	No	1.69
441	9.70	4.92	2.16	0.78	0.73	41.64	1.52	63.42	0.104	No	No	1.72
442	9.72	5.76	2.09	0.76	0.71	49.17	1.40	69.07	0.111	No	No	1.83
443	9.74	6.55	2.05	0.78	0.69	56.27	1.35	76.17	0.121	No	No	2.00
444	9.76	7.26	2.02	0.81	0.68	62.57	1.32	82.76	0.133	No	No	2.00
445	9.78	7.78	2.00	0.83	0.67	67.15	1.31	87.77	0.143	No	No	2.00
446	9.80	7.79	2.01	0.87	0.68	67.13	1.32	88.42	0.144	No	No	2.00
447	9.82	6.86	2.09	0.99	0.71	58.59	1.41	82.35	0.132	No	No	2.00
448	9.84	5.86	2.18	1.10	0.74	49.44	1.56	77.19	0.123	No	No	2.00
449	9.86	4.93	2.26	1.20	0.77	41.12	1.80	74.07	0.118	No	No	1.94
450	9.88	4.11	2.35	1.28	0.81	33.82	2.14	72.38	0.115	No	No	1.90
451	9.90	3.64	2.41	1.35	0.83	29.61	2.43	72.07	0.115	No	No	1.89
452	9.92	3.49	2.43	1.35	0.84	28.24	2.53	71.46	0.114	No	No	1.88
453	9.94	3.58	2.41	1.29	0.83	29.05	2.42	70.24	0.112	No	No	1.85
454	9.96	3.57	2.42	1.32	0.83	28.93	2.46	71.11	4.000	Yes	No	2.00
455	9.98	3.49	2.44	1.40	0.84	28.11	2.59	72.80	4.000	Yes	No	2.00
456	10.00	3.30	2.46	1.41	0.85	26.47	2.73	72.35	4.000	Yes	No	2.00
457	10.02	2.96	2.52	1.47	0.87	23.45	3.12	73.22	4.000	Yes	No	2.00
458	10.04	2.53	2.60	1.57	0.90	19.73	5.24	103.36	4.000	Yes	No	2.00
459	10.06	2.28	2.64	1.56	0.91	17.50	6.85	119.83	4.000	Yes	No	2.00
460	10.08	2.20	2.63	1.42	0.91	16.81	6.60	111.02	4.000	Yes	No	2.00
461	10.10	2.30	2.58	1.27	0.90	17.75	4.91	87.10	4.000	Yes	No	2.00
462	10.12	2.58	2.51	1.12	0.87	20.12	3.01	60.67	4.000	Yes	No	2.00
463	10.14	2.95	2.43	1.01	0.84	23.33	2.55	59.53	4.000	Yes	No	2.00
464	10.16	3.27	2.38	0.95	0.82	26.09	2.26	58.99	4.000	Yes	No	2.00
465	10.18	3.37	2.37	0.98	0.82	26.90	2.24	60.27	4.000	Yes	No	2.00
466	10.20	3.29	2.40	1.08	0.83	26.17	2.40	62.81	4.000	Yes	No	2.00
467	10.22	3.05	2.47	1.23	0.85	23.97	2.76	66.07	4.000	Yes	No	2.00
468	10.24	2.71	2.55	1.40	0.88	20.98	3.82	80.09	4.000	Yes	No	2.00
469	10.26	2.41	2.62	1.57	0.91	18.36	6.18	113.48	4.000	Yes	No	2.00
470	10.28	2.30	2.64	1.57	0.92	17.47	6.99	122.08	0.224	No	No	2.00
471	10.30	2.32	2.62	1.48	0.91	17.59	6.30	110.86	4.000	Yes	No	2.00
472	10.32	2.43	2.58	1.32	0.89	18.59	4.68	87.05	4.000	Yes	No	2.00
473	10.34	2.61	2.52	1.17	0.87	20.07	3.24	65.06	4.000	Yes	No	2.00
474	10.36	2.79	2.47	1.07	0.85	21.64	2.80	60.63	4.000	Yes	No	2.00
475	10.38	2.90	2.45	1.04	0.85	22.59	2.67	60.26	4.000	Yes	No	2.00
476	10.40	2.97	2.45	1.06	0.84	23.13	2.63	60.86	0.101	No	No	1.65
477	10.42	2.99	2.46	1.12	0.85	23.24	2.70	62.65	4.000	Yes	No	2.00
478	10.44	2.97	2.48	1.21	0.86	23.04	2.82	65.08	4.000	Yes	No	2.00
479	10.46	2.91	2.51	1.33	0.87	22.40	2.98	66.79	4.000	Yes	No	2.00
480	10.48	2.84	2.54	1.44	0.88	21.76	3.63	79.04	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	10.50	2.75	2.57	1.54	0.89	21.02	4.38	92.09	4.000	Yes	No	2.00
482	10.52	2.65	2.59	1.61	0.90	20.07	5.23	105.02	4.000	Yes	No	2.00
483	10.54	2.52	2.62	1.65	0.91	18.97	6.19	117.44	4.000	Yes	No	2.00
484	10.56	2.38	2.65	1.66	0.92	17.76	7.29	129.51	4.000	Yes	No	2.00
485	10.58	2.19	2.68	1.68	0.93	16.19	9.18	148.56	4.000	Yes	No	2.00
486	10.60	2.01	2.72	1.69	0.95	14.64	4.94	72.30	4.000	Yes	Yes	2.00
487	10.62	1.85	2.76	1.69	0.96	13.28	5.34	70.94	4.000	Yes	Yes	2.00
488	10.64	1.70	2.79	1.68	0.98	12.09	5.73	69.33	4.000	Yes	Yes	2.00
489	10.66	1.59	2.82	1.67	0.99	11.14	6.10	68.01	4.000	Yes	Yes	2.00
490	10.68	1.55	2.82	1.61	0.99	10.79	6.15	66.41	0.515	No	Yes	2.00
491	10.70	1.59	2.79	1.46	0.98	11.17	5.73	64.02	0.533	No	Yes	2.00
492	10.72	1.65	2.76	1.35	0.96	11.65	5.33	62.10	0.556	No	Yes	2.00
493	10.74	1.70	2.74	1.30	0.96	12.08	5.10	61.53	0.576	No	Yes	2.00
494	10.76	1.75	2.73	1.32	0.95	12.46	4.99	62.20	0.594	No	Yes	2.00
495	10.78	1.76	2.74	1.40	0.96	12.47	5.13	63.96	0.595	No	Yes	2.00
496	10.80	1.70	2.78	1.57	0.97	11.92	5.62	66.98	0.569	No	Yes	2.00
497	10.82	1.67	2.81	1.75	0.98	11.68	6.02	70.36	0.557	No	Yes	2.00
498	10.84	1.70	2.83	1.97	0.99	11.86	6.30	74.71	0.566	No	Yes	2.00
499	10.86	1.82	2.82	2.06	0.99	12.80	6.07	77.76	4.000	Yes	Yes	2.00
500	10.88	2.14	2.77	2.25	0.97	15.38	5.52	84.86	4.000	Yes	Yes	2.00
501	10.90	2.53	2.71	2.31	0.95	18.52	4.84	89.65	4.000	Yes	Yes	2.00
502	10.92	2.86	2.68	2.40	0.93	21.10	8.82	186.20	4.000	Yes	No	2.00
503	10.94	3.14	2.65	2.48	0.92	23.35	7.44	173.65	4.000	Yes	No	2.00
504	10.96	3.52	2.60	2.41	0.90	26.44	5.39	142.47	4.000	Yes	No	2.00
505	10.98	4.11	2.50	2.09	0.87	31.37	2.86	89.87	4.000	Yes	No	2.00
506	11.00	4.72	2.42	1.87	0.84	36.53	2.49	91.06	4.000	Yes	No	2.00
507	11.02	5.28	2.35	1.69	0.81	41.26	2.14	88.42	4.000	Yes	No	2.00
508	11.04	6.03	2.28	1.52	0.78	47.60	1.84	87.55	4.000	Yes	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	1.99	0.00	0.00	0.02	0.00
6.74	1.99	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	1.74	0.00	0.00	0.02	0.00
6.98	1.74	0.00	0.00	0.02	0.00	7.00	1.74	0.00	0.00	0.02	0.00
7.02	1.73	0.00	0.00	0.02	0.00	7.04	1.70	0.00	0.00	0.02	0.00
7.06	1.68	0.00	0.00	0.02	0.00	7.08	1.66	0.00	0.00	0.02	0.00
7.10	1.66	0.00	0.00	0.02	0.00	7.12	1.96	0.00	0.00	0.02	0.00
7.14	1.74	0.00	0.00	0.02	0.00	7.16	1.84	0.00	0.00	0.02	0.00
7.18	1.94	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	1.98	0.00	0.00	0.02	0.00
7.26	1.86	0.00	0.00	0.02	0.00	7.28	1.75	0.00	0.00	0.02	0.00
7.30	1.67	0.00	0.00	0.02	0.00	7.32	1.59	0.00	0.00	0.02	0.00
7.34	1.80	0.00	0.00	0.02	0.00	7.36	1.82	0.00	0.00	0.02	0.00
7.38	1.84	0.00	0.00	0.02	0.00	7.40	1.87	0.00	0.00	0.02	0.00
7.42	1.87	0.00	0.00	0.02	0.00	7.44	1.86	0.00	0.00	0.02	0.00
7.46	1.83	0.00	0.00	0.02	0.00	7.48	1.80	0.00	0.00	0.02	0.00
7.50	1.78	0.00	0.00	0.02	0.00	7.52	1.76	0.00	0.00	0.02	0.00
7.54	1.76	0.00	0.00	0.02	0.00	7.56	1.76	0.00	0.00	0.02	0.00
7.58	1.78	0.00	0.00	0.02	0.00	7.60	1.78	0.00	0.00	0.02	0.00
7.62	1.74	0.00	0.00	0.02	0.00	7.64	1.49	0.00	0.00	0.02	0.00
7.66	1.46	0.00	0.00	0.02	0.00	7.68	1.43	0.00	0.00	0.02	0.00
7.70	1.65	0.00	0.00	0.02	0.00	7.72	1.66	0.00	0.00	0.02	0.00
7.74	1.68	0.00	0.00	0.02	0.00	7.76	1.70	0.00	0.00	0.02	0.00
7.78	1.69	0.00	0.00	0.02	0.00	7.80	1.67	0.00	0.00	0.02	0.00
7.82	1.65	0.00	0.00	0.02	0.00	7.84	1.64	0.00	0.00	0.02	0.00
7.86	1.66	0.00	0.00	0.02	0.00	7.88	1.52	0.00	0.00	0.02	0.00
7.90	1.61	0.00	0.00	0.02	0.00	7.92	1.72	0.00	0.00	0.02	0.00
7.94	1.86	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	1.92	0.00	0.00	0.02	0.00	8.04	1.78	0.00	0.00	0.02	0.00
8.06	1.65	0.00	0.00	0.02	0.00	8.08	1.54	0.00	0.00	0.02	0.00
8.10	1.46	0.00	0.00	0.02	0.00	8.12	1.39	0.00	0.00	0.02	0.00
8.14	1.34	0.00	0.00	0.02	0.00	8.16	1.58	0.00	0.00	0.02	0.00
8.18	1.61	0.00	0.00	0.02	0.00	8.20	1.65	0.00	0.00	0.02	0.00
8.22	1.69	0.00	0.00	0.02	0.00	8.24	1.73	0.00	0.00	0.02	0.00
8.26	1.75	0.00	0.00	0.02	0.00	8.28	1.79	0.00	0.00	0.02	0.00
8.30	1.90	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	1.91	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	1.59	0.00	0.00	0.02	0.00	8.60	1.57	0.00	0.00	0.02	0.00
8.62	1.56	0.00	0.00	0.02	0.00	8.64	1.58	0.00	0.00	0.02	0.00
8.66	1.92	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	1.73	0.00	0.00	0.02	0.00	8.72	1.76	0.00	0.00	0.02	0.00
8.74	1.77	0.00	0.00	0.02	0.00	8.76	1.77	0.00	0.00	0.02	0.00
8.78	1.81	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	1.61	0.00	0.00	0.02	0.00
9.26	1.50	0.00	0.00	0.02	0.00	9.28	1.41	0.00	0.00	0.02	0.00
9.30	1.35	0.00	0.00	0.02	0.00	9.32	1.31	0.00	0.00	0.02	0.00
9.34	1.54	0.00	0.00	0.02	0.00	9.36	1.57	0.00	0.00	0.02	0.00
9.38	1.60	0.00	0.00	0.02	0.00	9.40	1.63	0.00	0.00	0.02	0.00
9.42	1.64	0.00	0.00	0.02	0.00	9.44	1.63	0.00	0.00	0.02	0.00
9.46	1.62	0.00	0.00	0.02	0.00	9.48	1.63	0.00	0.00	0.02	0.00
9.50	1.63	0.00	0.00	0.02	0.00	9.52	1.63	0.00	0.00	0.02	0.00
9.54	1.64	0.00	0.00	0.02	0.00	9.56	1.66	0.00	0.00	0.02	0.00
9.58	1.67	0.00	0.00	0.02	0.00	9.60	1.69	0.00	0.00	0.02	0.00
9.62	1.69	0.00	0.00	0.02	0.00	9.64	1.69	0.00	0.00	0.02	0.00
9.66	1.68	0.00	0.00	0.02	0.00	9.68	1.69	0.00	0.00	0.02	0.00
9.70	1.72	0.00	0.00	0.02	0.00	9.72	1.83	0.00	0.00	0.02	0.00
9.74	2.00	0.00	0.00	0.02	0.00	9.76	2.00	0.00	0.00	0.02	0.00
9.78	2.00	0.00	0.00	0.02	0.00	9.80	2.00	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	1.94	0.00	0.00	0.02	0.00	9.88	1.90	0.00	0.00	0.02	0.00
9.90	1.89	0.00	0.00	0.02	0.00	9.92	1.88	0.00	0.00	0.02	0.00
9.94	1.85	0.00	0.00	0.02	0.00	9.96	2.00	0.00	0.00	0.02	0.00
9.98	2.00	0.00	0.00	0.02	0.00	10.00	2.00	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	2.00	0.00	0.00	0.02	0.00
10.22	2.00	0.00	0.00	0.02	0.00	10.24	2.00	0.00	0.00	0.02	0.00
10.26	2.00	0.00	0.00	0.02	0.00	10.28	2.00	0.00	0.00	0.02	0.00
10.30	2.00	0.00	0.00	0.02	0.00	10.32	2.00	0.00	0.00	0.02	0.00
10.34	2.00	0.00	0.00	0.02	0.00	10.36	2.00	0.00	0.00	0.02	0.00
10.38	2.00	0.00	0.00	0.02	0.00	10.40	1.65	0.00	0.00	0.02	0.00
10.42	2.00	0.00	0.00	0.02	0.00	10.44	2.00	0.00	0.00	0.02	0.00
10.46	2.00	0.00	0.00	0.02	0.00	10.48	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.50	2.00	0.00	0.00	0.02	0.00	10.52	2.00	0.00	0.00	0.02	0.00
10.54	2.00	0.00	0.00	0.02	0.00	10.56	2.00	0.00	0.00	0.02	0.00
10.58	2.00	0.00	0.00	0.02	0.00	10.60	2.00	0.00	0.00	0.02	0.00
10.62	2.00	0.00	0.00	0.02	0.00	10.64	2.00	0.00	0.00	0.02	0.00
10.66	2.00	0.00	0.00	0.02	0.00	10.68	2.00	0.00	0.00	0.02	0.00
10.70	2.00	0.00	0.00	0.02	0.00	10.72	2.00	0.00	0.00	0.02	0.00
10.74	2.00	0.00	0.00	0.02	0.00	10.76	2.00	0.00	0.00	0.02	0.00
10.78	2.00	0.00	0.00	0.02	0.00	10.80	2.00	0.00	0.00	0.02	0.00
10.82	2.00	0.00	0.00	0.02	0.00	10.84	2.00	0.00	0.00	0.02	0.00
10.86	2.00	0.00	0.00	0.02	0.00	10.88	2.00	0.00	0.00	0.02	0.00
10.90	2.00	0.00	0.00	0.02	0.00	10.92	2.00	0.00	0.00	0.02	0.00
10.94	2.00	0.00	0.00	0.02	0.00	10.96	2.00	0.00	0.00	0.02	0.00
10.98	2.00	0.00	0.00	0.02	0.00	11.00	2.00	0.00	0.00	0.02	0.00
11.02	2.00	0.00	0.00	0.02	0.00	11.04	2.00	0.00	0.00	0.02	0.00

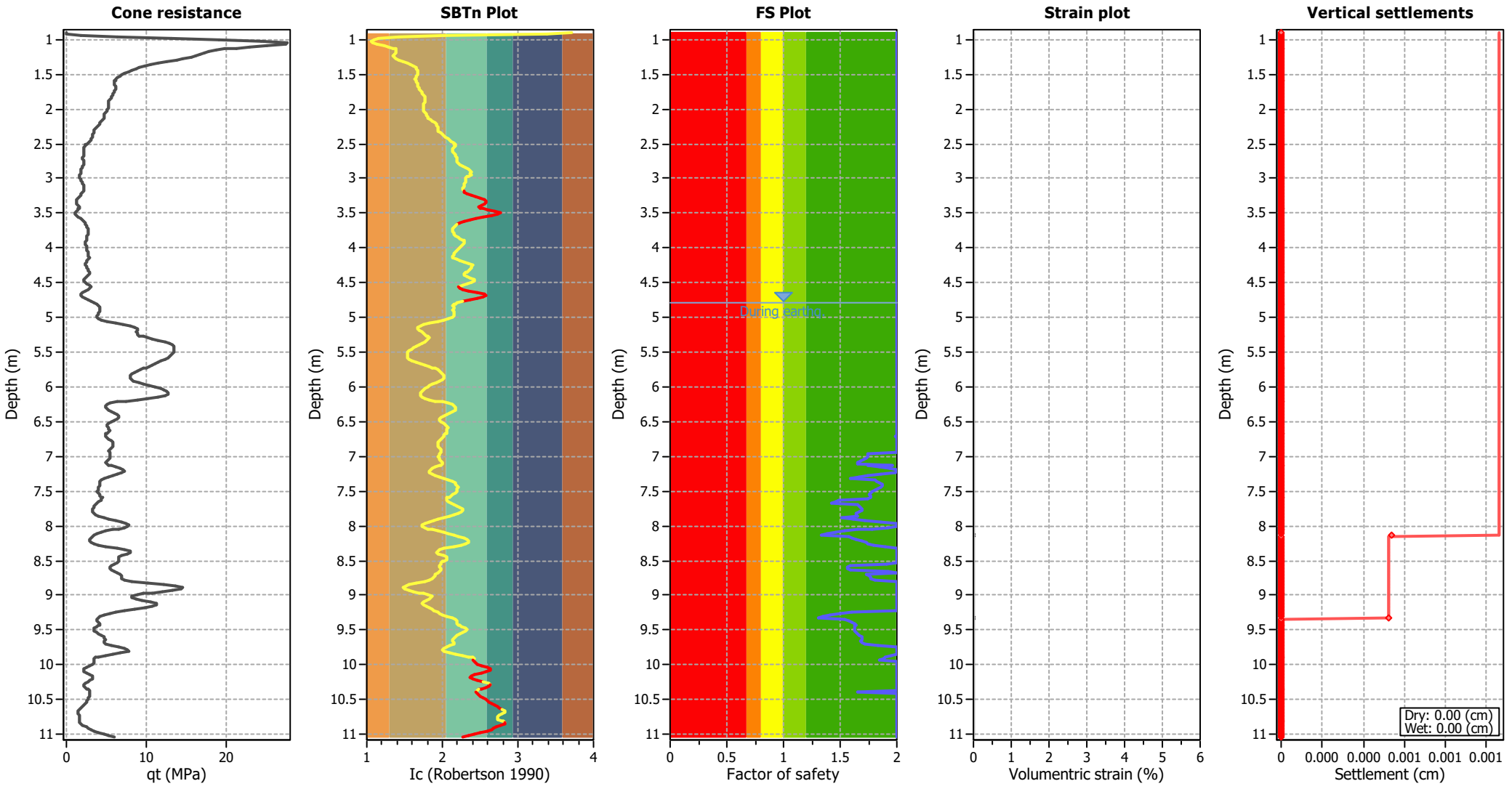
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.80	68.34	2.00	0.00	0.73	0.00	4.82	69.11	2.00	0.00	0.73	0.00
4.84	70.57	2.00	0.00	0.73	0.00	4.86	71.09	2.00	0.00	0.73	0.00
4.88	71.48	2.00	0.00	0.73	0.00	4.90	70.44	2.00	0.00	0.73	0.00
4.92	71.26	2.00	0.00	0.73	0.00	4.94	70.16	2.00	0.00	0.73	0.00
4.96	68.90	2.00	0.00	0.72	0.00	4.98	67.32	2.00	0.00	0.72	0.00
5.00	65.43	2.00	0.00	0.72	0.00	5.02	64.56	2.00	0.00	0.72	0.00
5.04	67.00	2.00	0.00	0.72	0.00	5.06	57.80	2.00	0.00	0.72	0.00
5.08	68.24	2.00	0.00	0.72	0.00	5.10	79.05	2.00	0.00	0.72	0.00
5.12	88.24	2.00	0.00	0.72	0.00	5.14	94.66	2.00	0.00	0.71	0.00
5.16	97.58	2.00	0.00	0.71	0.00	5.18	97.64	2.00	0.00	0.71	0.00
5.20	96.69	2.00	0.00	0.71	0.00	5.22	105.54	2.00	0.00	0.71	0.00
5.24	110.07	2.00	0.00	0.71	0.00	5.26	114.67	2.00	0.00	0.71	0.00
5.28	122.88	2.00	0.00	0.71	0.00	5.30	130.53	2.00	0.00	0.71	0.00
5.32	138.56	2.00	0.00	0.70	0.00	5.34	145.11	2.00	0.00	0.70	0.00
5.36	149.44	2.00	0.00	0.70	0.00	5.38	146.40	2.00	0.00	0.70	0.00
5.40	143.84	2.00	0.00	0.70	0.00	5.42	145.01	2.00	0.00	0.70	0.00
5.44	144.81	2.00	0.00	0.70	0.00	5.46	144.08	2.00	0.00	0.70	0.00
5.48	143.69	2.00	0.00	0.70	0.00	5.50	142.91	2.00	0.00	0.69	0.00
5.52	141.77	2.00	0.00	0.69	0.00	5.54	140.29	2.00	0.00	0.69	0.00
5.56	138.06	2.00	0.00	0.69	0.00	5.58	135.14	2.00	0.00	0.69	0.00
5.60	130.98	2.00	0.00	0.69	0.00	5.62	126.61	2.00	0.00	0.69	0.00
5.64	122.58	2.00	0.00	0.69	0.00	5.66	119.64	2.00	0.00	0.69	0.00
5.68	128.54	2.00	0.00	0.68	0.00	5.70	130.84	2.00	0.00	0.68	0.00
5.72	130.12	2.00	0.00	0.68	0.00	5.74	127.80	2.00	0.00	0.68	0.00
5.76	124.70	2.00	0.00	0.68	0.00	5.78	121.25	2.00	0.00	0.68	0.00
5.80	118.69	2.00	0.00	0.68	0.00	5.82	116.34	2.00	0.00	0.68	0.00
5.84	114.18	2.00	0.00	0.68	0.00	5.86	112.99	2.00	0.00	0.67	0.00
5.88	112.73	2.00	0.00	0.67	0.00	5.90	113.18	2.00	0.00	0.67	0.00
5.92	115.12	2.00	0.00	0.67	0.00	5.94	120.09	2.00	0.00	0.67	0.00
5.96	125.14	2.00	0.00	0.67	0.00	5.98	130.71	2.00	0.00	0.67	0.00
6.00	135.08	2.00	0.00	0.67	0.00	6.02	137.19	2.00	0.00	0.67	0.00
6.04	137.74	2.00	0.00	0.66	0.00	6.06	137.91	2.00	0.00	0.66	0.00
6.08	134.29	2.00	0.00	0.66	0.00	6.10	132.42	2.00	0.00	0.66	0.00
6.12	128.26	2.00	0.00	0.66	0.00	6.14	124.94	2.00	0.00	0.66	0.00
6.16	118.88	2.00	0.00	0.66	0.00	6.18	109.10	2.00	0.00	0.66	0.00
6.20	97.25	2.00	0.00	0.66	0.00	6.22	86.94	2.00	0.00	0.65	0.00
6.24	80.27	2.00	0.00	0.65	0.00	6.26	78.00	2.00	0.00	0.65	0.00
6.28	77.92	2.00	0.00	0.65	0.00	6.30	79.29	2.00	0.00	0.65	0.00
6.32	81.67	2.00	0.00	0.65	0.00	6.34	84.12	2.00	0.00	0.65	0.00
6.36	86.60	2.00	0.00	0.65	0.00	6.38	89.17	2.00	0.00	0.65	0.00
6.40	90.37	2.00	0.00	0.64	0.00	6.42	89.71	2.00	0.00	0.64	0.00
6.44	87.22	2.00	0.00	0.64	0.00	6.46	83.60	2.00	0.00	0.64	0.00
6.48	78.41	2.00	0.00	0.64	0.00	6.50	73.60	2.00	0.00	0.64	0.00
6.52	70.91	2.00	0.00	0.64	0.00	6.54	71.16	2.00	0.00	0.64	0.00
6.56	72.22	2.00	0.00	0.64	0.00	6.58	73.47	2.00	0.00	0.63	0.00
6.60	74.61	2.00	0.00	0.63	0.00	6.62	74.58	2.00	0.00	0.63	0.00
6.64	72.99	2.00	0.00	0.63	0.00	6.66	70.42	2.00	0.00	0.63	0.00
6.68	68.08	2.00	0.00	0.63	0.00	6.70	66.69	2.00	0.00	0.63	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.72	66.10	1.99	0.00	0.63	0.00	6.74	66.54	1.99	0.00	0.63	0.00
6.76	69.24	2.00	0.00	0.62	0.00	6.78	71.95	2.00	0.00	0.62	0.00
6.80	73.66	2.00	0.00	0.62	0.00	6.82	74.56	2.00	0.00	0.62	0.00
6.84	74.84	2.00	0.00	0.62	0.00	6.86	73.55	2.00	0.00	0.62	0.00
6.88	71.70	2.00	0.00	0.62	0.00	6.90	69.96	2.00	0.00	0.62	0.00
6.92	69.18	2.00	0.00	0.62	0.00	6.94	69.64	2.00	0.00	0.61	0.00
6.96	54.43	1.74	0.00	0.61	0.00	6.98	54.65	1.74	0.00	0.61	0.00
7.00	54.58	1.74	0.00	0.61	0.00	7.02	53.81	1.73	0.00	0.61	0.00
7.04	52.35	1.70	0.00	0.61	0.00	7.06	50.45	1.68	0.00	0.61	0.00
7.08	49.37	1.66	0.00	0.61	0.00	7.10	49.58	1.66	0.00	0.61	0.00
7.12	67.01	1.96	0.00	0.60	0.00	7.14	55.64	1.74	0.00	0.60	0.00
7.16	61.60	1.84	0.00	0.60	0.00	7.18	66.25	1.94	0.00	0.60	0.00
7.20	69.63	2.00	0.00	0.60	0.00	7.22	71.32	2.00	0.00	0.60	0.00
7.24	68.43	1.98	0.00	0.60	0.00	7.26	62.88	1.86	0.00	0.60	0.00
7.28	56.71	1.75	0.00	0.60	0.00	7.30	51.39	1.67	0.00	0.59	0.00
7.32	46.30	1.59	0.00	0.59	0.00	7.34	60.47	1.80	0.00	0.59	0.00
7.36	61.36	1.82	0.00	0.59	0.00	7.38	62.76	1.84	0.00	0.59	0.00
7.40	63.94	1.87	0.00	0.59	0.00	7.42	64.34	1.87	0.00	0.59	0.00
7.44	63.66	1.86	0.00	0.59	0.00	7.46	62.38	1.83	0.00	0.59	0.00
7.48	61.13	1.80	0.00	0.58	0.00	7.50	59.72	1.78	0.00	0.58	0.00
7.52	59.07	1.76	0.00	0.58	0.00	7.54	59.02	1.76	0.00	0.58	0.00
7.56	59.29	1.76	0.00	0.58	0.00	7.58	60.01	1.78	0.00	0.58	0.00
7.60	60.12	1.78	0.00	0.58	0.00	7.62	58.33	1.74	0.00	0.58	0.00
7.64	41.06	1.49	0.00	0.58	0.00	7.66	39.18	1.46	0.00	0.57	0.00
7.68	36.93	1.43	0.00	0.57	0.00	7.70	52.83	1.65	0.00	0.57	0.00
7.72	53.77	1.66	0.00	0.57	0.00	7.74	55.13	1.68	0.00	0.57	0.00
7.76	56.09	1.70	0.00	0.57	0.00	7.78	55.58	1.69	0.00	0.57	0.00
7.80	54.33	1.67	0.00	0.57	0.00	7.82	53.02	1.65	0.00	0.57	0.00
7.84	52.75	1.64	0.00	0.56	0.00	7.86	54.16	1.66	0.00	0.56	0.00
7.88	44.18	1.52	0.00	0.56	0.00	7.90	50.82	1.61	0.00	0.56	0.00
7.92	58.19	1.72	0.00	0.56	0.00	7.94	65.67	1.86	0.00	0.56	0.00
7.96	72.01	2.00	0.00	0.56	0.00	7.98	75.02	2.00	0.00	0.56	0.00
8.00	73.64	2.00	0.00	0.56	0.00	8.02	69.08	1.92	0.00	0.55	0.00
8.04	62.34	1.78	0.00	0.55	0.00	8.06	54.69	1.65	0.00	0.55	0.00
8.08	46.65	1.54	0.00	0.55	0.00	8.10	40.84	1.46	0.00	0.55	0.00
8.12	36.13	1.39	0.00	0.55	0.00	8.14	32.82	1.34	0.03	0.55	0.00
8.16	49.90	1.58	0.00	0.55	0.00	8.18	52.00	1.61	0.00	0.55	0.00
8.20	54.96	1.65	0.00	0.54	0.00	8.22	57.98	1.69	0.00	0.54	0.00
8.24	60.35	1.73	0.00	0.54	0.00	8.26	61.38	1.75	0.00	0.54	0.00
8.28	63.72	1.79	0.00	0.54	0.00	8.30	68.83	1.90	0.00	0.54	0.00
8.32	79.43	2.00	0.00	0.54	0.00	8.34	88.01	2.00	0.00	0.54	0.00
8.36	93.55	2.00	0.00	0.54	0.00	8.38	94.42	2.00	0.00	0.53	0.00
8.40	91.35	2.00	0.00	0.53	0.00	8.42	83.92	2.00	0.00	0.53	0.00
8.44	82.09	2.00	0.00	0.53	0.00	8.46	81.59	2.00	0.00	0.53	0.00
8.48	82.04	2.00	0.00	0.53	0.00	8.50	81.00	2.00	0.00	0.53	0.00
8.52	79.16	2.00	0.00	0.53	0.00	8.54	75.00	2.00	0.00	0.53	0.00
8.56	70.30	1.91	0.00	0.52	0.00	8.58	52.46	1.59	0.00	0.52	0.00
8.60	50.86	1.57	0.00	0.52	0.00	8.62	50.52	1.56	0.00	0.52	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.64	52.18	1.58	0.00	0.52	0.00	8.66	71.02	1.92	0.00	0.52	0.00
8.68	74.36	2.00	0.00	0.52	0.00	8.70	61.99	1.73	0.00	0.52	0.00
8.72	63.48	1.76	0.00	0.52	0.00	8.74	63.99	1.77	0.00	0.51	0.00
8.76	63.87	1.77	0.00	0.51	0.00	8.78	66.34	1.81	0.00	0.51	0.00
8.80	74.59	2.00	0.00	0.51	0.00	8.82	94.31	2.00	0.00	0.51	0.00
8.84	112.57	2.00	0.00	0.51	0.00	8.86	127.11	2.00	0.00	0.51	0.00
8.88	134.98	2.00	0.00	0.51	0.00	8.90	134.70	2.00	0.00	0.51	0.00
8.92	123.03	2.00	0.00	0.50	0.00	8.94	110.34	2.00	0.00	0.50	0.00
8.96	98.34	2.00	0.00	0.50	0.00	8.98	88.87	2.00	0.00	0.50	0.00
9.00	80.66	2.00	0.00	0.50	0.00	9.02	88.93	2.00	0.00	0.50	0.00
9.04	88.40	2.00	0.00	0.50	0.00	9.06	93.20	2.00	0.00	0.50	0.00
9.08	86.62	2.00	0.00	0.50	0.00	9.10	105.29	2.00	0.00	0.49	0.00
9.12	109.44	2.00	0.00	0.49	0.00	9.14	111.23	2.00	0.00	0.49	0.00
9.16	109.41	2.00	0.00	0.49	0.00	9.18	103.94	2.00	0.00	0.49	0.00
9.20	92.94	2.00	0.00	0.49	0.00	9.22	81.29	2.00	0.00	0.49	0.00
9.24	55.68	1.61	0.00	0.49	0.00	9.26	47.61	1.50	0.00	0.49	0.00
9.28	41.53	1.41	0.00	0.48	0.00	9.30	37.23	1.35	0.00	0.48	0.00
9.32	34.34	1.31	0.03	0.48	0.00	9.34	51.35	1.54	0.00	0.48	0.00
9.36	53.51	1.57	0.00	0.48	0.00	9.38	55.92	1.60	0.00	0.48	0.00
9.40	57.62	1.63	0.00	0.48	0.00	9.42	58.08	1.64	0.00	0.48	0.00
9.44	57.71	1.63	0.00	0.48	0.00	9.46	57.46	1.62	0.00	0.47	0.00
9.48	57.85	1.63	0.00	0.47	0.00	9.50	58.06	1.63	0.00	0.47	0.00
9.52	58.21	1.63	0.00	0.47	0.00	9.54	58.80	1.64	0.00	0.47	0.00
9.56	59.75	1.66	0.00	0.47	0.00	9.58	60.72	1.67	0.00	0.47	0.00
9.60	61.61	1.69	0.00	0.47	0.00	9.62	62.07	1.69	0.00	0.47	0.00
9.64	61.96	1.69	0.00	0.46	0.00	9.66	61.57	1.68	0.00	0.46	0.00
9.68	61.76	1.69	0.00	0.46	0.00	9.70	63.42	1.72	0.00	0.46	0.00
9.72	69.07	1.83	0.00	0.46	0.00	9.74	76.17	2.00	0.00	0.46	0.00
9.76	82.76	2.00	0.00	0.46	0.00	9.78	87.77	2.00	0.00	0.46	0.00
9.80	88.42	2.00	0.00	0.46	0.00	9.82	82.35	2.00	0.00	0.45	0.00
9.84	77.19	2.00	0.00	0.45	0.00	9.86	74.07	1.94	0.00	0.45	0.00
9.88	72.38	1.90	0.00	0.45	0.00	9.90	72.07	1.89	0.00	0.45	0.00
9.92	71.46	1.88	0.00	0.45	0.00	9.94	70.24	1.85	0.00	0.45	0.00
9.96	71.11	2.00	0.00	0.45	0.00	9.98	72.80	2.00	0.00	0.45	0.00
10.00	72.35	2.00	0.00	0.44	0.00	10.02	73.22	2.00	0.00	0.44	0.00
10.04	103.36	2.00	0.00	0.44	0.00	10.06	119.83	2.00	0.00	0.44	0.00
10.08	111.02	2.00	0.00	0.44	0.00	10.10	87.10	2.00	0.00	0.44	0.00
10.12	60.67	2.00	0.00	0.44	0.00	10.14	59.53	2.00	0.00	0.44	0.00
10.16	58.99	2.00	0.00	0.44	0.00	10.18	60.27	2.00	0.00	0.43	0.00
10.20	62.81	2.00	0.00	0.43	0.00	10.22	66.07	2.00	0.00	0.43	0.00
10.24	80.09	2.00	0.00	0.43	0.00	10.26	113.48	2.00	0.00	0.43	0.00
10.28	122.08	2.00	0.00	0.43	0.00	10.30	110.86	2.00	0.00	0.43	0.00
10.32	87.05	2.00	0.00	0.43	0.00	10.34	65.06	2.00	0.00	0.43	0.00
10.36	60.63	2.00	0.00	0.42	0.00	10.38	60.26	2.00	0.00	0.42	0.00
10.40	60.86	1.65	0.00	0.42	0.00	10.42	62.65	2.00	0.00	0.42	0.00
10.44	65.08	2.00	0.00	0.42	0.00	10.46	66.79	2.00	0.00	0.42	0.00
10.48	79.04	2.00	0.00	0.42	0.00	10.50	92.09	2.00	0.00	0.42	0.00
10.52	105.02	2.00	0.00	0.42	0.00	10.54	117.44	2.00	0.00	0.41	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.56	129.51	2.00	0.00	0.41	0.00	10.58	148.56	2.00	0.00	0.41	0.00
10.60	72.30	2.00	0.00	0.41	0.00	10.62	70.94	2.00	0.00	0.41	0.00
10.64	69.33	2.00	0.00	0.41	0.00	10.66	68.01	2.00	0.00	0.41	0.00
10.68	66.41	2.00	0.00	0.41	0.00	10.70	64.02	2.00	0.00	0.41	0.00
10.72	62.10	2.00	0.00	0.40	0.00	10.74	61.53	2.00	0.00	0.40	0.00
10.76	62.20	2.00	0.00	0.40	0.00	10.78	63.96	2.00	0.00	0.40	0.00
10.80	66.98	2.00	0.00	0.40	0.00	10.82	70.36	2.00	0.00	0.40	0.00
10.84	74.71	2.00	0.00	0.40	0.00	10.86	77.76	2.00	0.00	0.40	0.00
10.88	84.86	2.00	0.00	0.40	0.00	10.90	89.65	2.00	0.00	0.39	0.00
10.92	186.20	2.00	0.00	0.39	0.00	10.94	173.65	2.00	0.00	0.39	0.00
10.96	142.47	2.00	0.00	0.39	0.00	10.98	89.87	2.00	0.00	0.39	0.00
11.00	91.06	2.00	0.00	0.39	0.00	11.02	88.42	2.00	0.00	0.39	0.00
11.04	87.55	2.00	0.00	0.39	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.06	1.00	29.91	29.97	3.70	0.02	0.29
0.92	0.12	2.18	17.36	37.78	3.38	0.02	0.62
0.94	1.80	35.19	1.00	35.19	2.03	0.02	0.62
0.96	6.44	126.86	1.00	126.86	1.43	0.79	0.79
0.98	13.18	235.45	1.00	235.45	1.16	0.92	0.92
1.00	19.10	320.97	1.00	320.97	1.09	0.99	0.99
1.02	24.42	399.36	1.00	399.36	1.06	1.05	1.05
1.04	27.69	454.83	1.00	454.83	1.07	1.08	1.08
1.06	27.60	470.45	1.00	470.45	1.13	1.09	1.09
1.08	25.17	455.09	1.00	455.09	1.22	1.08	1.08
1.10	23.02	434.97	1.00	434.97	1.29	1.07	1.07
1.12	21.30	412.64	1.00	412.64	1.34	1.06	1.06
1.14	19.87	390.84	1.00	390.84	1.38	1.04	1.04
1.16	18.80	368.66	1.00	368.66	1.39	1.03	1.03
1.18	17.95	349.05	1.00	349.05	1.38	1.01	1.01
1.20	17.37	333.42	1.00	333.42	1.38	1.00	1.00
1.22	16.85	318.19	1.00	318.19	1.36	0.99	0.99
1.24	16.32	302.68	1.00	302.68	1.34	0.98	0.98
1.26	15.61	290.25	1.00	290.25	1.36	0.97	0.97
1.28	14.66	275.59	1.00	275.59	1.39	0.96	0.96
1.30	13.80	262.47	1.00	262.47	1.42	0.95	0.95
1.32	12.64	246.29	1.00	246.29	1.48	0.93	0.93
1.34	11.56	227.71	1.00	227.71	1.53	0.92	0.92
1.36	10.66	209.91	1.00	209.91	1.58	0.90	0.90
1.38	9.93	195.56	1.00	195.56	1.62	0.88	0.88
1.40	9.18	180.75	1.00	180.75	1.65	0.87	0.87
1.42	8.74	172.06	1.00	172.06	1.66	0.86	0.86
1.44	8.28	162.94	1.00	162.94	1.67	0.84	0.84
1.46	7.79	153.36	1.00	153.36	1.68	0.83	0.83
1.48	7.35	144.60	1.00	144.60	1.68	0.82	0.82
1.50	7.01	137.81	1.00	137.81	1.68	0.81	0.81
1.52	6.73	132.36	1.00	132.36	1.66	0.80	0.80
1.54	6.49	127.57	1.00	127.57	1.65	0.79	0.79
1.56	6.33	124.09	1.00	124.09	1.64	0.79	0.79
1.58	6.16	120.16	1.00	120.16	1.64	0.78	0.78
1.60	6.07	117.84	1.00	117.84	1.65	0.78	0.78
1.62	6.02	116.72	1.00	116.72	1.66	0.78	0.78
1.64	6.02	116.56	1.00	116.56	1.67	0.78	0.78
1.66	6.08	117.16	1.00	117.16	1.67	0.78	0.78
1.68	6.18	118.72	1.00	118.72	1.68	0.78	0.78
1.70	6.22	119.42	1.00	119.42	1.69	0.78	0.78
1.72	6.16	117.64	1.00	117.64	1.69	0.78	0.78
1.74	6.15	117.67	1.00	117.97	1.71	0.78	0.78
1.76	6.04	116.02	1.04	121.20	1.73	0.78	0.78
1.78	5.94	113.70	1.06	120.37	1.74	0.78	0.78
1.80	5.82	111.44	1.08	120.59	1.75	0.78	0.78
1.82	5.75	110.63	1.12	123.84	1.77	0.79	0.79
1.84	5.63	107.54	1.12	119.92	1.77	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	5.51	104.60	1.12	117.05	1.77	0.78	0.78
1.88	5.37	101.63	1.12	114.19	1.78	0.77	0.77
1.90	5.31	99.41	1.11	110.44	1.77	0.77	0.77
1.92	5.28	98.02	1.10	107.70	1.76	0.76	0.76
1.94	5.27	96.95	1.10	106.34	1.76	0.76	0.76
1.96	5.26	95.91	1.09	104.36	1.75	0.76	0.76
1.98	5.25	95.09	1.00	95.09	1.75	0.74	0.74
2.00	5.19	93.52	1.00	93.52	1.75	0.74	0.74
2.02	5.09	91.19	1.00	91.19	1.75	0.73	0.73
2.04	5.00	89.56	1.00	89.56	1.76	0.73	0.73
2.06	4.92	88.13	1.00	88.13	1.78	0.72	0.72
2.08	4.85	86.80	1.00	86.80	1.79	0.72	0.72
2.10	4.83	86.13	1.14	98.49	1.79	0.75	0.75
2.12	4.75	84.76	1.16	98.28	1.81	0.74	0.74
2.14	4.71	83.85	1.17	98.20	1.82	0.74	0.74
2.16	4.62	82.56	1.19	98.29	1.84	0.74	0.74
2.18	4.50	80.91	1.21	98.29	1.87	0.74	0.74
2.20	4.32	78.13	1.24	96.54	1.90	0.74	0.74
2.22	4.18	75.85	1.25	94.77	1.92	0.74	0.74
2.24	4.01	72.55	1.26	91.14	1.93	0.73	0.73
2.26	3.83	69.08	1.26	87.12	1.94	0.72	0.72
2.28	3.67	66.01	1.26	83.45	1.94	0.71	0.71
2.30	3.57	63.94	1.27	80.97	1.94	0.63	0.71
2.32	3.48	62.09	1.27	78.88	1.95	0.53	0.70
2.34	3.46	61.79	1.29	79.45	1.97	0.56	0.71
2.36	3.42	61.54	1.31	80.72	2.01	0.62	0.71
2.38	3.37	60.66	1.33	80.42	2.02	0.60	0.71
2.40	3.29	59.35	1.35	80.12	2.05	0.59	0.71
2.42	3.22	58.49	1.39	81.27	2.08	0.65	0.71
2.44	3.08	55.92	1.42	79.25	2.10	0.55	0.71
2.46	2.92	53.01	1.44	76.58	2.12	0.44	0.70
2.48	2.77	50.47	1.50	75.48	2.15	0.40	0.70
2.50	2.61	47.68	1.53	73.16	2.17	0.33	0.69
2.52	2.46	44.55	1.53	68.19	2.16	0.22	0.68
2.54	2.35	42.21	1.53	64.75	2.16	0.17	0.67
2.56	2.31	41.11	1.51	62.02	2.15	0.13	0.66
2.58	2.28	40.29	1.49	59.88	2.14	0.11	0.66
2.60	2.27	39.77	1.48	58.73	2.14	0.10	0.65
2.62	2.25	39.34	1.49	58.51	2.14	0.10	0.65
2.64	2.23	38.89	1.50	58.48	2.15	0.10	0.65
2.66	2.21	38.40	1.54	59.01	2.17	0.10	0.65
2.68	2.17	37.72	1.56	58.98	2.18	0.10	0.65
2.70	2.15	37.18	1.57	58.55	2.18	0.10	0.65
2.72	2.14	36.94	1.59	58.74	2.19	0.10	0.65
2.74	2.18	37.28	1.57	58.70	2.18	0.10	0.65
2.76	2.19	37.43	1.58	59.28	2.19	0.11	0.65
2.78	2.22	37.85	1.63	61.61	2.21	0.13	0.66
2.80	2.18	37.48	1.72	64.49	2.24	0.16	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	2.13	36.74	1.81	66.65	2.27	0.19	0.67
2.84	2.03	35.28	1.99	70.10	2.32	0.26	0.68
2.86	1.94	33.73	2.13	71.74	2.35	0.29	0.69
2.88	1.84	32.07	2.24	71.93	2.37	0.30	0.69
2.90	1.80	31.27	2.28	71.14	2.38	0.28	0.69
2.92	1.80	31.02	2.23	69.09	2.37	0.24	0.68
2.94	1.71	29.22	2.28	66.49	2.38	0.19	0.67
2.96	1.73	29.25	2.15	63.03	2.36	0.14	0.67
2.98	1.75	29.23	2.07	60.41	2.34	0.12	0.66
3.00	1.77	29.33	1.99	58.32	2.32	0.10	0.65
3.02	1.82	29.92	1.97	59.08	2.31	0.11	0.65
3.04	1.97	32.26	1.94	62.73	2.31	0.14	0.66
3.06	2.04	33.31	1.94	64.78	2.31	0.17	0.67
3.08	2.13	34.49	1.88	64.80	2.29	0.17	0.67
3.10	2.22	35.77	1.88	67.20	2.29	0.20	0.68
3.12	2.25	36.01	1.87	67.45	2.29	0.21	0.68
3.14	2.27	36.05	1.80	65.04	2.27	0.17	0.67
3.16	2.26	35.65	1.80	64.19	2.26	0.16	0.67
3.18	2.19	34.53	1.87	64.63	2.29	0.16	0.67
3.20	2.11	33.13	1.89	62.52	2.29	0.14	0.66
3.22	1.97	31.05	2.04	63.28	2.33	0.15	0.67
3.24	1.80	28.58	2.30	65.71	2.39	0.18	0.67
3.26	1.65	26.30	2.63	69.06	2.44	0.24	0.68
3.28	1.53	24.51	2.95	72.34	2.50	0.31	0.69
3.30	1.39	22.45	3.41	76.55	2.56	0.73	0.73
3.32	1.33	21.41	3.62	77.51	2.58	0.76	0.76
3.34	1.34	21.47	3.63	77.97	2.59	0.76	0.76
3.36	1.41	22.48	3.46	77.81	2.56	0.74	0.74
3.38	1.52	23.89	3.14	75.12	2.52	0.51	0.70
3.40	1.63	25.36	2.88	73.06	2.49	0.33	0.69
3.42	1.63	25.29	2.99	75.56	2.50	0.29	0.69
3.44	1.58	24.51	3.21	78.75	2.53	0.72	0.72
3.46	1.44	22.48	3.72	83.53	2.60	0.78	0.78
3.48	1.26	19.89	4.56	90.60	2.69	0.87	0.87
3.50	1.13	17.88	5.41	96.69	2.76	0.74	0.74
3.52	1.18	18.62	5.14	95.74	2.74	0.74	0.74
3.54	1.37	21.16	4.23	89.53	2.65	0.84	0.84
3.56	1.59	24.10	3.32	80.02	2.55	0.73	0.73
3.58	1.87	27.63	2.61	71.99	2.44	0.30	0.69
3.60	2.09	30.46	2.17	65.98	2.36	0.18	0.67
3.62	2.27	32.56	1.89	61.58	2.29	0.13	0.66
3.64	2.38	33.62	1.71	57.57	2.24	0.09	0.65
3.66	2.48	34.69	1.61	55.68	2.20	0.08	0.64
3.68	2.57	35.62	1.55	55.27	2.17	0.08	0.64
3.70	2.69	37.12	1.52	56.50	2.16	0.09	0.65
3.72	2.78	38.05	1.48	56.40	2.14	0.09	0.65
3.74	2.83	38.53	1.48	57.01	2.14	0.09	0.65
3.76	2.81	38.23	1.49	56.95	2.14	0.09	0.65

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	2.77	37.61	1.50	56.59	2.15	0.09	0.65
3.80	2.70	36.46	1.51	55.02	2.15	0.08	0.64
3.82	2.65	35.82	1.57	56.08	2.18	0.08	0.64
3.84	2.61	35.28	1.63	57.62	2.21	0.09	0.65
3.86	2.58	34.92	1.72	60.15	2.24	0.11	0.66
3.88	2.55	34.59	1.81	62.57	2.27	0.14	0.66
3.90	2.54	34.42	1.85	63.83	2.28	0.15	0.67
3.92	2.51	33.85	1.85	62.68	2.28	0.14	0.66
3.94	2.48	33.23	1.87	62.19	2.29	0.13	0.66
3.96	2.48	33.13	1.84	60.95	2.28	0.12	0.66
3.98	2.52	33.44	1.75	58.54	2.25	0.10	0.65
4.00	2.57	33.85	1.68	56.89	2.23	0.09	0.65
4.02	2.62	34.22	1.63	55.84	2.21	0.08	0.64
4.04	2.67	34.64	1.58	54.84	2.19	0.08	0.64
4.06	2.73	35.24	1.54	54.31	2.17	0.07	0.64
4.08	2.78	35.66	1.52	54.13	2.16	0.07	0.64
4.10	2.82	36.05	1.50	54.24	2.15	0.07	0.64
4.12	2.88	36.66	1.49	54.69	2.14	0.07	0.64
4.14	2.92	37.01	1.47	54.45	2.13	0.07	0.64
4.16	2.72	34.58	1.59	55.06	2.19	0.08	0.64
4.18	2.62	33.39	1.72	57.37	2.24	0.09	0.65
4.20	2.52	32.23	1.88	60.69	2.29	0.12	0.66
4.22	2.43	31.21	2.10	65.49	2.34	0.18	0.67
4.24	2.37	30.48	2.35	71.49	2.39	0.29	0.69
4.26	2.55	32.73	2.28	74.64	2.38	0.37	0.69
4.28	2.65	33.90	2.28	77.44	2.38	0.47	0.70
4.30	2.75	35.04	2.24	78.43	2.37	0.51	0.70
4.32	2.86	36.22	2.14	77.54	2.35	0.48	0.70
4.34	2.97	37.33	2.04	75.98	2.33	0.42	0.70
4.36	3.01	37.61	1.92	72.38	2.30	0.31	0.69
4.38	2.98	37.03	1.87	69.17	2.28	0.24	0.68
4.40	2.87	35.53	1.89	67.13	2.29	0.20	0.68
4.42	2.68	33.07	2.00	66.03	2.32	0.18	0.67
4.44	2.41	29.74	2.23	66.20	2.37	0.19	0.67
4.46	2.23	27.47	2.51	68.86	2.42	0.23	0.68
4.48	2.22	27.32	2.55	69.76	2.43	0.25	0.68
4.50	2.40	29.33	2.30	67.58	2.39	0.21	0.68
4.52	2.67	32.36	2.01	65.16	2.32	0.17	0.67
4.54	2.94	35.32	1.79	63.20	2.26	0.15	0.67
4.56	3.09	36.85	1.67	61.49	2.22	0.13	0.66
4.58	3.00	35.74	1.69	60.31	2.23	0.12	0.66
4.60	2.75	32.72	1.84	60.09	2.28	0.11	0.66
4.62	2.42	28.78	2.15	61.87	2.35	0.13	0.66
4.64	2.13	25.42	2.74	69.53	2.46	0.25	0.68
4.66	1.90	22.75	3.37	76.73	2.55	0.73	0.73
4.68	1.91	22.75	3.54	80.45	2.57	0.76	0.76
4.70	2.12	25.23	3.22	81.26	2.53	0.73	0.73
4.72	2.42	28.58	2.72	77.78	2.46	0.49	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	2.76	32.33	2.21	71.46	2.37	0.29	0.69
4.76	3.24	37.59	1.80	67.76	2.27	0.21	0.68
4.78	3.60	41.49	1.61	66.86	2.20	0.20	0.68
4.80	3.80	43.67	1.57	68.34	2.18	0.22	0.68
4.82	3.97	45.52	1.52	69.11	2.16	0.24	0.68
4.84	4.14	47.33	1.49	70.57	2.14	0.27	0.68
4.86	4.16	47.54	1.50	71.09	2.15	0.28	0.69
4.88	4.18	47.72	1.50	71.48	2.15	0.29	0.69
4.90	4.20	47.80	1.47	70.44	2.13	0.26	0.68
4.92	4.18	47.61	1.50	71.26	2.15	0.28	0.69
4.94	4.12	46.76	1.50	70.16	2.15	0.26	0.68
4.96	4.05	45.95	1.50	68.90	2.15	0.23	0.68
4.98	3.95	44.74	1.50	67.32	2.15	0.20	0.68
5.00	3.97	44.76	1.46	65.43	2.13	0.18	0.67
5.02	4.13	46.37	1.39	64.56	2.08	0.16	0.67
5.04	4.50	50.39	1.33	67.00	2.03	0.20	0.68
5.06	5.20	57.80	1.00	57.80	1.93	0.10	0.65
5.08	6.18	68.24	1.00	68.24	1.83	0.22	0.68
5.10	7.20	79.05	1.00	79.05	1.75	0.54	0.70
5.12	8.07	88.24	1.00	88.24	1.70	0.72	0.72
5.14	8.68	94.66	1.00	94.66	1.67	0.74	0.74
5.16	8.95	97.58	1.00	97.58	1.67	0.74	0.74
5.18	8.95	97.64	1.00	97.64	1.70	0.74	0.74
5.20	8.85	96.69	1.00	96.69	1.74	0.74	0.74
5.22	8.90	97.31	1.08	105.54	1.75	0.76	0.76
5.24	9.04	98.82	1.11	110.07	1.77	0.77	0.77
5.26	9.23	100.97	1.14	114.67	1.79	0.77	0.77
5.28	9.65	105.67	1.16	122.88	1.81	0.79	0.79
5.30	10.18	111.41	1.17	130.53	1.82	0.80	0.80
5.32	10.84	118.54	1.17	138.56	1.81	0.81	0.81
5.34	11.60	126.57	1.15	145.11	1.79	0.82	0.82
5.36	12.37	134.62	1.11	149.44	1.77	0.83	0.83
5.38	12.91	139.90	1.05	146.40	1.73	0.82	0.82
5.40	13.32	143.84	1.00	143.84	1.69	0.82	0.82
5.42	13.48	145.01	1.00	145.01	1.65	0.82	0.82
5.44	13.50	144.81	1.00	144.81	1.62	0.82	0.82
5.46	13.47	144.08	1.00	144.08	1.59	0.82	0.82
5.48	13.48	143.69	1.00	143.69	1.56	0.82	0.82
5.50	13.43	142.91	1.00	142.91	1.54	0.82	0.82
5.52	13.34	141.77	1.00	141.77	1.54	0.82	0.82
5.54	13.21	140.29	1.00	140.29	1.55	0.81	0.81
5.56	13.02	138.06	1.00	138.06	1.54	0.81	0.81
5.58	12.76	135.14	1.00	135.14	1.55	0.81	0.81
5.60	12.36	130.98	1.00	130.98	1.56	0.80	0.80
5.62	11.94	126.61	1.00	126.61	1.60	0.79	0.79
5.64	11.54	122.58	1.00	122.58	1.65	0.79	0.79
5.66	11.15	118.69	1.01	119.64	1.71	0.78	0.78
5.68	10.76	114.81	1.12	128.54	1.77	0.80	0.80

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	10.39	111.01	1.18	130.84	1.82	0.80	0.80
5.72	10.02	107.07	1.22	130.12	1.87	0.80	0.80
5.74	9.63	102.98	1.24	127.80	1.91	0.80	0.80
5.76	9.26	99.02	1.26	124.70	1.93	0.79	0.79
5.78	8.88	94.92	1.28	121.25	1.96	0.78	0.78
5.80	8.57	91.57	1.30	118.69	1.99	0.78	0.78
5.82	8.31	88.72	1.31	116.34	2.00	0.78	0.78
5.84	8.10	86.42	1.32	114.18	2.02	0.77	0.77
5.86	8.00	85.16	1.33	112.99	2.02	0.77	0.77
5.88	8.03	85.35	1.32	112.73	2.02	0.77	0.77
5.90	8.20	86.97	1.30	113.18	1.99	0.77	0.77
5.92	8.50	89.94	1.28	115.12	1.96	0.77	0.77
5.94	9.12	96.20	1.25	120.09	1.92	0.78	0.78
5.96	9.77	102.80	1.22	125.14	1.87	0.79	0.79
5.98	10.48	110.01	1.19	130.71	1.84	0.80	0.80
6.00	11.20	117.33	1.15	135.08	1.80	0.81	0.81
6.02	11.87	124.06	1.11	137.19	1.76	0.81	0.81
6.04	12.27	128.03	1.08	137.74	1.74	0.81	0.81
6.06	12.61	131.34	1.05	137.91	1.73	0.81	0.81
6.08	12.81	133.20	1.01	134.29	1.71	0.80	0.80
6.10	12.75	132.42	1.00	132.42	1.70	0.80	0.80
6.12	12.35	128.08	1.00	128.26	1.71	0.80	0.80
6.14	11.57	119.92	1.04	124.94	1.73	0.79	0.79
6.16	10.33	106.93	1.11	118.88	1.77	0.78	0.78
6.18	8.92	92.33	1.18	109.10	1.83	0.76	0.76
6.20	7.57	78.33	1.24	97.25	1.91	0.74	0.74
6.22	6.45	66.72	1.30	86.94	2.00	0.72	0.72
6.24	5.60	57.86	1.39	80.27	2.08	0.60	0.71
6.26	5.17	53.39	1.46	78.00	2.13	0.49	0.70
6.28	4.98	51.39	1.52	77.92	2.16	0.49	0.70
6.30	4.94	50.94	1.56	79.29	2.18	0.55	0.71
6.32	5.06	52.15	1.57	81.67	2.18	0.67	0.71
6.34	5.32	54.71	1.54	84.12	2.17	0.72	0.72
6.36	5.69	58.49	1.48	86.60	2.14	0.72	0.72
6.38	6.13	62.93	1.42	89.17	2.10	0.73	0.73
6.40	6.46	66.19	1.37	90.37	2.06	0.73	0.73
6.42	6.61	67.62	1.33	89.71	2.02	0.73	0.73
6.44	6.60	67.32	1.30	87.22	1.99	0.72	0.72
6.46	6.42	65.38	1.28	83.60	1.96	0.72	0.72
6.48	6.04	61.35	1.28	78.41	1.96	0.51	0.70
6.50	5.61	56.91	1.29	73.60	1.98	0.34	0.69
6.52	5.32	53.84	1.32	70.91	2.01	0.27	0.69
6.54	5.22	52.80	1.35	71.16	2.04	0.28	0.69
6.56	5.22	52.80	1.37	72.22	2.06	0.31	0.69
6.58	5.28	53.29	1.38	73.47	2.07	0.34	0.69
6.60	5.40	54.46	1.37	74.61	2.06	0.37	0.69
6.62	5.44	54.84	1.36	74.58	2.05	0.37	0.69
6.64	5.32	53.57	1.36	72.99	2.06	0.33	0.69

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	5.14	51.65	1.36	70.42	2.06	0.26	0.68
6.68	5.03	50.45	1.35	68.08	2.04	0.22	0.68
6.70	5.01	50.15	1.33	66.69	2.03	0.19	0.67
6.72	5.03	50.21	1.32	66.10	2.01	0.19	0.67
6.74	5.11	51.04	1.30	66.54	2.00	0.19	0.67
6.76	5.38	53.71	1.29	69.24	1.98	0.24	0.68
6.78	5.64	56.29	1.28	71.95	1.96	0.30	0.69
6.80	5.82	57.98	1.27	73.66	1.95	0.34	0.69
6.82	5.92	58.99	1.26	74.56	1.94	0.37	0.69
6.84	5.97	59.37	1.26	74.84	1.94	0.38	0.70
6.86	5.84	58.02	1.27	73.55	1.95	0.34	0.69
6.88	5.66	56.14	1.28	71.70	1.96	0.29	0.69
6.90	5.47	54.23	1.29	69.96	1.98	0.25	0.68
6.92	5.39	53.32	1.30	69.18	1.99	0.24	0.68
6.94	5.47	54.05	1.29	69.64	1.98	0.25	0.68
6.96	5.51	54.43	1.00	54.43	1.96	0.07	0.64
6.98	5.54	54.65	1.00	54.65	1.95	0.07	0.64
7.00	5.54	54.58	1.00	54.58	1.95	0.07	0.64
7.02	5.47	53.81	1.00	53.81	1.96	0.07	0.64
7.04	5.33	52.35	1.00	52.35	1.97	0.06	0.63
7.06	5.14	50.45	1.00	50.45	1.99	0.05	0.63
7.08	5.04	49.37	1.00	49.37	2.00	0.05	0.62
7.10	5.07	49.58	1.00	49.58	2.00	0.05	0.62
7.12	5.30	51.83	1.29	67.01	1.98	0.20	0.68
7.14	5.69	55.64	1.00	55.64	1.95	0.08	0.64
7.16	6.29	61.60	1.00	61.60	1.91	0.13	0.66
7.18	6.76	66.25	1.00	66.25	1.87	0.19	0.67
7.20	7.11	69.63	1.00	69.63	1.84	0.25	0.68
7.22	7.29	71.32	1.00	71.32	1.82	0.28	0.69
7.24	7.00	68.43	1.00	68.43	1.83	0.22	0.68
7.26	6.45	62.88	1.00	62.88	1.86	0.14	0.66
7.28	5.84	56.71	1.00	56.71	1.91	0.09	0.65
7.30	5.30	51.39	1.00	51.39	1.96	0.06	0.63
7.32	4.80	46.30	1.00	46.30	2.02	0.04	0.62
7.34	4.49	43.24	1.40	60.47	2.09	0.12	0.66
7.36	4.30	41.29	1.49	61.36	2.14	0.13	0.66
7.38	4.25	40.77	1.54	62.76	2.17	0.14	0.66
7.40	4.24	40.66	1.57	63.94	2.18	0.16	0.67
7.42	4.17	39.92	1.61	64.34	2.20	0.16	0.67
7.44	4.12	39.30	1.62	63.66	2.20	0.15	0.67
7.46	4.08	38.88	1.60	62.38	2.20	0.14	0.66
7.48	4.02	38.27	1.60	61.13	2.19	0.12	0.66
7.50	3.96	37.61	1.59	59.72	2.19	0.11	0.66
7.52	4.06	38.55	1.53	59.07	2.16	0.11	0.65
7.54	4.18	39.67	1.49	59.02	2.14	0.10	0.65
7.56	4.32	41.03	1.45	59.29	2.12	0.11	0.65
7.58	4.49	42.69	1.41	60.01	2.09	0.11	0.66
7.60	4.61	43.78	1.37	60.12	2.07	0.11	0.66

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	4.50	42.69	1.37	58.33	2.06	0.10	0.65
7.64	4.34	41.06	1.00	41.06	2.06	0.03	0.62
7.66	4.15	39.18	1.00	39.18	2.08	0.03	0.62
7.68	3.93	36.93	1.00	36.93	2.11	0.02	0.62
7.70	3.73	34.93	1.51	52.83	2.15	0.06	0.63
7.72	3.58	33.47	1.61	53.77	2.20	0.07	0.64
7.74	3.46	32.21	1.71	55.13	2.24	0.08	0.64
7.76	3.38	31.41	1.79	56.09	2.26	0.08	0.65
7.78	3.35	31.11	1.79	55.58	2.26	0.08	0.64
7.80	3.35	31.10	1.75	54.33	2.25	0.07	0.64
7.82	3.47	32.17	1.65	53.02	2.21	0.07	0.64
7.84	3.73	34.71	1.52	52.75	2.16	0.06	0.63
7.86	4.09	38.17	1.42	54.16	2.10	0.07	0.64
7.88	4.71	44.18	1.00	44.18	2.02	0.04	0.62
7.90	5.40	50.82	1.00	50.82	1.95	0.06	0.63
7.92	6.17	58.19	1.00	58.19	1.88	0.10	0.65
7.94	6.94	65.67	1.00	65.67	1.82	0.18	0.67
7.96	7.60	72.01	1.00	72.01	1.77	0.30	0.69
7.98	7.92	75.02	1.00	75.02	1.74	0.39	0.70
8.00	7.78	73.64	1.00	73.64	1.74	0.34	0.69
8.02	7.31	69.08	1.00	69.08	1.76	0.24	0.68
8.04	6.62	62.34	1.00	62.34	1.80	0.14	0.66
8.06	5.84	54.69	1.00	54.69	1.86	0.07	0.64
8.08	5.01	46.65	1.00	46.65	1.94	0.04	0.62
8.10	4.41	40.84	1.00	40.84	2.01	0.03	0.62
8.12	3.93	36.13	1.00	36.13	2.08	0.02	0.62
8.14	3.59	32.82	1.00	32.82	2.15	0.02	0.62
8.16	3.31	30.07	1.66	49.90	2.22	0.05	0.63
8.18	3.11	28.11	1.85	52.00	2.28	0.06	0.63
8.20	3.03	27.30	2.01	54.96	2.32	0.08	0.64
8.22	3.06	27.51	2.11	57.98	2.34	0.10	0.65
8.24	3.14	28.26	2.14	60.35	2.35	0.12	0.66
8.26	3.44	31.04	1.98	61.38	2.31	0.13	0.66
8.28	4.04	36.72	1.74	63.72	2.24	0.15	0.67
8.30	5.00	45.84	1.50	68.83	2.15	0.23	0.68
8.32	6.46	59.75	1.33	79.43	2.02	0.56	0.71
8.34	7.40	68.65	1.28	88.01	1.97	0.72	0.72
8.36	7.98	74.09	1.26	93.55	1.94	0.74	0.74
8.38	8.11	75.24	1.25	94.42	1.93	0.74	0.74
8.40	7.77	71.92	1.27	91.35	1.95	0.73	0.73
8.42	6.88	63.35	1.32	83.92	2.02	0.72	0.72
8.44	6.60	60.55	1.36	82.09	2.05	0.70	0.71
8.46	6.57	60.20	1.36	81.59	2.05	0.67	0.71
8.48	6.59	60.31	1.36	82.04	2.05	0.69	0.71
8.50	6.64	60.83	1.33	81.00	2.03	0.63	0.71
8.52	6.64	60.77	1.30	79.16	1.99	0.54	0.71
8.54	6.38	58.31	1.29	75.00	1.97	0.39	0.70
8.56	5.99	54.62	1.29	70.30	1.97	0.26	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	5.76	52.46	1.00	52.46	1.96	0.06	0.63
8.60	5.60	50.86	1.00	50.86	1.97	0.06	0.63
8.62	5.57	50.52	1.00	50.52	1.98	0.05	0.63
8.64	5.75	52.18	1.00	52.18	1.98	0.06	0.63
8.66	6.14	55.77	1.27	71.02	1.95	0.28	0.69
8.68	6.50	59.08	1.26	74.36	1.93	0.37	0.69
8.70	6.81	61.99	1.00	61.99	1.91	0.13	0.66
8.72	6.97	63.48	1.00	63.48	1.89	0.15	0.67
8.74	7.03	63.99	1.00	63.99	1.88	0.16	0.67
8.76	7.02	63.87	1.00	63.87	1.86	0.15	0.67
8.78	7.28	66.34	1.00	66.34	1.83	0.19	0.67
8.80	8.16	74.59	1.00	74.59	1.78	0.37	0.69
8.82	10.24	94.31	1.00	94.31	1.65	0.74	0.74
8.84	12.16	112.57	1.00	112.57	1.57	0.77	0.77
8.86	13.69	127.11	1.00	127.11	1.51	0.79	0.79
8.88	14.53	134.98	1.00	134.98	1.49	0.81	0.81
8.90	14.51	134.70	1.00	134.70	1.49	0.81	0.81
8.92	13.31	123.03	1.00	123.03	1.55	0.79	0.79
8.94	12.00	110.34	1.00	110.34	1.62	0.77	0.77
8.96	10.75	98.34	1.00	98.34	1.70	0.74	0.74
8.98	9.76	88.87	1.00	88.87	1.75	0.73	0.73
9.00	8.90	80.66	1.00	80.66	1.81	0.62	0.71
9.02	8.18	73.76	1.21	88.93	1.86	0.73	0.73
9.04	8.16	73.51	1.20	88.40	1.85	0.73	0.73
9.06	8.80	79.43	1.17	93.20	1.82	0.73	0.73
9.08	9.57	86.62	1.00	86.62	1.79	0.72	0.72
9.10	10.58	95.89	1.10	105.29	1.76	0.76	0.76
9.12	11.32	102.73	1.07	109.44	1.74	0.77	0.77
9.14	11.42	103.52	1.07	111.23	1.74	0.77	0.77
9.16	10.73	96.91	1.13	109.41	1.78	0.77	0.77
9.18	9.80	88.13	1.18	103.94	1.83	0.76	0.76
9.20	8.59	76.85	1.21	92.94	1.86	0.73	0.73
9.22	7.42	66.01	1.23	81.29	1.89	0.65	0.71
9.24	6.30	55.68	1.00	55.68	1.94	0.08	0.64
9.26	5.43	47.61	1.00	47.61	1.97	0.04	0.62
9.28	4.76	41.53	1.00	41.53	2.00	0.03	0.62
9.30	4.30	37.23	1.00	37.23	2.06	0.02	0.62
9.32	4.00	34.34	1.00	34.34	2.13	0.02	0.62
9.34	3.86	32.97	1.56	51.35	2.18	0.06	0.63
9.36	3.94	33.64	1.59	53.51	2.19	0.07	0.64
9.38	4.11	35.11	1.59	55.92	2.19	0.08	0.64
9.40	4.22	36.01	1.60	57.62	2.19	0.09	0.65
9.42	4.18	35.65	1.63	58.08	2.21	0.10	0.65
9.44	4.05	34.43	1.68	57.71	2.22	0.09	0.65
9.46	3.82	32.31	1.78	57.46	2.26	0.09	0.65
9.48	3.53	29.63	1.95	57.85	2.31	0.10	0.65
9.50	3.47	29.04	2.00	58.06	2.32	0.10	0.65
9.52	3.60	30.16	1.93	58.21	2.30	0.10	0.65

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	3.84	32.27	1.82	58.80	2.27	0.10	0.65
9.56	4.13	34.88	1.71	59.75	2.24	0.11	0.66
9.58	4.49	38.10	1.59	60.72	2.19	0.12	0.66
9.60	4.71	40.03	1.54	61.61	2.17	0.13	0.66
9.62	4.86	41.35	1.50	62.07	2.15	0.13	0.66
9.64	4.90	41.64	1.49	61.96	2.14	0.13	0.66
9.66	4.86	41.31	1.49	61.57	2.14	0.13	0.66
9.68	4.82	40.87	1.51	61.76	2.15	0.13	0.66
9.70	4.92	41.64	1.52	63.42	2.16	0.15	0.67
9.72	5.76	49.17	1.40	69.07	2.09	0.24	0.68
9.74	6.55	56.27	1.35	76.17	2.05	0.42	0.70
9.76	7.26	62.57	1.32	82.76	2.02	0.71	0.71
9.78	7.78	67.15	1.31	87.77	2.00	0.72	0.72
9.80	7.79	67.13	1.32	88.42	2.01	0.73	0.73
9.82	6.86	58.59	1.41	82.35	2.09	0.71	0.71
9.84	5.86	49.44	1.56	77.19	2.18	0.46	0.70
9.86	4.93	41.12	1.80	74.07	2.26	0.36	0.69
9.88	4.11	33.82	2.14	72.38	2.35	0.31	0.69
9.90	3.64	29.61	2.43	72.07	2.41	0.30	0.69
9.92	3.49	28.24	2.53	71.46	2.43	0.29	0.69
9.94	3.58	29.05	2.42	70.24	2.41	0.26	0.68
9.96	3.57	28.93	2.46	71.11	2.42	0.28	0.69
9.98	3.49	28.11	2.59	72.80	2.44	0.32	0.69
10.00	3.30	26.47	2.73	72.35	2.46	0.31	0.69
10.02	2.96	23.45	3.09	72.51	2.52	0.33	0.69
10.04	2.53	19.73	3.71	73.20	2.60	0.75	0.75
10.06	2.28	17.50	4.08	71.44	2.64	0.78	0.78
10.08	2.20	16.81	4.03	67.75	2.63	0.77	0.77
10.10	2.30	17.75	3.62	64.34	2.58	0.72	0.72
10.12	2.58	20.12	3.05	61.47	2.51	0.12	0.66
10.14	2.95	23.33	2.55	59.53	2.43	0.11	0.66
10.16	3.27	26.09	2.26	58.99	2.38	0.10	0.65
10.18	3.37	26.90	2.24	60.27	2.37	0.12	0.66
10.20	3.29	26.17	2.40	62.81	2.40	0.14	0.66
10.22	3.05	23.97	2.76	66.07	2.47	0.18	0.67
10.24	2.71	20.98	3.32	69.58	2.55	0.59	0.71
10.26	2.41	18.36	3.94	72.25	2.62	0.77	0.77
10.28	2.30	17.47	4.11	71.84	2.64	0.79	0.79
10.30	2.32	17.59	3.96	69.72	2.62	0.77	0.77
10.32	2.43	18.59	3.57	66.26	2.58	0.72	0.72
10.34	2.61	20.07	3.13	62.87	2.52	0.17	0.67
10.36	2.79	21.64	2.80	60.63	2.47	0.12	0.66
10.38	2.90	22.59	2.67	60.26	2.45	0.12	0.66
10.40	2.97	23.13	2.63	60.86	2.45	0.12	0.66
10.42	2.99	23.24	2.70	62.65	2.46	0.14	0.66
10.44	2.97	23.04	2.82	65.08	2.48	0.17	0.67
10.46	2.91	22.40	3.04	68.16	2.51	0.20	0.68
10.48	2.84	21.76	3.26	70.93	2.54	0.54	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	2.75	21.02	3.48	73.18	2.57	0.73	0.73
10.52	2.65	20.07	3.71	74.42	2.59	0.76	0.76
10.54	2.52	18.97	3.94	74.70	2.62	0.78	0.78
10.56	2.38	17.76	4.18	74.16	2.65	0.80	0.80
10.58	2.19	16.19	4.53	73.41	2.68	0.83	0.83
10.60	2.01	14.64	4.94	72.30	2.72	0.31	0.69
10.62	1.85	13.28	5.34	70.94	2.76	0.28	0.69
10.64	1.70	12.09	5.73	69.33	2.79	0.24	0.68
10.66	1.59	11.14	6.10	68.01	2.82	0.22	0.68
10.68	1.55	10.79	6.15	66.41	2.82	0.19	0.67
10.70	1.59	11.17	5.73	64.02	2.79	0.16	0.67
10.72	1.65	11.65	5.33	62.10	2.76	0.13	0.66
10.74	1.70	12.08	5.10	61.53	2.74	0.13	0.66
10.76	1.75	12.46	4.99	62.20	2.73	0.13	0.66
10.78	1.76	12.47	5.13	63.96	2.74	0.16	0.67
10.80	1.70	11.92	5.62	66.98	2.78	0.20	0.68
10.82	1.67	11.68	6.02	70.36	2.81	0.26	0.68
10.84	1.70	11.86	6.30	74.71	2.83	0.38	0.69
10.86	1.82	12.80	6.07	77.76	2.82	0.48	0.70
10.88	2.14	15.38	5.52	84.86	2.77	0.72	0.72
10.90	2.53	18.52	4.84	89.65	2.71	0.73	0.73
10.92	2.86	21.10	4.47	94.34	2.68	0.87	0.87
10.94	3.14	23.35	4.20	98.18	2.65	0.86	0.86
10.96	3.52	26.44	3.75	99.07	2.60	0.82	0.82
10.98	4.11	31.37	3.00	94.15	2.50	0.73	0.73
11.00	4.72	36.53	2.49	91.06	2.42	0.73	0.73
11.02	5.28	41.26	2.14	88.42	2.35	0.73	0.73
11.04	6.03	47.60	1.84	87.55	2.28	0.72	0.72

Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

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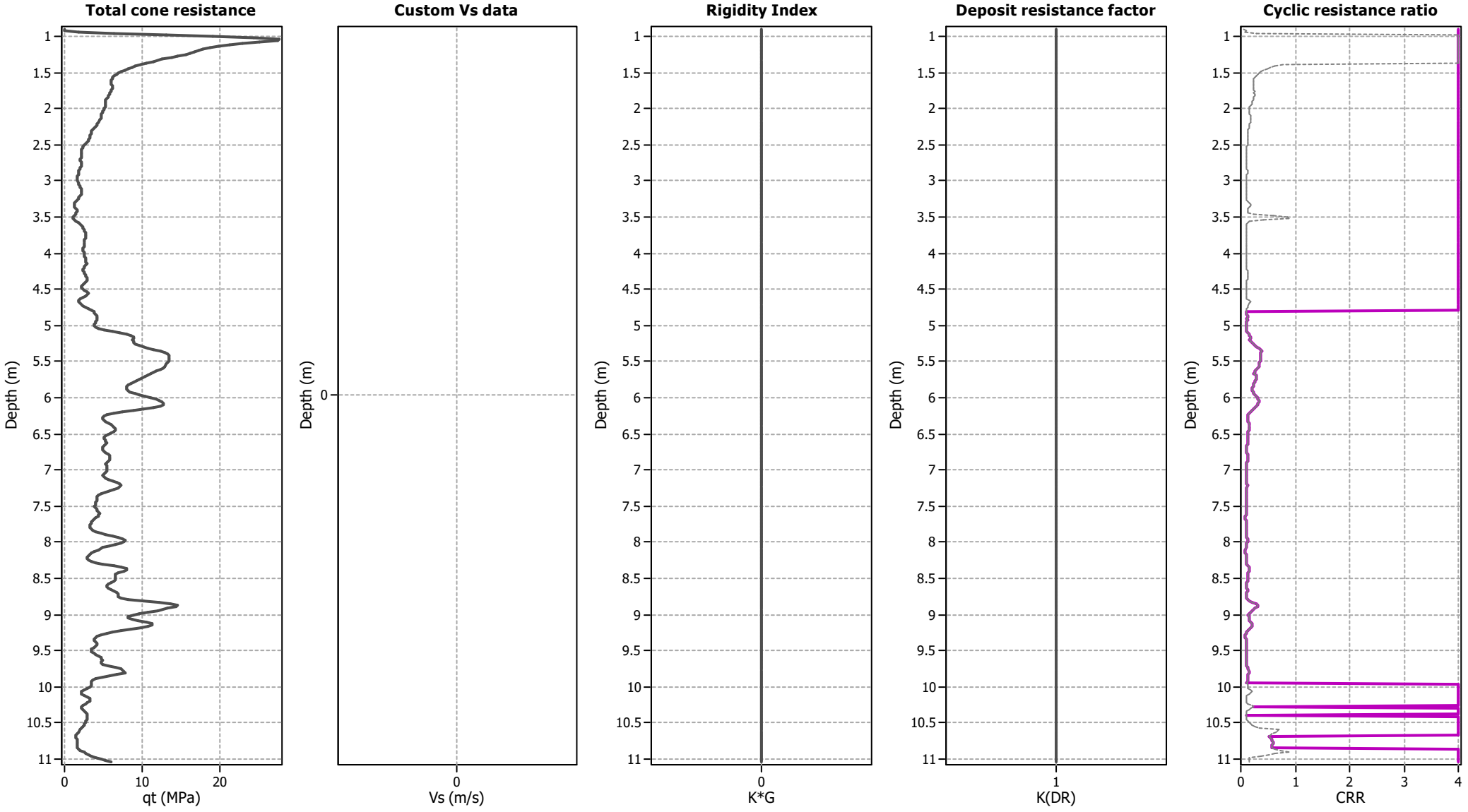
Aging Calculation Estimation



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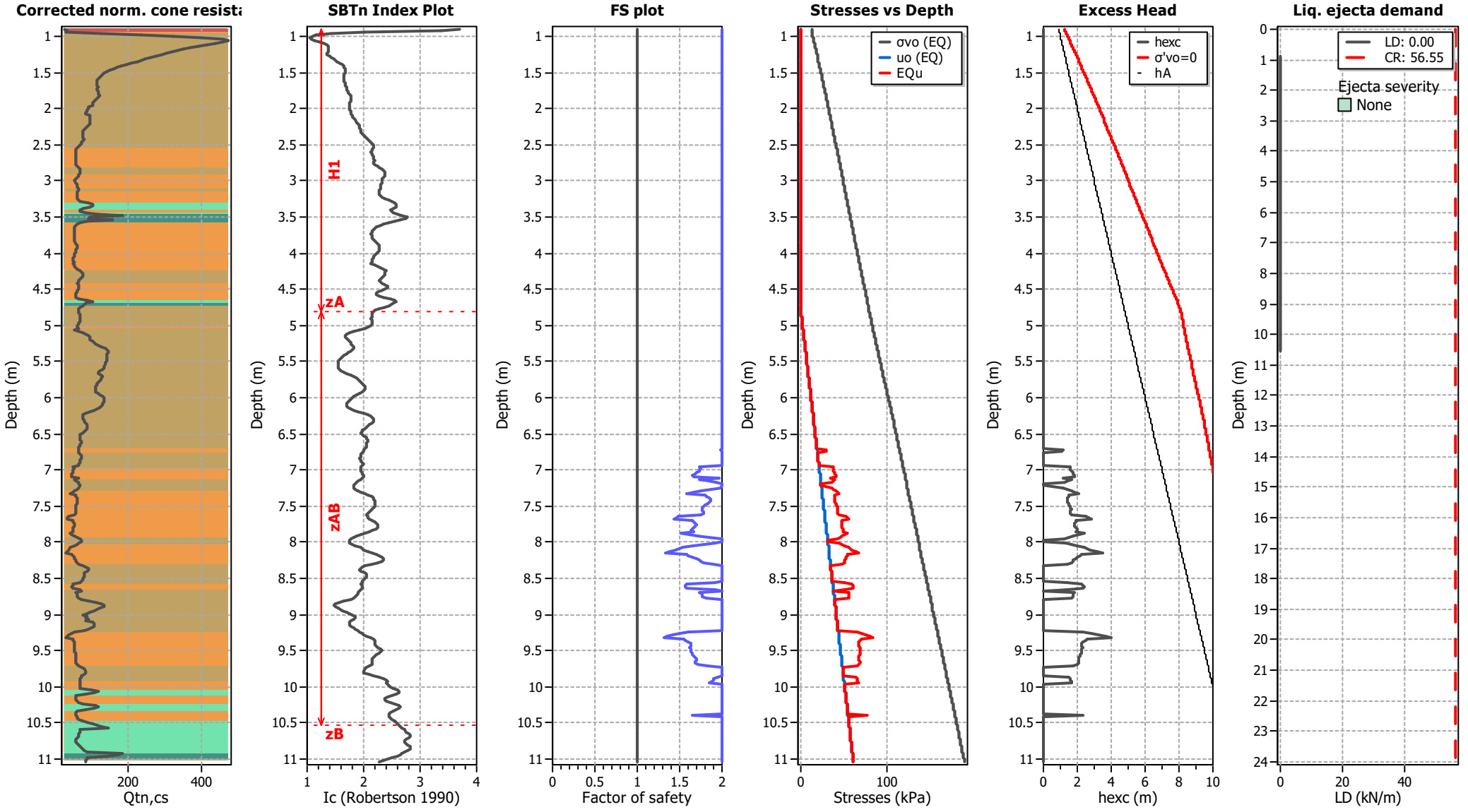
Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

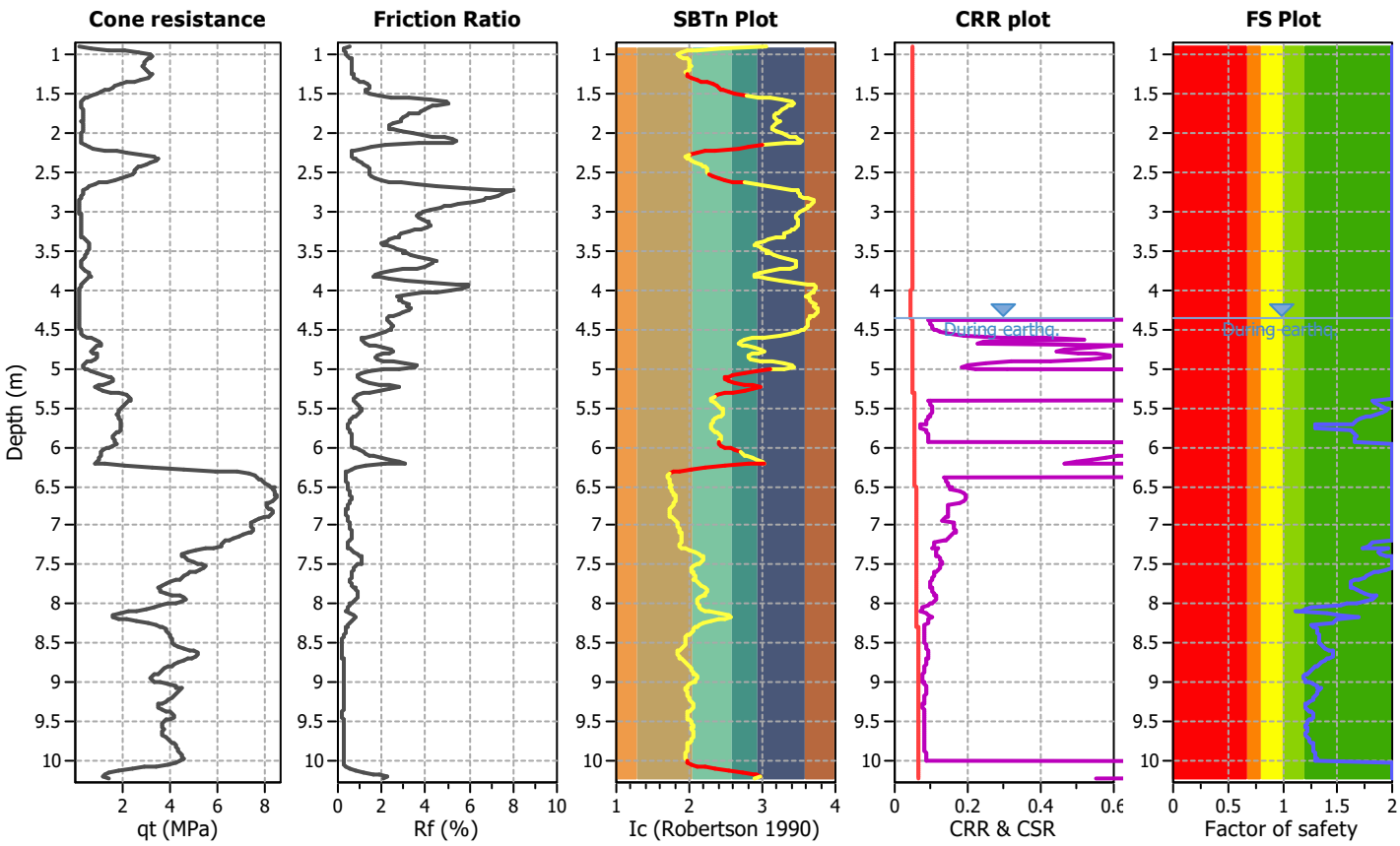
LIQUEFACTION ANALYSIS REPORT

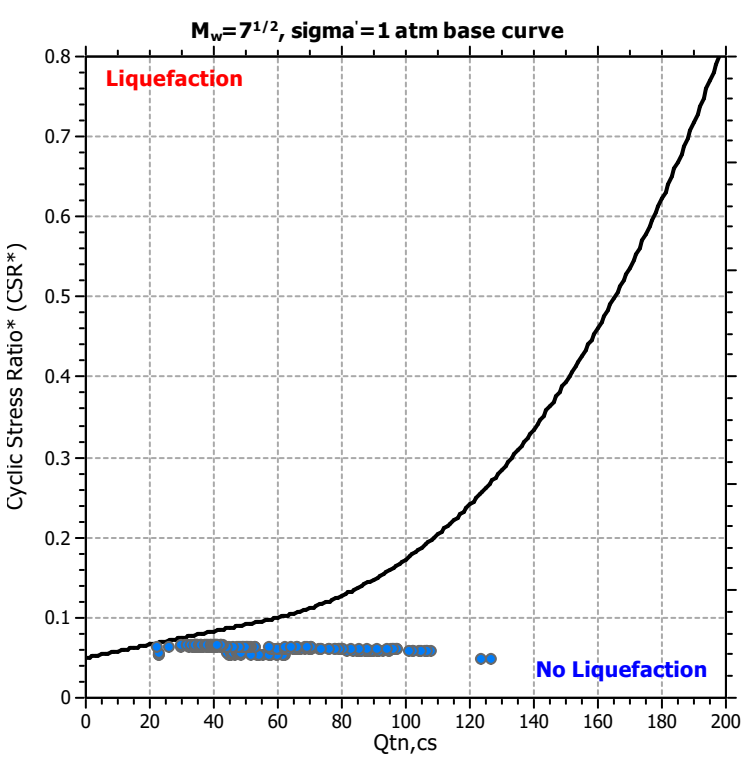
Project title : CWLP Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

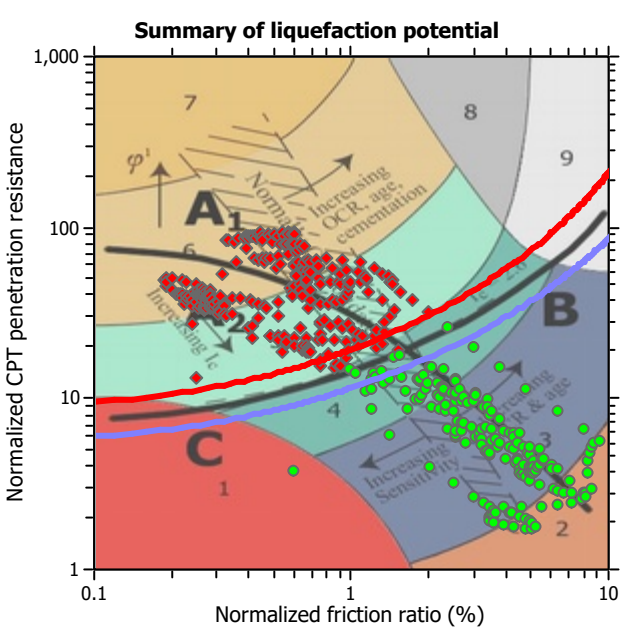
CPT file : CWLP CPT-2CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	4.36 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.36 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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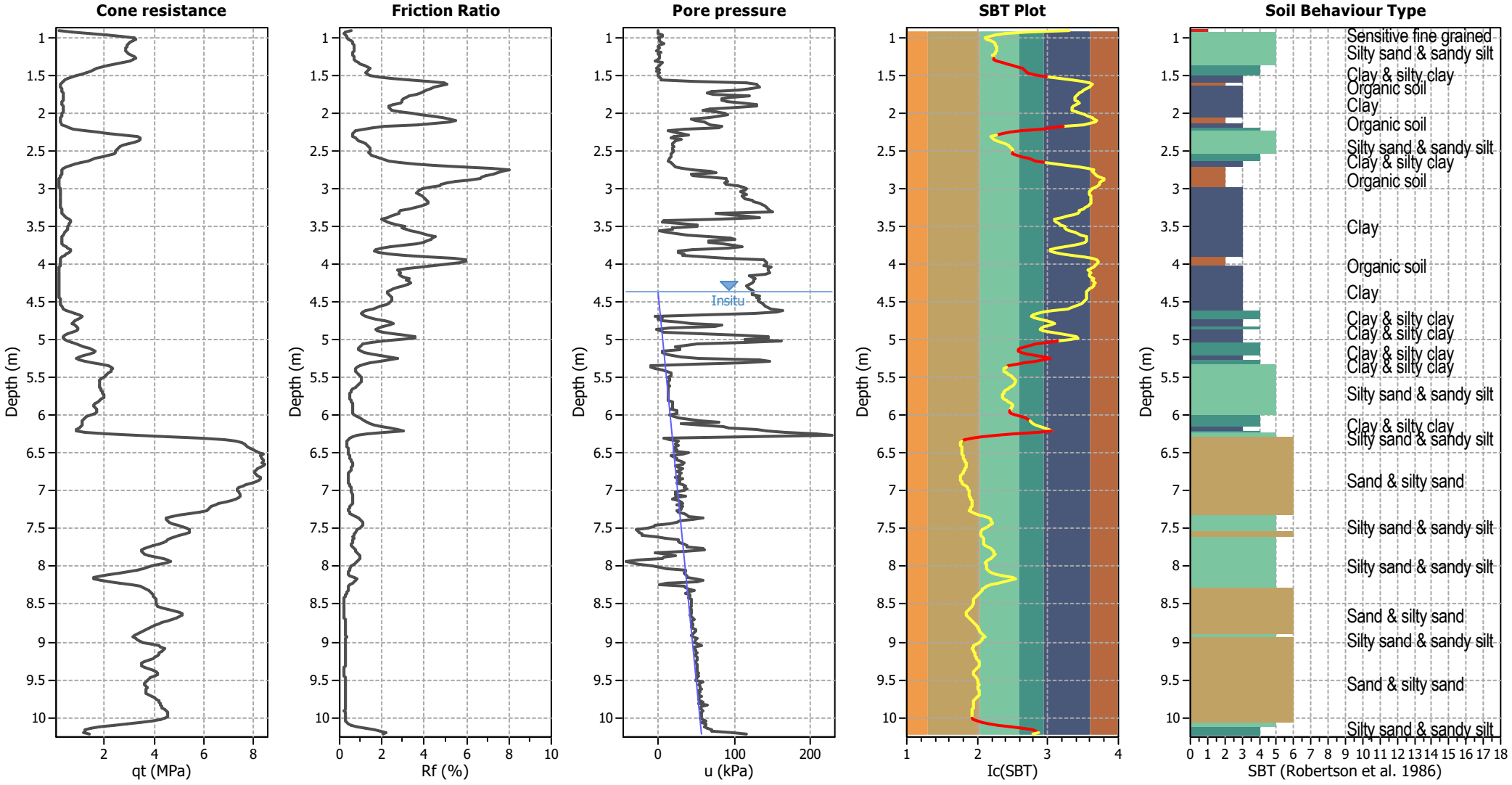
CPT name: CWLP CPT-2CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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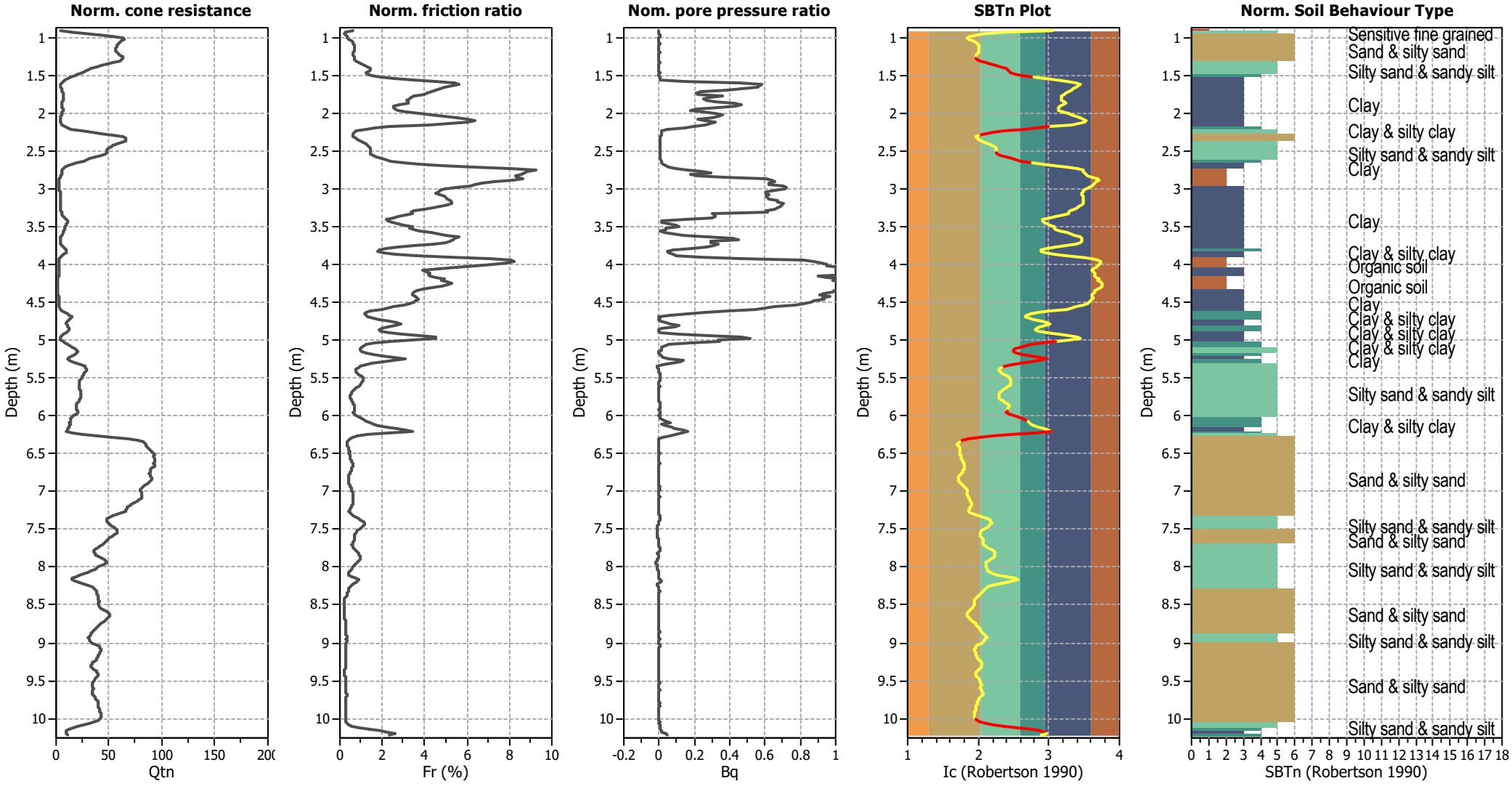
CPT name: CWLP CPT-2CCR

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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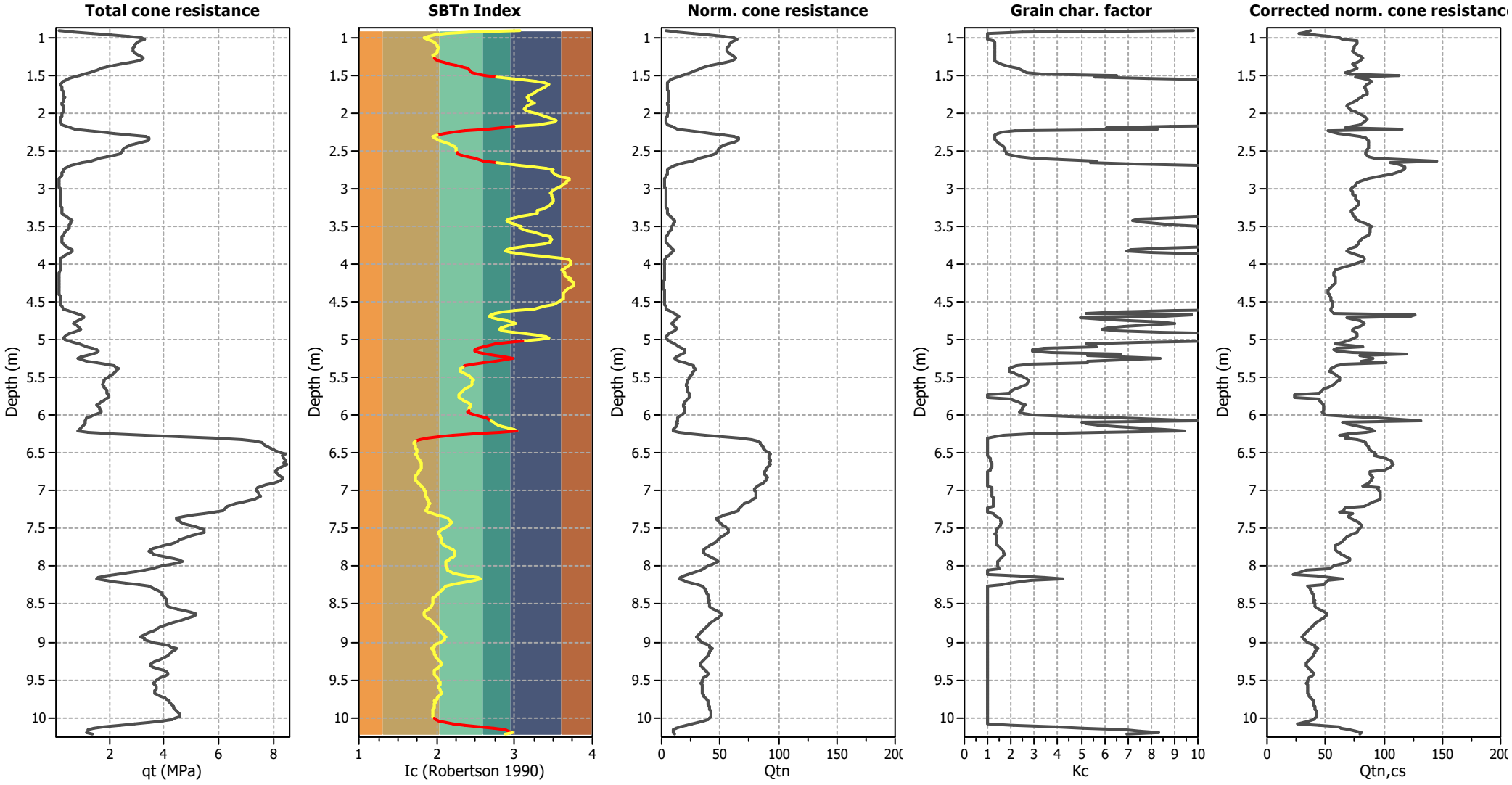
CPT name: CWLP CPT-2CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

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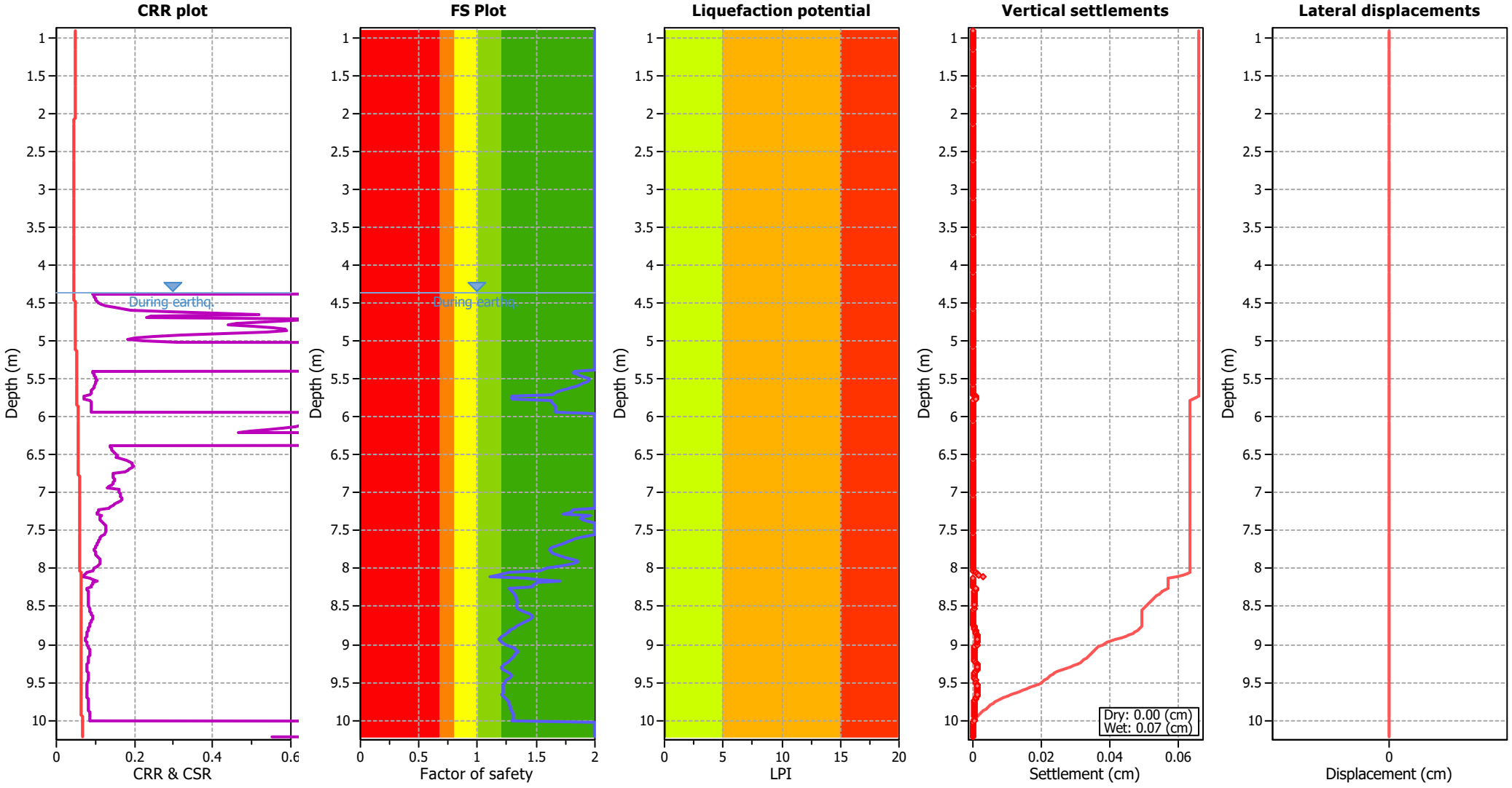
CPT name: CWLP CPT-2CCR

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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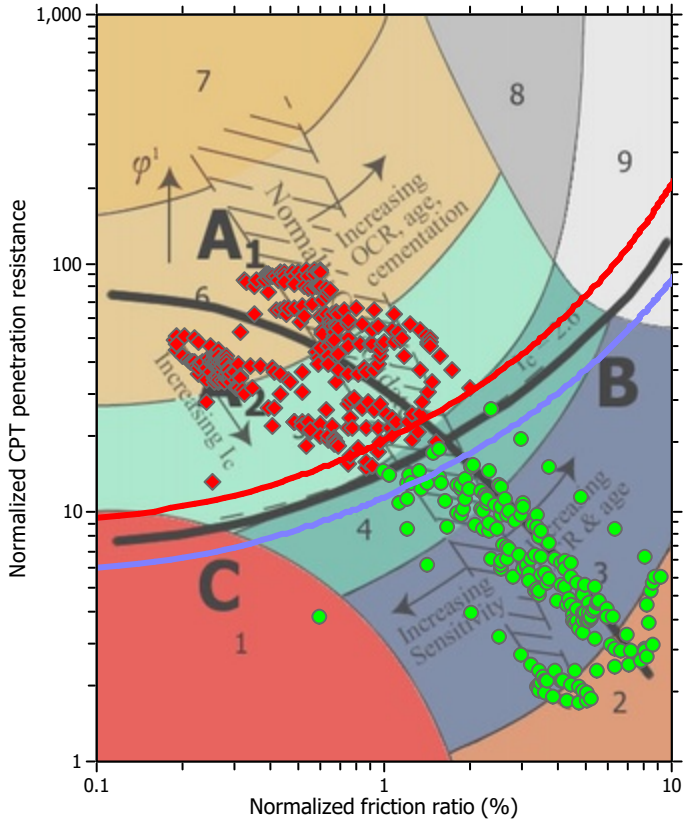
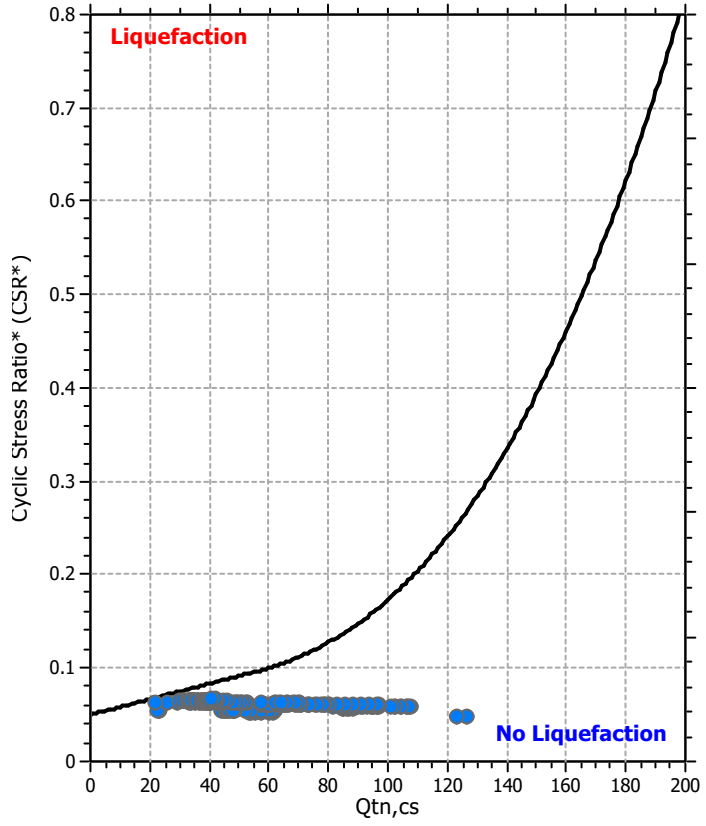
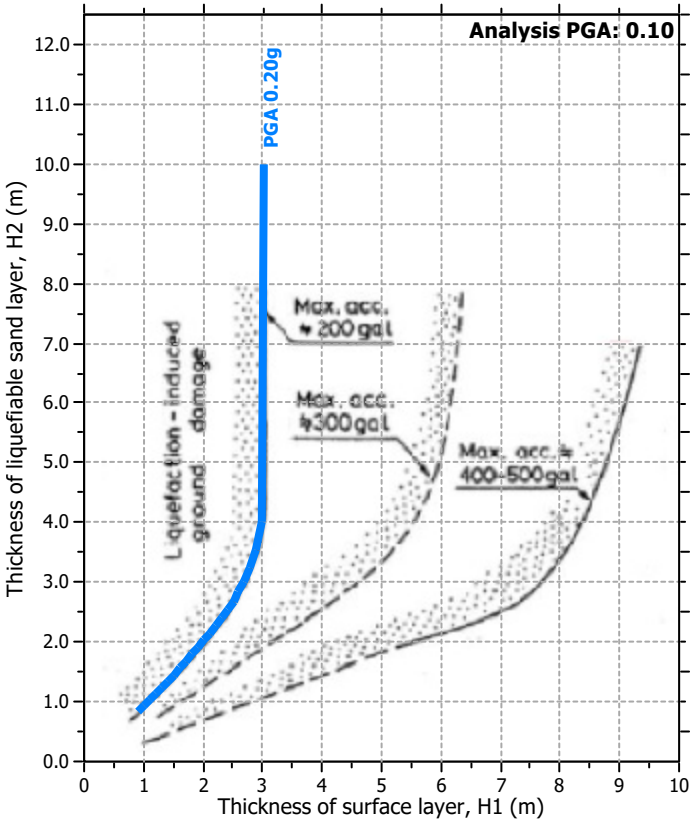
CPT name: CWLP CPT-2CCR

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

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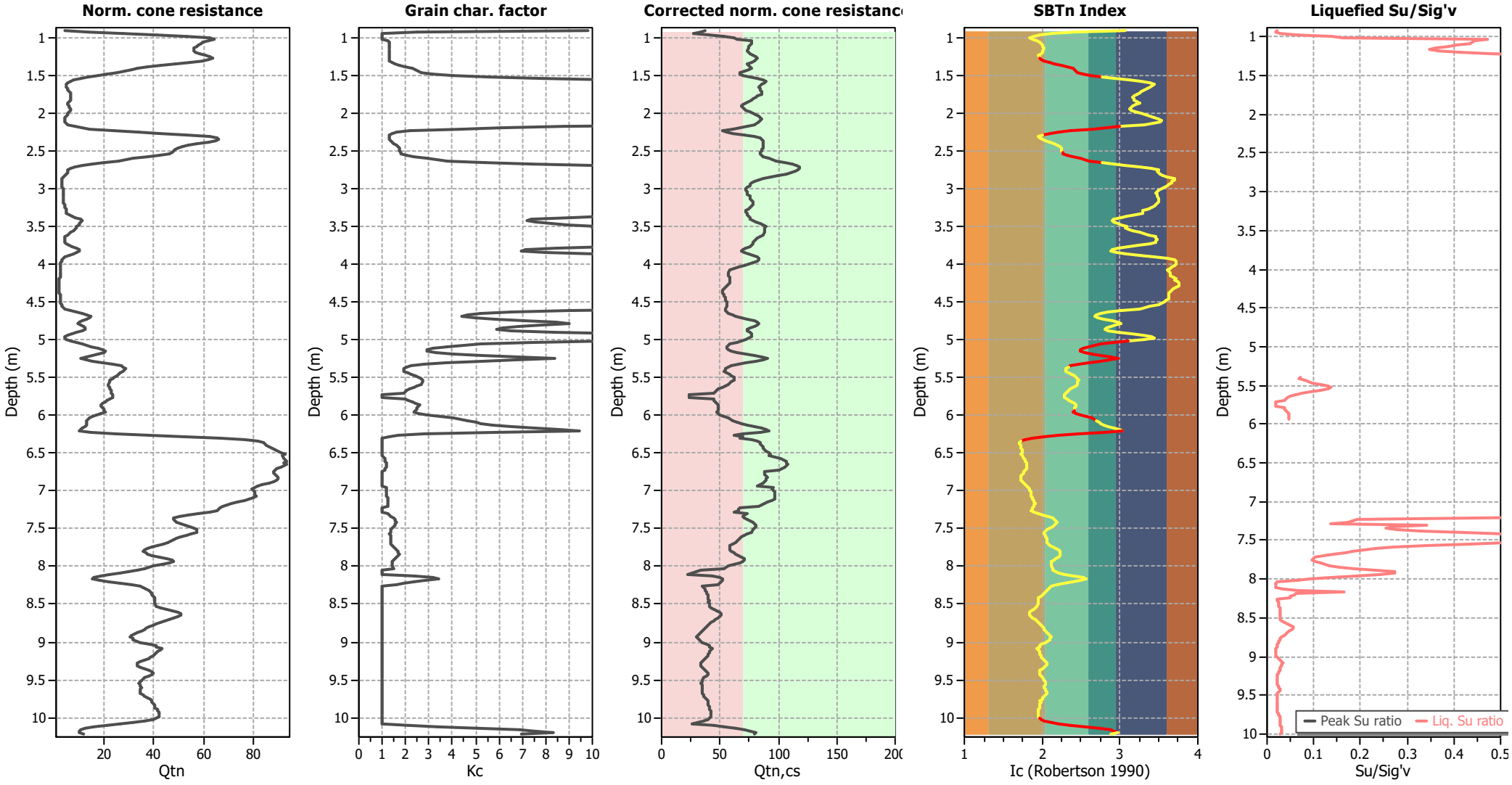
CPT name: CWLP CPT-2CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

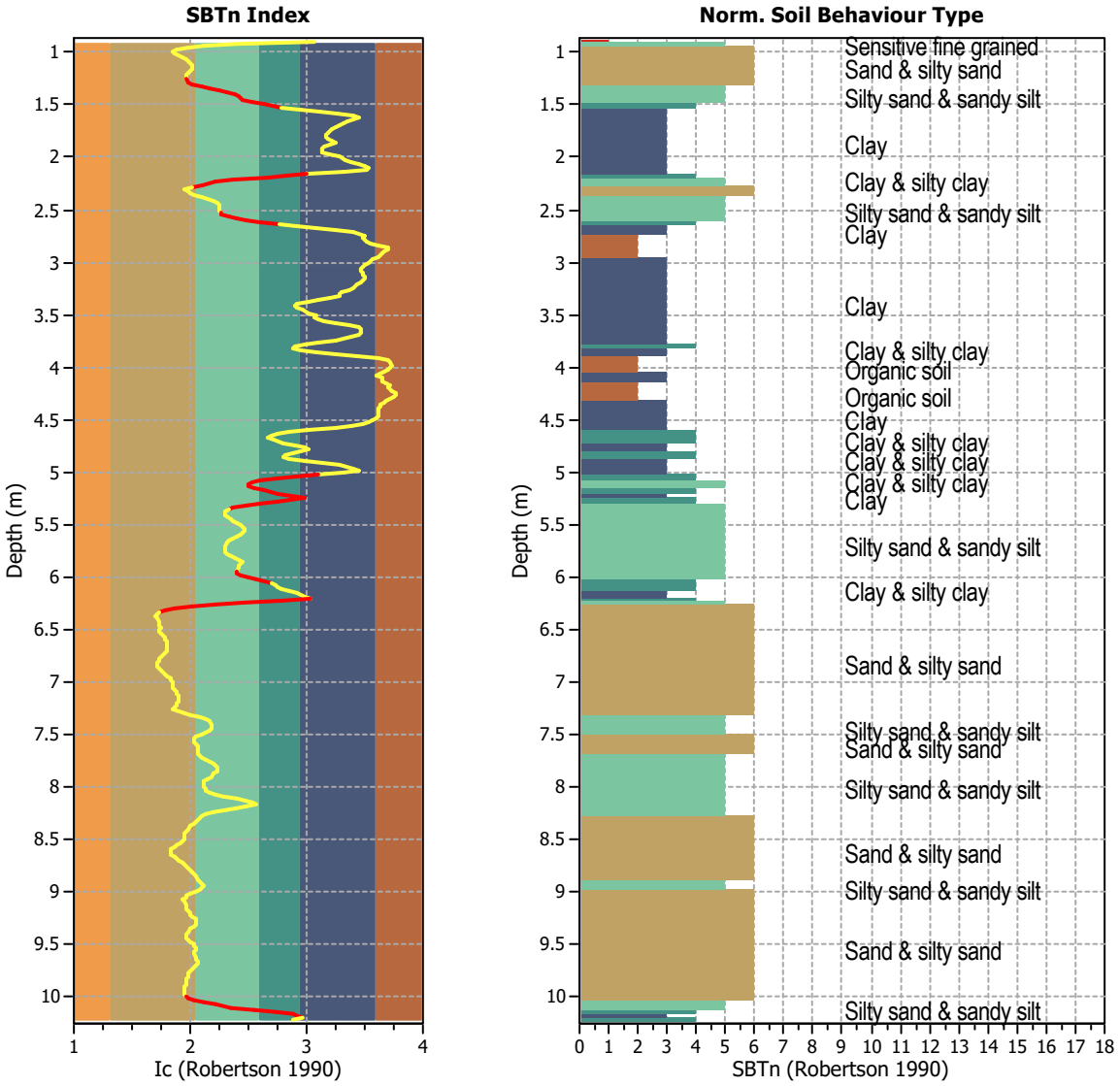
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.36 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.36 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	2

General statistics	
Total points in CPT file:	467
Total points excluded:	72
Exclusion percentage:	15.42%
Number of layers detected:	9

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	14	Start depth: 1.28 (m)	6	Sand & silty sand
		End depth: 1.54 (m)	3	Clay
Transition layer 2	7	Start depth: 2.18 (m)	4	Clay & silty clay
		End depth: 2.30 (m)	6	Sand & silty sand
Transition layer 3	7	Start depth: 2.54 (m)	5	Silty sand & sandy silt
		End depth: 2.66 (m)	3	Clay
Transition layer 4	5	Start depth: 5.04 (m)	4	Clay & silty clay
		End depth: 5.12 (m)	5	Silty sand & sandy silt
Transition layer 5	6	Start depth: 5.14 (m)	5	Silty sand & sandy silt
		End depth: 5.24 (m)	3	Clay
Transition layer 6	8	Start depth: 5.24 (m)	3	Clay
		End depth: 5.38 (m)	5	Silty sand & sandy silt
Transition layer 7	7	Start depth: 5.96 (m)	5	Silty sand & sandy silt
		End depth: 6.08 (m)	4	Clay & silty clay
Transition layer 8	8	Start depth: 6.22 (m)	4	Clay & silty clay
		End depth: 6.36 (m)	6	Sand & silty sand
Transition layer 9	10	Start depth: 10.02 (m)	6	Sand & silty sand
		End depth: 10.20 (m)	3	Clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.08	0.90	-0.50	62.56	13.73
2	0.92	0.08	0.90	-0.50	27.43	13.73
3	0.94	0.70	2.10	-0.40	5.00	14.51
4	0.96	2.51	3.70	4.80	5.00	15.29
5	0.98	3.68	9.10	6.10	5.00	15.83
6	1.00	3.42	13.10	0.10	5.00	16.22
7	1.02	3.19	14.60	1.70	5.00	16.50
8	1.04	3.13	16.00	1.70	11.04	16.65
9	1.06	2.97	18.40	2.90	12.08	16.76
10	1.08	3.00	20.60	6.70	12.66	16.82
11	1.10	2.94	22.20	2.40	12.92	16.81
12	1.12	2.95	19.70	-0.10	13.22	16.82
13	1.14	2.87	15.60	1.80	13.38	16.79
14	1.16	2.78	19.70	-1.20	13.24	16.76
15	1.18	2.78	19.10	4.10	12.96	16.76
16	1.20	2.90	19.40	0.80	12.70	16.80
17	1.22	3.17	19.30	1.90	11.87	16.78
18	1.24	3.25	18.00	1.10	12.15	16.94
19	1.26	3.42	17.10	1.50	12.22	17.00
20	1.28	3.23	31.30	0.10	12.52	16.98
21	1.30	3.14	24.60	-3.80	13.42	17.01
22	1.32	2.81	18.30	6.30	15.79	17.08
23	1.34	2.62	22.10	3.30	17.74	17.00
24	1.36	2.00	28.40	1.40	20.65	16.99
25	1.38	1.76	28.20	-0.10	23.33	16.96
26	1.40	1.65	28.60	-1.60	26.00	16.88
27	1.42	1.61	19.30	1.90	26.85	16.72
28	1.44	1.51	18.70	-1.90	27.77	16.52
29	1.46	1.35	15.50	1.80	28.78	16.25
30	1.48	1.06	13.30	0.40	31.94	16.06
31	1.50	0.87	11.60	-0.30	36.82	15.90
32	1.52	0.67	10.90	1.80	44.73	15.82
33	1.54	0.55	13.70	4.00	54.98	15.75
34	1.56	0.41	16.30	3.80	66.89	15.68
35	1.58	0.23	15.10	45.90	78.56	15.62
36	1.60	0.22	13.20	115.40	89.02	15.50
37	1.62	0.22	12.30	129.00	93.61	15.36
38	1.64	0.22	11.20	132.40	89.06	15.30
39	1.66	0.25	10.80	122.10	85.09	15.40
40	1.68	0.29	11.00	106.00	82.24	15.43
41	1.70	0.35	16.50	69.80	79.23	15.48
42	1.72	0.31	12.70	65.60	76.69	15.52
43	1.74	0.33	12.70	72.80	74.62	15.53
44	1.76	0.34	11.70	120.70	71.78	15.44
45	1.78	0.36	11.00	97.20	70.67	15.40
46	1.80	0.39	11.00	82.90	70.84	15.33
47	1.82	0.33	10.60	83.70	71.90	15.22
48	1.84	0.28	9.50	91.10	74.34	15.10

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.26	7.60	112.10	76.84	14.98
50	1.88	0.24	7.50	129.00	73.02	14.90
51	1.90	0.26	7.30	128.50	69.51	14.89
52	1.92	0.39	7.20	103.40	68.46	14.95
53	1.94	0.38	8.30	67.80	67.60	15.01
54	1.96	0.33	9.30	58.10	67.94	15.09
55	1.98	0.30	9.20	76.00	72.94	15.16
56	2.00	0.30	10.10	87.20	79.13	15.21
57	2.02	0.28	11.00	91.00	83.68	15.26
58	2.04	0.24	11.70	80.50	88.51	15.32
59	2.06	0.24	12.60	65.90	93.98	15.34
60	2.08	0.23	13.40	44.50	98.15	15.33
61	2.10	0.21	12.40	50.30	100.00	15.29
62	2.12	0.21	11.60	61.80	100.00	15.24
63	2.14	0.18	11.00	67.90	82.60	15.24
64	2.16	0.24	9.80	82.80	58.64	15.31
65	2.18	0.56	8.80	80.00	47.20	15.32
66	2.20	1.03	7.80	34.80	38.69	15.37
67	2.22	0.89	8.00	13.20	24.87	15.64
68	2.24	0.97	9.40	21.60	19.36	16.03
69	2.26	2.78	12.40	30.20	16.04	16.30
70	2.28	3.01	20.90	39.10	13.24	16.60
71	2.30	3.27	18.10	20.00	11.82	16.92
72	2.32	3.73	21.90	17.20	12.35	17.16
73	2.34	3.77	29.30	31.00	12.89	17.28
74	2.36	3.42	33.80	23.00	14.02	17.42
75	2.38	3.13	34.50	21.30	15.64	17.49
76	2.40	2.92	36.80	18.70	17.43	17.51
77	2.42	2.71	36.30	18.60	18.86	17.51
78	2.44	2.58	36.90	20.10	19.92	17.50
79	2.46	2.50	36.60	19.50	20.52	17.48
80	2.48	2.48	35.60	19.00	20.88	17.45
81	2.50	2.52	35.50	20.90	20.88	17.42
82	2.52	2.41	33.40	18.80	21.03	17.40
83	2.54	2.47	33.50	16.90	21.57	17.38
84	2.56	2.33	33.80	17.50	23.47	17.32
85	2.58	2.14	33.90	17.30	26.09	17.26
86	2.60	1.50	32.40	14.90	30.09	17.17
87	2.62	1.24	30.90	12.70	35.73	17.05
88	2.64	1.02	29.20	16.70	43.79	16.91
89	2.66	0.80	28.90	19.20	52.70	16.77
90	2.68	0.60	28.00	20.70	63.69	16.63
91	2.70	0.35	27.10	23.40	77.00	16.50
92	2.72	0.29	26.10	32.80	89.83	16.39
93	2.74	0.27	26.10	46.30	98.54	16.29
94	2.76	0.31	26.70	68.80	97.50	16.23
95	2.78	0.34	23.30	76.40	100.00	16.13
96	2.80	0.34	20.30	44.30	100.00	16.00

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.22	17.80	46.50	100.00	15.79
98	2.84	0.17	16.10	68.00	100.00	15.54
99	2.86	0.17	11.80	88.80	100.00	15.28
100	2.88	0.17	9.80	89.30	100.00	15.14
101	2.90	0.16	8.30	91.90	100.00	15.01
102	2.92	0.18	11.20	87.40	100.00	14.92
103	2.94	0.17	9.70	89.10	100.00	14.89
104	2.96	0.17	8.20	104.90	100.00	14.90
105	2.98	0.18	8.10	112.50	100.00	14.83
106	3.00	0.19	8.40	116.90	100.00	14.80
107	3.02	0.21	8.10	113.80	98.60	14.83
108	3.04	0.21	7.90	108.80	96.69	14.86
109	3.06	0.21	8.60	112.90	95.20	14.88
110	3.08	0.22	8.80	115.50	96.05	14.91
111	3.10	0.22	8.80	110.90	97.32	14.96
112	3.12	0.20	9.20	114.90	97.91	15.00
113	3.14	0.21	9.90	123.60	98.17	15.03
114	3.16	0.21	10.00	126.00	98.16	15.07
115	3.18	0.22	10.10	133.60	97.61	15.10
116	3.20	0.23	10.20	137.50	95.15	15.10
117	3.22	0.22	10.10	141.10	92.58	15.09
118	3.24	0.25	9.70	143.30	89.84	15.05
119	3.26	0.25	8.80	144.60	86.71	14.99
120	3.28	0.26	7.90	146.10	80.96	14.97
121	3.30	0.27	7.70	150.40	80.05	14.96
122	3.32	0.34	8.00	76.30	79.78	14.99
123	3.34	0.27	9.10	95.70	72.62	15.13
124	3.36	0.28	9.90	118.00	64.97	15.30
125	3.38	0.51	11.00	132.80	59.49	15.47
126	3.40	0.63	12.00	80.50	52.69	15.62
127	3.42	0.69	12.80	7.20	52.04	15.78
128	3.44	0.80	13.20	5.80	53.53	15.85
129	3.46	0.48	17.00	29.30	56.39	15.88
130	3.48	0.48	15.30	51.30	59.15	15.92
131	3.50	0.48	15.30	51.30	63.91	15.94
132	3.52	0.57	16.50	18.40	63.13	15.91
133	3.54	0.57	16.50	18.40	65.69	15.91
134	3.56	0.51	15.00	2.30	69.75	15.85
135	3.58	0.37	16.20	10.80	77.05	15.74
136	3.60	0.28	13.50	37.50	86.53	15.62
137	3.62	0.25	13.10	66.80	94.52	15.50
138	3.64	0.24	12.80	94.30	95.92	15.39
139	3.66	0.28	11.20	100.40	96.16	15.36
140	3.68	0.30	10.80	65.80	95.57	15.32
141	3.70	0.26	12.00	66.30	94.61	15.28
142	3.72	0.25	11.10	85.30	88.33	15.32
143	3.74	0.25	10.80	99.80	76.58	15.41
144	3.76	0.43	11.50	109.60	65.59	15.48

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.64	11.30	91.60	57.23	15.52
146	3.80	0.70	11.60	45.40	51.81	15.54
147	3.82	0.70	9.80	26.40	50.80	15.53
148	3.84	0.64	9.20	26.70	55.28	15.53
149	3.86	0.52	11.00	35.00	63.95	15.52
150	3.88	0.34	12.90	32.30	76.78	15.53
151	3.90	0.24	14.20	61.30	92.87	15.52
152	3.92	0.21	14.60	89.70	100.00	15.48
153	3.94	0.20	13.70	138.00	100.00	15.44
154	3.96	0.20	13.30	139.80	100.00	15.37
155	3.98	0.19	12.80	142.50	100.00	15.28
156	4.00	0.18	11.50	143.00	100.00	15.13
157	4.02	0.18	9.90	139.50	100.00	14.96
158	4.04	0.18	6.60	147.60	100.00	14.76
159	4.06	0.18	6.00	144.70	100.00	14.56
160	4.08	0.18	5.50	143.80	100.00	14.38
161	4.10	0.18	5.20	145.50	100.00	14.34
162	4.12	0.19	5.00	140.70	100.00	14.33
163	4.14	0.13	6.20	119.80	100.00	14.35
164	4.16	0.19	5.80	122.90	100.00	14.38
165	4.18	0.18	5.90	128.30	100.00	14.42
166	4.20	0.16	6.10	125.30	100.00	14.43
167	4.22	0.16	6.30	126.40	100.00	14.42
168	4.24	0.16	6.30	123.30	100.00	14.39
169	4.26	0.16	6.00	120.50	100.00	14.34
170	4.28	0.16	5.30	116.10	100.00	14.26
171	4.30	0.16	4.80	117.40	100.00	14.18
172	4.32	0.16	4.50	120.70	100.00	14.11
173	4.34	0.17	4.40	123.50	100.00	14.08
174	4.36	0.18	4.30	125.50	100.00	14.08
175	4.38	0.18	4.50	123.90	100.00	14.11
176	4.40	0.18	4.50	123.90	100.00	14.15
177	4.42	0.18	5.10	133.50	100.00	14.20
178	4.44	0.19	5.00	130.10	100.00	14.24
179	4.46	0.19	5.30	132.50	100.00	14.29
180	4.48	0.19	5.30	130.60	100.00	14.31
181	4.50	0.19	5.40	134.00	100.00	14.34
182	4.52	0.21	5.40	136.50	100.00	14.36
183	4.54	0.22	5.40	138.80	97.78	14.38
184	4.56	0.24	5.30	140.50	88.42	14.43
185	4.58	0.26	5.30	147.60	77.21	14.51
186	4.60	0.36	5.40	163.90	59.46	14.75
187	4.62	0.48	5.60	155.00	49.07	15.08
188	4.64	0.96	7.90	124.60	43.05	15.41
189	4.66	1.12	11.30	58.40	40.11	15.76
190	4.68	1.16	13.30	-3.70	38.98	16.02
191	4.70	1.16	17.60	5.50	41.62	16.14
192	4.72	1.05	17.80	-0.30	45.81	16.20

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.76	16.00	5.20	51.51	16.24
194	4.76	0.66	17.80	27.80	57.23	16.19
195	4.78	0.59	19.80	44.30	59.42	16.19
196	4.80	0.62	18.00	82.80	54.70	16.27
197	4.82	0.89	19.40	74.00	50.50	16.29
198	4.84	1.20	18.70	15.70	47.29	16.23
199	4.86	1.08	15.90	-1.00	46.31	16.17
200	4.88	0.88	13.70	3.30	48.95	16.07
201	4.90	0.67	13.40	7.30	56.95	15.93
202	4.92	0.48	15.10	57.80	68.33	15.78
203	4.94	0.35	14.70	106.30	79.86	15.67
204	4.96	0.28	12.70	144.80	90.07	15.59
205	4.98	0.33	12.10	144.20	93.49	15.47
206	5.00	0.32	12.00	114.30	81.76	15.43
207	5.02	0.33	9.90	162.30	65.51	15.49
208	5.04	0.64	9.80	114.20	52.97	15.51
209	5.06	0.94	10.30	50.60	42.89	15.58
210	5.08	1.12	8.90	23.70	35.66	15.78
211	5.10	1.38	10.60	29.00	32.00	16.00
212	5.12	1.67	14.10	29.50	30.43	16.19
213	5.14	1.77	17.90	5.90	30.46	16.37
214	5.16	1.70	18.70	5.80	32.66	16.50
215	5.18	1.51	19.70	10.30	37.00	16.59
216	5.20	1.10	21.30	19.20	43.20	16.63
217	5.22	0.89	25.30	30.30	50.38	16.60
218	5.24	0.73	27.00	54.00	56.82	16.57
219	5.26	0.68	23.10	133.30	49.97	16.63
220	5.28	0.80	21.50	147.10	43.34	16.68
221	5.30	1.87	21.50	112.20	35.19	16.71
222	5.32	1.87	23.00	47.50	29.59	16.77
223	5.34	2.37	21.30	-9.40	25.18	16.76
224	5.36	2.37	21.30	-9.40	23.96	16.69
225	5.38	2.42	15.20	-3.70	22.53	16.62
226	5.40	2.22	14.90	6.60	22.52	16.56
227	5.42	2.30	15.60	11.30	22.82	16.51
228	5.44	2.20	17.30	16.20	24.16	16.57
229	5.46	2.09	18.60	18.00	25.31	16.64
230	5.48	2.00	20.50	16.60	26.72	16.68
231	5.50	1.95	20.90	13.80	27.88	16.70
232	5.52	1.90	20.90	14.60	28.75	16.68
233	5.54	1.83	19.60	14.30	29.19	16.63
234	5.56	1.76	18.10	12.40	29.03	16.54
235	5.58	1.74	17.10	13.60	28.45	16.42
236	5.60	1.78	14.20	15.50	27.47	16.30
237	5.62	1.81	12.60	14.20	26.43	16.20
238	5.64	1.87	11.50	13.40	24.95	16.06
239	5.66	1.87	11.50	13.40	23.92	15.97
240	5.68	1.95	9.10	14.10	23.17	15.89

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	1.95	9.10	14.10	22.70	15.84
242	5.72	1.95	9.10	14.10	5.00	15.79
243	5.74	1.95	9.10	14.10	5.00	15.79
244	5.76	1.95	9.10	14.10	5.00	15.79
245	5.78	1.95	9.10	14.10	23.29	15.80
246	5.80	1.95	9.10	14.10	24.39	15.81
247	5.82	1.57	10.20	19.80	25.57	15.82
248	5.84	1.57	10.20	19.80	26.83	15.83
249	5.86	1.57	10.20	19.80	28.20	15.83
250	5.88	1.57	10.20	19.80	27.76	15.85
251	5.90	1.57	10.20	19.80	27.40	15.88
252	5.92	1.74	10.70	17.30	27.06	15.91
253	5.94	1.74	11.20	23.80	26.72	15.94
254	5.96	1.74	11.20	23.80	26.30	15.90
255	5.98	1.74	11.20	23.80	27.62	15.84
256	6.00	1.62	8.00	16.00	30.42	15.82
257	6.02	1.22	9.30	21.00	33.91	15.86
258	6.04	0.94	11.90	27.00	37.00	15.88
259	6.06	1.02	14.90	55.60	40.36	15.98
260	6.08	1.19	14.10	79.30	42.04	16.10
261	6.10	1.21	14.50	30.60	43.11	16.25
262	6.12	1.15	16.80	56.70	45.25	16.36
263	6.14	1.00	21.50	85.20	49.10	16.49
264	6.16	0.89	24.20	93.50	53.38	16.59
265	6.18	0.87	26.50	129.70	57.76	16.65
266	6.20	0.86	26.90	143.10	61.03	16.67
267	6.22	0.80	25.90	167.10	45.96	16.84
268	6.24	0.73	26.00	207.80	29.52	17.07
269	6.26	2.81	27.60	228.20	19.46	17.23
270	6.28	5.26	28.70	118.50	13.54	17.37
271	6.30	6.63	26.50	7.10	5.00	17.46
272	6.32	7.23	27.10	15.10	5.00	17.49
273	6.34	7.50	25.10	27.10	5.00	17.47
274	6.36	7.44	24.50	24.90	5.00	17.46
275	6.38	7.74	23.60	23.40	5.00	17.45
276	6.40	7.78	23.90	26.90	5.00	17.58
277	6.42	7.72	25.70	22.90	5.00	17.66
278	6.44	7.71	39.20	21.20	5.00	17.73
279	6.46	7.91	33.80	24.00	5.00	17.81
280	6.48	8.24	32.40	21.40	5.00	17.90
281	6.50	8.28	34.10	40.70	5.00	17.90
282	6.52	8.32	38.70	31.90	5.00	17.96
283	6.54	8.47	38.80	17.70	5.00	18.01
284	6.56	8.66	41.10	25.50	7.38	18.09
285	6.58	7.68	42.20	25.10	7.62	18.17
286	6.60	8.58	47.00	30.80	7.91	18.25
287	6.62	8.65	54.00	34.20	8.17	18.27
288	6.64	8.52	53.20	31.60	8.12	18.30

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	8.29	47.80	22.40	8.22	18.29
290	6.68	8.24	47.50	27.10	8.12	18.22
291	6.70	8.16	45.30	32.40	7.98	18.14
292	6.72	8.06	39.90	28.80	7.84	18.08
293	6.74	7.96	38.60	24.00	5.00	17.99
294	6.76	7.98	36.40	30.70	5.00	17.91
295	6.78	8.12	32.20	29.10	5.00	17.84
296	6.80	8.20	32.20	28.20	5.00	17.80
297	6.82	8.30	29.20	23.60	5.00	17.79
298	6.84	8.34	32.30	31.50	5.00	17.79
299	6.86	8.44	34.40	27.10	5.00	17.79
300	6.88	8.14	32.80	28.40	5.00	17.81
301	6.90	7.97	31.80	25.70	5.00	17.83
302	6.92	7.74	33.70	31.80	5.00	17.84
303	6.94	7.49	36.30	36.10	5.00	17.90
304	6.96	7.28	37.70	34.00	8.72	17.96
305	6.98	7.29	43.10	38.00	8.97	17.99
306	7.00	7.23	43.00	34.10	9.04	18.01
307	7.02	7.39	38.30	23.60	9.20	18.07
308	7.04	7.60	40.50	23.00	9.28	18.10
309	7.06	7.56	47.90	36.60	9.31	18.12
310	7.08	7.43	48.00	22.80	9.65	18.16
311	7.10	7.43	47.20	18.40	9.99	18.17
312	7.12	7.04	46.70	26.80	10.13	18.11
313	7.14	6.88	43.20	30.60	10.31	18.03
314	7.16	6.63	38.00	33.00	10.52	17.95
315	7.18	6.29	36.10	25.50	10.33	17.82
316	7.20	6.21	35.00	32.10	10.08	17.69
317	7.22	6.21	26.90	31.00	5.00	17.59
318	7.24	6.24	25.20	30.90	5.00	17.49
319	7.26	6.13	25.70	25.60	5.00	17.40
320	7.28	6.08	23.90	27.10	5.00	17.42
321	7.30	5.96	25.20	34.50	11.47	17.45
322	7.32	4.78	30.90	37.50	13.17	17.52
323	7.34	4.27	31.70	40.90	15.16	17.65
324	7.36	4.07	38.10	59.70	17.03	17.77
325	7.38	4.46	45.80	46.10	17.72	17.88
326	7.40	4.73	48.00	27.80	18.31	18.01
327	7.42	4.80	49.50	24.10	18.58	18.10
328	7.44	4.61	56.70	14.30	18.37	18.15
329	7.46	4.48	56.20	-3.90	17.68	18.19
330	7.48	5.07	55.10	-5.70	16.89	18.18
331	7.50	5.74	51.80	-13.30	15.75	18.11
332	7.52	5.72	45.70	-28.40	14.55	18.01
333	7.54	5.46	38.10	-25.50	13.84	17.87
334	7.56	5.22	32.50	-21.10	13.73	17.74
335	7.58	5.02	30.90	-20.80	13.92	17.62
336	7.60	4.83	31.30	-2.00	14.31	17.56

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	4.65	31.40	10.00	14.73	17.52
338	7.64	4.54	31.70	26.70	14.93	17.47
339	7.66	4.43	28.50	27.20	14.90	17.40
340	7.68	4.43	24.80	27.90	14.83	17.29
341	7.70	4.44	23.50	33.60	15.07	17.18
342	7.72	4.09	19.90	37.90	15.79	17.11
343	7.74	3.66	21.80	38.20	16.99	17.14
344	7.76	3.30	23.30	59.80	18.09	17.14
345	7.78	3.45	29.60	61.80	19.15	17.19
346	7.80	3.53	26.10	36.80	19.78	17.26
347	7.82	3.50	26.30	-3.60	20.08	17.38
348	7.84	3.56	30.60	11.90	20.27	17.47
349	7.86	3.66	36.30	23.20	19.96	17.60
350	7.88	3.79	41.00	8.50	19.13	17.73
351	7.90	4.47	42.00	5.60	18.36	17.83
352	7.92	5.01	43.40	-27.50	17.28	17.83
353	7.94	4.92	43.80	-41.80	16.40	17.74
354	7.96	4.71	31.70	-33.40	16.15	17.59
355	7.98	4.15	24.80	-25.30	16.40	17.39
356	8.00	3.79	21.40	-8.20	16.34	17.08
357	8.02	3.51	19.90	11.40	16.65	16.80
358	8.04	3.33	13.90	35.80	5.00	16.56
359	8.06	3.09	10.20	36.90	5.00	16.29
360	8.08	2.78	9.20	35.20	5.00	15.99
361	8.10	2.07	8.50	36.20	5.00	15.78
362	8.12	1.71	7.50	37.70	26.23	15.81
363	8.14	1.53	7.80	37.60	32.02	15.93
364	8.16	1.33	14.20	50.00	33.56	16.05
365	8.18	1.29	17.30	58.20	30.02	16.26
366	8.20	1.93	15.00	50.80	26.29	16.43
367	8.22	3.10	15.60	11.60	22.26	16.51
368	8.24	3.28	14.80	2.50	18.72	16.55
369	8.26	3.44	15.20	34.10	5.00	16.59
370	8.28	3.59	15.60	35.40	5.00	16.58
371	8.30	3.70	14.70	39.30	5.00	16.57
372	8.32	3.80	14.20	47.40	5.00	16.60
373	8.34	3.84	13.40	40.20	5.00	16.53
374	8.36	3.96	16.30	36.90	5.00	16.45
375	8.38	3.91	10.60	41.20	5.00	16.35
376	8.40	3.96	9.90	41.10	5.00	16.25
377	8.42	4.03	8.70	40.30	5.00	16.06
378	8.44	4.07	8.30	43.20	5.00	16.00
379	8.46	4.13	8.10	43.40	5.00	15.98
380	8.48	4.06	7.90	43.20	5.00	15.98
381	8.50	4.04	9.20	44.20	5.00	15.97
382	8.52	3.95	8.60	43.00	5.00	15.98
383	8.54	4.15	8.00	42.60	5.00	15.99
384	8.56	4.50	8.10	43.10	5.00	16.01

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	4.85	7.80	43.80	5.00	16.10
386	8.60	5.16	9.30	43.10	5.00	16.14
387	8.62	5.24	11.10	43.50	5.00	16.20
388	8.64	5.21	9.10	41.80	5.00	16.27
389	8.66	5.07	10.00	43.50	5.00	16.33
390	8.68	4.92	10.60	45.00	5.00	16.33
391	8.70	4.67	12.60	47.00	5.00	16.37
392	8.72	4.48	11.50	44.30	5.00	16.39
393	8.74	4.33	11.90	44.00	5.00	16.39
394	8.76	4.22	11.60	46.40	5.00	16.34
395	8.78	3.95	11.50	45.60	5.00	16.29
396	8.80	3.93	10.60	44.10	5.00	16.24
397	8.82	3.76	10.00	46.30	5.00	16.19
398	8.84	3.57	10.10	48.80	5.00	16.14
399	8.86	3.61	9.60	49.20	5.00	16.11
400	8.88	3.57	10.00	47.20	5.00	16.08
401	8.90	3.38	9.60	45.60	5.00	16.07
402	8.92	3.13	9.30	44.70	5.00	16.06
403	8.94	2.96	10.40	44.90	5.00	16.05
404	8.96	2.98	9.80	52.20	5.00	16.04
405	8.98	3.19	9.90	48.80	5.00	16.07
406	9.00	4.08	8.60	47.20	5.00	16.10
407	9.02	3.27	10.20	53.60	5.00	16.15
408	9.04	4.37	10.20	56.80	5.00	16.21
409	9.06	4.66	10.80	47.50	5.00	16.27
410	9.08	4.56	11.40	47.70	5.00	16.31
411	9.10	4.38	11.10	49.10	5.00	16.35
412	9.12	4.23	11.30	49.30	5.00	16.35
413	9.14	4.14	11.90	51.60	5.00	16.32
414	9.16	4.14	11.40	50.40	5.00	16.28
415	9.18	4.20	10.50	48.60	5.00	16.28
416	9.20	4.19	9.20	50.90	5.00	16.25
417	9.22	3.93	11.30	50.60	5.00	16.19
418	9.24	3.72	11.30	51.90	5.00	16.15
419	9.26	3.62	9.10	50.40	5.00	16.13
420	9.28	3.49	9.20	49.90	5.00	16.06
421	9.30	3.38	8.90	51.20	5.00	15.98
422	9.32	3.38	8.90	51.00	5.00	15.95
423	9.34	3.53	8.40	51.20	5.00	15.93
424	9.36	3.76	7.60	51.50	5.00	15.92
425	9.38	3.98	8.20	51.90	5.00	16.00
426	9.40	4.24	7.80	52.10	5.00	16.03
427	9.42	4.30	11.20	53.20	5.00	16.08
428	9.44	4.18	9.00	51.00	5.00	16.08
429	9.46	4.02	9.70	52.50	5.00	16.09
430	9.48	3.83	8.20	52.10	5.00	16.06
431	9.50	3.69	8.40	50.20	5.00	16.08
432	9.52	3.47	11.00	59.80	5.00	16.01

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	3.51	10.00	54.40	5.00	16.04
434	9.56	3.70	7.50	54.00	5.00	16.08
435	9.58	3.70	9.40	56.00	5.00	16.04
436	9.60	3.78	9.90	55.00	5.00	16.04
437	9.62	3.72	9.30	56.50	5.00	16.13
438	9.64	3.64	9.70	53.90	5.00	16.16
439	9.66	3.59	11.40	56.00	5.00	16.21
440	9.68	3.56	10.60	53.60	5.00	16.27
441	9.70	3.72	12.30	54.10	5.00	16.31
442	9.72	3.85	12.20	57.30	5.00	16.30
443	9.74	4.16	11.30	53.30	5.00	16.29
444	9.76	4.11	10.00	54.00	5.00	16.27
445	9.78	4.13	9.70	54.70	5.00	16.21
446	9.80	4.22	11.10	59.40	5.00	16.24
447	9.82	4.29	9.00	54.10	5.00	16.28
448	9.84	4.25	12.50	64.40	5.00	16.26
449	9.86	4.34	11.60	56.50	5.00	16.24
450	9.88	4.29	8.60	55.40	5.00	16.31
451	9.90	4.40	10.30	56.50	5.00	16.29
452	9.92	4.37	12.00	58.20	5.00	16.27
453	9.94	4.66	11.30	58.00	5.00	16.35
454	9.96	4.59	10.40	57.40	5.00	16.37
455	9.98	4.55	12.10	56.60	5.00	16.38
456	10.00	4.51	11.20	55.90	5.00	16.35
457	10.02	4.36	12.40	58.30	5.00	16.28
458	10.04	4.05	10.40	62.30	5.00	16.26
459	10.06	3.82	7.80	57.50	5.00	16.25
460	10.08	2.71	13.00	63.30	5.00	16.19
461	10.10	2.20	13.00	63.00	24.50	16.20
462	10.12	1.72	12.60	61.20	32.89	16.30
463	10.14	1.36	14.90	65.40	42.49	16.43
464	10.16	1.11	19.10	70.80	50.71	16.55
465	10.18	0.85	28.10	70.20	53.36	16.71
466	10.20	1.15	28.30	97.90	56.61	16.82
467	10.22	1.63	28.30	116.60	50.80	16.96

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.93	0.00	12.93	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.23	0.00	13.23	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	13.55	0.00	13.55	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	13.87	0.00	13.87	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	14.20	0.00	14.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	14.54	0.00	14.54	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	14.87	0.00	14.87	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.21	0.00	15.21	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.54	0.00	15.54	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	15.88	0.00	15.88	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	16.22	0.00	16.22	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	16.55	0.00	16.55	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	16.89	0.00	16.89	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.22	0.00	17.22	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.56	0.00	17.56	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	17.90	0.00	17.90	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	18.24	0.00	18.24	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	18.58	0.00	18.58	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
21	1.30	18.92	0.00	18.92	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
22	1.32	19.26	0.00	19.26	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
23	1.34	19.60	0.00	19.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
24	1.36	19.94	0.00	19.94	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
25	1.38	20.28	0.00	20.28	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
26	1.40	20.61	0.00	20.61	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
27	1.42	20.95	0.00	20.95	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
28	1.44	21.28	0.00	21.28	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
29	1.46	21.60	0.00	21.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
30	1.48	21.92	0.00	21.92	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
31	1.50	22.24	0.00	22.24	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
32	1.52	22.56	0.00	22.56	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
33	1.54	22.87	0.00	22.87	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
34	1.56	23.19	0.00	23.19	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	23.50	0.00	23.50	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	23.81	0.00	23.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	24.12	0.00	24.12	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	24.42	0.00	24.42	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	24.73	0.00	24.73	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	25.04	0.00	25.04	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	25.35	0.00	25.35	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	25.66	0.00	25.66	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	25.97	0.00	25.97	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	26.28	0.00	26.28	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	26.59	0.00	26.59	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	26.89	0.00	26.89	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	27.20	0.00	27.20	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	27.50	0.00	27.50	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	27.80	0.00	27.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	28.10	0.00	28.10	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	28.40	0.00	28.40	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	28.69	0.00	28.69	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	28.99	0.00	28.99	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	29.30	0.00	29.30	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	29.60	0.00	29.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	29.90	0.00	29.90	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	30.21	0.00	30.21	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	30.52	0.00	30.52	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	30.82	0.00	30.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	31.13	0.00	31.13	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	31.43	0.00	31.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	31.74	0.00	31.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	32.04	0.00	32.04	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	32.35	0.00	32.35	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	32.66	0.00	32.66	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
66	2.20	32.96	0.00	32.96	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
67	2.22	33.28	0.00	33.28	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
68	2.24	33.60	0.00	33.60	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
69	2.26	33.92	0.00	33.92	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
70	2.28	34.26	0.00	34.26	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
71	2.30	34.59	0.00	34.59	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
72	2.32	34.94	0.00	34.94	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
73	2.34	35.28	0.00	35.28	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
74	2.36	35.63	0.00	35.63	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
75	2.38	35.98	0.00	35.98	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
76	2.40	36.33	0.00	36.33	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
77	2.42	36.68	0.00	36.68	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
78	2.44	37.03	0.00	37.03	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
79	2.46	37.38	0.00	37.38	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
80	2.48	37.73	0.00	37.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	38.08	0.00	38.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	38.43	0.00	38.43	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	38.77	0.00	38.77	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
84	2.56	39.12	0.00	39.12	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
85	2.58	39.47	0.00	39.47	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
86	2.60	39.81	0.00	39.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
87	2.62	40.15	0.00	40.15	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
88	2.64	40.49	0.00	40.49	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
89	2.66	40.82	0.00	40.82	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
90	2.68	41.16	0.00	41.16	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	41.49	0.00	41.49	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	41.81	0.00	41.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	42.14	0.00	42.14	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	42.46	0.00	42.46	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	42.79	0.00	42.79	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	43.11	0.00	43.11	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	43.42	0.00	43.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
98	2.84	43.73	0.00	43.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
99	2.86	44.04	0.00	44.04	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
100	2.88	44.34	0.00	44.34	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
101	2.90	44.64	0.00	44.64	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	44.94	0.00	44.94	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	45.24	0.00	45.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	45.54	0.00	45.54	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	45.83	0.00	45.83	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	46.13	0.00	46.13	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
107	3.02	46.43	0.00	46.43	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
108	3.04	46.72	0.00	46.72	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
109	3.06	47.02	0.00	47.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
110	3.08	47.32	0.00	47.32	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
111	3.10	47.62	0.00	47.62	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
112	3.12	47.92	0.00	47.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
113	3.14	48.22	0.00	48.22	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
114	3.16	48.52	0.00	48.52	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
115	3.18	48.82	0.00	48.82	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
116	3.20	49.12	0.00	49.12	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
117	3.22	49.43	0.00	49.43	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
118	3.24	49.73	0.00	49.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
119	3.26	50.03	0.00	50.03	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
120	3.28	50.33	0.00	50.33	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
121	3.30	50.63	0.00	50.63	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
122	3.32	50.93	0.00	50.93	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
123	3.34	51.23	0.00	51.23	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
124	3.36	51.53	0.00	51.53	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
125	3.38	51.84	0.00	51.84	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
126	3.40	52.16	0.00	52.16	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
127	3.42	52.47	0.00	52.47	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
128	3.44	52.79	0.00	52.79	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
129	3.46	53.11	0.00	53.11	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
130	3.48	53.42	0.00	53.42	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
131	3.50	53.74	0.00	53.74	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
132	3.52	54.06	0.00	54.06	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
133	3.54	54.38	0.00	54.38	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
134	3.56	54.70	0.00	54.70	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
135	3.58	55.01	0.00	55.01	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
136	3.60	55.32	0.00	55.32	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
137	3.62	55.63	0.00	55.63	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
138	3.64	55.94	0.00	55.94	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
139	3.66	56.25	0.00	56.25	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
140	3.68	56.56	0.00	56.56	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
141	3.70	56.86	0.00	56.86	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
142	3.72	57.17	0.00	57.17	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
143	3.74	57.48	0.00	57.48	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
144	3.76	57.78	0.00	57.78	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	58.10	0.00	58.10	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
146	3.80	58.41	0.00	58.41	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
147	3.82	58.72	0.00	58.72	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
148	3.84	59.03	0.00	59.03	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
149	3.86	59.34	0.00	59.34	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
150	3.88	59.65	0.00	59.65	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
151	3.90	59.96	0.00	59.96	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
152	3.92	60.27	0.00	60.27	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
153	3.94	60.58	0.00	60.58	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
154	3.96	60.88	0.00	60.88	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
155	3.98	61.19	0.00	61.19	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
156	4.00	61.49	0.00	61.49	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
157	4.02	61.79	0.00	61.79	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
158	4.04	62.09	0.00	62.09	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
159	4.06	62.38	0.00	62.38	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
160	4.08	62.67	0.00	62.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
161	4.10	62.95	0.00	62.95	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
162	4.12	63.24	0.00	63.24	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
163	4.14	63.53	0.00	63.53	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
164	4.16	63.81	0.00	63.81	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
165	4.18	64.10	0.00	64.10	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
166	4.20	64.39	0.00	64.39	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
167	4.22	64.68	0.00	64.68	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
168	4.24	64.97	0.00	64.97	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
169	4.26	65.25	0.00	65.25	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
170	4.28	65.54	0.00	65.54	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
171	4.30	65.82	0.00	65.82	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
172	4.32	66.10	0.00	66.10	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
173	4.34	66.39	0.00	66.39	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
174	4.36	66.67	0.00	66.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
175	4.38	66.95	0.20	66.75	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
176	4.40	67.23	0.39	66.84	0.97	0.063	1.38	0.046	1.00	1.00	0.046	No
177	4.42	67.52	0.59	66.93	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
178	4.44	67.80	0.78	67.02	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
179	4.46	68.09	0.98	67.11	0.97	0.064	1.38	0.046	1.00	1.00	0.046	No
180	4.48	68.37	1.18	67.20	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
181	4.50	68.66	1.37	67.29	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
182	4.52	68.95	1.57	67.38	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
183	4.54	69.24	1.77	67.47	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
184	4.56	69.52	1.96	67.56	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
185	4.58	69.82	2.16	67.66	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
186	4.60	70.11	2.35	67.76	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
187	4.62	70.41	2.55	67.86	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
188	4.64	70.72	2.75	67.97	0.97	0.065	1.38	0.048	1.00	1.00	0.048	No
189	4.66	71.04	2.94	68.09	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
190	4.68	71.36	3.14	68.22	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
191	4.70	71.68	3.34	68.34	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
192	4.72	72.00	3.53	68.47	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	72.33	3.73	68.60	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
194	4.76	72.65	3.92	68.73	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
195	4.78	72.97	4.12	68.85	0.97	0.067	1.38	0.048	1.00	1.00	0.048	No
196	4.80	73.30	4.32	68.98	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
197	4.82	73.63	4.51	69.11	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
198	4.84	73.95	4.71	69.24	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
199	4.86	74.27	4.91	69.37	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
200	4.88	74.60	5.10	69.49	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
201	4.90	74.91	5.30	69.62	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
202	4.92	75.23	5.49	69.74	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
203	4.94	75.54	5.69	69.85	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
204	4.96	75.85	5.89	69.97	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
205	4.98	76.16	6.08	70.08	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
206	5.00	76.47	6.28	70.19	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
207	5.02	76.78	6.47	70.31	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
208	5.04	77.09	6.67	70.42	0.97	0.069	1.38	0.050	1.00	1.00	2.000	Yes
209	5.06	77.40	6.87	70.54	0.97	0.069	1.38	0.050	1.00	1.00	2.000	Yes
210	5.08	77.72	7.06	70.66	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
211	5.10	78.04	7.26	70.78	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
212	5.12	78.36	7.46	70.91	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
213	5.14	78.69	7.65	71.04	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
214	5.16	79.02	7.85	71.17	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
215	5.18	79.35	8.04	71.31	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
216	5.20	79.69	8.24	71.45	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
217	5.22	80.02	8.44	71.58	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
218	5.24	80.35	8.63	71.72	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
219	5.26	80.68	8.83	71.85	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
220	5.28	81.02	9.03	71.99	0.96	0.070	1.38	0.051	1.00	1.00	2.000	Yes
221	5.30	81.35	9.22	72.13	0.96	0.071	1.38	0.051	1.00	1.00	2.000	Yes
222	5.32	81.68	9.42	72.27	0.96	0.071	1.38	0.051	1.00	1.00	2.000	Yes
223	5.34	82.02	9.61	72.41	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
224	5.36	82.35	9.81	72.54	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
225	5.38	82.69	10.01	72.68	0.96	0.071	1.38	0.052	1.00	1.00	2.000	Yes
226	5.40	83.02	10.20	72.82	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
227	5.42	83.35	10.40	72.95	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
228	5.44	83.68	10.59	73.08	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
229	5.46	84.01	10.79	73.22	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
230	5.48	84.35	10.99	73.36	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
231	5.50	84.68	11.18	73.50	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
232	5.52	85.01	11.38	73.63	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
233	5.54	85.35	11.58	73.77	0.96	0.072	1.38	0.053	1.00	1.00	0.053	No
234	5.56	85.68	11.77	73.90	0.96	0.072	1.38	0.053	1.00	1.00	0.053	No
235	5.58	86.00	11.97	74.04	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
236	5.60	86.33	12.16	74.17	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
237	5.62	86.65	12.36	74.29	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
238	5.64	86.98	12.56	74.42	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
239	5.66	87.30	12.75	74.54	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
240	5.68	87.61	12.95	74.66	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	87.93	13.15	74.78	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
242	5.72	88.25	13.34	74.90	0.96	0.074	1.38	0.053	1.00	1.00	0.053	No
243	5.74	88.56	13.54	75.02	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
244	5.76	88.88	13.73	75.14	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
245	5.78	89.19	13.93	75.26	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
246	5.80	89.51	14.13	75.38	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
247	5.82	89.83	14.32	75.50	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
248	5.84	90.14	14.52	75.62	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
249	5.86	90.46	14.72	75.74	0.96	0.074	1.38	0.054	1.00	1.00	0.054	No
250	5.88	90.78	14.91	75.86	0.96	0.075	1.38	0.054	1.00	1.00	0.054	No
251	5.90	91.09	15.11	75.99	0.96	0.075	1.38	0.054	1.00	1.00	0.054	No
252	5.92	91.41	15.30	76.11	0.96	0.075	1.38	0.054	1.00	1.00	0.054	No
253	5.94	91.73	15.50	76.23	0.96	0.075	1.38	0.054	1.00	1.00	0.054	No
254	5.96	92.05	15.70	76.35	0.96	0.075	1.38	0.055	1.00	1.00	2.000	Yes
255	5.98	92.37	15.89	76.47	0.96	0.075	1.38	0.055	1.00	1.00	2.000	Yes
256	6.00	92.68	16.09	76.59	0.96	0.075	1.38	0.055	1.00	1.00	2.000	Yes
257	6.02	93.00	16.28	76.71	0.96	0.075	1.38	0.055	1.00	1.00	2.000	Yes
258	6.04	93.32	16.48	76.84	0.96	0.076	1.38	0.055	1.00	1.00	2.000	Yes
259	6.06	93.64	16.68	76.96	0.96	0.076	1.38	0.055	1.00	1.00	2.000	Yes
260	6.08	93.96	16.87	77.08	0.96	0.076	1.38	0.055	1.00	1.00	2.000	Yes
261	6.10	94.28	17.07	77.21	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
262	6.12	94.61	17.27	77.34	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
263	6.14	94.94	17.46	77.48	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
264	6.16	95.27	17.66	77.61	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
265	6.18	95.60	17.85	77.75	0.96	0.076	1.38	0.056	1.00	1.00	0.056	No
266	6.20	95.94	18.05	77.89	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
267	6.22	96.28	18.25	78.03	0.96	0.077	1.38	0.056	1.00	1.00	2.000	Yes
268	6.24	96.62	18.44	78.17	0.96	0.077	1.38	0.056	1.00	1.00	2.000	Yes
269	6.26	96.96	18.64	78.32	0.96	0.077	1.38	0.056	1.00	1.00	2.000	Yes
270	6.28	97.31	18.84	78.47	0.96	0.077	1.38	0.056	1.00	1.00	2.000	Yes
271	6.30	97.66	19.03	78.63	0.96	0.077	1.38	0.056	1.00	1.00	2.000	Yes
272	6.32	98.01	19.23	78.78	0.95	0.077	1.38	0.056	1.00	1.00	2.000	Yes
273	6.34	98.36	19.42	78.93	0.95	0.077	1.38	0.056	1.00	1.00	2.000	Yes
274	6.36	98.71	19.62	79.09	0.95	0.077	1.38	0.056	1.00	1.00	2.000	Yes
275	6.38	99.06	19.82	79.24	0.95	0.078	1.38	0.056	1.00	1.00	0.056	No
276	6.40	99.41	20.01	79.39	0.95	0.078	1.38	0.056	1.00	1.00	0.056	No
277	6.42	99.76	20.21	79.55	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
278	6.44	100.11	20.40	79.71	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
279	6.46	100.47	20.60	79.87	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
280	6.48	100.83	20.80	80.03	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
281	6.50	101.19	20.99	80.19	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
282	6.52	101.55	21.19	80.36	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
283	6.54	101.91	21.39	80.52	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
284	6.56	102.27	21.58	80.69	0.95	0.078	1.38	0.057	1.00	1.00	0.057	No
285	6.58	102.63	21.78	80.85	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
286	6.60	103.00	21.97	81.02	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
287	6.62	103.36	22.17	81.19	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
288	6.64	103.73	22.37	81.36	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	104.09	22.56	81.53	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
290	6.68	104.46	22.76	81.70	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
291	6.70	104.82	22.96	81.87	0.95	0.079	1.38	0.058	1.00	1.00	0.058	No
292	6.72	105.18	23.15	82.03	0.95	0.079	1.38	0.058	1.00	1.00	0.058	No
293	6.74	105.54	23.35	82.19	0.95	0.079	1.38	0.058	1.00	1.00	0.058	No
294	6.76	105.90	23.54	82.36	0.95	0.079	1.38	0.058	1.00	1.00	0.058	No
295	6.78	106.26	23.74	82.52	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
296	6.80	106.61	23.94	82.68	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
297	6.82	106.97	24.13	82.84	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
298	6.84	107.32	24.33	83.00	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
299	6.86	107.68	24.53	83.16	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
300	6.88	108.04	24.72	83.32	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
301	6.90	108.39	24.92	83.48	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
302	6.92	108.75	25.11	83.64	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
303	6.94	109.11	25.31	83.80	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
304	6.96	109.47	25.51	83.96	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
305	6.98	109.83	25.70	84.12	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
306	7.00	110.19	25.90	84.29	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
307	7.02	110.55	26.09	84.45	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
308	7.04	110.91	26.29	84.62	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
309	7.06	111.27	26.49	84.79	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
310	7.08	111.64	26.68	84.95	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
311	7.10	112.00	26.88	85.12	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
312	7.12	112.36	27.08	85.29	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
313	7.14	112.72	27.27	85.45	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
314	7.16	113.08	27.47	85.61	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
315	7.18	113.44	27.66	85.77	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
316	7.20	113.79	27.86	85.93	0.95	0.081	1.38	0.059	1.00	1.00	0.059	No
317	7.22	114.14	28.06	86.09	0.95	0.082	1.38	0.059	1.00	1.00	0.059	No
318	7.24	114.49	28.25	86.24	0.95	0.082	1.38	0.059	1.00	1.00	0.059	No
319	7.26	114.84	28.45	86.39	0.95	0.082	1.38	0.059	1.00	1.00	0.059	No
320	7.28	115.19	28.65	86.54	0.95	0.082	1.38	0.059	1.00	1.00	0.059	No
321	7.30	115.54	28.84	86.70	0.95	0.082	1.38	0.060	1.00	1.00	0.060	No
322	7.32	115.89	29.04	86.85	0.95	0.082	1.38	0.060	1.00	1.00	0.060	No
323	7.34	116.24	29.23	87.01	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
324	7.36	116.60	29.43	87.17	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
325	7.38	116.96	29.63	87.33	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
326	7.40	117.32	29.82	87.49	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
327	7.42	117.68	30.02	87.66	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
328	7.44	118.04	30.21	87.83	0.94	0.082	1.38	0.060	1.00	1.00	0.060	No
329	7.46	118.40	30.41	87.99	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
330	7.48	118.77	30.61	88.16	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
331	7.50	119.13	30.80	88.33	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
332	7.52	119.49	31.00	88.49	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
333	7.54	119.85	31.20	88.65	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
334	7.56	120.20	31.39	88.81	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
335	7.58	120.56	31.59	88.97	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
336	7.60	120.91	31.78	89.12	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	7.62	121.26	31.98	89.28	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
338	7.64	121.61	32.18	89.43	0.94	0.083	1.38	0.060	1.00	1.00	0.060	No
339	7.66	121.95	32.37	89.58	0.94	0.083	1.38	0.061	1.00	1.00	0.061	No
340	7.68	122.30	32.57	89.73	0.94	0.083	1.38	0.061	1.00	1.00	0.061	No
341	7.70	122.64	32.77	89.88	0.94	0.083	1.38	0.061	1.00	1.00	0.061	No
342	7.72	122.99	32.96	90.02	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
343	7.74	123.33	33.16	90.17	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
344	7.76	123.67	33.35	90.32	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
345	7.78	124.02	33.55	90.47	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
346	7.80	124.36	33.75	90.61	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
347	7.82	124.71	33.94	90.77	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
348	7.84	125.06	34.14	90.92	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
349	7.86	125.41	34.34	91.07	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
350	7.88	125.76	34.53	91.23	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
351	7.90	126.12	34.73	91.39	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
352	7.92	126.48	34.92	91.55	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
353	7.94	126.83	35.12	91.71	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
354	7.96	127.18	35.32	91.87	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
355	7.98	127.53	35.51	92.02	0.94	0.084	1.38	0.061	1.00	1.00	0.061	No
356	8.00	127.87	35.71	92.16	0.94	0.085	1.38	0.061	1.00	1.00	0.061	No
357	8.02	128.21	35.90	92.30	0.94	0.085	1.38	0.061	1.00	1.00	0.061	No
358	8.04	128.54	36.10	92.44	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
359	8.06	128.87	36.30	92.57	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
360	8.08	129.19	36.49	92.69	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
361	8.10	129.50	36.69	92.81	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
362	8.12	129.82	36.89	92.93	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
363	8.14	130.14	37.08	93.05	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
364	8.16	130.46	37.28	93.18	0.94	0.085	1.38	0.062	1.00	1.00	0.062	No
365	8.18	130.78	37.47	93.31	0.93	0.085	1.38	0.062	1.00	1.00	0.062	No
366	8.20	131.11	37.67	93.44	0.93	0.085	1.38	0.062	1.00	1.00	0.062	No
367	8.22	131.44	37.87	93.57	0.93	0.085	1.38	0.062	1.00	1.00	0.062	No
368	8.24	131.77	38.06	93.71	0.93	0.085	1.38	0.062	1.00	1.00	0.062	No
369	8.26	132.10	38.26	93.85	0.93	0.085	1.38	0.062	1.00	1.00	0.062	No
370	8.28	132.44	38.46	93.98	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
371	8.30	132.77	38.65	94.12	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
372	8.32	133.10	38.85	94.25	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
373	8.34	133.43	39.04	94.39	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
374	8.36	133.76	39.24	94.52	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
375	8.38	134.09	39.44	94.65	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
376	8.40	134.41	39.63	94.78	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
377	8.42	134.73	39.83	94.90	0.93	0.086	1.38	0.062	1.00	1.00	0.062	No
378	8.44	135.05	40.02	95.03	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
379	8.46	135.37	40.22	95.15	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
380	8.48	135.69	40.42	95.27	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
381	8.50	136.01	40.61	95.40	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
382	8.52	136.33	40.81	95.52	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
383	8.54	136.65	41.01	95.64	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
384	8.56	136.97	41.20	95.77	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	8.58	137.29	41.40	95.89	0.93	0.086	1.38	0.063	1.00	1.00	0.063	No
386	8.60	137.62	41.59	96.02	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
387	8.62	137.94	41.79	96.15	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
388	8.64	138.26	41.99	96.28	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
389	8.66	138.59	42.18	96.41	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
390	8.68	138.92	42.38	96.54	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
391	8.70	139.24	42.58	96.67	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
392	8.72	139.57	42.77	96.80	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
393	8.74	139.90	42.97	96.93	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
394	8.76	140.23	43.16	97.06	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
395	8.78	140.55	43.36	97.19	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
396	8.80	140.88	43.56	97.32	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
397	8.82	141.20	43.75	97.45	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
398	8.84	141.52	43.95	97.58	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
399	8.86	141.85	44.15	97.70	0.93	0.087	1.38	0.063	1.00	1.00	0.063	No
400	8.88	142.17	44.34	97.83	0.92	0.087	1.38	0.063	1.00	1.00	0.063	No
401	8.90	142.49	44.54	97.95	0.92	0.087	1.38	0.064	1.00	1.00	0.064	No
402	8.92	142.81	44.73	98.08	0.92	0.087	1.38	0.064	1.00	1.00	0.064	No
403	8.94	143.13	44.93	98.20	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
404	8.96	143.45	45.13	98.33	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
405	8.98	143.77	45.32	98.45	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
406	9.00	144.10	45.52	98.58	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
407	9.02	144.42	45.71	98.70	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
408	9.04	144.74	45.91	98.83	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
409	9.06	145.07	46.11	98.96	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
410	9.08	145.40	46.30	99.09	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
411	9.10	145.72	46.50	99.22	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
412	9.12	146.05	46.70	99.35	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
413	9.14	146.38	46.89	99.48	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
414	9.16	146.70	47.09	99.61	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
415	9.18	147.03	47.28	99.74	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
416	9.20	147.35	47.48	99.87	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
417	9.22	147.68	47.68	100.00	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
418	9.24	148.00	47.87	100.13	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
419	9.26	148.32	48.07	100.25	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
420	9.28	148.64	48.27	100.38	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
421	9.30	148.96	48.46	100.50	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
422	9.32	149.28	48.66	100.62	0.92	0.088	1.38	0.064	1.00	1.00	0.064	No
423	9.34	149.60	48.85	100.75	0.92	0.089	1.38	0.064	1.00	1.00	0.064	No
424	9.36	149.92	49.05	100.87	0.92	0.089	1.38	0.064	1.00	1.00	0.064	No
425	9.38	150.24	49.25	100.99	0.92	0.089	1.38	0.064	1.00	1.00	0.064	No
426	9.40	150.56	49.44	101.12	0.92	0.089	1.38	0.064	1.00	1.00	0.064	No
427	9.42	150.88	49.64	101.24	0.92	0.089	1.38	0.064	1.00	1.00	0.064	No
428	9.44	151.20	49.83	101.37	0.92	0.089	1.38	0.065	1.00	1.00	0.065	No
429	9.46	151.52	50.03	101.49	0.92	0.089	1.38	0.065	1.00	1.00	0.065	No
430	9.48	151.84	50.23	101.62	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
431	9.50	152.17	50.42	101.74	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
432	9.52	152.49	50.62	101.87	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
433	9.54	152.81	50.82	101.99	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
434	9.56	153.13	51.01	102.12	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
435	9.58	153.45	51.21	102.24	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
436	9.60	153.77	51.40	102.37	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
437	9.62	154.09	51.60	102.49	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
438	9.64	154.42	51.80	102.62	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
439	9.66	154.74	51.99	102.75	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
440	9.68	155.07	52.19	102.88	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
441	9.70	155.39	52.39	103.01	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
442	9.72	155.72	52.58	103.14	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
443	9.74	156.04	52.78	103.27	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
444	9.76	156.37	52.97	103.40	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
445	9.78	156.69	53.17	103.52	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
446	9.80	157.02	53.37	103.65	0.91	0.089	1.38	0.065	1.00	1.00	0.065	No
447	9.82	157.34	53.56	103.78	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
448	9.84	157.67	53.76	103.91	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
449	9.86	157.99	53.96	104.04	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
450	9.88	158.32	54.15	104.17	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
451	9.90	158.65	54.35	104.30	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
452	9.92	158.97	54.54	104.43	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
453	9.94	159.30	54.74	104.56	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
454	9.96	159.63	54.94	104.69	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
455	9.98	159.95	55.13	104.82	0.91	0.090	1.38	0.065	1.00	1.00	0.065	No
456	10.00	160.28	55.33	104.95	0.90	0.090	1.38	0.065	1.00	1.00	0.065	No
457	10.02	160.61	55.52	105.08	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
458	10.04	160.93	55.72	105.21	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
459	10.06	161.26	55.92	105.34	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
460	10.08	161.58	56.11	105.47	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
461	10.10	161.90	56.31	105.59	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
462	10.12	162.23	56.51	105.72	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
463	10.14	162.56	56.70	105.86	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
464	10.16	162.89	56.90	105.99	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
465	10.18	163.22	57.09	106.13	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
466	10.20	163.56	57.29	106.27	0.90	0.090	1.38	0.065	1.00	1.00	2.000	Yes
467	10.22	163.90	57.49	106.41	0.90	0.090	1.38	0.066	1.00	1.00	0.066	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.20	3.06	0.60	1.00	3.78	9.83	37.15	4.000	No	Yes	2.00
2	0.92	0.69	2.42	0.25	0.78	13.36	2.51	33.51	4.000	No	No	2.00
3	0.94	1.41	2.12	0.24	0.66	27.57	1.00	27.57	4.000	No	No	2.00
4	0.96	2.08	1.98	0.28	0.61	40.74	1.00	40.74	4.000	No	No	2.00
5	0.98	2.70	1.89	0.32	0.58	53.03	1.00	53.03	4.000	No	No	2.00
6	1.00	3.19	1.84	0.36	0.56	62.60	1.00	62.60	4.000	No	No	2.00
7	1.02	3.28	1.87	0.44	0.57	64.43	1.00	64.43	4.000	No	No	2.00
8	1.04	3.14	1.93	0.53	0.59	61.73	1.25	77.42	4.000	No	No	2.00
9	1.06	3.05	1.97	0.61	0.61	59.86	1.28	76.74	4.000	No	No	2.00
10	1.08	3.00	1.99	0.65	0.62	58.88	1.30	76.45	4.000	No	No	2.00
11	1.10	2.95	2.00	0.66	0.62	57.85	1.31	75.56	4.000	No	No	2.00
12	1.12	2.91	2.01	0.68	0.62	57.07	1.32	75.08	4.000	No	No	2.00
13	1.14	2.86	2.02	0.68	0.63	56.19	1.32	74.21	4.000	No	No	2.00
14	1.16	2.85	2.01	0.66	0.62	56.02	1.32	73.74	4.000	No	No	2.00
15	1.18	2.90	2.00	0.65	0.62	56.90	1.31	74.41	4.000	No	No	2.00
16	1.20	2.98	1.99	0.65	0.62	58.39	1.30	75.90	4.000	No	No	2.00
17	1.22	3.10	1.96	0.60	0.61	60.93	1.28	77.77	4.000	No	No	2.00
18	1.24	3.19	1.97	0.66	0.61	62.70	1.28	80.51	4.000	No	No	2.00
19	1.26	3.24	1.97	0.68	0.61	63.62	1.29	81.80	4.000	No	No	2.00
20	1.28	3.17	1.98	0.69	0.62	62.17	1.29	80.48	4.000	Yes	No	2.00
21	1.30	3.04	2.02	0.75	0.63	59.67	1.32	78.90	4.000	Yes	No	2.00
22	1.32	2.76	2.10	0.91	0.66	54.08	1.42	76.68	4.000	Yes	No	2.00
23	1.34	2.47	2.16	0.99	0.68	48.27	1.53	73.73	4.000	Yes	No	2.00
24	1.36	2.17	2.25	1.17	0.72	42.39	1.75	74.10	4.000	Yes	No	2.00
25	1.38	1.93	2.32	1.33	0.74	37.68	2.01	75.70	4.000	Yes	No	2.00
26	1.40	1.71	2.39	1.46	0.77	33.29	2.32	77.25	4.000	Yes	No	2.00
27	1.42	1.58	2.41	1.42	0.78	30.71	2.43	74.68	4.000	Yes	No	2.00
28	1.44	1.44	2.43	1.35	0.79	27.93	2.55	71.33	4.000	Yes	No	2.00
29	1.46	1.28	2.46	1.25	0.80	24.84	2.70	66.99	4.000	Yes	No	2.00
30	1.48	1.09	2.53	1.31	0.82	21.12	3.37	71.22	4.000	Yes	No	2.00
31	1.50	0.90	2.63	1.48	0.86	17.31	6.54	113.16	4.000	Yes	No	2.00
32	1.52	0.71	2.78	1.91	0.92	13.58	5.58	75.81	4.000	Yes	Yes	2.00
33	1.54	0.55	2.95	2.58	0.98	10.36	7.92	82.03	4.000	Yes	Yes	2.00
34	1.56	0.42	3.12	3.48	1.00	7.86	11.00	86.45	4.000	No	Yes	2.00
35	1.58	0.34	3.27	4.51	1.00	6.18	14.40	88.98	4.000	No	Yes	2.00
36	1.60	0.28	3.39	5.41	1.00	4.97	17.80	88.46	4.000	No	Yes	2.00
37	1.62	0.25	3.44	5.60	1.00	4.41	19.40	85.63	4.000	No	Yes	2.00
38	1.64	0.26	3.39	4.95	1.00	4.67	17.81	83.12	4.000	No	Yes	2.00
39	1.66	0.29	3.35	4.74	1.00	5.14	16.48	84.79	4.000	No	Yes	2.00
40	1.68	0.30	3.31	4.50	1.00	5.45	15.56	84.81	4.000	No	Yes	2.00
41	1.70	0.32	3.28	4.30	1.00	5.84	14.61	85.38	4.000	No	Yes	2.00
42	1.72	0.34	3.25	4.12	1.00	6.19	13.83	85.60	4.000	No	Yes	2.00
43	1.74	0.35	3.22	3.95	1.00	6.46	13.21	85.35	4.000	No	Yes	2.00
44	1.76	0.36	3.18	3.52	1.00	6.62	12.38	81.96	4.000	No	Yes	2.00
45	1.78	0.37	3.17	3.37	1.00	6.69	12.06	80.63	4.000	No	Yes	2.00
46	1.80	0.36	3.17	3.26	1.00	6.51	12.11	78.83	4.000	No	Yes	2.00
47	1.82	0.34	3.19	3.18	1.00	6.17	12.41	76.55	4.000	No	Yes	2.00
48	1.84	0.32	3.22	3.21	1.00	5.69	13.13	74.68	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	0.29	3.25	3.21	1.00	5.23	13.88	72.54	4.000	No	Yes	2.00
50	1.88	0.31	3.20	2.81	1.00	5.49	12.74	69.91	4.000	No	Yes	2.00
51	1.90	0.33	3.15	2.55	1.00	5.86	11.73	68.70	4.000	No	Yes	2.00
52	1.92	0.34	3.14	2.56	1.00	6.10	11.44	69.71	4.000	No	Yes	2.00
53	1.94	0.35	3.13	2.58	1.00	6.31	11.20	70.70	4.000	No	Yes	2.00
54	1.96	0.35	3.13	2.71	1.00	6.42	11.29	72.54	4.000	No	Yes	2.00
55	1.98	0.33	3.20	3.18	1.00	5.94	12.71	75.58	4.000	No	Yes	2.00
56	2.00	0.30	3.28	3.77	1.00	5.37	14.58	78.26	4.000	No	Yes	2.00
57	2.02	0.28	3.33	4.29	1.00	5.03	16.02	80.56	4.000	No	Yes	2.00
58	2.04	0.27	3.39	4.91	1.00	4.72	17.63	83.27	4.000	No	Yes	2.00
59	2.06	0.25	3.45	5.56	1.00	4.34	19.54	84.80	4.000	No	Yes	2.00
60	2.08	0.24	3.49	6.02	1.00	4.05	21.06	85.26	4.000	No	Yes	2.00
61	2.10	0.22	3.53	6.34	1.00	3.80	22.35	84.93	4.000	No	Yes	2.00
62	2.12	0.22	3.52	6.04	1.00	3.80	21.90	83.28	4.000	No	Yes	2.00
63	2.14	0.29	3.32	4.15	1.00	5.10	15.68	79.90	4.000	No	Yes	2.00
64	2.16	0.45	3.00	2.32	1.00	8.33	8.82	73.51	4.000	No	Yes	2.00
65	2.18	0.59	2.82	1.63	0.94	10.97	6.12	67.12	4.000	Yes	Yes	2.00
66	2.20	0.74	2.67	1.23	0.88	14.05	8.26	115.99	4.000	Yes	No	2.00
67	2.22	1.25	2.36	0.76	0.77	24.05	2.18	52.52	4.000	Yes	No	2.00
68	2.24	1.74	2.21	0.69	0.71	33.69	1.64	55.32	4.000	Yes	No	2.00
69	2.26	2.19	2.11	0.64	0.67	42.51	1.43	60.81	4.000	Yes	No	2.00
70	2.28	2.76	2.01	0.61	0.63	53.40	1.32	70.29	4.000	Yes	No	2.00
71	2.30	3.32	1.96	0.62	0.61	62.67	1.27	79.90	4.000	Yes	No	2.00
72	2.32	3.44	1.98	0.73	0.62	65.22	1.29	84.12	4.000	No	No	2.00
73	2.34	3.47	2.00	0.80	0.63	65.81	1.31	85.91	4.000	No	No	2.00
74	2.36	3.40	2.04	0.93	0.64	65.09	1.34	87.41	4.000	No	No	2.00
75	2.38	3.19	2.09	1.08	0.67	62.06	1.41	87.53	4.000	No	No	2.00
76	2.40	2.95	2.15	1.22	0.69	57.57	1.51	86.83	4.000	No	No	2.00
77	2.42	2.77	2.20	1.33	0.70	53.95	1.60	86.54	4.000	No	No	2.00
78	2.44	2.64	2.23	1.40	0.72	51.39	1.69	86.64	4.000	No	No	2.00
79	2.46	2.56	2.24	1.43	0.72	49.81	1.74	86.47	4.000	No	No	2.00
80	2.48	2.50	2.25	1.44	0.73	48.63	1.77	85.97	4.000	No	No	2.00
81	2.50	2.48	2.25	1.43	0.73	48.21	1.77	85.25	4.000	No	No	2.00
82	2.52	2.45	2.26	1.43	0.73	47.55	1.78	84.71	4.000	No	No	2.00
83	2.54	2.38	2.27	1.45	0.74	46.18	1.83	84.59	4.000	Yes	No	2.00
84	2.56	2.17	2.33	1.57	0.76	42.13	2.02	85.26	4.000	Yes	No	2.00
85	2.58	1.94	2.39	1.73	0.78	37.50	2.33	87.46	4.000	Yes	No	2.00
86	2.60	1.65	2.49	1.99	0.82	31.73	2.89	91.67	4.000	Yes	No	2.00
87	2.62	1.34	2.61	2.39	0.86	25.67	5.68	145.83	4.000	Yes	No	2.00
88	2.64	1.03	2.76	3.01	0.92	19.62	5.38	105.62	4.000	Yes	Yes	2.00
89	2.66	0.81	2.91	3.77	0.98	15.10	7.37	111.28	4.000	Yes	Yes	2.00
90	2.68	0.62	3.08	4.84	1.00	11.37	10.13	115.20	4.000	No	Yes	2.00
91	2.70	0.47	3.25	6.37	1.00	8.44	13.93	117.58	4.000	No	Yes	2.00
92	2.72	0.37	3.40	8.08	1.00	6.55	18.08	118.34	4.000	No	Yes	2.00
93	2.74	0.32	3.50	9.25	1.00	5.52	21.21	117.04	4.000	No	Yes	2.00
94	2.76	0.32	3.49	8.82	1.00	5.49	20.82	114.22	4.000	No	Yes	2.00
95	2.78	0.31	3.50	8.69	1.00	5.19	21.36	110.81	4.000	No	Yes	2.00
96	2.80	0.29	3.52	8.56	1.00	4.80	22.17	106.54	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.26	3.56	8.29	1.00	4.25	23.47	99.76	4.000	No	Yes	2.00
98	2.84	0.23	3.62	8.35	1.00	3.58	25.98	93.15	4.000	No	Yes	2.00
99	2.86	0.19	3.70	8.65	1.00	2.91	29.78	86.73	4.000	No	Yes	2.00
100	2.88	0.18	3.70	8.15	1.00	2.77	29.93	82.89	4.000	No	Yes	2.00
101	2.90	0.18	3.67	7.25	1.00	2.77	28.52	78.94	4.000	No	Yes	2.00
102	2.92	0.19	3.66	6.74	1.00	2.77	27.70	76.61	4.000	No	Yes	2.00
103	2.94	0.19	3.63	6.35	1.00	2.83	26.67	75.48	4.000	No	Yes	2.00
104	2.96	0.19	3.61	6.14	1.00	2.93	25.78	75.54	4.000	No	Yes	2.00
105	2.98	0.20	3.57	5.47	1.00	3.07	23.93	73.43	4.000	No	Yes	2.00
106	3.00	0.21	3.53	4.96	1.00	3.24	22.27	72.17	4.000	No	Yes	2.00
107	3.02	0.22	3.50	4.76	1.00	3.41	21.23	72.42	4.000	No	Yes	2.00
108	3.04	0.23	3.48	4.65	1.00	3.55	20.52	72.88	4.000	No	Yes	2.00
109	3.06	0.23	3.46	4.55	1.00	3.66	19.97	73.13	4.000	No	Yes	2.00
110	3.08	0.23	3.47	4.69	1.00	3.64	20.29	73.89	4.000	No	Yes	2.00
111	3.10	0.23	3.48	4.93	1.00	3.63	20.75	75.24	4.000	No	Yes	2.00
112	3.12	0.23	3.49	5.08	1.00	3.63	20.97	76.16	4.000	No	Yes	2.00
113	3.14	0.23	3.49	5.18	1.00	3.66	21.07	77.00	4.000	No	Yes	2.00
114	3.16	0.24	3.49	5.27	1.00	3.70	21.06	77.90	4.000	No	Yes	2.00
115	3.18	0.24	3.49	5.28	1.00	3.76	20.86	78.45	4.000	No	Yes	2.00
116	3.20	0.25	3.46	5.04	1.00	3.92	19.96	78.28	4.000	No	Yes	2.00
117	3.22	0.26	3.43	4.74	1.00	4.07	19.04	77.46	4.000	No	Yes	2.00
118	3.24	0.26	3.40	4.39	1.00	4.20	18.08	75.97	4.000	No	Yes	2.00
119	3.26	0.27	3.37	4.00	1.00	4.36	17.02	74.24	4.000	No	Yes	2.00
120	3.28	0.29	3.30	3.47	1.00	4.79	15.15	72.56	4.000	No	Yes	2.00
121	3.30	0.30	3.29	3.38	1.00	4.85	14.87	72.10	4.000	No	Yes	2.00
122	3.32	0.30	3.28	3.40	1.00	4.92	14.78	72.67	4.000	No	Yes	2.00
123	3.34	0.35	3.20	3.05	1.00	5.85	12.62	73.86	4.000	No	Yes	2.00
124	3.36	0.42	3.09	2.71	1.00	7.17	10.48	75.11	4.000	No	Yes	2.00
125	3.38	0.49	3.01	2.50	1.00	8.44	9.04	76.32	4.000	No	Yes	2.00
126	3.40	0.59	2.91	2.18	0.98	10.26	7.37	75.60	4.000	No	Yes	2.00
127	3.42	0.63	2.90	2.28	0.98	10.88	7.22	78.49	4.000	No	Yes	2.00
128	3.44	0.62	2.92	2.47	0.99	10.72	7.57	81.15	4.000	No	Yes	2.00
129	3.46	0.59	2.97	2.73	1.00	10.15	8.26	83.85	4.000	No	Yes	2.00
130	3.48	0.57	3.01	3.00	1.00	9.64	8.95	86.34	4.000	No	Yes	2.00
131	3.50	0.52	3.08	3.43	1.00	8.74	10.19	89.07	4.000	No	Yes	2.00
132	3.52	0.53	3.07	3.31	1.00	8.79	9.98	87.74	4.000	No	Yes	2.00
133	3.54	0.51	3.10	3.52	1.00	8.30	10.67	88.60	4.000	No	Yes	2.00
134	3.56	0.46	3.16	3.79	1.00	7.49	11.80	88.42	4.000	No	Yes	2.00
135	3.58	0.40	3.25	4.29	1.00	6.29	13.94	87.68	4.000	No	Yes	2.00
136	3.60	0.34	3.36	5.01	1.00	5.10	16.96	86.45	4.000	No	Yes	2.00
137	3.62	0.29	3.45	5.60	1.00	4.29	19.73	84.66	4.000	No	Yes	2.00
138	3.64	0.28	3.47	5.44	1.00	4.03	20.24	81.66	4.000	No	Yes	2.00
139	3.66	0.28	3.47	5.37	1.00	3.97	20.32	80.67	4.000	No	Yes	2.00
140	3.68	0.28	3.46	5.19	1.00	3.95	20.11	79.38	4.000	No	Yes	2.00
141	3.70	0.28	3.45	4.98	1.00	3.95	19.76	78.08	4.000	No	Yes	2.00
142	3.72	0.31	3.38	4.43	1.00	4.43	17.57	77.89	4.000	No	Yes	2.00
143	3.74	0.38	3.25	3.52	1.00	5.60	13.80	77.24	4.000	No	Yes	2.00
144	3.76	0.47	3.10	2.75	1.00	7.08	10.65	75.35	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.56	2.98	2.21	1.00	8.56	8.47	72.49	4.000	No	Yes	2.00
146	3.80	0.63	2.90	1.87	0.98	9.69	7.16	69.42	4.000	No	Yes	2.00
147	3.82	0.65	2.88	1.80	0.98	9.89	6.93	68.55	4.000	No	Yes	2.00
148	3.84	0.58	2.95	2.07	1.00	8.91	7.99	71.19	4.000	No	Yes	2.00
149	3.86	0.49	3.08	2.63	1.00	7.32	10.20	74.66	4.000	No	Yes	2.00
150	3.88	0.40	3.25	3.65	1.00	5.69	13.86	78.82	4.000	No	Yes	2.00
151	3.90	0.32	3.44	5.18	1.00	4.28	19.14	81.87	4.000	No	Yes	2.00
152	3.92	0.25	3.61	7.08	1.00	3.22	25.81	83.15	4.000	No	Yes	2.00
153	3.94	0.23	3.70	8.11	1.00	2.79	29.73	82.99	4.000	No	Yes	2.00
154	3.96	0.22	3.72	8.25	1.00	2.62	31.04	81.47	4.000	No	Yes	2.00
155	3.98	0.22	3.73	7.90	1.00	2.53	31.15	78.88	4.000	No	Yes	2.00
156	4.00	0.21	3.72	7.18	1.00	2.45	30.57	74.88	4.000	No	Yes	2.00
157	4.02	0.21	3.70	6.37	1.00	2.38	29.64	70.53	4.000	No	Yes	2.00
158	4.04	0.21	3.67	5.50	1.00	2.31	28.48	65.89	4.000	No	Yes	2.00
159	4.06	0.21	3.64	4.64	1.00	2.29	26.84	61.57	4.000	No	Yes	2.00
160	4.08	0.21	3.60	3.94	1.00	2.29	25.26	57.94	4.000	No	Yes	2.00
161	4.10	0.20	3.65	4.22	1.00	2.10	27.40	57.48	4.000	No	Yes	2.00
162	4.12	0.20	3.64	4.15	1.00	2.11	27.12	57.24	4.000	No	Yes	2.00
163	4.14	0.20	3.65	4.21	1.00	2.10	27.36	57.44	4.000	No	Yes	2.00
164	4.16	0.19	3.68	4.51	1.00	2.02	28.74	57.99	4.000	No	Yes	2.00
165	4.18	0.19	3.72	4.96	1.00	1.90	30.88	58.80	4.000	No	Yes	2.00
166	4.20	0.19	3.70	4.77	1.00	1.98	29.70	58.80	4.000	No	Yes	2.00
167	4.22	0.18	3.74	5.09	1.00	1.86	31.66	58.80	4.000	No	Yes	2.00
168	4.24	0.18	3.76	5.24	1.00	1.76	33.07	58.24	4.000	No	Yes	2.00
169	4.26	0.18	3.76	5.09	1.00	1.73	33.09	57.19	4.000	No	Yes	2.00
170	4.28	0.18	3.75	4.76	1.00	1.72	32.34	55.76	4.000	No	Yes	2.00
171	4.30	0.18	3.72	4.34	1.00	1.75	31.00	54.22	4.000	No	Yes	2.00
172	4.32	0.19	3.69	3.92	1.00	1.80	29.34	52.82	4.000	No	Yes	2.00
173	4.34	0.19	3.66	3.63	1.00	1.87	27.90	52.13	4.000	No	Yes	2.00
174	4.36	0.19	3.64	3.47	1.00	1.92	27.00	51.83	4.000	No	Yes	2.00
175	4.38	0.20	3.63	3.45	1.00	1.98	26.43	52.32	0.094	No	Yes	2.00
176	4.40	0.20	3.62	3.46	1.00	2.03	26.07	52.80	0.097	No	Yes	2.00
177	4.42	0.21	3.62	3.55	1.00	2.06	26.06	53.57	0.098	No	Yes	2.00
178	4.44	0.21	3.62	3.62	1.00	2.08	26.10	54.17	0.099	No	Yes	2.00
179	4.46	0.21	3.62	3.69	1.00	2.11	26.03	54.84	0.101	No	Yes	2.00
180	4.48	0.22	3.60	3.58	1.00	2.19	25.12	55.07	0.105	No	Yes	2.00
181	4.50	0.22	3.57	3.47	1.00	2.30	24.10	55.37	0.110	No	Yes	2.00
182	4.52	0.23	3.54	3.27	1.00	2.43	22.76	55.38	0.116	No	Yes	2.00
183	4.54	0.25	3.49	3.00	1.00	2.65	20.92	55.40	0.126	No	Yes	2.00
184	4.56	0.28	3.39	2.52	1.00	3.15	17.59	55.38	0.150	No	Yes	2.00
185	4.58	0.34	3.25	2.02	1.00	3.95	13.99	55.27	0.188	No	Yes	2.00
186	4.60	0.48	3.01	1.42	1.00	6.12	9.03	55.25	0.292	No	Yes	2.00
187	4.62	0.66	2.85	1.21	0.97	8.56	6.53	55.90	0.408	No	Yes	2.00
188	4.64	0.83	2.75	1.14	0.93	10.90	5.23	57.00	0.520	No	Yes	2.00
189	4.66	0.99	2.69	1.22	0.91	12.99	9.78	127.02	0.244	No	No	2.00
190	4.68	1.10	2.67	1.33	0.90	14.44	8.55	123.51	0.230	No	No	2.00
191	4.70	1.05	2.72	1.55	0.92	13.89	4.94	68.59	0.662	No	Yes	2.00
192	4.72	0.96	2.80	1.86	0.95	12.68	5.81	73.73	0.605	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.84	2.89	2.30	0.99	11.20	7.09	79.42	0.534	No	Yes	2.00
194	4.76	0.74	2.98	2.68	1.00	9.69	8.47	82.06	0.462	No	Yes	2.00
195	4.78	0.71	3.01	2.86	1.00	9.24	9.02	83.33	0.441	No	Yes	2.00
196	4.80	0.80	2.94	2.58	1.00	10.51	7.85	82.50	0.501	No	Yes	2.00
197	4.82	0.88	2.88	2.27	0.98	11.61	6.86	79.60	0.554	No	Yes	2.00
198	4.84	0.94	2.82	1.98	0.96	12.30	6.14	75.49	0.587	No	Yes	2.00
199	4.86	0.95	2.81	1.86	0.95	12.36	5.92	73.23	0.590	No	Yes	2.00
200	4.88	0.87	2.85	1.94	0.97	11.26	6.51	73.23	0.537	No	Yes	2.00
201	4.90	0.70	2.98	2.34	1.00	8.95	8.40	75.23	0.427	No	Yes	2.00
202	4.92	0.54	3.14	2.97	1.00	6.71	11.40	76.55	0.320	No	Yes	2.00
203	4.94	0.44	3.29	3.74	1.00	5.21	14.81	77.11	0.248	No	Yes	2.00
204	4.96	0.37	3.40	4.49	1.00	4.24	18.16	76.95	0.202	No	Yes	2.00
205	4.98	0.35	3.44	4.55	1.00	3.85	19.36	74.56	0.184	No	Yes	2.00
206	5.00	0.40	3.31	3.46	1.00	4.66	15.41	71.72	0.222	No	Yes	2.00
207	5.02	0.53	3.10	2.37	1.00	6.48	10.62	68.85	0.309	No	Yes	2.00
208	5.04	0.69	2.92	1.67	1.00	8.64	7.44	64.24	4.000	Yes	Yes	2.00
209	5.06	0.90	2.74	1.21	0.93	11.32	5.20	58.82	4.000	Yes	Yes	2.00
210	5.08	1.16	2.61	0.99	0.88	14.64	5.63	82.42	4.000	Yes	No	2.00
211	5.10	1.38	2.53	0.95	0.85	17.45	3.40	59.40	4.000	Yes	No	2.00
212	5.12	1.53	2.49	0.97	0.84	19.32	2.94	56.81	4.000	Yes	No	2.00
213	5.14	1.61	2.50	1.06	0.84	20.31	2.94	59.82	4.000	Yes	No	2.00
214	5.16	1.55	2.54	1.25	0.85	19.65	3.74	73.46	4.000	Yes	No	2.00
215	5.18	1.39	2.63	1.56	0.89	17.74	6.69	118.64	4.000	Yes	No	2.00
216	5.20	1.19	2.75	2.02	0.93	15.17	5.26	79.82	4.000	Yes	Yes	2.00
217	5.22	0.99	2.87	2.56	0.98	12.63	6.83	86.30	4.000	Yes	Yes	2.00
218	5.24	0.85	2.98	3.06	1.00	10.77	8.37	90.16	4.000	Yes	Yes	2.00
219	5.26	1.01	2.87	2.55	0.98	12.84	6.74	86.50	4.000	Yes	Yes	2.00
220	5.28	1.21	2.75	2.06	0.93	15.29	5.29	80.87	4.000	Yes	Yes	2.00
221	5.30	1.53	2.60	1.52	0.88	19.27	5.29	101.96	4.000	Yes	No	2.00
222	5.32	1.86	2.48	1.22	0.83	23.28	2.81	65.53	4.000	Yes	No	2.00
223	5.34	2.18	2.37	0.97	0.79	27.03	2.22	60.02	4.000	Yes	No	2.00
224	5.36	2.25	2.34	0.88	0.78	27.75	2.08	57.67	4.000	Yes	No	2.00
225	5.38	2.34	2.30	0.78	0.76	28.67	1.93	55.20	4.000	Yes	No	2.00
226	5.40	2.30	2.30	0.76	0.76	28.20	1.92	54.27	0.095	No	No	1.83
227	5.42	2.25	2.31	0.75	0.77	27.50	1.96	53.76	0.094	No	No	1.82
228	5.44	2.17	2.34	0.83	0.78	26.51	2.10	55.70	0.096	No	No	1.85
229	5.46	2.11	2.37	0.92	0.79	25.87	2.24	57.84	0.098	No	No	1.88
230	5.48	2.03	2.41	1.01	0.80	24.92	2.41	60.16	0.100	No	No	1.92
231	5.50	1.96	2.44	1.07	0.81	24.00	2.57	61.68	0.102	No	No	1.95
232	5.52	1.89	2.46	1.11	0.82	23.16	2.69	62.34	0.103	No	No	1.96
233	5.54	1.84	2.47	1.10	0.83	22.47	2.76	61.91	0.102	No	No	1.94
234	5.56	1.80	2.46	1.05	0.82	22.00	2.73	60.10	0.100	No	No	1.90
235	5.58	1.79	2.45	0.96	0.82	21.70	2.65	57.49	0.098	No	No	1.85
236	5.60	1.79	2.43	0.86	0.81	21.71	2.51	54.59	0.095	No	No	1.80
237	5.62	1.82	2.40	0.77	0.80	21.91	2.38	52.06	0.093	No	No	1.76
238	5.64	1.86	2.36	0.66	0.79	22.32	2.19	48.94	0.091	No	No	1.71
239	5.66	1.90	2.34	0.60	0.78	22.65	2.07	46.98	0.089	No	No	1.68
240	5.68	1.92	2.32	0.55	0.77	22.92	1.99	45.66	0.088	No	No	1.65

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	1.94	2.30	0.52	0.76	23.06	1.94	44.80	0.087	No	No	1.64
242	5.72	1.96	2.29	0.49	0.76	23.20	1.00	23.20	0.069	No	No	1.30
243	5.74	1.96	2.29	0.49	0.76	23.17	1.00	23.17	0.069	No	No	1.29
244	5.76	1.96	2.29	0.49	0.76	23.14	1.00	23.14	0.069	No	No	1.29
245	5.78	1.88	2.32	0.52	0.77	22.22	2.00	44.55	0.087	No	No	1.62
246	5.80	1.80	2.35	0.56	0.78	21.31	2.13	45.32	0.088	No	No	1.63
247	5.82	1.73	2.38	0.60	0.79	20.39	2.27	46.23	0.089	No	No	1.64
248	5.84	1.65	2.41	0.64	0.81	19.46	2.43	47.27	0.089	No	No	1.66
249	5.86	1.57	2.44	0.69	0.82	18.54	2.61	48.46	0.090	No	No	1.67
250	5.88	1.61	2.43	0.68	0.81	18.92	2.55	48.30	0.090	No	No	1.67
251	5.90	1.64	2.42	0.68	0.81	19.31	2.50	48.35	0.090	No	No	1.66
252	5.92	1.67	2.42	0.68	0.81	19.69	2.46	48.41	0.090	No	No	1.66
253	5.94	1.71	2.41	0.67	0.81	20.08	2.41	48.47	0.090	No	No	1.66
254	5.96	1.72	2.40	0.64	0.80	20.15	2.36	47.55	4.000	Yes	No	2.00
255	5.98	1.62	2.43	0.67	0.81	18.91	2.53	47.93	4.000	Yes	No	2.00
256	6.00	1.46	2.49	0.76	0.84	17.02	2.94	50.02	4.000	Yes	No	2.00
257	6.02	1.31	2.57	0.91	0.87	15.33	4.45	68.24	4.000	Yes	No	2.00
258	6.04	1.20	2.63	1.05	0.89	14.03	6.69	93.85	4.000	Yes	No	2.00
259	6.06	1.12	2.70	1.26	0.92	13.07	10.07	131.65	4.000	Yes	No	2.00
260	6.08	1.11	2.73	1.42	0.93	12.91	5.02	64.87	4.000	Yes	Yes	2.00
261	6.10	1.12	2.75	1.59	0.94	13.09	5.24	68.65	0.625	No	Yes	2.00
262	6.12	1.10	2.79	1.81	0.95	12.81	5.69	72.93	0.611	No	Yes	2.00
263	6.14	1.04	2.85	2.19	0.98	12.09	6.54	79.07	0.577	No	Yes	2.00
264	6.16	0.97	2.92	2.64	1.00	11.30	7.53	85.11	0.539	No	Yes	2.00
265	6.18	0.91	2.99	3.09	1.00	10.42	8.60	89.62	0.497	No	Yes	2.00
266	6.20	0.86	3.04	3.41	1.00	9.76	9.44	92.06	0.465	No	Yes	2.00
267	6.22	1.24	2.80	2.32	0.96	14.53	5.85	84.96	4.000	Yes	Yes	2.00
268	6.24	2.12	2.47	1.33	0.83	24.78	2.80	69.49	4.000	Yes	No	2.00
269	6.26	3.27	2.21	0.85	0.73	37.82	1.65	62.37	4.000	Yes	No	2.00
270	6.28	4.55	2.02	0.61	0.66	52.03	1.33	68.99	4.000	Yes	No	2.00
271	6.30	5.90	1.87	0.47	0.60	66.69	1.00	66.69	4.000	Yes	No	2.00
272	6.32	6.82	1.78	0.39	0.57	76.53	1.00	76.53	4.000	Yes	No	2.00
273	6.34	7.31	1.74	0.35	0.55	81.69	1.00	81.69	4.000	Yes	No	2.00
274	6.36	7.54	1.71	0.33	0.54	84.04	1.00	84.04	4.000	Yes	No	2.00
275	6.38	7.64	1.71	0.33	0.54	84.98	1.00	84.98	0.137	No	No	2.00
276	6.40	7.68	1.72	0.36	0.55	85.50	1.00	85.50	0.138	No	No	2.00
277	6.42	7.78	1.73	0.38	0.55	86.51	1.00	86.51	0.140	No	No	2.00
278	6.44	7.87	1.73	0.40	0.55	87.55	1.00	87.55	0.142	No	No	2.00
279	6.46	7.97	1.74	0.42	0.55	88.62	1.00	88.62	0.145	No	No	2.00
280	6.48	8.10	1.75	0.45	0.56	89.95	1.00	89.95	0.148	No	No	2.00
281	6.50	8.25	1.74	0.44	0.55	91.47	1.00	91.47	0.151	No	No	2.00
282	6.52	8.40	1.74	0.45	0.55	93.02	1.00	93.02	0.155	No	No	2.00
283	6.54	8.29	1.75	0.48	0.56	91.82	1.00	91.82	0.152	No	No	2.00
284	6.56	8.35	1.76	0.50	0.56	92.47	1.11	102.36	0.180	No	No	2.00
285	6.58	8.41	1.78	0.54	0.57	93.18	1.12	104.68	0.187	No	No	2.00
286	6.60	8.42	1.79	0.57	0.57	93.29	1.14	106.47	0.192	No	No	2.00
287	6.62	8.35	1.80	0.59	0.58	92.44	1.16	106.80	0.193	No	No	2.00
288	6.64	8.46	1.80	0.60	0.58	93.56	1.15	107.84	0.197	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	8.37	1.80	0.60	0.58	92.54	1.16	107.16	0.194	No	No	2.00
290	6.68	8.26	1.80	0.57	0.58	91.08	1.15	104.98	0.188	No	No	2.00
291	6.70	8.15	1.79	0.54	0.57	89.69	1.15	102.73	0.181	No	No	2.00
292	6.72	8.08	1.79	0.52	0.57	88.84	1.14	101.01	0.176	No	No	2.00
293	6.74	8.06	1.77	0.48	0.57	88.39	1.00	88.39	0.144	No	No	2.00
294	6.76	8.07	1.76	0.45	0.56	88.27	1.00	88.27	0.144	No	No	2.00
295	6.78	8.12	1.74	0.42	0.55	88.60	1.00	88.60	0.145	No	No	2.00
296	6.80	8.19	1.73	0.40	0.55	89.25	1.00	89.25	0.146	No	No	2.00
297	6.82	8.29	1.72	0.39	0.55	90.10	1.00	90.10	0.148	No	No	2.00
298	6.84	8.29	1.72	0.39	0.55	90.05	1.00	90.05	0.148	No	No	2.00
299	6.86	8.24	1.72	0.39	0.55	89.46	1.00	89.46	0.147	No	No	2.00
300	6.88	8.13	1.74	0.41	0.55	88.23	1.00	88.23	0.144	No	No	2.00
301	6.90	7.96	1.76	0.43	0.56	86.37	1.00	86.37	0.140	No	No	2.00
302	6.92	7.73	1.78	0.45	0.57	83.87	1.00	83.87	0.135	No	No	2.00
303	6.94	7.56	1.80	0.49	0.58	82.06	1.00	82.06	0.131	No	No	2.00
304	6.96	7.41	1.83	0.53	0.59	80.49	1.18	95.07	0.160	No	No	2.00
305	6.98	7.34	1.84	0.55	0.59	79.68	1.19	94.91	0.160	No	No	2.00
306	7.00	7.36	1.84	0.56	0.59	79.85	1.19	95.35	0.161	No	No	2.00
307	7.02	7.42	1.85	0.58	0.60	80.40	1.20	96.47	0.164	No	No	2.00
308	7.04	7.45	1.85	0.59	0.60	80.64	1.20	96.97	0.165	No	No	2.00
309	7.06	7.49	1.85	0.60	0.60	80.99	1.20	97.50	0.166	No	No	2.00
310	7.08	7.42	1.87	0.63	0.60	80.21	1.21	97.45	0.166	No	No	2.00
311	7.10	7.27	1.88	0.65	0.61	78.61	1.23	96.34	0.163	No	No	2.00
312	7.12	7.09	1.89	0.64	0.61	76.51	1.23	94.08	0.157	No	No	2.00
313	7.14	6.86	1.90	0.63	0.61	73.95	1.23	91.30	0.151	No	No	2.00
314	7.16	6.62	1.91	0.61	0.62	71.23	1.24	88.34	0.144	No	No	2.00
315	7.18	6.45	1.90	0.57	0.62	69.29	1.24	85.59	0.138	No	No	2.00
316	7.20	6.32	1.89	0.52	0.61	67.77	1.23	83.23	0.134	No	No	2.00
317	7.22	6.22	1.88	0.49	0.61	66.57	1.00	66.57	0.107	No	No	1.81
318	7.24	6.18	1.87	0.45	0.60	65.99	1.00	65.99	0.107	No	No	1.80
319	7.26	6.13	1.86	0.42	0.60	65.35	1.00	65.35	0.106	No	No	1.78
320	7.28	5.85	1.89	0.46	0.61	62.31	1.00	62.31	0.102	No	No	1.72
321	7.30	5.45	1.94	0.51	0.63	58.14	1.27	73.58	0.117	No	No	1.97
322	7.32	5.04	2.01	0.61	0.66	53.80	1.31	70.71	0.113	No	No	1.89
323	7.34	4.72	2.08	0.75	0.68	50.40	1.39	69.99	0.112	No	No	1.88
324	7.36	4.47	2.14	0.89	0.71	47.79	1.48	70.93	0.113	No	No	1.90
325	7.38	4.47	2.16	0.98	0.72	47.82	1.53	72.98	0.116	No	No	1.94
326	7.40	4.54	2.18	1.08	0.72	48.54	1.57	75.99	0.121	No	No	2.00
327	7.42	4.62	2.19	1.14	0.73	49.36	1.58	78.18	0.124	No	No	2.00
328	7.44	4.74	2.18	1.15	0.72	50.59	1.57	79.39	0.127	No	No	2.00
329	7.46	4.94	2.16	1.12	0.72	52.65	1.52	80.22	0.128	No	No	2.00
330	7.48	5.12	2.14	1.06	0.71	54.48	1.48	80.40	0.128	No	No	2.00
331	7.50	5.29	2.10	0.96	0.69	56.12	1.42	79.46	0.127	No	No	2.00
332	7.52	5.44	2.06	0.84	0.68	57.53	1.36	78.43	0.125	No	No	2.00
333	7.54	5.43	2.03	0.75	0.67	57.28	1.34	76.54	0.122	No	No	2.00
334	7.56	5.25	2.03	0.70	0.67	55.24	1.33	73.62	0.117	No	No	1.94
335	7.58	5.04	2.04	0.67	0.67	52.92	1.34	70.87	0.113	No	No	1.88
336	7.60	4.85	2.05	0.67	0.67	50.92	1.35	68.94	0.110	No	No	1.83

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	4.70	2.06	0.67	0.68	49.22	1.37	67.45	0.109	No	No	1.80
338	7.64	4.58	2.07	0.66	0.68	47.92	1.38	66.07	0.107	No	No	1.77
339	7.66	4.50	2.07	0.64	0.68	47.03	1.38	64.79	0.105	No	No	1.74
340	7.68	4.39	2.07	0.60	0.68	45.78	1.37	62.92	0.103	No	No	1.70
341	7.70	4.22	2.08	0.58	0.69	43.86	1.38	60.74	0.101	No	No	1.66
342	7.72	3.99	2.10	0.59	0.69	41.45	1.42	58.77	0.099	No	No	1.63
343	7.74	3.80	2.14	0.64	0.71	39.37	1.48	58.34	0.098	No	No	1.62
344	7.76	3.61	2.17	0.69	0.72	37.44	1.55	58.04	0.098	No	No	1.61
345	7.78	3.49	2.20	0.75	0.73	36.15	1.63	58.76	0.099	No	No	1.62
346	7.80	3.47	2.22	0.81	0.74	35.90	1.67	60.12	0.100	No	No	1.64
347	7.82	3.54	2.23	0.87	0.75	36.61	1.70	62.19	0.102	No	No	1.68
348	7.84	3.61	2.24	0.92	0.75	37.29	1.72	63.95	0.104	No	No	1.71
349	7.86	3.80	2.23	0.96	0.74	39.23	1.69	66.28	0.107	No	No	1.75
350	7.88	4.10	2.20	0.97	0.73	42.34	1.62	68.76	0.110	No	No	1.80
351	7.90	4.37	2.18	0.97	0.73	45.12	1.57	70.79	0.113	No	No	1.85
352	7.92	4.58	2.15	0.91	0.71	47.23	1.50	70.79	0.113	No	No	1.85
353	7.94	4.65	2.12	0.82	0.70	47.86	1.45	69.34	0.111	No	No	1.81
354	7.96	4.51	2.11	0.75	0.70	46.34	1.44	66.55	0.107	No	No	1.75
355	7.98	4.21	2.12	0.69	0.70	43.16	1.45	62.54	0.103	No	No	1.67
356	8.00	3.90	2.12	0.59	0.70	39.79	1.45	57.51	0.098	No	No	1.59
357	8.02	3.58	2.13	0.52	0.71	36.36	1.46	53.19	0.094	No	No	1.53
358	8.04	3.31	2.14	0.47	0.71	33.47	1.00	33.47	0.078	No	No	1.27
359	8.06	2.96	2.17	0.44	0.72	29.86	1.00	29.86	0.075	No	No	1.22
360	8.08	2.60	2.21	0.40	0.74	26.08	1.00	26.08	0.072	No	No	1.16
361	8.10	2.24	2.28	0.41	0.76	22.30	1.00	22.30	0.069	No	No	1.11
362	8.12	1.89	2.40	0.54	0.81	18.64	2.35	43.82	0.087	No	No	1.40
363	8.14	1.59	2.53	0.76	0.86	15.54	3.41	53.02	0.094	No	No	1.52
364	8.16	1.56	2.56	0.86	0.87	15.23	4.24	64.60	0.105	No	No	1.70
365	8.18	1.84	2.48	0.82	0.84	18.11	2.88	52.10	0.093	No	No	1.50
366	8.20	2.19	2.40	0.75	0.81	21.71	2.36	51.20	0.092	No	No	1.49
367	8.22	2.61	2.29	0.63	0.77	26.03	1.90	49.41	0.091	No	No	1.47
368	8.24	3.07	2.19	0.52	0.73	30.72	1.59	48.97	0.091	No	No	1.46
369	8.26	3.43	2.13	0.46	0.71	34.31	1.00	34.31	0.079	No	No	1.27
370	8.28	3.57	2.10	0.43	0.70	35.71	1.00	35.71	0.080	No	No	1.28
371	8.30	3.68	2.08	0.41	0.69	36.83	1.00	36.83	0.081	No	No	1.30
372	8.32	3.78	2.07	0.41	0.68	37.85	1.00	37.85	0.082	No	No	1.31
373	8.34	3.85	2.04	0.37	0.68	38.45	1.00	38.45	0.082	No	No	1.32
374	8.36	3.90	2.03	0.34	0.67	38.94	1.00	38.94	0.082	No	No	1.32
375	8.38	3.95	2.00	0.31	0.66	39.35	1.00	39.35	0.083	No	No	1.33
376	8.40	3.99	1.99	0.28	0.65	39.77	1.00	39.77	0.083	No	No	1.33
377	8.42	4.03	1.96	0.23	0.64	40.05	1.00	40.05	0.083	No	No	1.33
378	8.44	4.06	1.95	0.22	0.64	40.32	1.00	40.32	0.084	No	No	1.34
379	8.46	4.07	1.94	0.21	0.64	40.46	1.00	40.46	0.084	No	No	1.34
380	8.48	4.06	1.95	0.21	0.64	40.26	1.00	40.26	0.084	No	No	1.33
381	8.50	4.07	1.94	0.21	0.64	40.39	1.00	40.39	0.084	No	No	1.33
382	8.52	4.15	1.93	0.21	0.63	41.11	1.00	41.11	0.084	No	No	1.34
383	8.54	4.30	1.91	0.20	0.63	42.65	1.00	42.65	0.086	No	No	1.36
384	8.56	4.53	1.89	0.19	0.62	44.87	1.00	44.87	0.087	No	No	1.39

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	4.79	1.86	0.19	0.61	47.45	1.00	47.45	0.090	No	No	1.42
386	8.60	5.00	1.84	0.19	0.60	49.56	1.00	49.56	0.091	No	No	1.45
387	8.62	5.11	1.83	0.19	0.60	50.68	1.00	50.68	0.092	No	No	1.46
388	8.64	5.13	1.84	0.20	0.60	50.80	1.00	50.80	0.092	No	No	1.46
389	8.66	5.03	1.86	0.22	0.61	49.78	1.00	49.78	0.091	No	No	1.45
390	8.68	4.88	1.88	0.23	0.61	48.21	1.00	48.21	0.090	No	No	1.43
391	8.70	4.71	1.91	0.25	0.62	46.40	1.00	46.40	0.089	No	No	1.40
392	8.72	4.53	1.93	0.26	0.63	44.64	1.00	44.64	0.087	No	No	1.38
393	8.74	4.34	1.96	0.28	0.64	42.64	1.00	42.64	0.086	No	No	1.35
394	8.76	4.19	1.97	0.28	0.65	41.09	1.00	41.09	0.084	No	No	1.33
395	8.78	4.04	1.99	0.28	0.66	39.60	1.00	39.60	0.083	No	No	1.31
396	8.80	3.89	2.01	0.29	0.66	38.03	1.00	38.03	0.082	No	No	1.29
397	8.82	3.77	2.02	0.29	0.67	36.78	1.00	36.78	0.081	No	No	1.27
398	8.84	3.70	2.03	0.28	0.67	35.97	1.00	35.97	0.080	No	No	1.26
399	8.86	3.59	2.04	0.29	0.68	34.83	1.00	34.83	0.079	No	No	1.25
400	8.88	3.46	2.06	0.29	0.68	33.53	1.00	33.53	0.078	No	No	1.23
401	8.90	3.34	2.08	0.31	0.69	32.27	1.00	32.27	0.077	No	No	1.21
402	8.92	3.21	2.11	0.32	0.70	30.98	1.00	30.98	0.076	No	No	1.19
403	8.94	3.14	2.12	0.33	0.71	30.20	1.00	30.20	0.075	No	No	1.18
404	8.96	3.28	2.09	0.31	0.70	31.58	1.00	31.58	0.076	No	No	1.20
405	8.98	3.31	2.09	0.31	0.70	31.83	1.00	31.83	0.077	No	No	1.20
406	9.00	3.59	2.04	0.28	0.68	34.62	1.00	34.62	0.079	No	No	1.24
407	9.02	3.92	2.00	0.26	0.66	37.93	1.00	37.93	0.082	No	No	1.28
408	9.04	4.20	1.96	0.25	0.65	40.64	1.00	40.64	0.084	No	No	1.31
409	9.06	4.25	1.96	0.26	0.65	41.18	1.00	41.18	0.084	No	No	1.32
410	9.08	4.45	1.94	0.25	0.64	43.05	1.00	43.05	0.086	No	No	1.34
411	9.10	4.40	1.95	0.27	0.64	42.56	1.00	42.56	0.085	No	No	1.34
412	9.12	4.30	1.97	0.28	0.65	41.49	1.00	41.49	0.085	No	No	1.32
413	9.14	4.22	1.97	0.28	0.65	40.73	1.00	40.73	0.084	No	No	1.31
414	9.16	4.19	1.97	0.27	0.65	40.32	1.00	40.32	0.084	No	No	1.31
415	9.18	4.13	1.98	0.27	0.65	39.70	1.00	39.70	0.083	No	No	1.30
416	9.20	4.04	1.99	0.28	0.66	38.83	1.00	38.83	0.082	No	No	1.28
417	9.22	3.94	2.00	0.27	0.66	37.78	1.00	37.78	0.081	No	No	1.27
418	9.24	3.80	2.02	0.27	0.67	36.34	1.00	36.34	0.080	No	No	1.25
419	9.26	3.64	2.04	0.29	0.68	34.70	1.00	34.70	0.079	No	No	1.23
420	9.28	3.53	2.06	0.28	0.68	33.58	1.00	33.58	0.078	No	No	1.21
421	9.30	3.49	2.05	0.27	0.68	33.17	1.00	33.17	0.078	No	No	1.21
422	9.32	3.52	2.04	0.26	0.68	33.42	1.00	33.42	0.078	No	No	1.21
423	9.34	3.62	2.03	0.24	0.67	34.35	1.00	34.35	0.079	No	No	1.22
424	9.36	3.79	2.00	0.22	0.66	36.02	1.00	36.02	0.080	No	No	1.24
425	9.38	3.97	1.98	0.23	0.65	37.79	1.00	37.79	0.081	No	No	1.27
426	9.40	4.10	1.96	0.22	0.65	39.03	1.00	39.03	0.083	No	No	1.28
427	9.42	4.15	1.96	0.23	0.65	39.51	1.00	39.51	0.083	No	No	1.29
428	9.44	4.12	1.97	0.23	0.65	39.19	1.00	39.19	0.083	No	No	1.28
429	9.46	4.01	1.98	0.24	0.66	38.06	1.00	38.06	0.082	No	No	1.27
430	9.48	3.85	2.01	0.25	0.66	36.40	1.00	36.40	0.080	No	No	1.24
431	9.50	3.71	2.03	0.27	0.67	35.04	1.00	35.04	0.079	No	No	1.23
432	9.52	3.65	2.03	0.26	0.68	34.38	1.00	34.38	0.079	No	No	1.22

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	9.54	3.62	2.04	0.27	0.68	34.09	1.00	34.09	0.078	No	No	1.21
434	9.56	3.64	2.04	0.27	0.68	34.25	1.00	34.25	0.079	No	No	1.21
435	9.58	3.69	2.03	0.26	0.67	34.72	1.00	34.72	0.079	No	No	1.22
436	9.60	3.72	2.03	0.26	0.67	34.95	1.00	34.95	0.079	No	No	1.22
437	9.62	3.70	2.04	0.28	0.68	34.69	1.00	34.69	0.079	No	No	1.22
438	9.64	3.67	2.05	0.29	0.68	34.38	1.00	34.38	0.079	No	No	1.21
439	9.66	3.66	2.06	0.30	0.69	34.22	1.00	34.22	0.079	No	No	1.21
440	9.68	3.68	2.06	0.32	0.69	34.44	1.00	34.44	0.079	No	No	1.21
441	9.70	3.79	2.05	0.32	0.68	35.44	1.00	35.44	0.080	No	No	1.23
442	9.72	3.89	2.03	0.30	0.68	36.41	1.00	36.41	0.080	No	No	1.24
443	9.74	4.00	2.01	0.29	0.67	37.49	1.00	37.49	0.081	No	No	1.25
444	9.76	4.10	2.00	0.28	0.66	38.43	1.00	38.43	0.082	No	No	1.26
445	9.78	4.19	1.98	0.25	0.65	39.25	1.00	39.25	0.083	No	No	1.27
446	9.80	4.21	1.98	0.26	0.65	39.38	1.00	39.38	0.083	No	No	1.27
447	9.82	4.25	1.98	0.26	0.65	39.80	1.00	39.80	0.083	No	No	1.28
448	9.84	4.29	1.97	0.26	0.65	40.08	1.00	40.08	0.083	No	No	1.28
449	9.86	4.32	1.96	0.25	0.65	40.41	1.00	40.41	0.084	No	No	1.28
450	9.88	4.34	1.97	0.26	0.65	40.53	1.00	40.53	0.084	No	No	1.29
451	9.90	4.42	1.96	0.25	0.65	41.30	1.00	41.30	0.084	No	No	1.30
452	9.92	4.47	1.95	0.24	0.64	41.74	1.00	41.74	0.085	No	No	1.30
453	9.94	4.52	1.95	0.26	0.64	42.21	1.00	42.21	0.085	No	No	1.31
454	9.96	4.54	1.95	0.26	0.64	42.37	1.00	42.37	0.085	No	No	1.31
455	9.98	4.54	1.95	0.26	0.65	42.31	1.00	42.31	0.085	No	No	1.31
456	10.00	4.42	1.96	0.27	0.65	41.10	1.00	41.10	0.084	No	No	1.29
457	10.02	4.27	1.98	0.26	0.66	39.57	1.00	39.57	4.000	Yes	No	2.00
458	10.04	3.90	2.03	0.29	0.68	35.97	1.00	35.97	4.000	Yes	No	2.00
459	10.06	3.44	2.11	0.35	0.71	31.46	1.00	31.46	4.000	Yes	No	2.00
460	10.08	2.91	2.21	0.41	0.75	26.33	1.00	26.33	4.000	Yes	No	2.00
461	10.10	2.37	2.35	0.55	0.80	21.11	2.14	45.18	4.000	Yes	No	2.00
462	10.12	1.83	2.55	0.87	0.87	15.87	3.86	61.34	4.000	Yes	No	2.00
463	10.14	1.46	2.74	1.35	0.95	12.28	5.11	62.79	4.000	Yes	Yes	2.00
464	10.16	1.25	2.88	1.90	1.00	10.26	6.91	70.83	4.000	Yes	Yes	2.00
465	10.18	1.23	2.92	2.22	1.00	10.08	7.53	75.89	4.000	Yes	Yes	2.00
466	10.20	1.19	2.97	2.57	1.00	9.66	8.32	80.37	4.000	Yes	Yes	2.00
467	10.22	1.39	2.88	2.30	1.00	11.55	6.93	79.98	0.551	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	1.83	0.00	0.00	0.02	0.00
5.42	1.82	0.00	0.00	0.02	0.00	5.44	1.85	0.00	0.00	0.02	0.00
5.46	1.88	0.00	0.00	0.02	0.00	5.48	1.92	0.00	0.00	0.02	0.00
5.50	1.95	0.00	0.00	0.02	0.00	5.52	1.96	0.00	0.00	0.02	0.00
5.54	1.94	0.00	0.00	0.02	0.00	5.56	1.90	0.00	0.00	0.02	0.00
5.58	1.85	0.00	0.00	0.02	0.00	5.60	1.80	0.00	0.00	0.02	0.00
5.62	1.76	0.00	0.00	0.02	0.00	5.64	1.71	0.00	0.00	0.02	0.00
5.66	1.68	0.00	0.00	0.02	0.00	5.68	1.65	0.00	0.00	0.02	0.00
5.70	1.64	0.00	0.00	0.02	0.00	5.72	1.30	0.00	0.00	0.02	0.00
5.74	1.29	0.00	0.00	0.02	0.00	5.76	1.29	0.00	0.00	0.02	0.00
5.78	1.62	0.00	0.00	0.02	0.00	5.80	1.63	0.00	0.00	0.02	0.00
5.82	1.64	0.00	0.00	0.02	0.00	5.84	1.66	0.00	0.00	0.02	0.00
5.86	1.67	0.00	0.00	0.02	0.00	5.88	1.67	0.00	0.00	0.02	0.00
5.90	1.66	0.00	0.00	0.02	0.00	5.92	1.66	0.00	0.00	0.02	0.00
5.94	1.66	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	1.81	0.00	0.00	0.02	0.00	7.24	1.80	0.00	0.00	0.02	0.00
7.26	1.78	0.00	0.00	0.02	0.00	7.28	1.72	0.00	0.00	0.02	0.00
7.30	1.97	0.00	0.00	0.02	0.00	7.32	1.89	0.00	0.00	0.02	0.00
7.34	1.88	0.00	0.00	0.02	0.00	7.36	1.90	0.00	0.00	0.02	0.00
7.38	1.94	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	1.94	0.00	0.00	0.02	0.00
7.58	1.88	0.00	0.00	0.02	0.00	7.60	1.83	0.00	0.00	0.02	0.00
7.62	1.80	0.00	0.00	0.02	0.00	7.64	1.77	0.00	0.00	0.02	0.00
7.66	1.74	0.00	0.00	0.02	0.00	7.68	1.70	0.00	0.00	0.02	0.00
7.70	1.66	0.00	0.00	0.02	0.00	7.72	1.63	0.00	0.00	0.02	0.00
7.74	1.62	0.00	0.00	0.02	0.00	7.76	1.61	0.00	0.00	0.02	0.00
7.78	1.62	0.00	0.00	0.02	0.00	7.80	1.64	0.00	0.00	0.02	0.00
7.82	1.68	0.00	0.00	0.02	0.00	7.84	1.71	0.00	0.00	0.02	0.00
7.86	1.75	0.00	0.00	0.02	0.00	7.88	1.80	0.00	0.00	0.02	0.00
7.90	1.85	0.00	0.00	0.02	0.00	7.92	1.85	0.00	0.00	0.02	0.00
7.94	1.81	0.00	0.00	0.02	0.00	7.96	1.75	0.00	0.00	0.02	0.00
7.98	1.67	0.00	0.00	0.02	0.00	8.00	1.59	0.00	0.00	0.02	0.00
8.02	1.53	0.00	0.00	0.02	0.00	8.04	1.27	0.00	0.00	0.02	0.00
8.06	1.22	0.00	0.00	0.02	0.00	8.08	1.16	0.00	0.00	0.02	0.00
8.10	1.11	0.00	0.00	0.02	0.00	8.12	1.40	0.00	0.00	0.02	0.00
8.14	1.52	0.00	0.00	0.02	0.00	8.16	1.70	0.00	0.00	0.02	0.00
8.18	1.50	0.00	0.00	0.02	0.00	8.20	1.49	0.00	0.00	0.02	0.00
8.22	1.47	0.00	0.00	0.02	0.00	8.24	1.46	0.00	0.00	0.02	0.00
8.26	1.27	0.00	0.00	0.02	0.00	8.28	1.28	0.00	0.00	0.02	0.00
8.30	1.30	0.00	0.00	0.02	0.00	8.32	1.31	0.00	0.00	0.02	0.00
8.34	1.32	0.00	0.00	0.02	0.00	8.36	1.32	0.00	0.00	0.02	0.00
8.38	1.33	0.00	0.00	0.02	0.00	8.40	1.33	0.00	0.00	0.02	0.00
8.42	1.33	0.00	0.00	0.02	0.00	8.44	1.34	0.00	0.00	0.02	0.00
8.46	1.34	0.00	0.00	0.02	0.00	8.48	1.33	0.00	0.00	0.02	0.00
8.50	1.33	0.00	0.00	0.02	0.00	8.52	1.34	0.00	0.00	0.02	0.00
8.54	1.36	0.00	0.00	0.02	0.00	8.56	1.39	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	1.42	0.00	0.00	0.02	0.00	8.60	1.45	0.00	0.00	0.02	0.00
8.62	1.46	0.00	0.00	0.02	0.00	8.64	1.46	0.00	0.00	0.02	0.00
8.66	1.45	0.00	0.00	0.02	0.00	8.68	1.43	0.00	0.00	0.02	0.00
8.70	1.40	0.00	0.00	0.02	0.00	8.72	1.38	0.00	0.00	0.02	0.00
8.74	1.35	0.00	0.00	0.02	0.00	8.76	1.33	0.00	0.00	0.02	0.00
8.78	1.31	0.00	0.00	0.02	0.00	8.80	1.29	0.00	0.00	0.02	0.00
8.82	1.27	0.00	0.00	0.02	0.00	8.84	1.26	0.00	0.00	0.02	0.00
8.86	1.25	0.00	0.00	0.02	0.00	8.88	1.23	0.00	0.00	0.02	0.00
8.90	1.21	0.00	0.00	0.02	0.00	8.92	1.19	0.00	0.00	0.02	0.00
8.94	1.18	0.00	0.00	0.02	0.00	8.96	1.20	0.00	0.00	0.02	0.00
8.98	1.20	0.00	0.00	0.02	0.00	9.00	1.24	0.00	0.00	0.02	0.00
9.02	1.28	0.00	0.00	0.02	0.00	9.04	1.31	0.00	0.00	0.02	0.00
9.06	1.32	0.00	0.00	0.02	0.00	9.08	1.34	0.00	0.00	0.02	0.00
9.10	1.34	0.00	0.00	0.02	0.00	9.12	1.32	0.00	0.00	0.02	0.00
9.14	1.31	0.00	0.00	0.02	0.00	9.16	1.31	0.00	0.00	0.02	0.00
9.18	1.30	0.00	0.00	0.02	0.00	9.20	1.28	0.00	0.00	0.02	0.00
9.22	1.27	0.00	0.00	0.02	0.00	9.24	1.25	0.00	0.00	0.02	0.00
9.26	1.23	0.00	0.00	0.02	0.00	9.28	1.21	0.00	0.00	0.02	0.00
9.30	1.21	0.00	0.00	0.02	0.00	9.32	1.21	0.00	0.00	0.02	0.00
9.34	1.22	0.00	0.00	0.02	0.00	9.36	1.24	0.00	0.00	0.02	0.00
9.38	1.27	0.00	0.00	0.02	0.00	9.40	1.28	0.00	0.00	0.02	0.00
9.42	1.29	0.00	0.00	0.02	0.00	9.44	1.28	0.00	0.00	0.02	0.00
9.46	1.27	0.00	0.00	0.02	0.00	9.48	1.24	0.00	0.00	0.02	0.00
9.50	1.23	0.00	0.00	0.02	0.00	9.52	1.22	0.00	0.00	0.02	0.00
9.54	1.21	0.00	0.00	0.02	0.00	9.56	1.21	0.00	0.00	0.02	0.00
9.58	1.22	0.00	0.00	0.02	0.00	9.60	1.22	0.00	0.00	0.02	0.00
9.62	1.22	0.00	0.00	0.02	0.00	9.64	1.21	0.00	0.00	0.02	0.00
9.66	1.21	0.00	0.00	0.02	0.00	9.68	1.21	0.00	0.00	0.02	0.00
9.70	1.23	0.00	0.00	0.02	0.00	9.72	1.24	0.00	0.00	0.02	0.00
9.74	1.25	0.00	0.00	0.02	0.00	9.76	1.26	0.00	0.00	0.02	0.00
9.78	1.27	0.00	0.00	0.02	0.00	9.80	1.27	0.00	0.00	0.02	0.00
9.82	1.28	0.00	0.00	0.02	0.00	9.84	1.28	0.00	0.00	0.02	0.00
9.86	1.28	0.00	0.00	0.02	0.00	9.88	1.29	0.00	0.00	0.02	0.00
9.90	1.30	0.00	0.00	0.02	0.00	9.92	1.30	0.00	0.00	0.02	0.00
9.94	1.31	0.00	0.00	0.02	0.00	9.96	1.31	0.00	0.00	0.02	0.00
9.98	1.31	0.00	0.00	0.02	0.00	10.00	1.29	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	2.00	0.00	0.00	0.02	0.00
10.22	2.00	0.00	0.00	0.02	0.00						

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

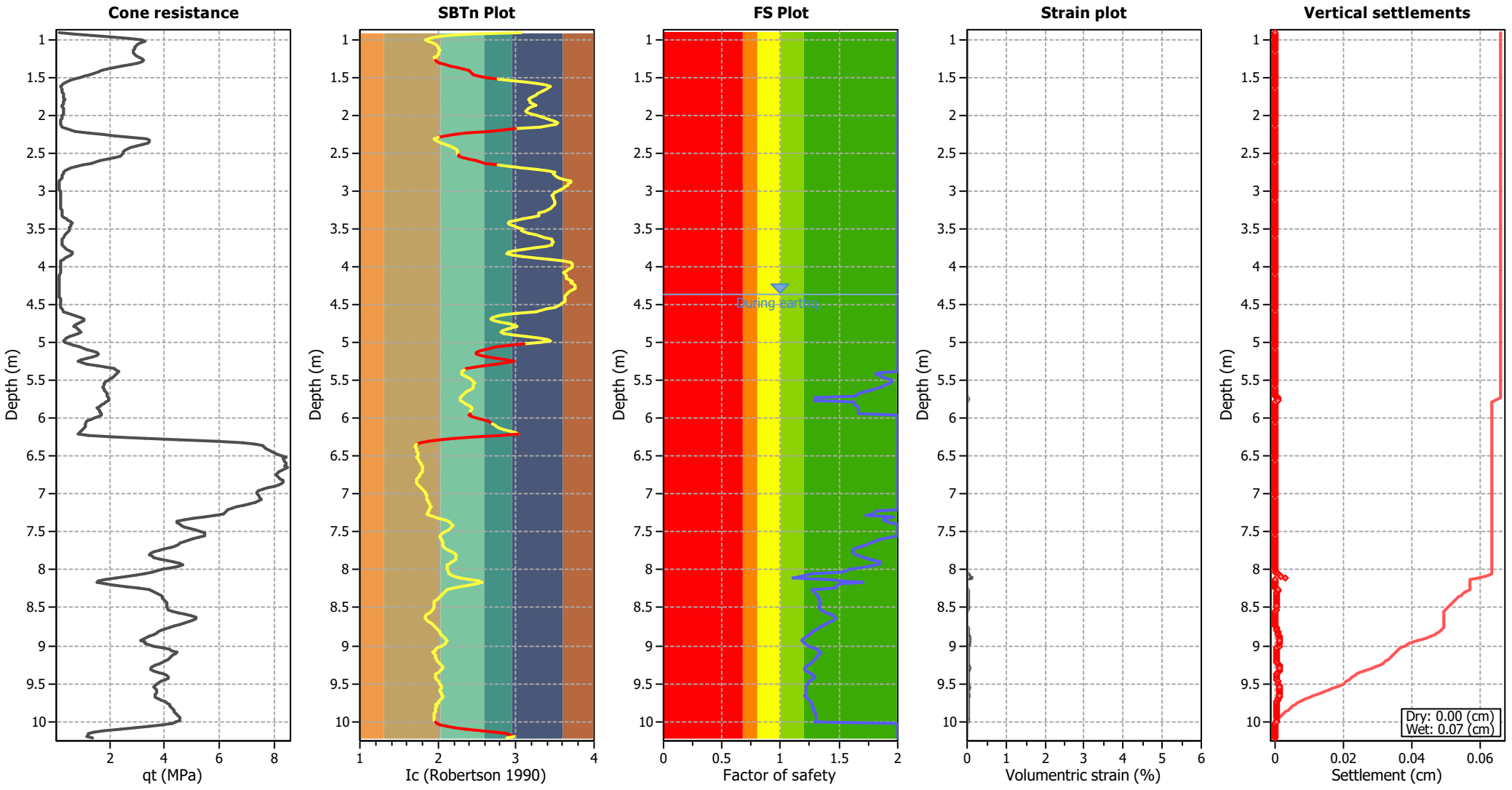
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.36	51.83	2.00	0.00	0.76	0.00	4.38	52.32	2.00	0.00	0.76	0.00
4.40	52.80	2.00	0.00	0.76	0.00	4.42	53.57	2.00	0.00	0.75	0.00
4.44	54.17	2.00	0.00	0.75	0.00	4.46	54.84	2.00	0.00	0.75	0.00
4.48	55.07	2.00	0.00	0.75	0.00	4.50	55.37	2.00	0.00	0.75	0.00
4.52	55.38	2.00	0.00	0.75	0.00	4.54	55.40	2.00	0.00	0.75	0.00
4.56	55.38	2.00	0.00	0.75	0.00	4.58	55.27	2.00	0.00	0.75	0.00
4.60	55.25	2.00	0.00	0.74	0.00	4.62	55.90	2.00	0.00	0.74	0.00
4.64	57.00	2.00	0.00	0.74	0.00	4.66	127.02	2.00	0.00	0.74	0.00
4.68	123.51	2.00	0.00	0.74	0.00	4.70	68.59	2.00	0.00	0.74	0.00
4.72	73.73	2.00	0.00	0.74	0.00	4.74	79.42	2.00	0.00	0.74	0.00
4.76	82.06	2.00	0.00	0.74	0.00	4.78	83.33	2.00	0.00	0.73	0.00
4.80	82.50	2.00	0.00	0.73	0.00	4.82	79.60	2.00	0.00	0.73	0.00
4.84	75.49	2.00	0.00	0.73	0.00	4.86	73.23	2.00	0.00	0.73	0.00
4.88	73.23	2.00	0.00	0.73	0.00	4.90	75.23	2.00	0.00	0.73	0.00
4.92	76.55	2.00	0.00	0.73	0.00	4.94	77.11	2.00	0.00	0.73	0.00
4.96	76.95	2.00	0.00	0.72	0.00	4.98	74.56	2.00	0.00	0.72	0.00
5.00	71.72	2.00	0.00	0.72	0.00	5.02	68.85	2.00	0.00	0.72	0.00
5.04	64.24	2.00	0.00	0.72	0.00	5.06	58.82	2.00	0.00	0.72	0.00
5.08	82.42	2.00	0.00	0.72	0.00	5.10	59.40	2.00	0.00	0.72	0.00
5.12	56.81	2.00	0.00	0.72	0.00	5.14	59.82	2.00	0.00	0.71	0.00
5.16	73.46	2.00	0.00	0.71	0.00	5.18	118.64	2.00	0.00	0.71	0.00
5.20	79.82	2.00	0.00	0.71	0.00	5.22	86.30	2.00	0.00	0.71	0.00
5.24	90.16	2.00	0.00	0.71	0.00	5.26	86.50	2.00	0.00	0.71	0.00
5.28	80.87	2.00	0.00	0.71	0.00	5.30	101.96	2.00	0.00	0.71	0.00
5.32	65.53	2.00	0.00	0.70	0.00	5.34	60.02	2.00	0.00	0.70	0.00
5.36	57.67	2.00	0.00	0.70	0.00	5.38	55.20	2.00	0.00	0.70	0.00
5.40	54.27	1.83	0.00	0.70	0.00	5.42	53.76	1.82	0.00	0.70	0.00
5.44	55.70	1.85	0.00	0.70	0.00	5.46	57.84	1.88	0.00	0.70	0.00
5.48	60.16	1.92	0.00	0.70	0.00	5.50	61.68	1.95	0.00	0.69	0.00
5.52	62.34	1.96	0.00	0.69	0.00	5.54	61.91	1.94	0.00	0.69	0.00
5.56	60.10	1.90	0.00	0.69	0.00	5.58	57.49	1.85	0.00	0.69	0.00
5.60	54.59	1.80	0.00	0.69	0.00	5.62	52.06	1.76	0.00	0.69	0.00
5.64	48.94	1.71	0.00	0.69	0.00	5.66	46.98	1.68	0.00	0.69	0.00
5.68	45.66	1.65	0.00	0.68	0.00	5.70	44.80	1.64	0.00	0.68	0.00
5.72	23.20	1.30	0.04	0.68	0.00	5.74	23.17	1.29	0.04	0.68	0.00
5.76	23.14	1.29	0.04	0.68	0.00	5.78	44.55	1.62	0.00	0.68	0.00
5.80	45.32	1.63	0.00	0.68	0.00	5.82	46.23	1.64	0.00	0.68	0.00
5.84	47.27	1.66	0.00	0.68	0.00	5.86	48.46	1.67	0.00	0.67	0.00
5.88	48.30	1.67	0.00	0.67	0.00	5.90	48.35	1.66	0.00	0.67	0.00
5.92	48.41	1.66	0.00	0.67	0.00	5.94	48.47	1.66	0.00	0.67	0.00
5.96	47.55	2.00	0.00	0.67	0.00	5.98	47.93	2.00	0.00	0.67	0.00
6.00	50.02	2.00	0.00	0.67	0.00	6.02	68.24	2.00	0.00	0.67	0.00
6.04	93.85	2.00	0.00	0.66	0.00	6.06	131.65	2.00	0.00	0.66	0.00
6.08	64.87	2.00	0.00	0.66	0.00	6.10	68.65	2.00	0.00	0.66	0.00
6.12	72.93	2.00	0.00	0.66	0.00	6.14	79.07	2.00	0.00	0.66	0.00
6.16	85.11	2.00	0.00	0.66	0.00	6.18	89.62	2.00	0.00	0.66	0.00
6.20	92.06	2.00	0.00	0.66	0.00	6.22	84.96	2.00	0.00	0.65	0.00
6.24	69.49	2.00	0.00	0.65	0.00	6.26	62.37	2.00	0.00	0.65	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.28	68.99	2.00	0.00	0.65	0.00	6.30	66.69	2.00	0.00	0.65	0.00
6.32	76.53	2.00	0.00	0.65	0.00	6.34	81.69	2.00	0.00	0.65	0.00
6.36	84.04	2.00	0.00	0.65	0.00	6.38	84.98	2.00	0.00	0.65	0.00
6.40	85.50	2.00	0.00	0.64	0.00	6.42	86.51	2.00	0.00	0.64	0.00
6.44	87.55	2.00	0.00	0.64	0.00	6.46	88.62	2.00	0.00	0.64	0.00
6.48	89.95	2.00	0.00	0.64	0.00	6.50	91.47	2.00	0.00	0.64	0.00
6.52	93.02	2.00	0.00	0.64	0.00	6.54	91.82	2.00	0.00	0.64	0.00
6.56	102.36	2.00	0.00	0.64	0.00	6.58	104.68	2.00	0.00	0.63	0.00
6.60	106.47	2.00	0.00	0.63	0.00	6.62	106.80	2.00	0.00	0.63	0.00
6.64	107.84	2.00	0.00	0.63	0.00	6.66	107.16	2.00	0.00	0.63	0.00
6.68	104.98	2.00	0.00	0.63	0.00	6.70	102.73	2.00	0.00	0.63	0.00
6.72	101.01	2.00	0.00	0.63	0.00	6.74	88.39	2.00	0.00	0.63	0.00
6.76	88.27	2.00	0.00	0.62	0.00	6.78	88.60	2.00	0.00	0.62	0.00
6.80	89.25	2.00	0.00	0.62	0.00	6.82	90.10	2.00	0.00	0.62	0.00
6.84	90.05	2.00	0.00	0.62	0.00	6.86	89.46	2.00	0.00	0.62	0.00
6.88	88.23	2.00	0.00	0.62	0.00	6.90	86.37	2.00	0.00	0.62	0.00
6.92	83.87	2.00	0.00	0.62	0.00	6.94	82.06	2.00	0.00	0.61	0.00
6.96	95.07	2.00	0.00	0.61	0.00	6.98	94.91	2.00	0.00	0.61	0.00
7.00	95.35	2.00	0.00	0.61	0.00	7.02	96.47	2.00	0.00	0.61	0.00
7.04	96.97	2.00	0.00	0.61	0.00	7.06	97.50	2.00	0.00	0.61	0.00
7.08	97.45	2.00	0.00	0.61	0.00	7.10	96.34	2.00	0.00	0.61	0.00
7.12	94.08	2.00	0.00	0.60	0.00	7.14	91.30	2.00	0.00	0.60	0.00
7.16	88.34	2.00	0.00	0.60	0.00	7.18	85.59	2.00	0.00	0.60	0.00
7.20	83.23	2.00	0.00	0.60	0.00	7.22	66.57	1.81	0.00	0.60	0.00
7.24	65.99	1.80	0.00	0.60	0.00	7.26	65.35	1.78	0.00	0.60	0.00
7.28	62.31	1.72	0.00	0.60	0.00	7.30	73.58	1.97	0.00	0.59	0.00
7.32	70.71	1.89	0.00	0.59	0.00	7.34	69.99	1.88	0.00	0.59	0.00
7.36	70.93	1.90	0.00	0.59	0.00	7.38	72.98	1.94	0.00	0.59	0.00
7.40	75.99	2.00	0.00	0.59	0.00	7.42	78.18	2.00	0.00	0.59	0.00
7.44	79.39	2.00	0.00	0.59	0.00	7.46	80.22	2.00	0.00	0.59	0.00
7.48	80.40	2.00	0.00	0.58	0.00	7.50	79.46	2.00	0.00	0.58	0.00
7.52	78.43	2.00	0.00	0.58	0.00	7.54	76.54	2.00	0.00	0.58	0.00
7.56	73.62	1.94	0.00	0.58	0.00	7.58	70.87	1.88	0.00	0.58	0.00
7.60	68.94	1.83	0.00	0.58	0.00	7.62	67.45	1.80	0.00	0.58	0.00
7.64	66.07	1.77	0.00	0.58	0.00	7.66	64.79	1.74	0.00	0.57	0.00
7.68	62.92	1.70	0.00	0.57	0.00	7.70	60.74	1.66	0.00	0.57	0.00
7.72	58.77	1.63	0.00	0.57	0.00	7.74	58.34	1.62	0.00	0.57	0.00
7.76	58.04	1.61	0.00	0.57	0.00	7.78	58.76	1.62	0.00	0.57	0.00
7.80	60.12	1.64	0.00	0.57	0.00	7.82	62.19	1.68	0.00	0.57	0.00
7.84	63.95	1.71	0.00	0.56	0.00	7.86	66.28	1.75	0.00	0.56	0.00
7.88	68.76	1.80	0.00	0.56	0.00	7.90	70.79	1.85	0.00	0.56	0.00
7.92	70.79	1.85	0.00	0.56	0.00	7.94	69.34	1.81	0.00	0.56	0.00
7.96	66.55	1.75	0.00	0.56	0.00	7.98	62.54	1.67	0.00	0.56	0.00
8.00	57.51	1.59	0.00	0.56	0.00	8.02	53.19	1.53	0.00	0.55	0.00
8.04	33.47	1.27	0.04	0.55	0.00	8.06	29.86	1.22	0.07	0.55	0.00
8.08	26.08	1.16	0.09	0.55	0.00	8.10	22.30	1.11	0.14	0.55	0.00
8.12	43.82	1.40	0.00	0.55	0.00	8.14	53.02	1.52	0.00	0.55	0.00
8.16	64.60	1.70	0.00	0.55	0.00	8.18	52.10	1.50	0.00	0.55	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.20	51.20	1.49	0.00	0.54	0.00	8.22	49.41	1.47	0.00	0.54	0.00
8.24	48.97	1.46	0.00	0.54	0.00	8.26	34.31	1.27	0.04	0.54	0.00
8.28	35.71	1.28	0.03	0.54	0.00	8.30	36.83	1.30	0.03	0.54	0.00
8.32	37.85	1.31	0.03	0.54	0.00	8.34	38.45	1.32	0.03	0.54	0.00
8.36	38.94	1.32	0.03	0.54	0.00	8.38	39.35	1.33	0.02	0.53	0.00
8.40	39.77	1.33	0.02	0.53	0.00	8.42	40.05	1.33	0.02	0.53	0.00
8.44	40.32	1.34	0.02	0.53	0.00	8.46	40.46	1.34	0.02	0.53	0.00
8.48	40.26	1.33	0.02	0.53	0.00	8.50	40.39	1.33	0.02	0.53	0.00
8.52	41.11	1.34	0.02	0.53	0.00	8.54	42.65	1.36	0.00	0.53	0.00
8.56	44.87	1.39	0.00	0.52	0.00	8.58	47.45	1.42	0.00	0.52	0.00
8.60	49.56	1.45	0.00	0.52	0.00	8.62	50.68	1.46	0.00	0.52	0.00
8.64	50.80	1.46	0.00	0.52	0.00	8.66	49.78	1.45	0.00	0.52	0.00
8.68	48.21	1.43	0.00	0.52	0.00	8.70	46.40	1.40	0.00	0.52	0.00
8.72	44.64	1.38	0.00	0.52	0.00	8.74	42.64	1.35	0.00	0.51	0.00
8.76	41.09	1.33	0.02	0.51	0.00	8.78	39.60	1.31	0.03	0.51	0.00
8.80	38.03	1.29	0.03	0.51	0.00	8.82	36.78	1.27	0.03	0.51	0.00
8.84	35.97	1.26	0.03	0.51	0.00	8.86	34.83	1.25	0.05	0.51	0.00
8.88	33.53	1.23	0.06	0.51	0.00	8.90	32.27	1.21	0.06	0.51	0.00
8.92	30.98	1.19	0.07	0.50	0.00	8.94	30.20	1.18	0.07	0.50	0.00
8.96	31.58	1.20	0.07	0.50	0.00	8.98	31.83	1.20	0.07	0.50	0.00
9.00	34.62	1.24	0.05	0.50	0.00	9.02	37.93	1.28	0.03	0.50	0.00
9.04	40.64	1.31	0.02	0.50	0.00	9.06	41.18	1.32	0.02	0.50	0.00
9.08	43.05	1.34	0.02	0.50	0.00	9.10	42.56	1.34	0.02	0.49	0.00
9.12	41.49	1.32	0.02	0.49	0.00	9.14	40.73	1.31	0.02	0.49	0.00
9.16	40.32	1.31	0.02	0.49	0.00	9.18	39.70	1.30	0.03	0.49	0.00
9.20	38.83	1.28	0.03	0.49	0.00	9.22	37.78	1.27	0.03	0.49	0.00
9.24	36.34	1.25	0.03	0.49	0.00	9.26	34.70	1.23	0.05	0.49	0.00
9.28	33.58	1.21	0.06	0.48	0.00	9.30	33.17	1.21	0.06	0.48	0.00
9.32	33.42	1.21	0.06	0.48	0.00	9.34	34.35	1.22	0.06	0.48	0.00
9.36	36.02	1.24	0.05	0.48	0.00	9.38	37.79	1.27	0.03	0.48	0.00
9.40	39.03	1.28	0.03	0.48	0.00	9.42	39.51	1.29	0.03	0.48	0.00
9.44	39.19	1.28	0.03	0.48	0.00	9.46	38.06	1.27	0.03	0.47	0.00
9.48	36.40	1.24	0.05	0.47	0.00	9.50	35.04	1.23	0.05	0.47	0.00
9.52	34.38	1.22	0.06	0.47	0.00	9.54	34.09	1.21	0.06	0.47	0.00
9.56	34.25	1.21	0.06	0.47	0.00	9.58	34.72	1.22	0.05	0.47	0.00
9.60	34.95	1.22	0.05	0.47	0.00	9.62	34.69	1.22	0.05	0.47	0.00
9.64	34.38	1.21	0.06	0.46	0.00	9.66	34.22	1.21	0.06	0.46	0.00
9.68	34.44	1.21	0.06	0.46	0.00	9.70	35.44	1.23	0.05	0.46	0.00
9.72	36.41	1.24	0.05	0.46	0.00	9.74	37.49	1.25	0.03	0.46	0.00
9.76	38.43	1.26	0.03	0.46	0.00	9.78	39.25	1.27	0.03	0.46	0.00
9.80	39.38	1.27	0.03	0.46	0.00	9.82	39.80	1.28	0.03	0.45	0.00
9.84	40.08	1.28	0.03	0.45	0.00	9.86	40.41	1.28	0.03	0.45	0.00
9.88	40.53	1.29	0.02	0.45	0.00	9.90	41.30	1.30	0.02	0.45	0.00
9.92	41.74	1.30	0.02	0.45	0.00	9.94	42.21	1.31	0.02	0.45	0.00
9.96	42.37	1.31	0.02	0.45	0.00	9.98	42.31	1.31	0.02	0.45	0.00
10.00	41.10	1.29	0.02	0.44	0.00	10.02	39.57	2.00	0.00	0.44	0.00
10.04	35.97	2.00	0.00	0.44	0.00	10.06	31.46	2.00	0.00	0.44	0.00
10.08	26.33	2.00	0.00	0.44	0.00	10.10	45.18	2.00	0.00	0.44	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.12	61.34	2.00	0.00	0.44	0.00	10.14	62.79	2.00	0.00	0.44	0.00
10.16	70.83	2.00	0.00	0.44	0.00	10.18	75.89	2.00	0.00	0.43	0.00
10.20	80.37	2.00	0.00	0.43	0.00	10.22	79.98	2.00	0.00	0.43	0.00

Total estimated settlement: 0.07

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.20	3.78	9.83	37.15	3.06	0.07	1.11
0.92	0.69	13.36	2.51	33.51	2.42	0.02	0.62
0.94	1.41	27.57	1.00	27.57	2.12	0.02	0.62
0.96	2.08	40.74	1.00	40.74	1.98	0.03	0.62
0.98	2.70	53.03	1.00	53.03	1.89	0.07	0.64
1.00	3.19	62.60	1.00	62.60	1.84	0.14	0.66
1.02	3.28	64.43	1.00	64.43	1.87	0.16	0.67
1.04	3.14	61.73	1.25	77.42	1.93	0.47	0.70
1.06	3.05	59.86	1.28	76.74	1.97	0.45	0.70
1.08	3.00	58.88	1.30	76.45	1.99	0.43	0.70
1.10	2.95	57.85	1.31	75.56	2.00	0.40	0.70
1.12	2.91	57.07	1.32	75.08	2.01	0.39	0.70
1.14	2.86	56.19	1.32	74.21	2.02	0.36	0.69
1.16	2.85	56.02	1.32	73.74	2.01	0.35	0.69
1.18	2.90	56.90	1.31	74.41	2.00	0.37	0.69
1.20	2.98	58.39	1.30	75.90	1.99	0.41	0.70
1.22	3.10	60.93	1.28	77.77	1.96	0.48	0.70
1.24	3.19	62.70	1.28	80.51	1.97	0.61	0.71
1.26	3.24	63.62	1.29	81.80	1.97	0.68	0.71
1.28	3.17	62.17	1.29	80.48	1.98	0.61	0.71
1.30	3.04	59.67	1.32	78.90	2.02	0.53	0.70
1.32	2.76	54.08	1.42	76.68	2.10	0.44	0.70
1.34	2.47	48.27	1.53	73.73	2.16	0.35	0.69
1.36	2.17	42.39	1.75	74.10	2.25	0.36	0.69
1.38	1.93	37.68	2.01	75.70	2.32	0.41	0.70
1.40	1.71	33.29	2.32	77.25	2.39	0.46	0.70
1.42	1.58	30.71	2.43	74.68	2.41	0.38	0.69
1.44	1.44	27.93	2.55	71.33	2.43	0.28	0.69
1.46	1.28	24.84	2.70	66.99	2.46	0.20	0.68
1.48	1.09	21.12	3.18	67.07	2.53	0.28	0.69
1.50	0.90	17.31	4.01	69.52	2.63	0.77	0.77
1.52	0.71	13.58	5.58	75.81	2.78	0.41	0.70
1.54	0.55	10.36	7.92	82.03	2.95	0.69	0.71
1.56	0.42	7.86	11.00	86.45	3.12	0.70	1.23
1.58	0.34	6.18	14.40	88.98	3.27	0.64	0.95
1.60	0.28	4.97	17.80	88.46	3.39	0.55	0.76
1.62	0.25	4.41	19.40	85.63	3.44	0.51	0.66
1.64	0.26	4.67	17.81	83.12	3.39	0.46	0.69
1.66	0.29	5.14	16.48	84.79	3.35	0.44	0.75
1.68	0.30	5.45	15.56	84.81	3.31	0.44	0.79
1.70	0.32	5.84	14.61	85.38	3.28	0.65	0.83
1.72	0.34	6.19	13.83	85.60	3.25	0.49	0.87
1.74	0.35	6.46	13.21	85.35	3.22	0.49	0.90
1.76	0.36	6.62	12.38	81.96	3.18	0.45	0.91
1.78	0.37	6.69	12.06	80.63	3.17	0.41	0.91
1.80	0.36	6.51	12.11	78.83	3.17	0.41	0.88
1.82	0.34	6.17	12.41	76.55	3.19	0.39	0.82
1.84	0.32	5.69	13.13	74.68	3.22	0.35	0.75

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.29	5.23	13.88	72.54	3.25	0.27	0.68
1.88	0.31	5.49	12.74	69.91	3.20	0.27	0.71
1.90	0.33	5.86	11.73	68.70	3.15	0.26	0.75
1.92	0.34	6.10	11.44	69.71	3.14	0.25	0.77
1.94	0.35	6.31	11.20	70.70	3.13	0.29	0.79
1.96	0.35	6.42	11.29	72.54	3.13	0.32	0.79
1.98	0.33	5.94	12.71	75.58	3.20	0.31	0.73
2.00	0.30	5.37	14.58	78.26	3.28	0.34	0.65
2.02	0.28	5.03	16.02	80.56	3.33	0.36	0.60
2.04	0.27	4.72	17.63	83.27	3.39	0.38	0.56
2.06	0.25	4.34	19.54	84.80	3.45	0.41	0.51
2.08	0.24	4.05	21.06	85.26	3.49	0.43	0.47
2.10	0.22	3.80	22.35	84.93	3.53	0.39	0.44
2.12	0.22	3.80	21.90	83.28	3.52	0.37	0.43
2.14	0.29	5.10	15.68	79.90	3.32	0.34	0.58
2.16	0.45	8.33	8.82	73.51	3.00	0.30	0.93
2.18	0.59	10.97	6.12	67.12	2.82	0.20	0.68
2.20	0.74	14.05	4.37	61.33	2.67	0.78	0.78
2.22	1.25	24.05	2.18	52.52	2.36	0.06	0.63
2.24	1.74	33.69	1.64	55.32	2.21	0.08	0.64
2.26	2.19	42.51	1.43	60.81	2.11	0.12	0.66
2.28	2.76	53.40	1.32	70.29	2.01	0.26	0.68
2.30	3.32	62.67	1.27	79.90	1.96	0.58	0.71
2.32	3.44	65.22	1.29	84.12	1.98	0.72	0.72
2.34	3.47	65.81	1.31	85.91	2.00	0.72	0.72
2.36	3.40	65.09	1.34	87.41	2.04	0.72	0.72
2.38	3.19	62.06	1.41	87.53	2.09	0.72	0.72
2.40	2.95	57.57	1.51	86.83	2.15	0.72	0.72
2.42	2.77	53.95	1.60	86.54	2.20	0.72	0.72
2.44	2.64	51.39	1.69	86.64	2.23	0.72	0.72
2.46	2.56	49.81	1.74	86.47	2.24	0.72	0.72
2.48	2.50	48.63	1.77	85.97	2.25	0.72	0.72
2.50	2.48	48.21	1.77	85.25	2.25	0.72	0.72
2.52	2.45	47.55	1.78	84.71	2.26	0.72	0.72
2.54	2.38	46.18	1.83	84.59	2.27	0.72	0.72
2.56	2.17	42.13	2.02	85.26	2.33	0.72	0.72
2.58	1.94	37.50	2.33	87.46	2.39	0.72	0.72
2.60	1.65	31.73	2.89	91.67	2.49	0.73	0.73
2.62	1.34	25.67	3.82	98.03	2.61	0.82	0.82
2.64	1.03	19.62	5.38	105.62	2.76	0.76	0.76
2.66	0.81	15.10	7.37	111.28	2.91	0.77	0.77
2.68	0.62	11.37	10.13	115.20	3.08	0.68	1.00
2.70	0.47	8.44	13.93	117.58	3.25	0.65	0.74
2.72	0.37	6.55	18.08	118.34	3.40	0.62	0.57
2.74	0.32	5.52	21.21	117.04	3.50	0.62	0.47
2.76	0.32	5.49	20.82	114.22	3.49	0.63	0.47
2.78	0.31	5.19	21.36	110.81	3.50	0.54	0.44
2.80	0.29	4.80	22.17	106.54	3.52	0.47	0.40

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.26	4.25	23.47	99.76	3.56	0.41	0.35
2.84	0.23	3.58	25.98	93.15	3.62	0.37	0.30
2.86	0.19	2.91	29.78	86.73	3.70	0.27	0.24
2.88	0.18	2.77	29.93	82.89	3.70	0.22	0.23
2.90	0.18	2.77	28.52	78.94	3.67	0.19	0.22
2.92	0.19	2.77	27.70	76.61	3.66	0.25	0.22
2.94	0.19	2.83	26.67	75.48	3.63	0.21	0.23
2.96	0.19	2.93	25.78	75.54	3.61	0.18	0.23
2.98	0.20	3.07	23.93	73.43	3.57	0.18	0.24
3.00	0.21	3.24	22.27	72.17	3.53	0.18	0.25
3.02	0.22	3.41	21.23	72.42	3.50	0.17	0.27
3.04	0.23	3.55	20.52	72.88	3.48	0.17	0.28
3.06	0.23	3.66	19.97	73.13	3.46	0.18	0.28
3.08	0.23	3.64	20.29	73.89	3.47	0.19	0.28
3.10	0.23	3.63	20.75	75.24	3.48	0.18	0.28
3.12	0.23	3.63	20.97	76.16	3.49	0.19	0.27
3.14	0.23	3.66	21.07	77.00	3.49	0.21	0.27
3.16	0.24	3.70	21.06	77.90	3.49	0.21	0.28
3.18	0.24	3.76	20.86	78.45	3.49	0.21	0.28
3.20	0.25	3.92	19.96	78.28	3.46	0.21	0.29
3.22	0.26	4.07	19.04	77.46	3.43	0.20	0.30
3.24	0.26	4.20	18.08	75.97	3.40	0.20	0.31
3.26	0.27	4.36	17.02	74.24	3.37	0.18	0.32
3.28	0.29	4.79	15.15	72.56	3.30	0.16	0.34
3.30	0.30	4.85	14.87	72.10	3.29	0.15	0.35
3.32	0.30	4.92	14.78	72.67	3.28	0.16	0.35
3.34	0.35	5.85	12.62	73.86	3.20	0.18	0.42
3.36	0.42	7.17	10.48	75.11	3.09	0.19	0.51
3.38	0.49	8.44	9.04	76.32	3.01	0.21	0.60
3.40	0.59	10.26	7.37	75.60	2.91	0.40	0.70
3.42	0.63	10.88	7.22	78.49	2.90	0.52	0.70
3.44	0.62	10.72	7.57	81.15	2.92	0.64	0.71
3.46	0.59	10.15	8.26	83.85	2.97	0.72	0.72
3.48	0.57	9.64	8.95	86.34	3.01	0.29	0.69
3.50	0.52	8.74	10.19	89.07	3.08	0.28	0.62
3.52	0.53	8.79	9.98	87.74	3.07	0.31	0.63
3.54	0.51	8.30	10.67	88.60	3.10	0.30	0.59
3.56	0.46	7.49	11.80	88.42	3.16	0.27	0.54
3.58	0.40	6.29	13.94	87.68	3.25	0.29	0.45
3.60	0.34	5.10	16.96	86.45	3.36	0.24	0.36
3.62	0.29	4.29	19.73	84.66	3.45	0.24	0.31
3.64	0.28	4.03	20.24	81.66	3.47	0.23	0.29
3.66	0.28	3.97	20.32	80.67	3.47	0.20	0.28
3.68	0.28	3.95	20.11	79.38	3.46	0.19	0.28
3.70	0.28	3.95	19.76	78.08	3.45	0.21	0.28
3.72	0.31	4.43	17.57	77.89	3.38	0.19	0.32
3.74	0.38	5.60	13.80	77.24	3.25	0.19	0.40
3.76	0.47	7.08	10.65	75.35	3.10	0.20	0.51

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.56	8.56	8.47	72.49	2.98	0.31	0.69
3.80	0.63	9.69	7.16	69.42	2.90	0.24	0.68
3.82	0.65	9.89	6.93	68.55	2.88	0.23	0.68
3.84	0.58	8.91	7.99	71.19	2.95	0.28	0.69
3.86	0.49	7.32	10.20	74.66	3.08	0.19	0.52
3.88	0.40	5.69	13.86	78.82	3.25	0.22	0.41
3.90	0.32	4.28	19.14	81.87	3.44	0.24	0.31
3.92	0.25	3.22	25.81	83.15	3.61	0.24	0.23
3.94	0.23	2.79	29.73	82.99	3.70	0.23	0.20
3.96	0.22	2.62	31.04	81.47	3.72	0.22	0.19
3.98	0.22	2.53	31.15	78.88	3.73	0.21	0.18
4.00	0.21	2.45	30.57	74.88	3.72	0.19	0.17
4.02	0.21	2.38	29.64	70.53	3.70	0.16	0.17
4.04	0.21	2.31	28.48	65.89	3.67	0.11	0.17
4.06	0.21	2.29	26.84	61.57	3.64	0.10	0.16
4.08	0.21	2.29	25.26	57.94	3.60	0.09	0.16
4.10	0.20	2.10	27.40	57.48	3.65	0.08	0.15
4.12	0.20	2.11	27.12	57.24	3.64	0.08	0.15
4.14	0.20	2.10	27.36	57.44	3.65	0.10	0.15
4.16	0.19	2.02	28.74	57.99	3.68	0.09	0.14
4.18	0.19	1.90	30.88	58.80	3.72	0.09	0.14
4.20	0.19	1.98	29.70	58.80	3.70	0.09	0.14
4.22	0.18	1.86	31.66	58.80	3.74	0.10	0.13
4.24	0.18	1.76	33.07	58.24	3.76	0.10	0.13
4.26	0.18	1.73	33.09	57.19	3.76	0.09	0.12
4.28	0.18	1.72	32.34	55.76	3.75	0.08	0.12
4.30	0.18	1.75	31.00	54.22	3.72	0.07	0.12
4.32	0.19	1.80	29.34	52.82	3.69	0.07	0.13
4.34	0.19	1.87	27.90	52.13	3.66	0.07	0.13
4.36	0.19	1.92	27.00	51.83	3.64	0.06	0.14
4.38	0.20	1.98	26.43	52.32	3.63	0.07	0.14
4.40	0.20	2.03	26.07	52.80	3.62	0.07	0.14
4.42	0.21	2.06	26.06	53.57	3.62	0.08	0.15
4.44	0.21	2.08	26.10	54.17	3.62	0.07	0.15
4.46	0.21	2.11	26.03	54.84	3.62	0.08	0.15
4.48	0.22	2.19	25.12	55.07	3.60	0.08	0.16
4.50	0.22	2.30	24.10	55.37	3.57	0.08	0.16
4.52	0.23	2.43	22.76	55.38	3.54	0.08	0.17
4.54	0.25	2.65	20.92	55.40	3.49	0.08	0.19
4.56	0.28	3.15	17.59	55.38	3.39	0.08	0.22
4.58	0.34	3.95	13.99	55.27	3.25	0.08	0.28
4.60	0.48	6.12	9.03	55.25	3.01	0.08	0.44
4.62	0.66	8.56	6.53	55.90	2.85	0.08	0.64
4.64	0.83	10.90	5.23	57.00	2.75	0.09	0.65
4.66	0.99	12.99	4.64	60.25	2.69	0.79	0.79
4.68	1.10	14.44	4.42	63.86	2.67	0.79	0.79
4.70	1.05	13.89	4.94	68.59	2.72	0.23	0.68
4.72	0.96	12.68	5.81	73.73	2.80	0.35	0.69

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.84	11.20	7.09	79.42	2.89	0.56	0.71
4.76	0.74	9.69	8.47	82.06	2.98	0.69	0.71
4.78	0.71	9.24	9.02	83.33	3.01	0.29	0.66
4.80	0.80	10.51	7.85	82.50	2.94	0.71	0.71
4.82	0.88	11.61	6.86	79.60	2.88	0.56	0.71
4.84	0.94	12.30	6.14	75.49	2.82	0.40	0.70
4.86	0.95	12.36	5.92	73.23	2.81	0.33	0.69
4.88	0.87	11.26	6.51	73.23	2.85	0.33	0.69
4.90	0.70	8.95	8.40	75.23	2.98	0.39	0.70
4.92	0.54	6.71	11.40	76.55	3.14	0.22	0.48
4.94	0.44	5.21	14.81	77.11	3.29	0.21	0.37
4.96	0.37	4.24	18.16	76.95	3.40	0.18	0.30
4.98	0.35	3.85	19.36	74.56	3.44	0.17	0.28
5.00	0.40	4.66	15.41	71.72	3.31	0.17	0.33
5.02	0.53	6.48	10.62	68.85	3.10	0.14	0.46
5.04	0.69	8.64	7.44	64.24	2.92	0.16	0.67
5.06	0.90	11.32	5.20	58.82	2.74	0.10	0.65
5.08	1.16	14.64	3.81	55.72	2.61	0.71	0.71
5.10	1.38	17.45	3.19	55.61	2.53	0.11	0.65
5.12	1.53	19.32	2.94	56.81	2.49	0.09	0.65
5.14	1.61	20.31	2.94	59.82	2.50	0.11	0.66
5.16	1.55	19.65	3.29	64.69	2.54	0.34	0.69
5.18	1.39	17.74	4.05	71.81	2.63	0.78	0.78
5.20	1.19	15.17	5.26	79.82	2.75	0.58	0.71
5.22	0.99	12.63	6.83	86.30	2.87	0.72	0.72
5.24	0.85	10.77	8.37	90.16	2.98	0.73	0.73
5.26	1.01	12.84	6.74	86.50	2.87	0.72	0.72
5.28	1.21	15.29	5.29	80.87	2.75	0.63	0.71
5.30	1.53	19.27	3.72	71.74	2.60	0.75	0.75
5.32	1.86	23.28	2.81	65.53	2.48	0.18	0.67
5.34	2.18	27.03	2.22	60.02	2.37	0.11	0.66
5.36	2.25	27.75	2.08	57.67	2.34	0.09	0.65
5.38	2.34	28.67	1.93	55.20	2.30	0.08	0.64
5.40	2.30	28.20	1.92	54.27	2.30	0.07	0.64
5.42	2.25	27.50	1.96	53.76	2.31	0.07	0.64
5.44	2.17	26.51	2.10	55.70	2.34	0.08	0.64
5.46	2.11	25.87	2.24	57.84	2.37	0.10	0.65
5.48	2.03	24.92	2.41	60.16	2.41	0.11	0.66
5.50	1.96	24.00	2.57	61.68	2.44	0.13	0.66
5.52	1.89	23.16	2.69	62.34	2.46	0.14	0.66
5.54	1.84	22.47	2.76	61.91	2.47	0.13	0.66
5.56	1.80	22.00	2.73	60.10	2.46	0.11	0.66
5.58	1.79	21.70	2.65	57.49	2.45	0.09	0.65
5.60	1.79	21.71	2.51	54.59	2.43	0.07	0.64
5.62	1.82	21.91	2.38	52.06	2.40	0.06	0.63
5.64	1.86	22.32	2.19	48.94	2.36	0.05	0.62
5.66	1.90	22.65	2.07	46.98	2.34	0.04	0.62
5.68	1.92	22.92	1.99	45.66	2.32	0.04	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	1.94	23.06	1.94	44.80	2.30	0.04	0.62
5.72	1.96	23.20	1.00	23.20	2.29	0.02	0.62
5.74	1.96	23.17	1.00	23.17	2.29	0.02	0.62
5.76	1.96	23.14	1.00	23.14	2.29	0.02	0.62
5.78	1.88	22.22	2.00	44.55	2.32	0.04	0.62
5.80	1.80	21.31	2.13	45.32	2.35	0.04	0.62
5.82	1.73	20.39	2.27	46.23	2.38	0.04	0.62
5.84	1.65	19.46	2.43	47.27	2.41	0.04	0.62
5.86	1.57	18.54	2.61	48.46	2.44	0.05	0.62
5.88	1.61	18.92	2.55	48.30	2.43	0.05	0.62
5.90	1.64	19.31	2.50	48.35	2.42	0.05	0.62
5.92	1.67	19.69	2.46	48.41	2.42	0.05	0.62
5.94	1.71	20.08	2.41	48.47	2.41	0.05	0.62
5.96	1.72	20.15	2.36	47.55	2.40	0.04	0.62
5.98	1.62	18.91	2.53	47.93	2.43	0.05	0.62
6.00	1.46	17.02	2.94	50.02	2.49	0.05	0.63
6.02	1.31	15.33	3.50	53.68	2.57	0.22	0.68
6.04	1.20	14.03	4.05	56.81	2.63	0.74	0.74
6.06	1.12	13.07	4.69	61.28	2.70	0.80	0.80
6.08	1.11	12.91	5.02	64.87	2.73	0.17	0.67
6.10	1.12	13.09	5.24	68.65	2.75	0.23	0.68
6.12	1.10	12.81	5.69	72.93	2.79	0.32	0.69
6.14	1.04	12.09	6.54	79.07	2.85	0.54	0.71
6.16	0.97	11.30	7.53	85.11	2.92	0.72	0.72
6.18	0.91	10.42	8.60	89.62	2.99	0.73	0.73
6.20	0.86	9.76	9.44	92.06	3.04	0.35	0.70
6.22	1.24	14.53	5.85	84.96	2.80	0.72	0.72
6.24	2.12	24.78	2.80	69.49	2.47	0.24	0.68
6.26	3.27	37.82	1.65	62.37	2.21	0.14	0.66
6.28	4.55	52.03	1.33	68.99	2.02	0.23	0.68
6.30	5.90	66.69	1.00	66.69	1.87	0.19	0.67
6.32	6.82	76.53	1.00	76.53	1.78	0.44	0.70
6.34	7.31	81.69	1.00	81.69	1.74	0.67	0.71
6.36	7.54	84.04	1.00	84.04	1.71	0.72	0.72
6.38	7.64	84.98	1.00	84.98	1.71	0.72	0.72
6.40	7.68	85.50	1.00	85.50	1.72	0.72	0.72
6.42	7.78	86.51	1.00	86.51	1.73	0.72	0.72
6.44	7.87	87.55	1.00	87.55	1.73	0.72	0.72
6.46	7.97	88.62	1.00	88.62	1.74	0.73	0.73
6.48	8.10	89.95	1.00	89.95	1.75	0.73	0.73
6.50	8.25	91.47	1.00	91.47	1.74	0.73	0.73
6.52	8.40	93.02	1.00	93.02	1.74	0.73	0.73
6.54	8.29	91.82	1.00	91.82	1.75	0.73	0.73
6.56	8.35	92.47	1.11	102.36	1.76	0.75	0.75
6.58	8.41	93.18	1.12	104.68	1.78	0.76	0.76
6.60	8.42	93.29	1.14	106.47	1.79	0.76	0.76
6.62	8.35	92.44	1.16	106.80	1.80	0.76	0.76
6.64	8.46	93.56	1.15	107.84	1.80	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	8.37	92.54	1.16	107.16	1.80	0.76	0.76
6.68	8.26	91.08	1.15	104.98	1.80	0.76	0.76
6.70	8.15	89.69	1.15	102.73	1.79	0.75	0.75
6.72	8.08	88.84	1.14	101.01	1.79	0.75	0.75
6.74	8.06	88.39	1.00	88.39	1.77	0.73	0.73
6.76	8.07	88.27	1.00	88.27	1.76	0.72	0.72
6.78	8.12	88.60	1.00	88.60	1.74	0.73	0.73
6.80	8.19	89.25	1.00	89.25	1.73	0.73	0.73
6.82	8.29	90.10	1.00	90.10	1.72	0.73	0.73
6.84	8.29	90.05	1.00	90.05	1.72	0.73	0.73
6.86	8.24	89.46	1.00	89.46	1.72	0.73	0.73
6.88	8.13	88.23	1.00	88.23	1.74	0.72	0.72
6.90	7.96	86.37	1.00	86.37	1.76	0.72	0.72
6.92	7.73	83.87	1.00	83.87	1.78	0.72	0.72
6.94	7.56	82.06	1.00	82.06	1.80	0.69	0.71
6.96	7.41	80.49	1.18	95.07	1.83	0.74	0.74
6.98	7.34	79.68	1.19	94.91	1.84	0.74	0.74
7.00	7.36	79.85	1.19	95.35	1.84	0.74	0.74
7.02	7.42	80.40	1.20	96.47	1.85	0.74	0.74
7.04	7.45	80.64	1.20	96.97	1.85	0.74	0.74
7.06	7.49	80.99	1.20	97.50	1.85	0.74	0.74
7.08	7.42	80.21	1.21	97.45	1.87	0.74	0.74
7.10	7.27	78.61	1.23	96.34	1.88	0.74	0.74
7.12	7.09	76.51	1.23	94.08	1.89	0.74	0.74
7.14	6.86	73.95	1.23	91.30	1.90	0.73	0.73
7.16	6.62	71.23	1.24	88.34	1.91	0.73	0.73
7.18	6.45	69.29	1.24	85.59	1.90	0.72	0.72
7.20	6.32	67.77	1.23	83.23	1.89	0.71	0.71
7.22	6.22	66.57	1.00	66.57	1.88	0.19	0.67
7.24	6.18	65.99	1.00	65.99	1.87	0.18	0.67
7.26	6.13	65.35	1.00	65.35	1.86	0.17	0.67
7.28	5.85	62.31	1.00	62.31	1.89	0.14	0.66
7.30	5.45	58.14	1.27	73.58	1.94	0.34	0.69
7.32	5.04	53.80	1.31	70.71	2.01	0.27	0.69
7.34	4.72	50.40	1.39	69.99	2.08	0.25	0.68
7.36	4.47	47.79	1.48	70.93	2.14	0.28	0.69
7.38	4.47	47.82	1.53	72.98	2.16	0.33	0.69
7.40	4.54	48.54	1.57	75.99	2.18	0.42	0.70
7.42	4.62	49.36	1.58	78.18	2.19	0.50	0.70
7.44	4.74	50.59	1.57	79.39	2.18	0.56	0.71
7.46	4.94	52.65	1.52	80.22	2.16	0.59	0.71
7.48	5.12	54.48	1.48	80.40	2.14	0.60	0.71
7.50	5.29	56.12	1.42	79.46	2.10	0.56	0.71
7.52	5.44	57.53	1.36	78.43	2.06	0.51	0.70
7.54	5.43	57.28	1.34	76.54	2.03	0.44	0.70
7.56	5.25	55.24	1.33	73.62	2.03	0.34	0.69
7.58	5.04	52.92	1.34	70.87	2.04	0.27	0.69
7.60	4.85	50.92	1.35	68.94	2.05	0.23	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	4.70	49.22	1.37	67.45	2.06	0.21	0.68
7.64	4.58	47.92	1.38	66.07	2.07	0.18	0.67
7.66	4.50	47.03	1.38	64.79	2.07	0.17	0.67
7.68	4.39	45.78	1.37	62.92	2.07	0.14	0.66
7.70	4.22	43.86	1.38	60.74	2.08	0.12	0.66
7.72	3.99	41.45	1.42	58.77	2.10	0.10	0.65
7.74	3.80	39.37	1.48	58.34	2.14	0.10	0.65
7.76	3.61	37.44	1.55	58.04	2.17	0.10	0.65
7.78	3.49	36.15	1.63	58.76	2.20	0.10	0.65
7.80	3.47	35.90	1.67	60.12	2.22	0.11	0.66
7.82	3.54	36.61	1.70	62.19	2.23	0.13	0.66
7.84	3.61	37.29	1.72	63.95	2.24	0.16	0.67
7.86	3.80	39.23	1.69	66.28	2.23	0.19	0.67
7.88	4.10	42.34	1.62	68.76	2.20	0.23	0.68
7.90	4.37	45.12	1.57	70.79	2.18	0.27	0.69
7.92	4.58	47.23	1.50	70.79	2.15	0.27	0.69
7.94	4.65	47.86	1.45	69.34	2.12	0.24	0.68
7.96	4.51	46.34	1.44	66.55	2.11	0.19	0.67
7.98	4.21	43.16	1.45	62.54	2.12	0.14	0.66
8.00	3.90	39.79	1.45	57.51	2.12	0.09	0.65
8.02	3.58	36.36	1.46	53.19	2.13	0.07	0.64
8.04	3.31	33.47	1.00	33.47	2.14	0.02	0.62
8.06	2.96	29.86	1.00	29.86	2.17	0.02	0.62
8.08	2.60	26.08	1.00	26.08	2.21	0.02	0.62
8.10	2.24	22.30	1.00	22.30	2.28	0.02	0.62
8.12	1.89	18.64	2.35	43.82	2.40	0.03	0.62
8.14	1.59	15.54	3.19	49.55	2.53	0.07	0.64
8.16	1.56	15.23	3.44	52.42	2.56	0.16	0.67
8.18	1.84	18.11	2.88	52.10	2.48	0.06	0.63
8.20	2.19	21.71	2.36	51.20	2.40	0.06	0.63
8.22	2.61	26.03	1.90	49.41	2.29	0.05	0.62
8.24	3.07	30.72	1.59	48.97	2.19	0.05	0.62
8.26	3.43	34.31	1.00	34.31	2.13	0.02	0.62
8.28	3.57	35.71	1.00	35.71	2.10	0.02	0.62
8.30	3.68	36.83	1.00	36.83	2.08	0.02	0.62
8.32	3.78	37.85	1.00	37.85	2.07	0.02	0.62
8.34	3.85	38.45	1.00	38.45	2.04	0.03	0.62
8.36	3.90	38.94	1.00	38.94	2.03	0.03	0.62
8.38	3.95	39.35	1.00	39.35	2.00	0.03	0.62
8.40	3.99	39.77	1.00	39.77	1.99	0.03	0.62
8.42	4.03	40.05	1.00	40.05	1.96	0.03	0.62
8.44	4.06	40.32	1.00	40.32	1.95	0.03	0.62
8.46	4.07	40.46	1.00	40.46	1.94	0.03	0.62
8.48	4.06	40.26	1.00	40.26	1.95	0.03	0.62
8.50	4.07	40.39	1.00	40.39	1.94	0.03	0.62
8.52	4.15	41.11	1.00	41.11	1.93	0.03	0.62
8.54	4.30	42.65	1.00	42.65	1.91	0.03	0.62
8.56	4.53	44.87	1.00	44.87	1.89	0.04	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	4.79	47.45	1.00	47.45	1.86	0.04	0.62
8.60	5.00	49.56	1.00	49.56	1.84	0.05	0.62
8.62	5.11	50.68	1.00	50.68	1.83	0.06	0.63
8.64	5.13	50.80	1.00	50.80	1.84	0.06	0.63
8.66	5.03	49.78	1.00	49.78	1.86	0.05	0.62
8.68	4.88	48.21	1.00	48.21	1.88	0.05	0.62
8.70	4.71	46.40	1.00	46.40	1.91	0.04	0.62
8.72	4.53	44.64	1.00	44.64	1.93	0.04	0.62
8.74	4.34	42.64	1.00	42.64	1.96	0.03	0.62
8.76	4.19	41.09	1.00	41.09	1.97	0.03	0.62
8.78	4.04	39.60	1.00	39.60	1.99	0.03	0.62
8.80	3.89	38.03	1.00	38.03	2.01	0.02	0.62
8.82	3.77	36.78	1.00	36.78	2.02	0.02	0.62
8.84	3.70	35.97	1.00	35.97	2.03	0.02	0.62
8.86	3.59	34.83	1.00	34.83	2.04	0.02	0.62
8.88	3.46	33.53	1.00	33.53	2.06	0.02	0.62
8.90	3.34	32.27	1.00	32.27	2.08	0.02	0.62
8.92	3.21	30.98	1.00	30.98	2.11	0.02	0.62
8.94	3.14	30.20	1.00	30.20	2.12	0.02	0.62
8.96	3.28	31.58	1.00	31.58	2.09	0.02	0.62
8.98	3.31	31.83	1.00	31.83	2.09	0.02	0.62
9.00	3.59	34.62	1.00	34.62	2.04	0.02	0.62
9.02	3.92	37.93	1.00	37.93	2.00	0.02	0.62
9.04	4.20	40.64	1.00	40.64	1.96	0.03	0.62
9.06	4.25	41.18	1.00	41.18	1.96	0.03	0.62
9.08	4.45	43.05	1.00	43.05	1.94	0.03	0.62
9.10	4.40	42.56	1.00	42.56	1.95	0.03	0.62
9.12	4.30	41.49	1.00	41.49	1.97	0.03	0.62
9.14	4.22	40.73	1.00	40.73	1.97	0.03	0.62
9.16	4.19	40.32	1.00	40.32	1.97	0.03	0.62
9.18	4.13	39.70	1.00	39.70	1.98	0.03	0.62
9.20	4.04	38.83	1.00	38.83	1.99	0.03	0.62
9.22	3.94	37.78	1.00	37.78	2.00	0.02	0.62
9.24	3.80	36.34	1.00	36.34	2.02	0.02	0.62
9.26	3.64	34.70	1.00	34.70	2.04	0.02	0.62
9.28	3.53	33.58	1.00	33.58	2.06	0.02	0.62
9.30	3.49	33.17	1.00	33.17	2.05	0.02	0.62
9.32	3.52	33.42	1.00	33.42	2.04	0.02	0.62
9.34	3.62	34.35	1.00	34.35	2.03	0.02	0.62
9.36	3.79	36.02	1.00	36.02	2.00	0.02	0.62
9.38	3.97	37.79	1.00	37.79	1.98	0.02	0.62
9.40	4.10	39.03	1.00	39.03	1.96	0.03	0.62
9.42	4.15	39.51	1.00	39.51	1.96	0.03	0.62
9.44	4.12	39.19	1.00	39.19	1.97	0.03	0.62
9.46	4.01	38.06	1.00	38.06	1.98	0.03	0.62
9.48	3.85	36.40	1.00	36.40	2.01	0.02	0.62
9.50	3.71	35.04	1.00	35.04	2.03	0.02	0.62
9.52	3.65	34.38	1.00	34.38	2.03	0.02	0.62

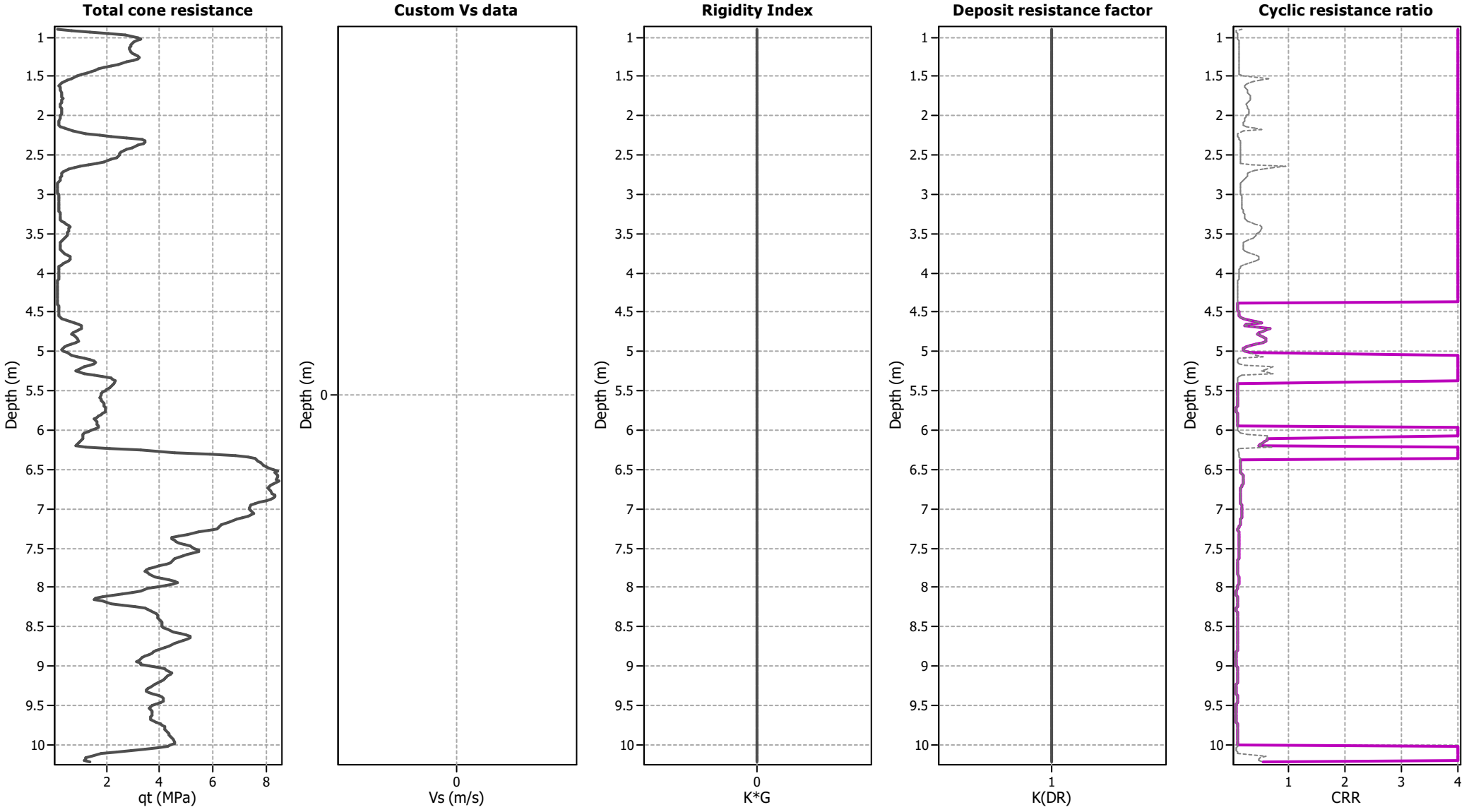
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	3.62	34.09	1.00	34.09	2.04	0.02	0.62
9.56	3.64	34.25	1.00	34.25	2.04	0.02	0.62
9.58	3.69	34.72	1.00	34.72	2.03	0.02	0.62
9.60	3.72	34.95	1.00	34.95	2.03	0.02	0.62
9.62	3.70	34.69	1.00	34.69	2.04	0.02	0.62
9.64	3.67	34.38	1.00	34.38	2.05	0.02	0.62
9.66	3.66	34.22	1.00	34.22	2.06	0.02	0.62
9.68	3.68	34.44	1.00	34.44	2.06	0.02	0.62
9.70	3.79	35.44	1.00	35.44	2.05	0.02	0.62
9.72	3.89	36.41	1.00	36.41	2.03	0.02	0.62
9.74	4.00	37.49	1.00	37.49	2.01	0.02	0.62
9.76	4.10	38.43	1.00	38.43	2.00	0.03	0.62
9.78	4.19	39.25	1.00	39.25	1.98	0.03	0.62
9.80	4.21	39.38	1.00	39.38	1.98	0.03	0.62
9.82	4.25	39.80	1.00	39.80	1.98	0.03	0.62
9.84	4.29	40.08	1.00	40.08	1.97	0.03	0.62
9.86	4.32	40.41	1.00	40.41	1.96	0.03	0.62
9.88	4.34	40.53	1.00	40.53	1.97	0.03	0.62
9.90	4.42	41.30	1.00	41.30	1.96	0.03	0.62
9.92	4.47	41.74	1.00	41.74	1.95	0.03	0.62
9.94	4.52	42.21	1.00	42.21	1.95	0.03	0.62
9.96	4.54	42.37	1.00	42.37	1.95	0.03	0.62
9.98	4.54	42.31	1.00	42.31	1.95	0.03	0.62
10.00	4.42	41.10	1.00	41.10	1.96	0.03	0.62
10.02	4.27	39.57	1.00	39.57	1.98	0.03	0.62
10.04	3.90	35.97	1.00	35.97	2.03	0.02	0.62
10.06	3.44	31.46	1.00	31.46	2.11	0.02	0.62
10.08	2.91	26.33	1.00	26.33	2.21	0.02	0.62
10.10	2.37	21.11	2.14	45.18	2.35	0.04	0.62
10.12	1.83	15.87	3.33	52.88	2.55	0.13	0.66
10.14	1.46	12.28	5.11	62.79	2.74	0.14	0.66
10.16	1.25	10.26	6.91	70.83	2.88	0.27	0.69
10.18	1.23	10.08	7.53	75.89	2.92	0.41	0.70
10.20	1.19	9.66	8.32	80.37	2.97	0.60	0.71
10.22	1.39	11.55	6.93	79.98	2.88	0.58	0.71

Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

Aging Calculation Estimation



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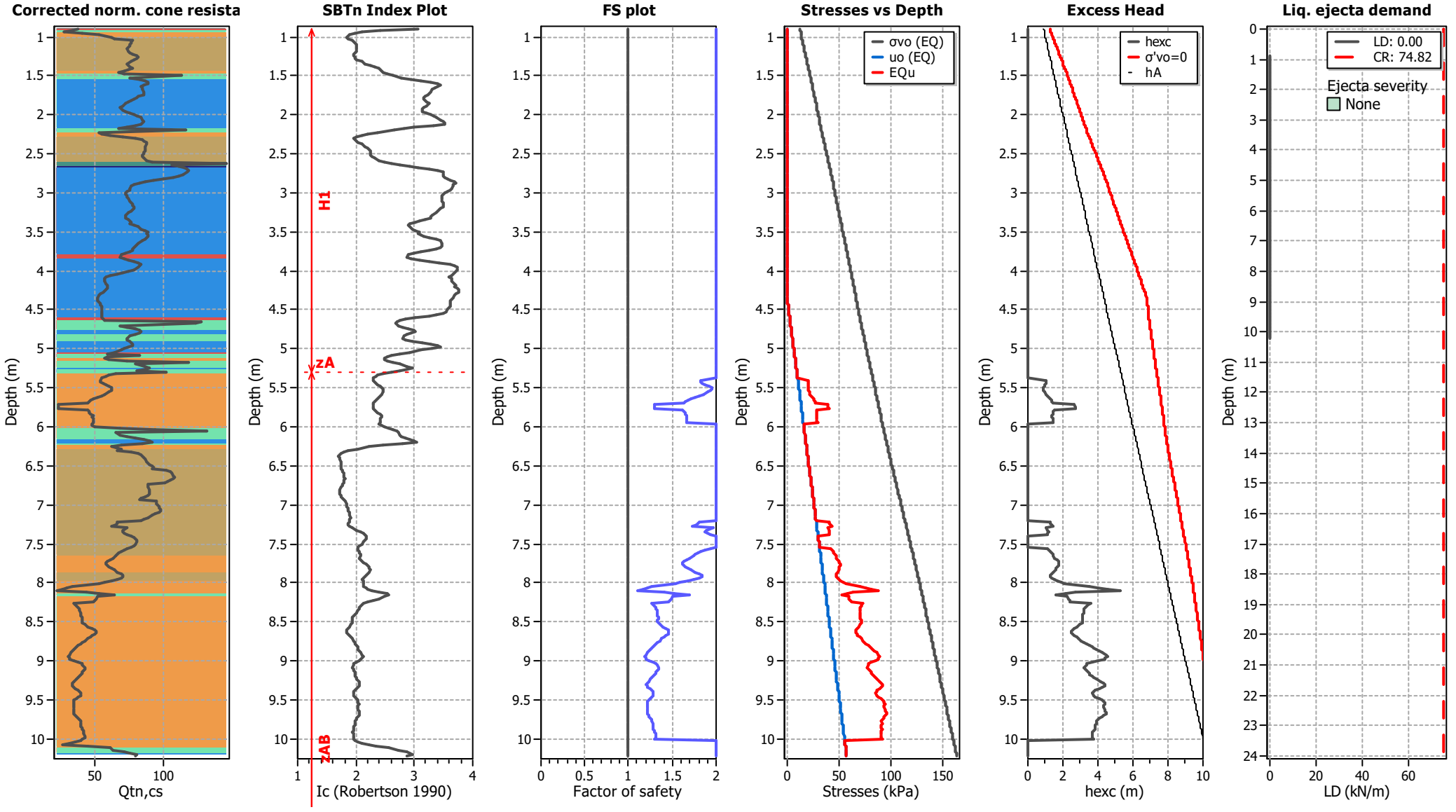
Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

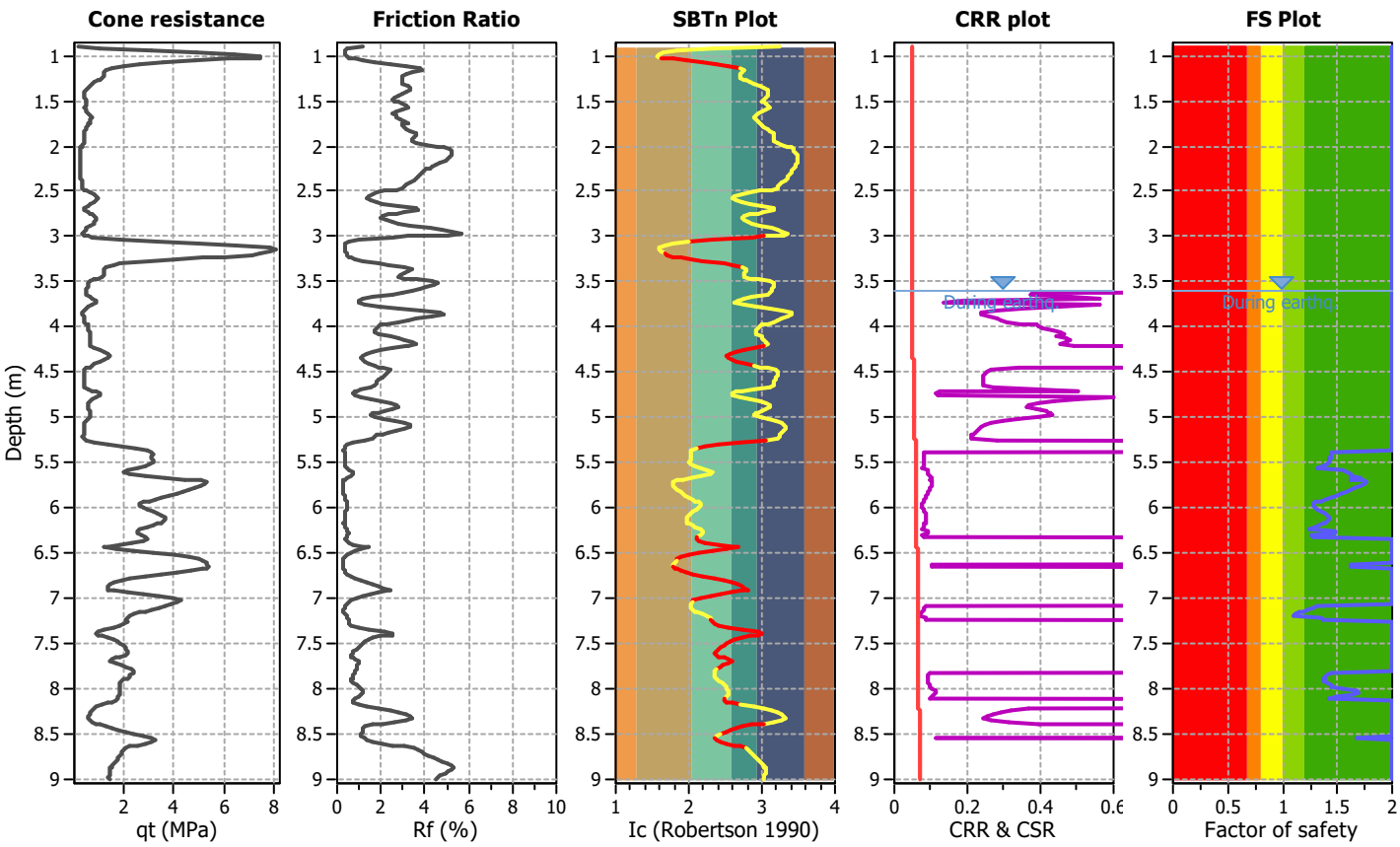
LIQUEFACTION ANALYSIS REPORT

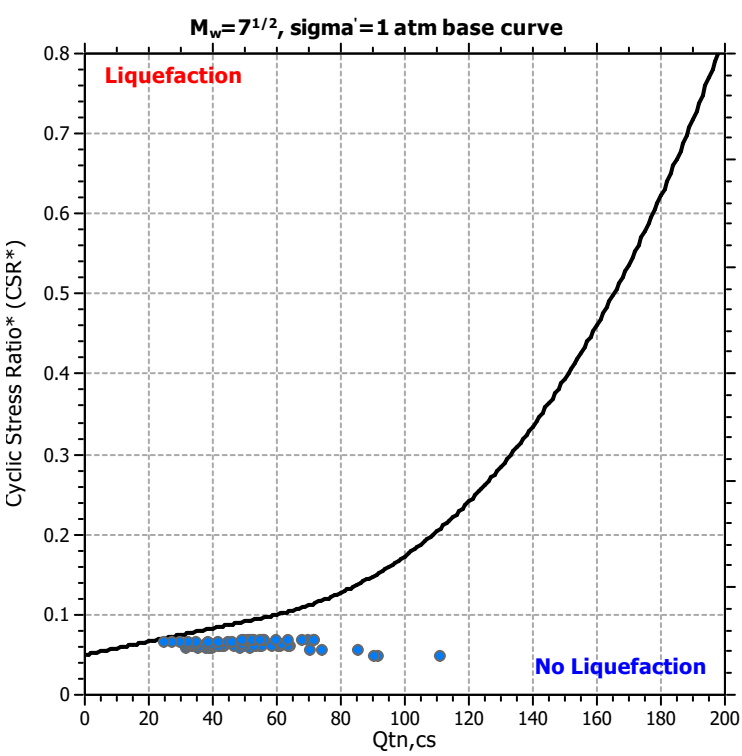
Project title : CWLP Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

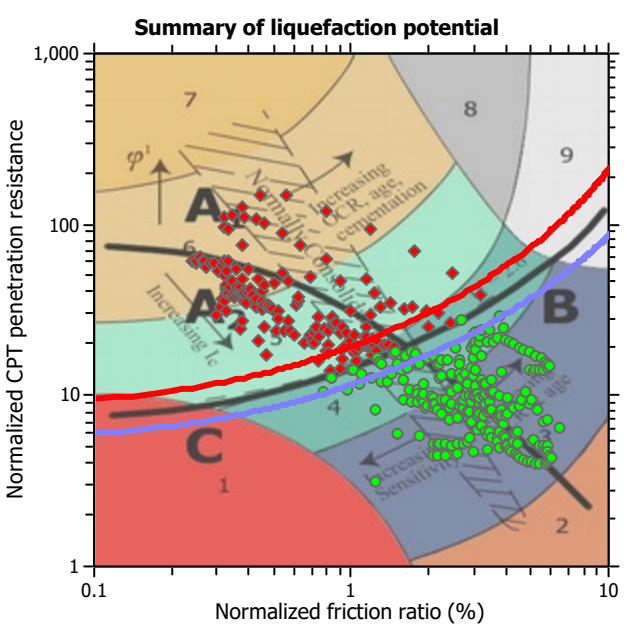
CPT file : CWLP CPT-3CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.60 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	3.60 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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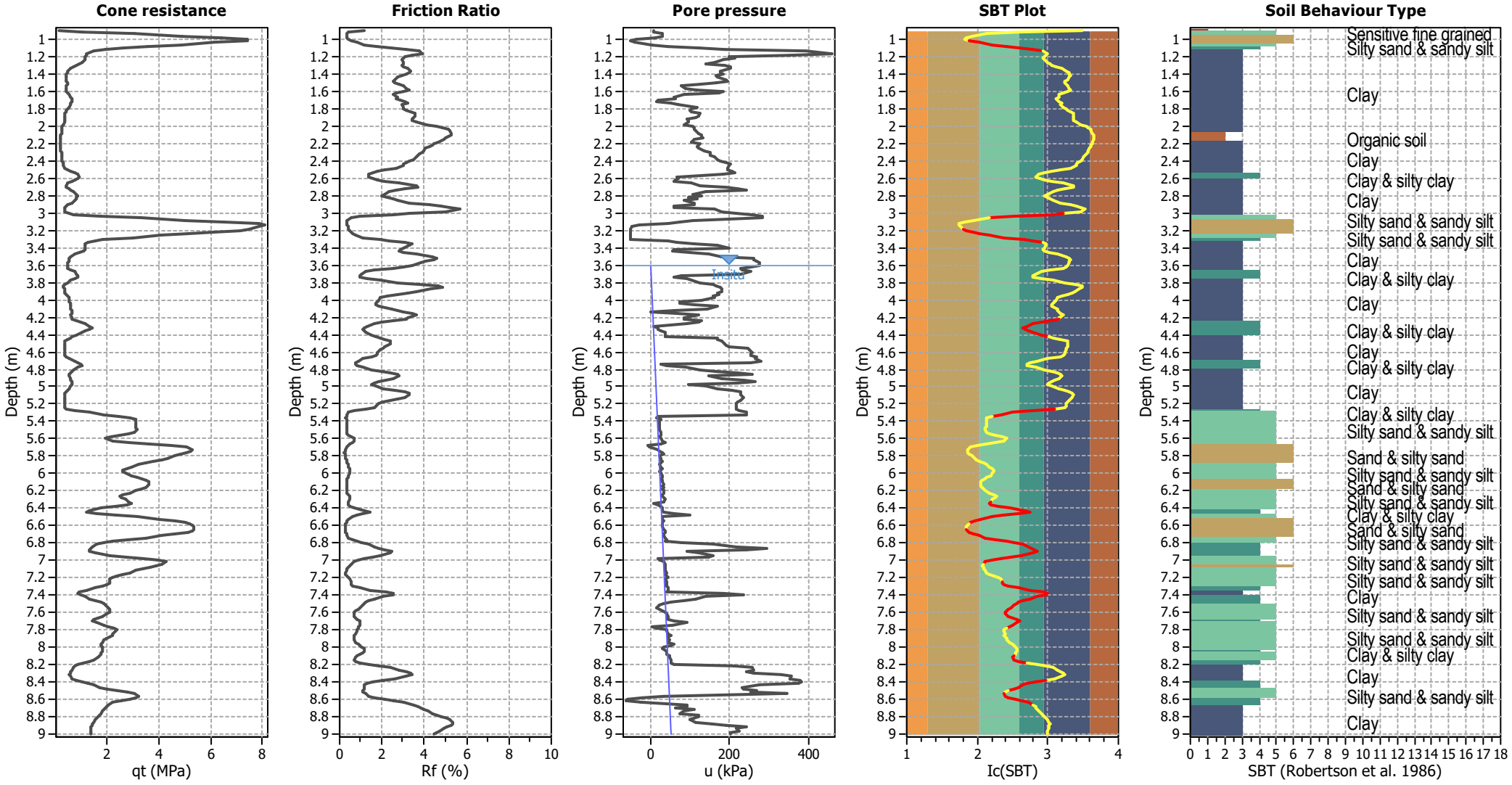
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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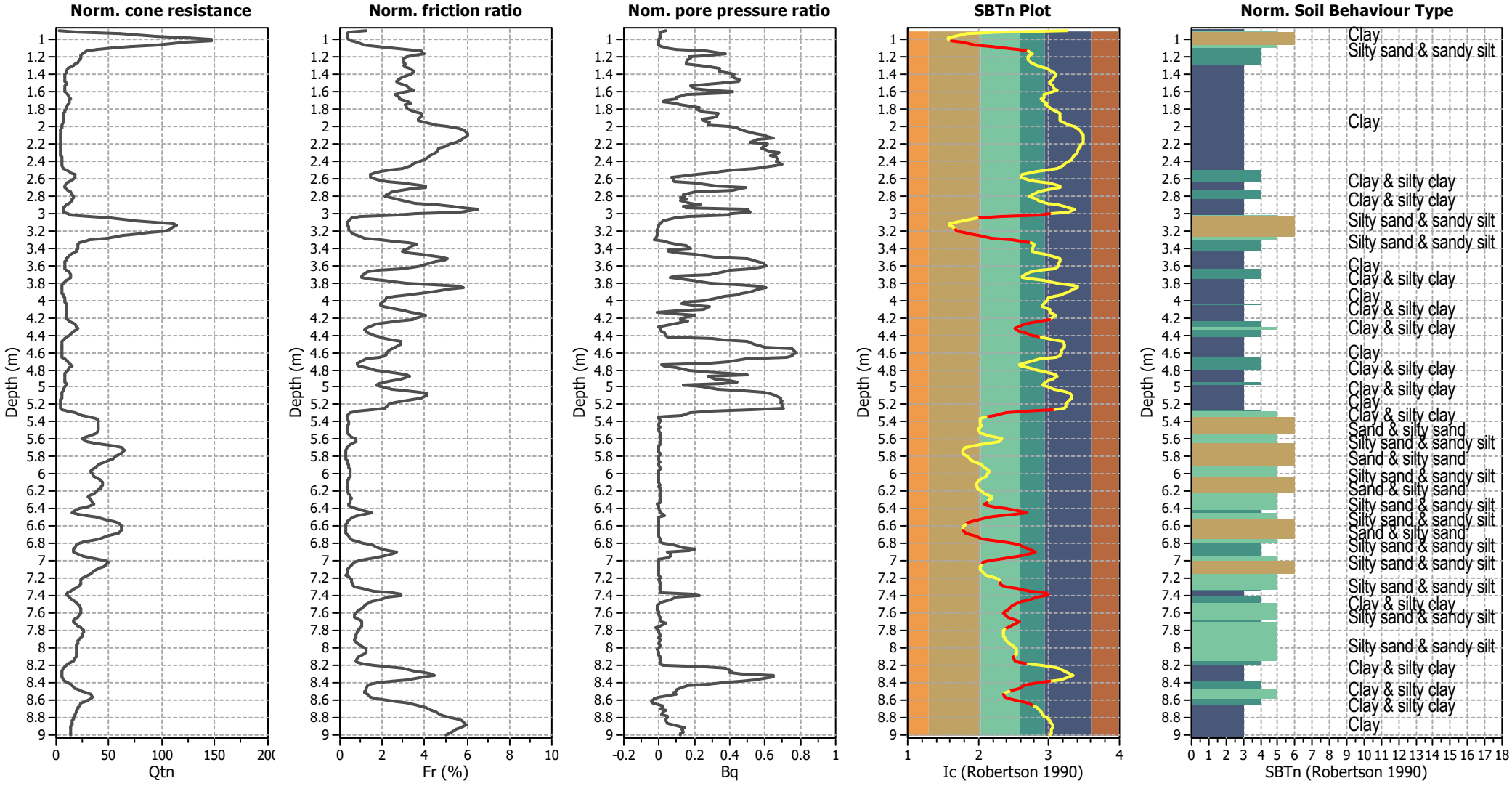
CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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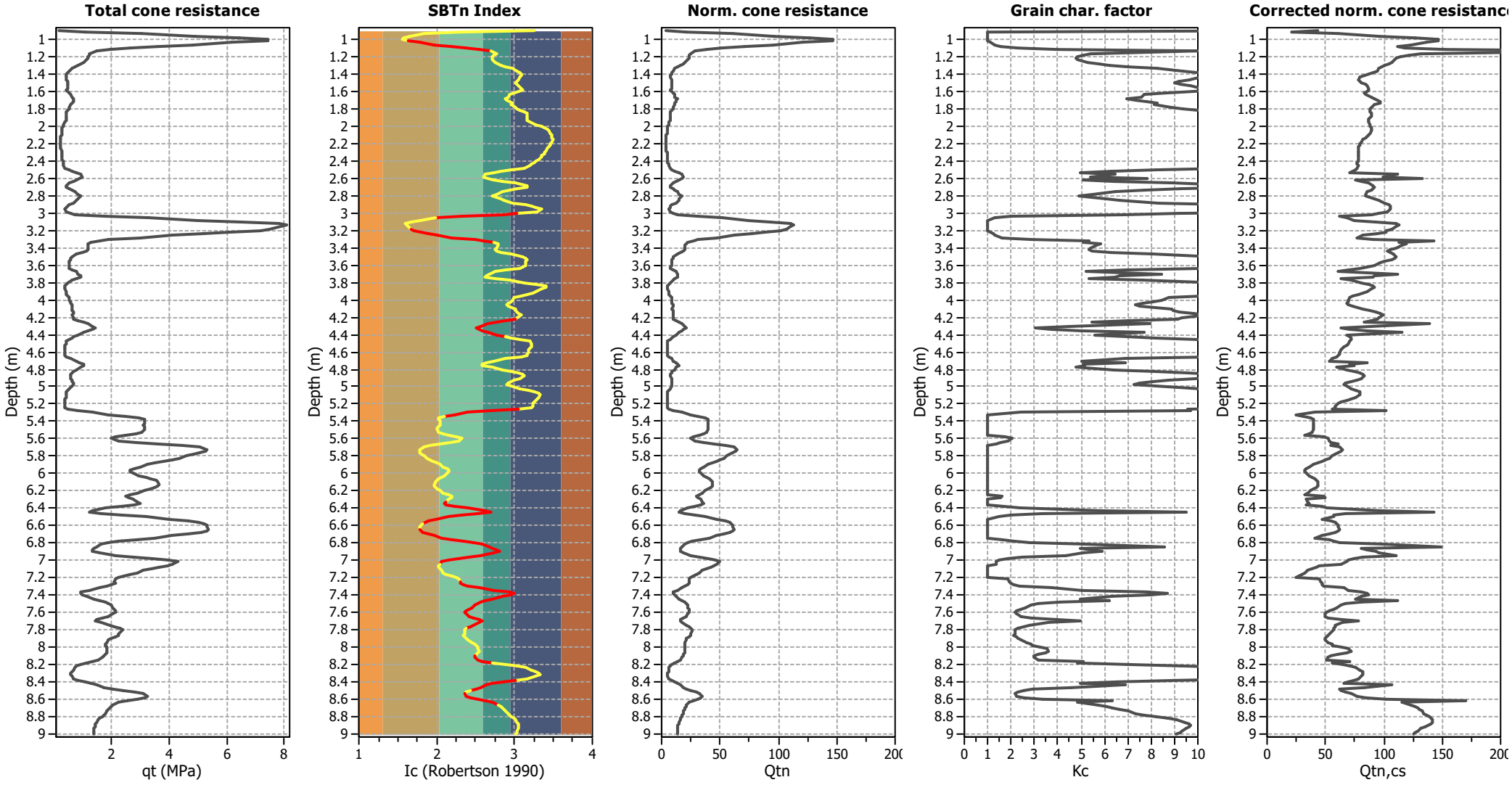
CPT name: CWLP CPT-3CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

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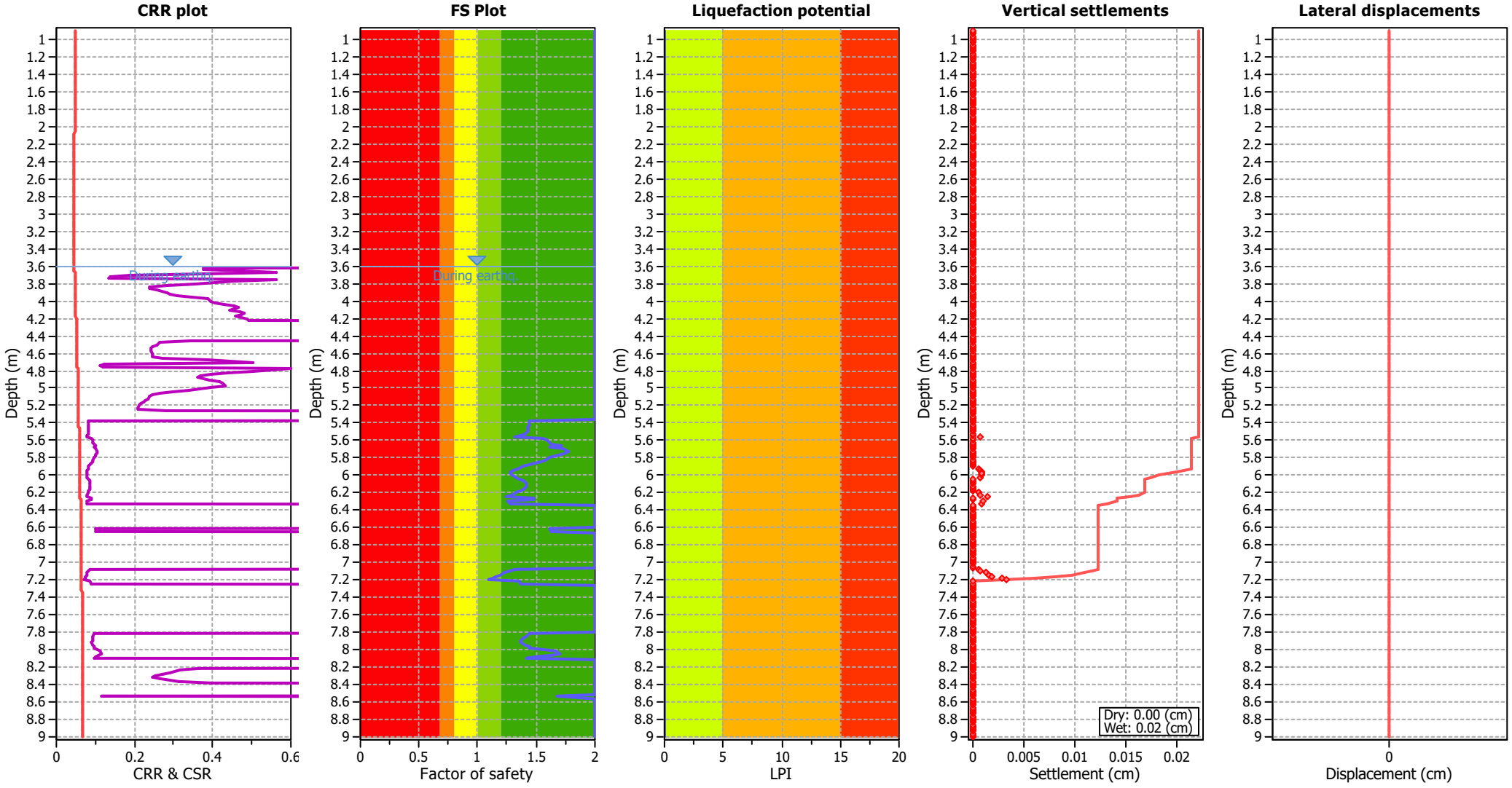
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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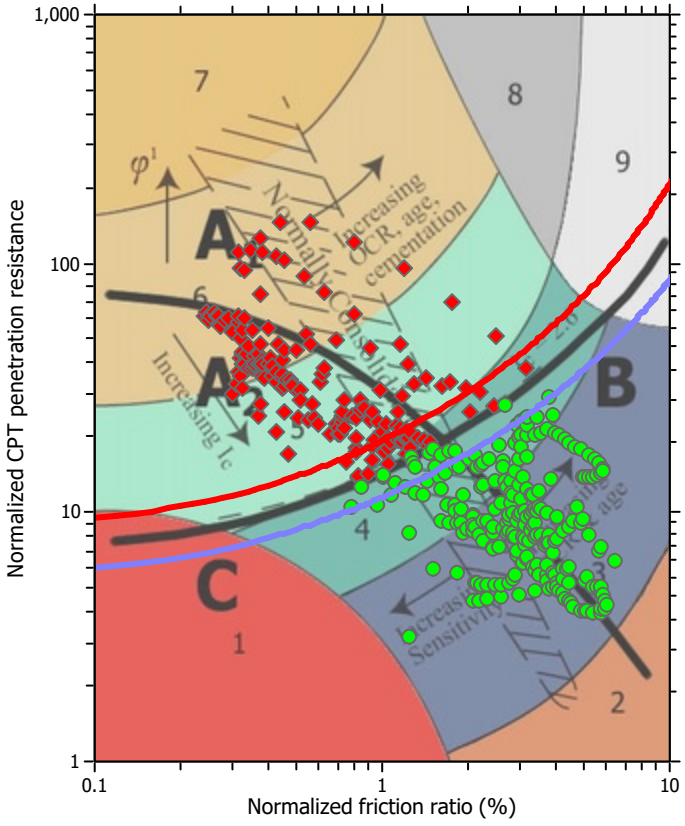
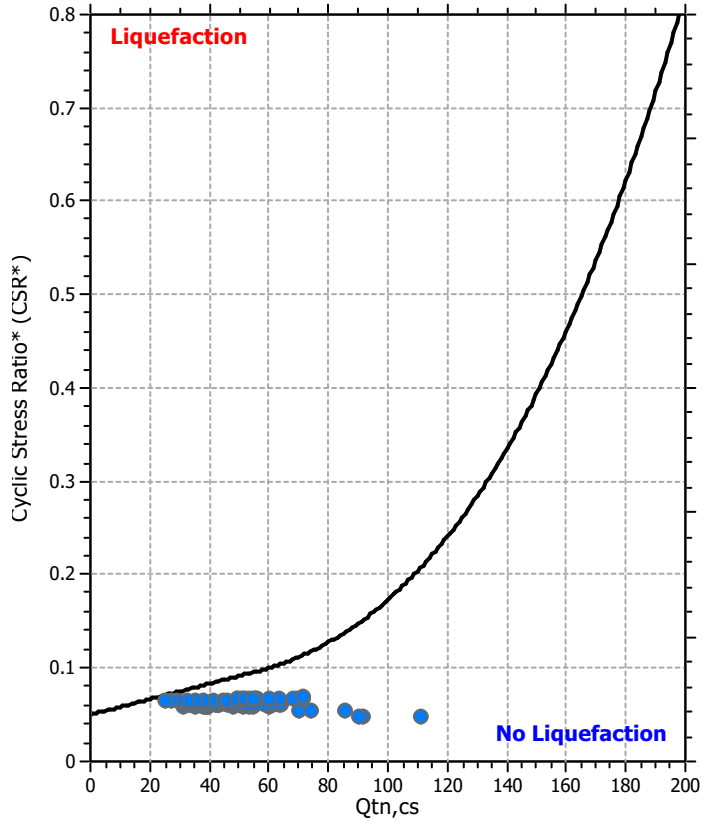
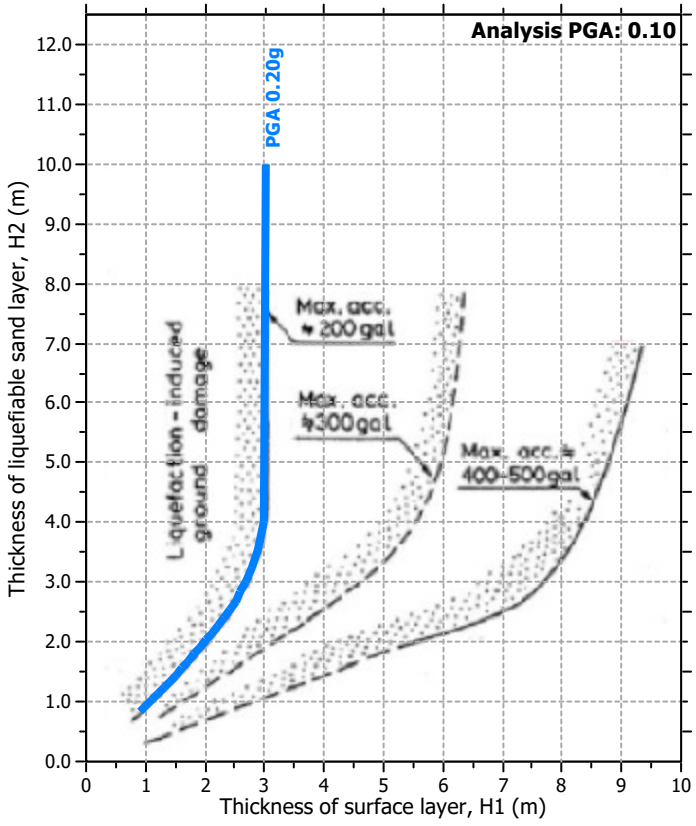
Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

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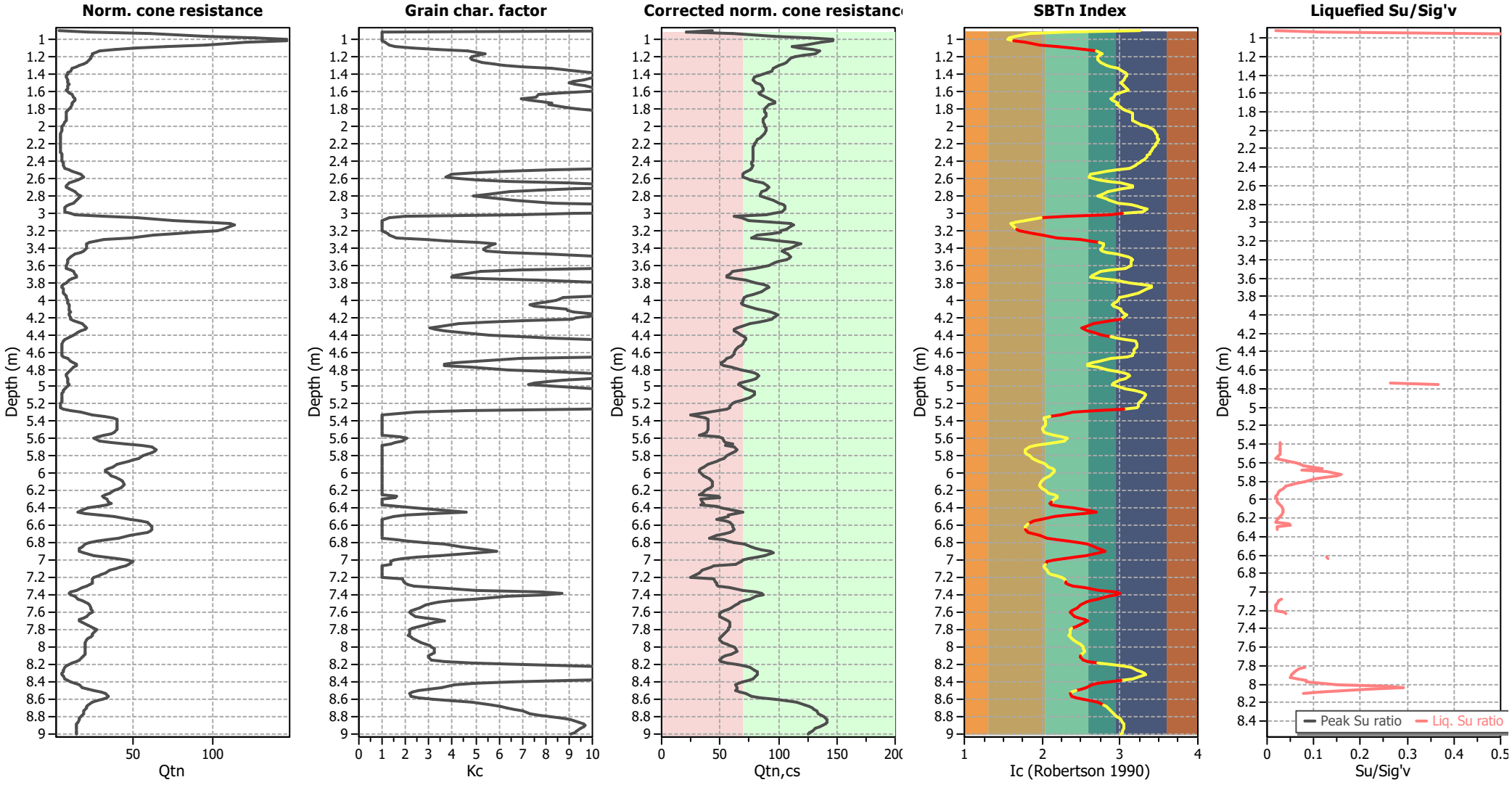
CPT name: CWLP CPT-3CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

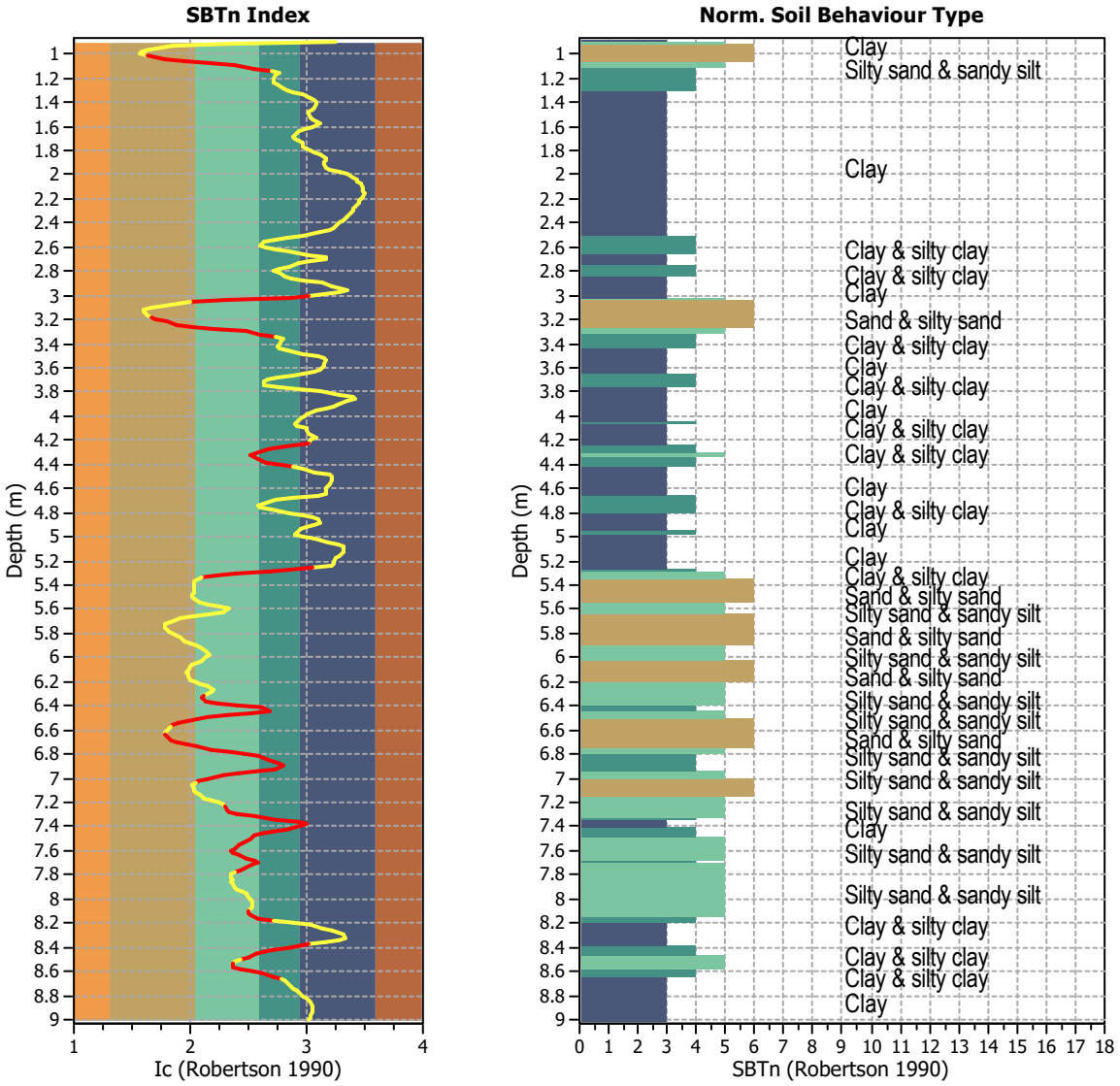
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.60 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.60 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	406
I_c maximum check value:	3.00	Total points excluded:	123
I_c change ratio value:	0.0100	Exclusion percentage:	30.30%
Minimum number of points in layer:	2	Number of layers detected:	17

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	7	Start depth: 1.04 (m)	6	Sand & silty sand
		End depth: 1.16 (m)	4	Clay & silty clay
Transition layer 2	4	Start depth: 3.02 (m)	3	Clay
		End depth: 3.08 (m)	6	Sand & silty sand
Transition layer 3	9	Start depth: 3.20 (m)	6	Sand & silty sand
		End depth: 3.36 (m)	4	Clay & silty clay
Transition layer 4	5	Start depth: 4.24 (m)	3	Clay
		End depth: 4.32 (m)	5	Silty sand & sandy silt
Transition layer 5	7	Start depth: 4.32 (m)	5	Silty sand & sandy silt
		End depth: 4.44 (m)	3	Clay
Transition layer 6	5	Start depth: 5.28 (m)	4	Clay & silty clay
		End depth: 5.36 (m)	6	Sand & silty sand
Transition layer 7	6	Start depth: 6.34 (m)	5	Silty sand & sandy silt
		End depth: 6.44 (m)	4	Clay & silty clay
Transition layer 8	9	Start depth: 6.44 (m)	4	Clay & silty clay
		End depth: 6.60 (m)	6	Sand & silty sand
Transition layer 9	13	Start depth: 6.66 (m)	6	Sand & silty sand
		End depth: 6.90 (m)	4	Clay & silty clay
Transition layer 10	9	Start depth: 6.90 (m)	4	Clay & silty clay
		End depth: 7.06 (m)	6	Sand & silty sand
Transition layer 11	7	Start depth: 7.26 (m)	5	Silty sand & sandy silt
		End depth: 7.38 (m)	3	Clay
Transition layer 12	12	Start depth: 7.38 (m)	3	Clay
		End depth: 7.60 (m)	5	Silty sand & sandy silt
Transition layer 13	5	Start depth: 7.62 (m)	5	Silty sand & sandy silt
		End depth: 7.70 (m)	4	Clay & silty clay
Transition layer 14	6	Start depth: 7.70 (m)	4	Clay & silty clay
		End depth: 7.80 (m)	5	Silty sand & sandy silt
Transition layer 15	5	Start depth: 8.12 (m)	5	Silty sand & sandy silt
		End depth: 8.20 (m)	4	Clay & silty clay
Transition layer 16	7	Start depth: 8.40 (m)	4	Clay & silty clay
		End depth: 8.52 (m)	5	Silty sand & sandy silt
Transition layer 17	7	Start depth: 8.56 (m)	5	Silty sand & sandy silt
		End depth: 8.68 (m)	3	Clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.00	0.60	5.80	77.25	13.73
2	0.92	0.00	0.60	5.80	5.00	14.77
3	0.94	0.85	7.40	28.30	5.00	16.08
4	0.96	4.53	13.80	28.70	5.00	16.76
5	0.98	9.96	28.00	11.00	4.08	17.36
6	1.00	9.12	28.40	-37.90	3.81	17.77
7	1.02	7.60	42.70	-50.50	4.78	18.05
8	1.04	5.98	51.20	-40.60	7.75	18.15
9	1.06	4.52	57.90	2.30	12.28	18.25
10	1.08	3.55	63.30	42.80	18.52	18.24
11	1.10	2.50	70.50	123.90	25.83	18.15
12	1.12	1.32	70.40	186.80	33.12	17.98
13	1.14	1.12	60.20	394.30	40.31	17.76
14	1.16	1.09	42.30	459.30	43.94	17.54
15	1.18	1.13	35.20	352.80	42.36	17.37
16	1.20	1.33	35.00	197.90	41.28	17.22
17	1.22	1.19	37.60	211.90	40.98	17.16
18	1.24	1.04	37.00	182.50	41.27	17.09
19	1.26	1.06	32.90	160.90	43.32	16.97
20	1.28	0.99	26.60	137.70	45.58	16.81
21	1.30	0.81	22.50	186.80	47.72	16.61
22	1.32	0.66	22.40	203.80	51.31	16.40
23	1.34	0.52	19.30	201.60	56.37	16.21
24	1.36	0.47	17.50	175.90	60.86	16.06
25	1.38	0.42	15.80	176.80	63.17	15.88
26	1.40	0.41	14.10	181.80	64.49	15.72
27	1.42	0.41	12.30	166.50	64.67	15.58
28	1.44	0.36	11.00	168.50	63.62	15.48
29	1.46	0.37	10.00	190.30	61.79	15.46
30	1.48	0.40	11.00	194.80	60.02	15.51
31	1.50	0.48	12.20	165.30	59.29	15.60
32	1.52	0.53	13.80	125.00	60.23	15.71
33	1.54	0.48	15.10	78.50	62.01	15.76
34	1.56	0.42	16.00	87.20	63.97	15.74
35	1.58	0.36	14.00	115.80	66.21	15.71
36	1.60	0.38	12.50	183.90	62.31	15.73
37	1.62	0.41	13.20	171.20	57.89	15.75
38	1.64	0.66	14.40	83.10	54.06	15.86
39	1.66	0.66	14.60	57.00	53.53	16.06
40	1.68	0.68	18.00	63.40	50.84	16.22
41	1.70	0.63	24.60	19.00	52.39	16.26
42	1.72	0.80	22.20	15.50	54.59	16.27
43	1.74	0.59	18.60	52.00	56.44	16.24
44	1.76	0.51	17.00	68.00	55.91	16.09
45	1.78	0.52	16.60	116.00	58.86	15.94
46	1.80	0.51	13.60	101.90	60.72	15.86
47	1.82	0.48	14.40	99.30	63.40	15.81
48	1.84	0.43	14.90	103.80	66.75	15.75

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.33	15.00	126.10	69.94	15.74
50	1.88	0.33	14.80	122.70	70.22	15.72
51	1.90	0.38	14.50	114.10	69.68	15.72
52	1.92	0.47	13.70	92.00	69.37	15.69
53	1.94	0.45	14.20	93.70	70.16	15.65
54	1.96	0.33	13.20	96.80	73.23	15.61
55	1.98	0.29	13.20	83.40	79.37	15.58
56	2.00	0.26	13.80	106.20	85.86	15.53
57	2.02	0.26	14.00	110.60	89.15	15.52
58	2.04	0.26	13.90	110.20	91.95	15.52
59	2.06	0.25	14.10	113.10	93.38	15.49
60	2.08	0.23	13.80	121.70	95.23	15.45
61	2.10	0.22	12.80	128.00	96.84	15.40
62	2.12	0.21	12.40	128.10	97.49	15.34
63	2.14	0.21	11.70	132.20	97.39	15.28
64	2.16	0.22	11.40	111.00	98.27	15.23
65	2.18	0.22	11.10	101.90	96.89	15.18
66	2.20	0.19	10.50	123.90	95.36	15.14
67	2.22	0.22	9.80	122.50	94.68	15.12
68	2.24	0.23	9.90	119.20	93.83	15.09
69	2.26	0.23	10.10	122.50	91.43	15.08
70	2.28	0.22	9.80	135.50	90.20	15.10
71	2.30	0.23	9.80	150.10	89.17	15.11
72	2.32	0.24	10.00	151.80	87.64	15.12
73	2.34	0.25	10.00	149.60	85.73	15.15
74	2.36	0.25	10.30	162.50	84.41	15.17
75	2.38	0.26	10.40	170.10	82.16	15.18
76	2.40	0.26	10.10	177.40	79.43	15.19
77	2.42	0.29	9.90	192.00	76.89	15.20
78	2.44	0.31	9.80	203.80	74.99	15.22
79	2.46	0.32	9.90	198.30	73.61	15.25
80	2.48	0.32	10.70	192.80	67.11	15.33
81	2.50	0.31	10.90	195.80	56.08	15.47
82	2.52	0.54	11.20	206.80	48.04	15.61
83	2.54	0.88	11.70	213.00	41.83	15.75
84	2.56	0.94	12.70	185.00	36.73	15.88
85	2.58	1.01	13.80	64.50	35.34	15.97
86	2.60	1.07	14.40	70.70	38.24	15.99
87	2.62	0.88	15.00	62.60	42.33	15.95
88	2.64	0.54	14.20	58.40	48.53	15.90
89	2.66	0.45	13.30	103.30	59.05	15.85
90	2.68	0.38	14.40	125.90	70.46	15.81
91	2.70	0.33	17.20	192.60	70.33	15.85
92	2.72	0.32	18.30	221.50	60.45	15.96
93	2.74	0.53	16.40	241.70	54.15	16.05
94	2.76	0.96	15.50	137.90	48.86	16.10
95	2.78	0.84	16.60	108.10	44.25	16.18
96	2.80	0.77	16.70	128.40	41.56	16.29

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.86	20.50	96.20	44.26	16.34
98	2.84	0.99	22.10	116.70	47.10	16.38
99	2.86	0.74	21.40	85.80	49.51	16.42
100	2.88	0.60	21.90	108.70	56.57	16.37
101	2.90	0.60	21.90	108.70	68.32	16.27
102	2.92	0.26	21.70	56.80	74.42	16.22
103	2.94	0.26	21.70	56.80	79.56	16.16
104	2.96	0.44	20.70	160.10	85.69	16.10
105	2.98	0.38	20.10	181.40	80.01	16.08
106	3.00	0.37	20.10	217.30	60.01	16.16
107	3.02	0.39	17.40	257.40	50.05	16.18
108	3.04	1.12	16.10	284.30	23.28	16.50
109	3.06	1.12	16.10	284.30	12.76	16.76
110	3.08	5.81	17.00	104.80	5.00	16.99
111	3.10	8.00	22.20	74.40	5.00	17.23
112	3.12	8.93	22.90	44.80	4.35	17.47
113	3.14	8.63	28.40	-30.30	4.46	17.62
114	3.16	7.89	33.80	-46.60	4.93	17.69
115	3.18	6.99	32.20	-52.40	5.00	17.74
116	3.20	6.99	32.20	-52.40	5.00	17.75
117	3.22	6.99	32.20	-52.40	8.02	17.67
118	3.24	6.99	32.20	-52.40	10.07	17.61
119	3.26	2.41	32.20	-52.40	13.35	17.52
120	3.28	2.41	32.20	-52.40	19.05	17.46
121	3.30	1.73	32.20	-52.40	29.97	17.33
122	3.32	1.50	40.40	42.40	35.28	17.31
123	3.34	1.29	39.50	65.40	42.50	17.28
124	3.36	0.87	39.80	109.70	45.80	17.30
125	3.38	0.86	41.20	167.30	45.03	17.24
126	3.40	1.22	40.60	198.10	43.96	17.17
127	3.42	1.52	30.80	59.80	43.57	17.08
128	3.44	1.34	27.50	54.40	44.12	16.99
129	3.46	0.77	26.80	98.00	48.02	16.88
130	3.48	0.63	30.40	148.20	55.75	16.73
131	3.50	0.54	32.90	180.20	65.70	16.60
132	3.52	0.51	23.10	259.40	69.25	16.53
133	3.54	0.50	22.50	261.90	70.21	16.43
134	3.56	0.50	22.10	267.90	69.25	16.29
135	3.58	0.48	21.50	277.00	68.93	16.19
136	3.60	0.46	19.70	277.00	68.00	16.03
137	3.62	0.45	14.60	254.10	66.36	15.85
138	3.64	0.44	10.00	227.50	63.53	15.65
139	3.66	0.46	9.90	233.20	50.54	15.52
140	3.68	0.49	9.60	255.10	42.90	15.43
141	3.70	1.14	8.30	226.30	38.91	15.43
142	3.72	1.10	8.00	77.40	36.94	15.42
143	3.74	0.93	8.20	58.10	36.75	15.45
144	3.76	0.74	8.70	91.90	43.73	15.50

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.58	10.60	103.00	53.87	15.59
146	3.80	0.37	13.30	126.50	66.68	15.69
147	3.82	0.31	16.20	156.10	79.35	15.76
148	3.84	0.31	18.10	165.80	89.47	15.79
149	3.86	0.31	17.30	178.00	90.53	15.84
150	3.88	0.31	16.40	179.50	85.27	15.81
151	3.90	0.36	16.40	179.50	78.79	15.73
152	3.92	0.44	12.70	168.50	75.30	15.64
153	3.94	0.46	10.80	171.10	70.55	15.55
154	3.96	0.37	10.80	158.80	63.91	15.46
155	3.98	0.44	10.20	161.00	58.44	15.45
156	4.00	0.59	10.20	127.10	57.17	15.42
157	4.02	0.71	10.20	75.10	55.70	15.41
158	4.04	0.53	9.40	71.80	53.80	15.46
159	4.06	0.46	9.70	111.40	52.40	15.54
160	4.08	0.59	11.30	169.60	53.24	15.68
161	4.10	0.76	13.10	141.70	58.80	15.93
162	4.12	0.77	16.50	58.40	59.02	16.14
163	4.14	0.40	25.20	0.50	60.00	16.29
164	4.16	0.64	23.10	64.20	62.42	16.39
165	4.18	0.69	23.40	120.20	64.62	16.43
166	4.20	0.72	23.00	83.40	60.65	16.39
167	4.22	0.68	21.10	82.60	59.91	16.36
168	4.24	0.59	19.20	128.70	51.29	16.42
169	4.26	0.65	19.90	122.60	44.26	16.45
170	4.28	1.45	21.40	91.80	38.40	16.45
171	4.30	1.58	19.80	5.70	33.92	16.42
172	4.32	1.58	15.90	19.00	31.30	16.35
173	4.34	1.42	12.70	17.20	32.58	16.19
174	4.36	1.14	12.60	25.50	34.80	16.04
175	4.38	0.87	12.90	36.50	38.11	15.94
176	4.40	0.87	12.90	36.50	44.66	15.82
177	4.42	0.87	12.90	36.50	50.96	15.71
178	4.44	0.41	11.00	170.00	56.14	15.60
179	4.46	0.40	10.50	169.40	63.23	15.46
180	4.48	0.38	9.90	179.70	73.11	15.30
181	4.50	0.37	9.50	187.20	74.02	15.22
182	4.52	0.36	9.10	190.80	74.46	15.13
183	4.54	0.34	8.40	198.10	73.99	15.06
184	4.56	0.34	7.30	245.80	73.17	14.99
185	4.58	0.35	7.20	250.00	72.02	14.92
186	4.60	0.35	7.10	256.40	70.99	14.88
187	4.62	0.36	6.90	252.80	70.45	14.86
188	4.64	0.35	6.80	251.90	70.03	14.82
189	4.66	0.35	6.80	266.80	65.10	14.83
190	4.68	0.34	6.10	264.00	50.70	14.93
191	4.70	0.53	6.30	280.70	41.95	15.06
192	4.72	1.15	6.30	253.90	37.22	15.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	1.25	7.80	26.40	34.87	15.33
194	4.76	1.08	8.40	41.90	35.01	15.49
195	4.78	0.90	9.50	87.80	40.72	15.61
196	4.80	0.73	11.50	125.40	48.51	15.69
197	4.82	0.49	13.30	166.40	55.87	15.80
198	4.84	0.47	14.90	220.60	61.48	15.87
199	4.86	0.55	16.80	256.20	65.70	15.92
200	4.88	0.61	16.30	147.30	66.79	15.93
201	4.90	0.54	16.10	179.60	62.68	15.92
202	4.92	0.44	14.60	235.50	58.28	15.83
203	4.94	0.66	11.80	263.80	55.55	15.67
204	4.96	0.75	9.90	221.30	53.44	15.54
205	4.98	0.67	7.30	95.40	52.22	15.48
206	5.00	0.59	9.40	141.20	56.11	15.49
207	5.02	0.50	11.80	168.70	63.58	15.53
208	5.04	0.41	13.40	206.90	71.35	15.62
209	5.06	0.37	14.10	228.60	77.92	15.67
210	5.08	0.37	14.30	227.90	81.83	15.67
211	5.10	0.37	14.30	228.30	82.93	15.62
212	5.12	0.36	13.00	234.10	82.22	15.51
213	5.14	0.36	11.10	230.50	80.81	15.35
214	5.16	0.34	8.30	227.70	79.02	15.16
215	5.18	0.34	6.70	219.90	77.32	14.98
216	5.20	0.34	6.50	217.10	76.17	14.81
217	5.22	0.33	6.40	215.20	75.58	14.72
218	5.24	0.32	6.10	217.90	74.69	14.68
219	5.26	0.32	5.80	216.90	61.57	14.73
220	5.28	0.35	5.40	225.40	40.01	14.90
221	5.30	0.82	5.60	241.70	26.59	15.12
222	5.32	2.01	5.50	243.90	5.00	15.42
223	5.34	2.97	6.80	17.30	5.00	15.69
224	5.36	3.16	10.10	15.50	5.00	15.92
225	5.38	3.28	10.90	25.50	5.00	16.18
226	5.40	3.13	11.40	22.50	5.00	16.27
227	5.42	3.06	15.80	20.90	5.00	16.25
228	5.44	3.06	10.80	21.90	5.00	16.22
229	5.46	3.10	9.50	23.40	5.00	16.21
230	5.48	3.16	9.20	21.70	5.00	16.09
231	5.50	3.23	11.00	22.70	5.00	16.08
232	5.52	3.15	10.10	24.30	5.00	16.08
233	5.54	3.15	10.10	24.30	5.00	16.09
234	5.56	2.53	10.50	24.40	5.00	16.08
235	5.58	2.07	10.90	23.00	20.85	16.13
236	5.60	1.61	12.50	24.90	23.73	16.26
237	5.62	1.39	15.20	30.20	22.20	16.47
238	5.64	2.24	19.40	37.40	17.90	16.64
239	5.66	3.77	20.90	25.20	13.91	16.79
240	5.68	5.10	16.60	-7.10	5.00	16.85

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	5.60	16.60	-3.50	5.00	16.78
242	5.72	5.55	13.90	16.40	5.00	16.63
243	5.74	5.29	11.00	21.20	5.00	16.56
244	5.76	5.06	9.90	29.70	5.00	16.47
245	5.78	4.83	12.50	32.20	5.00	16.45
246	5.80	4.67	12.60	22.40	5.00	16.47
247	5.82	4.49	13.70	25.80	5.00	16.50
248	5.84	4.05	13.30	25.30	5.00	16.47
249	5.86	3.81	12.40	28.90	5.00	16.44
250	5.88	3.51	12.30	26.40	5.00	16.40
251	5.90	3.24	12.50	23.40	5.00	16.35
252	5.92	2.96	13.10	27.10	5.00	16.31
253	5.94	2.67	12.70	28.00	5.00	16.27
254	5.96	2.51	11.60	25.90	5.00	16.26
255	5.98	2.46	12.00	23.40	5.00	16.26
256	6.00	2.60	12.90	26.50	5.00	16.30
257	6.02	2.90	13.10	27.50	5.00	16.34
258	6.04	3.25	13.80	27.60	5.00	16.36
259	6.06	3.49	12.40	25.30	5.00	16.36
260	6.08	3.64	11.40	28.60	5.00	16.36
261	6.10	3.56	11.90	29.20	5.00	16.33
262	6.12	3.67	11.90	32.20	5.00	16.30
263	6.14	3.70	11.90	28.50	5.00	16.28
264	6.16	3.66	10.90	31.30	5.00	16.23
265	6.18	3.34	10.30	29.80	5.00	16.18
266	6.20	3.10	10.10	33.20	5.00	16.17
267	6.22	2.92	10.50	31.10	5.00	16.14
268	6.24	2.72	12.20	30.40	5.00	16.17
269	6.26	2.42	11.40	29.80	18.78	16.24
270	6.28	2.04	13.50	32.50	18.51	16.29
271	6.30	2.46	14.30	36.00	5.00	16.28
272	6.32	3.25	12.80	31.40	5.00	16.30
273	6.34	3.49	10.80	7.10	5.00	16.27
274	6.36	3.11	11.10	19.10	5.00	16.19
275	6.38	2.53	11.10	25.50	19.91	16.13
276	6.40	1.49	11.50	27.40	26.14	16.13
277	6.42	1.05	13.50	30.50	35.97	16.28
278	6.44	0.82	15.90	32.90	39.87	16.35
279	6.46	0.84	27.20	58.00	31.90	16.52
280	6.48	1.93	18.80	99.50	23.19	16.69
281	6.50	3.50	15.80	30.80	17.26	16.83
282	6.52	4.63	16.60	31.00	5.00	16.79
283	6.54	4.92	17.50	33.50	5.00	16.78
284	6.56	5.10	17.20	31.00	5.00	16.76
285	6.58	5.04	13.60	30.50	5.00	16.73
286	6.60	5.45	12.90	29.20	5.00	16.65
287	6.62	5.43	13.40	30.50	5.00	16.58
288	6.64	5.42	12.30	31.70	5.00	16.61

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	5.32	12.90	35.20	5.00	16.64
290	6.68	5.26	14.90	36.90	5.00	16.66
291	6.70	5.03	15.10	32.20	5.00	16.69
292	6.72	4.55	15.50	33.50	5.00	16.66
293	6.74	3.07	16.40	38.30	5.00	16.61
294	6.76	2.62	13.80	41.50	18.59	16.65
295	6.78	2.26	15.90	36.20	24.42	16.65
296	6.80	1.82	23.00	75.50	29.54	16.67
297	6.82	1.42	23.20	158.00	34.87	16.75
298	6.84	1.20	23.90	216.40	38.98	16.82
299	6.86	1.30	26.30	293.30	41.68	16.84
300	6.88	1.45	26.10	240.80	44.05	16.93
301	6.90	1.37	28.50	92.30	46.08	17.11
302	6.92	1.19	34.60	119.80	42.46	17.32
303	6.94	1.25	47.60	159.40	33.71	17.55
304	6.96	2.44	49.50	145.60	27.44	17.69
305	6.98	4.37	43.90	18.30	21.98	17.71
306	7.00	4.41	38.10	22.90	17.55	17.61
307	7.02	4.41	23.40	31.50	14.84	17.41
308	7.04	4.21	20.40	35.70	14.12	17.12
309	7.06	4.04	18.20	37.00	5.00	16.81
310	7.08	3.48	12.90	35.30	5.00	16.56
311	7.10	3.48	12.90	35.30	5.00	16.29
312	7.12	3.05	8.00	37.70	5.00	16.03
313	7.14	2.89	6.70	38.50	5.00	15.88
314	7.16	2.64	7.90	38.00	5.00	15.69
315	7.18	2.40	7.90	39.60	5.00	15.82
316	7.20	2.20	7.40	44.70	5.00	15.91
317	7.22	1.96	13.80	37.10	22.10	15.96
318	7.24	1.92	11.60	40.40	22.70	16.03
319	7.26	2.08	10.80	40.50	22.99	16.10
320	7.28	2.31	11.20	40.20	24.00	16.03
321	7.30	2.27	11.00	40.80	26.22	16.00
322	7.32	1.38	11.40	42.10	32.63	16.26
323	7.34	1.04	11.80	45.10	42.00	16.38
324	7.36	0.78	28.60	40.90	54.60	16.44
325	7.38	0.65	26.00	184.70	58.06	16.54
326	7.40	0.75	24.50	233.80	55.46	16.67
327	7.42	1.19	22.70	138.00	48.20	16.66
328	7.44	1.44	21.80	114.30	41.70	16.69
329	7.46	1.60	21.50	84.80	36.46	16.73
330	7.48	1.73	22.60	51.00	33.32	16.76
331	7.50	1.93	22.60	32.60	31.53	16.78
332	7.52	2.05	21.50	20.20	29.91	16.76
333	7.54	2.02	21.10	13.30	28.25	16.70
334	7.56	2.08	18.10	22.60	26.79	16.60
335	7.58	2.15	16.10	30.70	25.53	16.49
336	7.60	2.20	13.70	38.00	24.60	16.37

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	2.23	12.40	40.50	25.21	16.24
338	7.64	2.06	12.80	45.40	26.81	16.13
339	7.66	1.51	11.70	45.70	29.77	16.09
340	7.68	1.31	11.70	44.00	32.94	16.07
341	7.70	1.19	13.70	57.00	34.73	16.16
342	7.72	1.38	13.80	93.40	32.41	16.37
343	7.74	1.82	18.50	54.90	29.28	16.55
344	7.76	2.49	22.10	4.50	27.54	16.66
345	7.78	2.66	21.10	14.00	25.67	16.75
346	7.80	2.08	19.40	41.10	24.56	16.77
347	7.82	2.43	19.00	41.00	24.57	16.69
348	7.84	2.36	18.00	45.20	24.87	16.53
349	7.86	2.23	16.10	50.80	24.26	16.44
350	7.88	2.07	10.70	43.40	25.10	16.35
351	7.90	2.08	12.90	45.40	25.87	16.22
352	7.92	1.84	14.50	46.00	26.65	16.14
353	7.94	1.75	11.90	43.70	28.39	16.26
354	7.96	1.76	12.40	57.20	30.08	16.38
355	7.98	1.79	18.60	51.50	30.92	16.49
356	8.00	1.84	21.20	32.60	31.64	16.62
357	8.02	1.85	22.00	29.70	32.27	16.71
358	8.04	1.86	21.80	40.30	32.44	16.73
359	8.06	1.82	20.50	41.20	32.21	16.65
360	8.08	1.78	19.80	41.70	31.48	16.51
361	8.10	1.72	14.80	47.00	30.54	16.31
362	8.12	1.72	10.90	48.30	30.56	16.09
363	8.14	1.69	8.60	49.60	31.52	15.84
364	8.16	1.34	8.30	50.50	34.90	15.75
365	8.18	1.07	9.40	51.80	41.22	15.79
366	8.20	0.82	12.90	59.90	50.86	15.88
367	8.22	0.66	15.40	209.10	60.26	16.00
368	8.24	0.60	17.50	257.60	68.33	16.10
369	8.26	0.64	18.80	259.10	73.95	16.17
370	8.28	0.61	19.60	243.10	78.31	16.21
371	8.30	0.54	20.00	259.50	81.95	16.22
372	8.32	0.47	20.80	331.10	83.93	16.20
373	8.34	0.44	19.60	357.80	79.26	16.19
374	8.36	0.54	18.60	354.40	70.52	16.19
375	8.38	0.78	16.70	378.10	59.52	16.21
376	8.40	0.96	15.80	380.80	49.27	16.25
377	8.42	1.22	16.30	373.30	41.69	16.32
378	8.44	1.49	16.30	273.70	37.22	16.45
379	8.46	1.72	17.80	232.60	34.12	16.66
380	8.48	1.89	22.10	236.30	30.99	16.87
381	8.50	2.18	28.90	267.70	27.64	17.05
382	8.52	2.68	29.90	253.60	25.68	17.34
383	8.54	3.28	29.30	343.60	24.99	17.60
384	8.56	3.69	45.50	31.50	25.31	17.80

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	3.46	56.40	-22.30	27.75	17.96
386	8.60	3.01	60.90	-58.70	31.87	18.11
387	8.62	2.18	65.80	-62.70	36.57	18.15
388	8.64	2.07	72.60	-27.00	41.29	18.16
389	8.66	2.03	70.00	91.30	45.48	18.18
390	8.68	2.00	73.50	93.00	47.19	18.21
391	8.70	1.95	77.20	63.10	48.29	18.21
392	8.72	1.84	77.50	111.60	49.63	18.21
393	8.74	1.82	75.90	83.40	51.10	18.21
394	8.76	1.76	73.80	75.00	52.63	18.21
395	8.78	1.72	78.70	121.30	54.14	18.22
396	8.80	1.66	82.30	119.40	56.07	18.22
397	8.82	1.58	82.30	108.60	58.05	18.22
398	8.84	1.49	80.90	99.60	59.67	18.20
399	8.86	1.45	80.00	114.40	61.06	18.18
400	8.88	1.43	77.60	152.70	61.88	18.14
401	8.90	1.39	76.90	192.60	61.91	18.10
402	8.92	1.37	73.60	240.60	61.67	18.05
403	8.94	1.37	67.90	216.70	61.40	17.99
404	8.96	1.36	65.20	223.20	60.64	17.94
405	8.98	1.35	62.30	201.80	60.24	17.90
406	9.00	1.38	62.30	201.80	59.71	17.88

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.66	0.00	12.66	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.98	0.00	12.98	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.31	0.00	13.31	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	13.66	0.00	13.66	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	14.02	0.00	14.02	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	14.38	0.00	14.38	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	14.74	0.00	14.74	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
9	1.06	15.10	0.00	15.10	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
10	1.08	15.47	0.00	15.47	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
11	1.10	15.83	0.00	15.83	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
12	1.12	16.19	0.00	16.19	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
13	1.14	16.55	0.00	16.55	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
14	1.16	16.90	0.00	16.90	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
15	1.18	17.25	0.00	17.25	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.59	0.00	17.59	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.93	0.00	17.93	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	18.27	0.00	18.27	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	18.61	0.00	18.61	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	18.95	0.00	18.95	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	19.28	0.00	19.28	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	19.61	0.00	19.61	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	19.93	0.00	19.93	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	20.26	0.00	20.26	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	20.57	0.00	20.57	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	20.89	0.00	20.89	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	21.20	0.00	21.20	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	21.51	0.00	21.51	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	21.82	0.00	21.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	22.13	0.00	22.13	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	22.44	0.00	22.44	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	22.75	0.00	22.75	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	23.07	0.00	23.07	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	23.38	0.00	23.38	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	23.70	0.00	23.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	24.01	0.00	24.01	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	24.33	0.00	24.33	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	24.65	0.00	24.65	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	24.97	0.00	24.97	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	25.29	0.00	25.29	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	25.62	0.00	25.62	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	25.94	0.00	25.94	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	26.27	0.00	26.27	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	26.59	0.00	26.59	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	26.91	0.00	26.91	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	27.22	0.00	27.22	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	27.54	0.00	27.54	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	27.86	0.00	27.86	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	1.86	28.17	0.00	28.17	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	28.49	0.00	28.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	28.80	0.00	28.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	29.11	0.00	29.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	29.43	0.00	29.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	29.74	0.00	29.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	30.05	0.00	30.05	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	30.36	0.00	30.36	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	30.67	0.00	30.67	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	30.98	0.00	30.98	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	31.29	0.00	31.29	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	31.60	0.00	31.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	31.91	0.00	31.91	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	32.22	0.00	32.22	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	32.52	0.00	32.52	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	32.83	0.00	32.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	33.13	0.00	33.13	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	33.43	0.00	33.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	33.73	0.00	33.73	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	34.04	0.00	34.04	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	34.34	0.00	34.34	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	34.64	0.00	34.64	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
71	2.30	34.94	0.00	34.94	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
72	2.32	35.24	0.00	35.24	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
73	2.34	35.55	0.00	35.55	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
74	2.36	35.85	0.00	35.85	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
75	2.38	36.15	0.00	36.15	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
76	2.40	36.46	0.00	36.46	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
77	2.42	36.76	0.00	36.76	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
78	2.44	37.07	0.00	37.07	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
79	2.46	37.37	0.00	37.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
80	2.48	37.68	0.00	37.68	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	37.99	0.00	37.99	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	38.30	0.00	38.30	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	38.61	0.00	38.61	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
84	2.56	38.93	0.00	38.93	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
85	2.58	39.25	0.00	39.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
86	2.60	39.57	0.00	39.57	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
87	2.62	39.89	0.00	39.89	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
88	2.64	40.21	0.00	40.21	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
89	2.66	40.53	0.00	40.53	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
90	2.68	40.84	0.00	40.84	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	41.16	0.00	41.16	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	41.48	0.00	41.48	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	41.80	0.00	41.80	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	42.12	0.00	42.12	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	42.44	0.00	42.44	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	42.77	0.00	42.77	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	43.10	0.00	43.10	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
98	2.84	43.42	0.00	43.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
99	2.86	43.75	0.00	43.75	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
100	2.88	44.08	0.00	44.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
101	2.90	44.41	0.00	44.41	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	44.73	0.00	44.73	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	45.05	0.00	45.05	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	45.38	0.00	45.38	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	45.70	0.00	45.70	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	46.02	0.00	46.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
107	3.02	46.34	0.00	46.34	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
108	3.04	46.67	0.00	46.67	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
109	3.06	47.01	0.00	47.01	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
110	3.08	47.35	0.00	47.35	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
111	3.10	47.69	0.00	47.69	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
112	3.12	48.04	0.00	48.04	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
113	3.14	48.40	0.00	48.40	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
114	3.16	48.75	0.00	48.75	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
115	3.18	49.10	0.00	49.10	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
116	3.20	49.46	0.00	49.46	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
117	3.22	49.81	0.00	49.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
118	3.24	50.16	0.00	50.16	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
119	3.26	50.51	0.00	50.51	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
120	3.28	50.86	0.00	50.86	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
121	3.30	51.21	0.00	51.21	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
122	3.32	51.56	0.00	51.56	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
123	3.34	51.90	0.00	51.90	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
124	3.36	52.25	0.00	52.25	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
125	3.38	52.59	0.00	52.59	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
126	3.40	52.94	0.00	52.94	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
127	3.42	53.28	0.00	53.28	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
128	3.44	53.62	0.00	53.62	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
129	3.46	53.96	0.00	53.96	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
130	3.48	54.29	0.00	54.29	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
131	3.50	54.62	0.00	54.62	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
132	3.52	54.95	0.00	54.95	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
133	3.54	55.28	0.00	55.28	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
134	3.56	55.61	0.00	55.61	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
135	3.58	55.93	0.00	55.93	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
136	3.60	56.25	0.00	56.25	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
137	3.62	56.57	0.20	56.37	0.98	0.064	1.38	0.046	1.00	1.00	0.046	No
138	3.64	56.88	0.39	56.49	0.98	0.064	1.38	0.046	1.00	1.00	0.046	No
139	3.66	57.19	0.59	56.60	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
140	3.68	57.50	0.78	56.72	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
141	3.70	57.81	0.98	56.83	0.97	0.064	1.38	0.047	1.00	1.00	0.047	No
142	3.72	58.12	1.18	56.94	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
143	3.74	58.43	1.37	57.05	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
144	3.76	58.74	1.57	57.17	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	59.05	1.77	57.28	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
146	3.80	59.36	1.96	57.40	0.97	0.065	1.38	0.048	1.00	1.00	0.048	No
147	3.82	59.68	2.16	57.52	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
148	3.84	59.99	2.35	57.64	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
149	3.86	60.31	2.55	57.76	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
150	3.88	60.63	2.75	57.88	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
151	3.90	60.94	2.94	58.00	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
152	3.92	61.25	3.14	58.11	0.97	0.067	1.38	0.048	1.00	1.00	0.048	No
153	3.94	61.57	3.34	58.23	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
154	3.96	61.87	3.53	58.34	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
155	3.98	62.18	3.73	58.46	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
156	4.00	62.49	3.92	58.57	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
157	4.02	62.80	4.12	58.68	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
158	4.04	63.11	4.32	58.79	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
159	4.06	63.42	4.51	58.91	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
160	4.08	63.73	4.71	59.02	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
161	4.10	64.05	4.91	59.15	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
162	4.12	64.37	5.10	59.27	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
163	4.14	64.70	5.30	59.40	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
164	4.16	65.03	5.49	59.53	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
165	4.18	65.36	5.69	59.67	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
166	4.20	65.68	5.89	59.80	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
167	4.22	66.01	6.08	59.93	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
168	4.24	66.34	6.28	60.06	0.97	0.070	1.38	0.051	1.00	1.00	2.000	Yes
169	4.26	66.67	6.47	60.19	0.97	0.070	1.38	0.051	1.00	1.00	2.000	Yes
170	4.28	67.00	6.67	60.33	0.97	0.070	1.38	0.051	1.00	1.00	2.000	Yes
171	4.30	67.33	6.87	60.46	0.97	0.070	1.38	0.051	1.00	1.00	2.000	Yes
172	4.32	67.65	7.06	60.59	0.97	0.070	1.38	0.051	1.00	1.00	2.000	Yes
173	4.34	67.98	7.26	60.72	0.97	0.071	1.38	0.051	1.00	1.00	2.000	Yes
174	4.36	68.30	7.46	60.84	0.97	0.071	1.38	0.051	1.00	1.00	2.000	Yes
175	4.38	68.62	7.65	60.97	0.97	0.071	1.38	0.052	1.00	1.00	2.000	Yes
176	4.40	68.93	7.85	61.09	0.97	0.071	1.38	0.052	1.00	1.00	2.000	Yes
177	4.42	69.25	8.04	61.20	0.97	0.071	1.38	0.052	1.00	1.00	2.000	Yes
178	4.44	69.56	8.24	61.32	0.97	0.071	1.38	0.052	1.00	1.00	2.000	Yes
179	4.46	69.87	8.44	61.43	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
180	4.48	70.18	8.63	61.54	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
181	4.50	70.48	8.83	61.65	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
182	4.52	70.78	9.03	61.76	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
183	4.54	71.08	9.22	61.86	0.97	0.072	1.38	0.053	1.00	1.00	0.053	No
184	4.56	71.38	9.42	61.97	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
185	4.58	71.68	9.61	62.07	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
186	4.60	71.98	9.81	62.17	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
187	4.62	72.28	10.01	62.27	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
188	4.64	72.57	10.20	62.37	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
189	4.66	72.87	10.40	62.47	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
190	4.68	73.17	10.59	62.57	0.97	0.074	1.38	0.053	1.00	1.00	0.053	No
191	4.70	73.47	10.79	62.68	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
192	4.72	73.77	10.99	62.79	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	4.74	74.08	11.18	62.90	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
194	4.76	74.39	11.38	63.01	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
195	4.78	74.70	11.58	63.13	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
196	4.80	75.02	11.77	63.24	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
197	4.82	75.33	11.97	63.36	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
198	4.84	75.65	12.16	63.48	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
199	4.86	75.97	12.36	63.61	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
200	4.88	76.29	12.56	63.73	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
201	4.90	76.60	12.75	63.85	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
202	4.92	76.92	12.95	63.97	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
203	4.94	77.23	13.15	64.09	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
204	4.96	77.55	13.34	64.20	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
205	4.98	77.86	13.54	64.32	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
206	5.00	78.16	13.73	64.43	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
207	5.02	78.48	13.93	64.55	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
208	5.04	78.79	14.13	64.66	0.97	0.076	1.38	0.056	1.00	1.00	0.056	No
209	5.06	79.10	14.32	64.78	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
210	5.08	79.41	14.52	64.90	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
211	5.10	79.73	14.72	65.01	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
212	5.12	80.04	14.91	65.13	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
213	5.14	80.34	15.11	65.24	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
214	5.16	80.65	15.30	65.34	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
215	5.18	80.95	15.50	65.45	0.96	0.078	1.38	0.056	1.00	1.00	0.056	No
216	5.20	81.24	15.70	65.55	0.96	0.078	1.38	0.056	1.00	1.00	0.056	No
217	5.22	81.54	15.89	65.65	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
218	5.24	81.83	16.09	65.74	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
219	5.26	82.13	16.28	65.84	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
220	5.28	82.42	16.48	65.94	0.96	0.078	1.38	0.057	1.00	1.00	2.000	Yes
221	5.30	82.73	16.68	66.05	0.96	0.078	1.38	0.057	1.00	1.00	2.000	Yes
222	5.32	83.04	16.87	66.16	0.96	0.079	1.38	0.057	1.00	1.00	2.000	Yes
223	5.34	83.35	17.07	66.28	0.96	0.079	1.38	0.057	1.00	1.00	2.000	Yes
224	5.36	83.67	17.27	66.40	0.96	0.079	1.38	0.057	1.00	1.00	2.000	Yes
225	5.38	83.99	17.46	66.53	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
226	5.40	84.32	17.66	66.66	0.96	0.079	1.38	0.058	1.00	1.00	0.058	No
227	5.42	84.64	17.85	66.79	0.96	0.079	1.38	0.058	1.00	1.00	0.058	No
228	5.44	84.97	18.05	66.92	0.96	0.079	1.38	0.058	1.00	1.00	0.058	No
229	5.46	85.29	18.25	67.04	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
230	5.48	85.61	18.44	67.17	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
231	5.50	85.93	18.64	67.29	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
232	5.52	86.25	18.84	67.42	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
233	5.54	86.58	19.03	67.55	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
234	5.56	86.90	19.23	67.67	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
235	5.58	87.22	19.42	67.80	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
236	5.60	87.55	19.62	67.93	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
237	5.62	87.88	19.82	68.06	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
238	5.64	88.21	20.01	68.20	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
239	5.66	88.54	20.21	68.34	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
240	5.68	88.88	20.40	68.48	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	89.22	20.60	68.62	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
242	5.72	89.55	20.80	68.75	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
243	5.74	89.88	20.99	68.89	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
244	5.76	90.21	21.19	69.02	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
245	5.78	90.54	21.39	69.15	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
246	5.80	90.87	21.58	69.29	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
247	5.82	91.20	21.78	69.42	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
248	5.84	91.53	21.97	69.55	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
249	5.86	91.86	22.17	69.69	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
250	5.88	92.18	22.37	69.82	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
251	5.90	92.51	22.56	69.95	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
252	5.92	92.84	22.76	70.08	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
253	5.94	93.16	22.96	70.21	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
254	5.96	93.49	23.15	70.34	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
255	5.98	93.81	23.35	70.47	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
256	6.00	94.14	23.54	70.60	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
257	6.02	94.47	23.74	70.73	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
258	6.04	94.79	23.94	70.86	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
259	6.06	95.12	24.13	70.99	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
260	6.08	95.45	24.33	71.12	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
261	6.10	95.77	24.53	71.25	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
262	6.12	96.10	24.72	71.38	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
263	6.14	96.43	24.92	71.51	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
264	6.16	96.75	25.11	71.64	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
265	6.18	97.07	25.31	71.76	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
266	6.20	97.40	25.51	71.89	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
267	6.22	97.72	25.70	72.02	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
268	6.24	98.04	25.90	72.15	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
269	6.26	98.37	26.09	72.27	0.96	0.085	1.38	0.061	1.00	1.00	0.061	No
270	6.28	98.69	26.29	72.40	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
271	6.30	99.02	26.49	72.53	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
272	6.32	99.35	26.68	72.66	0.95	0.085	1.38	0.062	1.00	1.00	0.062	No
273	6.34	99.67	26.88	72.79	0.95	0.085	1.38	0.062	1.00	1.00	2.000	Yes
274	6.36	99.99	27.08	72.92	0.95	0.085	1.38	0.062	1.00	1.00	2.000	Yes
275	6.38	100.32	27.27	73.05	0.95	0.085	1.38	0.062	1.00	1.00	2.000	Yes
276	6.40	100.64	27.47	73.17	0.95	0.085	1.38	0.062	1.00	1.00	2.000	Yes
277	6.42	100.97	27.66	73.30	0.95	0.085	1.38	0.062	1.00	1.00	2.000	Yes
278	6.44	101.29	27.86	73.43	0.95	0.086	1.38	0.062	1.00	1.00	2.000	Yes
279	6.46	101.62	28.06	73.57	0.95	0.086	1.38	0.062	1.00	1.00	2.000	Yes
280	6.48	101.96	28.25	73.70	0.95	0.086	1.38	0.062	1.00	1.00	2.000	Yes
281	6.50	102.29	28.45	73.84	0.95	0.086	1.38	0.062	1.00	1.00	2.000	Yes
282	6.52	102.63	28.65	73.98	0.95	0.086	1.38	0.062	1.00	1.00	2.000	Yes
283	6.54	102.96	28.84	74.12	0.95	0.086	1.38	0.063	1.00	1.00	2.000	Yes
284	6.56	103.30	29.04	74.26	0.95	0.086	1.38	0.063	1.00	1.00	2.000	Yes
285	6.58	103.63	29.23	74.40	0.95	0.086	1.38	0.063	1.00	1.00	2.000	Yes
286	6.60	103.97	29.43	74.54	0.95	0.086	1.38	0.063	1.00	1.00	2.000	Yes
287	6.62	104.30	29.63	74.67	0.95	0.086	1.38	0.063	1.00	1.00	0.063	No
288	6.64	104.63	29.82	74.81	0.95	0.087	1.38	0.063	1.00	1.00	0.063	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
289	6.66	104.96	30.02	74.95	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
290	6.68	105.30	30.21	75.08	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
291	6.70	105.63	30.41	75.22	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
292	6.72	105.96	30.61	75.36	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
293	6.74	106.30	30.80	75.49	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
294	6.76	106.63	31.00	75.63	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
295	6.78	106.96	31.20	75.77	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
296	6.80	107.30	31.39	75.90	0.95	0.087	1.38	0.063	1.00	1.00	2.000	Yes
297	6.82	107.63	31.59	76.04	0.95	0.087	1.38	0.064	1.00	1.00	2.000	Yes
298	6.84	107.97	31.78	76.18	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
299	6.86	108.30	31.98	76.32	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
300	6.88	108.64	32.18	76.47	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
301	6.90	108.99	32.37	76.61	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
302	6.92	109.33	32.57	76.76	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
303	6.94	109.68	32.77	76.92	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
304	6.96	110.04	32.96	77.07	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
305	6.98	110.39	33.16	77.23	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
306	7.00	110.74	33.35	77.39	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
307	7.02	111.09	33.55	77.54	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
308	7.04	111.43	33.75	77.69	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
309	7.06	111.77	33.94	77.83	0.95	0.088	1.38	0.064	1.00	1.00	2.000	Yes
310	7.08	112.10	34.14	77.96	0.95	0.089	1.38	0.064	1.00	1.00	0.064	No
311	7.10	112.43	34.34	78.09	0.95	0.089	1.38	0.064	1.00	1.00	0.064	No
312	7.12	112.75	34.53	78.22	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
313	7.14	113.06	34.73	78.34	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
314	7.16	113.38	34.92	78.46	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
315	7.18	113.70	35.12	78.58	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
316	7.20	114.01	35.32	78.70	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
317	7.22	114.33	35.51	78.82	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
318	7.24	114.65	35.71	78.94	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
319	7.26	114.98	35.90	79.07	0.95	0.089	1.38	0.065	1.00	1.00	2.000	Yes
320	7.28	115.30	36.10	79.19	0.95	0.089	1.38	0.065	1.00	1.00	2.000	Yes
321	7.30	115.62	36.30	79.32	0.95	0.090	1.38	0.065	1.00	1.00	2.000	Yes
322	7.32	115.94	36.49	79.45	0.95	0.090	1.38	0.065	1.00	1.00	2.000	Yes
323	7.34	116.27	36.69	79.58	0.94	0.090	1.38	0.065	1.00	1.00	2.000	Yes
324	7.36	116.60	36.89	79.71	0.94	0.090	1.38	0.065	1.00	1.00	2.000	Yes
325	7.38	116.93	37.08	79.85	0.94	0.090	1.38	0.065	1.00	1.00	2.000	Yes
326	7.40	117.26	37.28	79.98	0.94	0.090	1.38	0.065	1.00	1.00	2.000	Yes
327	7.42	117.59	37.47	80.12	0.94	0.090	1.38	0.065	1.00	1.00	2.000	Yes
328	7.44	117.93	37.67	80.26	0.94	0.090	1.38	0.066	1.00	1.00	2.000	Yes
329	7.46	118.26	37.87	80.40	0.94	0.090	1.38	0.066	1.00	1.00	2.000	Yes
330	7.48	118.60	38.06	80.54	0.94	0.090	1.38	0.066	1.00	1.00	2.000	Yes
331	7.50	118.93	38.26	80.68	0.94	0.090	1.38	0.066	1.00	1.00	2.000	Yes
332	7.52	119.27	38.46	80.81	0.94	0.090	1.38	0.066	1.00	1.00	2.000	Yes
333	7.54	119.60	38.65	80.95	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
334	7.56	119.94	38.85	81.09	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
335	7.58	120.27	39.04	81.22	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
336	7.60	120.59	39.24	81.35	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	120.92	39.44	81.48	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
338	7.64	121.24	39.63	81.61	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
339	7.66	121.56	39.83	81.73	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
340	7.68	121.88	40.02	81.86	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
341	7.70	122.21	40.22	81.99	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
342	7.72	122.53	40.42	82.12	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
343	7.74	122.86	40.61	82.25	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
344	7.76	123.20	40.81	82.39	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
345	7.78	123.53	41.01	82.53	0.94	0.091	1.38	0.066	1.00	1.00	2.000	Yes
346	7.80	123.87	41.20	82.67	0.94	0.092	1.38	0.067	1.00	1.00	2.000	Yes
347	7.82	124.20	41.40	82.80	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
348	7.84	124.53	41.59	82.94	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
349	7.86	124.86	41.79	83.07	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
350	7.88	125.19	41.99	83.20	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
351	7.90	125.51	42.18	83.33	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
352	7.92	125.84	42.38	83.46	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
353	7.94	126.16	42.58	83.59	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
354	7.96	126.49	42.77	83.72	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
355	7.98	126.82	42.97	83.85	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
356	8.00	127.15	43.16	83.99	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
357	8.02	127.48	43.36	84.12	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
358	8.04	127.82	43.56	84.26	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
359	8.06	128.15	43.75	84.40	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
360	8.08	128.48	43.95	84.53	0.94	0.092	1.38	0.067	1.00	1.00	0.067	No
361	8.10	128.81	44.15	84.66	0.94	0.093	1.38	0.067	1.00	1.00	0.067	No
362	8.12	129.13	44.34	84.79	0.94	0.093	1.38	0.067	1.00	1.00	2.000	Yes
363	8.14	129.45	44.54	84.91	0.94	0.093	1.38	0.067	1.00	1.00	2.000	Yes
364	8.16	129.76	44.73	85.03	0.94	0.093	1.38	0.067	1.00	1.00	2.000	Yes
365	8.18	130.08	44.93	85.15	0.93	0.093	1.38	0.067	1.00	1.00	2.000	Yes
366	8.20	130.40	45.13	85.27	0.93	0.093	1.38	0.068	1.00	1.00	2.000	Yes
367	8.22	130.72	45.32	85.39	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
368	8.24	131.04	45.52	85.52	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
369	8.26	131.36	45.71	85.65	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
370	8.28	131.68	45.91	85.77	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
371	8.30	132.01	46.11	85.90	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
372	8.32	132.33	46.30	86.03	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
373	8.34	132.66	46.50	86.16	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
374	8.36	132.98	46.70	86.29	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
375	8.38	133.31	46.89	86.41	0.93	0.093	1.38	0.068	1.00	1.00	0.068	No
376	8.40	133.63	47.09	86.54	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
377	8.42	133.96	47.28	86.67	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
378	8.44	134.29	47.48	86.81	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
379	8.46	134.62	47.68	86.94	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
380	8.48	134.96	47.87	87.08	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
381	8.50	135.30	48.07	87.23	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
382	8.52	135.64	48.27	87.38	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
383	8.54	136.00	48.46	87.53	0.93	0.094	1.38	0.068	1.00	1.00	0.068	No
384	8.56	136.35	48.66	87.69	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	8.58	136.71	48.85	87.86	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
386	8.60	137.07	49.05	88.02	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
387	8.62	137.44	49.25	88.19	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
388	8.64	137.80	49.44	88.36	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
389	8.66	138.16	49.64	88.52	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
390	8.68	138.53	49.83	88.69	0.93	0.094	1.38	0.068	1.00	1.00	2.000	Yes
391	8.70	138.89	50.03	88.86	0.93	0.094	1.38	0.068	1.00	1.00	0.068	No
392	8.72	139.26	50.23	89.03	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
393	8.74	139.62	50.42	89.20	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
394	8.76	139.98	50.62	89.36	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
395	8.78	140.35	50.82	89.53	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
396	8.80	140.71	51.01	89.70	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
397	8.82	141.08	51.21	89.87	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
398	8.84	141.44	51.40	90.04	0.93	0.094	1.38	0.069	1.00	1.00	0.069	No
399	8.86	141.80	51.60	90.20	0.93	0.095	1.38	0.069	1.00	1.00	0.069	No
400	8.88	142.17	51.80	90.37	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
401	8.90	142.53	51.99	90.54	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
402	8.92	142.89	52.19	90.70	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
403	8.94	143.25	52.39	90.87	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
404	8.96	143.61	52.58	91.03	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
405	8.98	143.97	52.78	91.19	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No
406	9.00	144.32	52.97	91.35	0.92	0.095	1.38	0.069	1.00	1.00	0.069	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.17	3.25	1.24	1.00	3.12	14.00	43.62	4.000	No	Yes	2.00
2	0.92	1.08	2.31	0.43	0.74	21.02	1.00	21.02	4.000	No	No	2.00
3	0.94	3.07	1.84	0.33	0.56	60.33	1.00	60.33	4.000	No	No	2.00
4	0.96	4.89	1.65	0.32	0.49	96.31	1.00	96.31	4.000	No	No	2.00
5	0.98	6.41	1.58	0.38	0.46	126.30	1.00	126.30	4.000	No	No	2.00
6	1.00	7.43	1.57	0.44	0.45	146.46	1.00	146.46	4.000	No	No	2.00
7	1.02	7.43	1.63	0.56	0.48	146.38	1.00	146.38	4.000	No	No	2.00
8	1.04	6.15	1.78	0.79	0.54	121.11	1.13	137.06	4.000	Yes	No	2.00
9	1.06	4.83	1.97	1.19	0.61	95.07	1.29	122.42	4.000	Yes	No	2.00
10	1.08	3.58	2.19	1.76	0.69	70.40	1.58	111.23	4.000	Yes	No	2.00
11	1.10	2.63	2.39	2.47	0.77	51.53	2.30	118.49	4.000	Yes	No	2.00
12	1.12	1.96	2.55	3.16	0.83	38.29	3.99	152.78	4.000	Yes	No	2.00
13	1.14	1.48	2.70	3.80	0.89	28.93	10.01	289.48	4.000	Yes	No	2.00
14	1.16	1.25	2.76	3.94	0.91	24.34	5.42	131.81	4.000	Yes	Yes	2.00
15	1.18	1.23	2.74	3.48	0.90	23.85	5.09	121.37	4.000	No	Yes	2.00
16	1.20	1.20	2.72	3.16	0.89	23.37	4.87	113.81	4.000	No	Yes	2.00
17	1.22	1.19	2.71	3.04	0.89	23.04	4.81	110.85	4.000	No	Yes	2.00
18	1.24	1.15	2.72	2.99	0.89	22.34	4.87	108.76	4.000	No	Yes	2.00
19	1.26	1.05	2.75	3.04	0.91	20.30	5.29	107.36	4.000	No	Yes	2.00
20	1.28	0.94	2.79	3.07	0.92	18.19	5.76	104.80	4.000	No	Yes	2.00
21	1.30	0.84	2.83	3.02	0.94	16.15	6.23	100.66	4.000	No	Yes	2.00
22	1.32	0.72	2.89	3.09	0.96	13.85	7.04	97.53	4.000	No	Yes	2.00
23	1.34	0.61	2.97	3.31	0.99	11.62	8.26	95.96	4.000	No	Yes	2.00
24	1.36	0.53	3.03	3.51	1.00	10.03	9.39	94.17	4.000	No	Yes	2.00
25	1.38	0.48	3.07	3.45	1.00	9.03	10.00	90.31	4.000	No	Yes	2.00
26	1.40	0.45	3.09	3.33	1.00	8.37	10.35	86.64	4.000	No	Yes	2.00
27	1.42	0.42	3.09	3.13	1.00	7.97	10.40	82.86	4.000	No	Yes	2.00
28	1.44	0.42	3.07	2.91	1.00	7.91	10.12	80.05	4.000	No	Yes	2.00
29	1.46	0.44	3.05	2.73	1.00	8.16	9.63	78.56	4.000	No	Yes	2.00
30	1.48	0.46	3.02	2.66	1.00	8.60	9.18	78.89	4.000	No	Yes	2.00
31	1.50	0.48	3.01	2.73	1.00	8.99	8.99	80.83	4.000	No	Yes	2.00
32	1.52	0.48	3.03	2.95	1.00	9.12	9.23	84.16	4.000	No	Yes	2.00
33	1.54	0.47	3.05	3.16	1.00	8.89	9.69	86.17	4.000	No	Yes	2.00
34	1.56	0.45	3.08	3.31	1.00	8.51	10.21	86.86	4.000	No	Yes	2.00
35	1.58	0.43	3.11	3.47	1.00	8.05	10.81	87.10	4.000	No	Yes	2.00
36	1.60	0.47	3.06	3.15	1.00	8.78	9.77	85.77	4.000	No	Yes	2.00
37	1.62	0.52	2.99	2.80	1.00	9.69	8.63	83.68	4.000	No	Yes	2.00
38	1.64	0.58	2.93	2.63	0.98	10.92	7.69	84.06	4.000	No	Yes	2.00
39	1.66	0.62	2.92	2.84	0.98	11.79	7.57	89.24	4.000	No	Yes	2.00
40	1.68	0.69	2.88	2.81	0.96	13.20	6.94	91.55	4.000	No	Yes	2.00
41	1.70	0.68	2.91	3.00	0.97	12.90	7.30	94.14	4.000	No	Yes	2.00
42	1.72	0.65	2.94	3.22	0.98	12.31	7.82	96.28	4.000	No	Yes	2.00
43	1.74	0.62	2.97	3.35	0.99	11.68	8.27	96.61	4.000	No	Yes	2.00
44	1.76	0.60	2.96	3.08	0.99	11.27	8.14	91.74	4.000	No	Yes	2.00
45	1.78	0.54	3.01	3.14	1.00	10.08	8.88	89.46	4.000	No	Yes	2.00
46	1.80	0.51	3.03	3.20	1.00	9.45	9.35	88.38	4.000	No	Yes	2.00
47	1.82	0.47	3.07	3.35	1.00	8.77	10.06	88.22	4.000	No	Yes	2.00
48	1.84	0.44	3.12	3.57	1.00	8.04	10.96	88.17	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	0.41	3.16	3.86	1.00	7.53	11.85	89.27	4.000	No	Yes	2.00
50	1.88	0.41	3.16	3.86	1.00	7.46	11.93	88.97	4.000	No	Yes	2.00
51	1.90	0.41	3.16	3.79	1.00	7.52	11.78	88.52	4.000	No	Yes	2.00
52	1.92	0.41	3.15	3.71	1.00	7.49	11.69	87.56	4.000	No	Yes	2.00
53	1.94	0.40	3.16	3.72	1.00	7.29	11.91	86.88	4.000	No	Yes	2.00
54	1.96	0.37	3.20	3.95	1.00	6.80	12.80	87.01	4.000	No	Yes	2.00
55	1.98	0.33	3.28	4.50	1.00	6.00	14.65	87.91	4.000	No	Yes	2.00
56	2.00	0.30	3.36	5.10	1.00	5.27	16.74	88.28	4.000	No	Yes	2.00
57	2.02	0.28	3.39	5.46	1.00	4.98	17.84	88.95	4.000	No	Yes	2.00
58	2.04	0.27	3.43	5.78	1.00	4.75	18.82	89.40	4.000	No	Yes	2.00
59	2.06	0.26	3.44	5.88	1.00	4.60	19.32	88.92	4.000	No	Yes	2.00
60	2.08	0.25	3.46	6.00	1.00	4.41	19.99	88.12	4.000	No	Yes	2.00
61	2.10	0.25	3.48	6.05	1.00	4.23	20.58	86.96	4.000	No	Yes	2.00
62	2.12	0.24	3.48	5.97	1.00	4.11	20.81	85.47	4.000	No	Yes	2.00
63	2.14	0.24	3.48	5.81	1.00	4.04	20.78	83.92	4.000	No	Yes	2.00
64	2.16	0.23	3.49	5.76	1.00	3.91	21.11	82.60	4.000	No	Yes	2.00
65	2.18	0.23	3.48	5.47	1.00	3.93	20.59	81.02	4.000	No	Yes	2.00
66	2.20	0.24	3.46	5.22	1.00	3.99	20.03	79.89	4.000	No	Yes	2.00
67	2.22	0.24	3.45	5.08	1.00	4.00	19.79	79.07	4.000	No	Yes	2.00
68	2.24	0.24	3.45	4.92	1.00	4.02	19.48	78.25	4.000	No	Yes	2.00
69	2.26	0.25	3.42	4.67	1.00	4.17	18.63	77.74	4.000	No	Yes	2.00
70	2.28	0.25	3.41	4.58	1.00	4.28	18.20	77.83	4.000	No	Yes	2.00
71	2.30	0.26	3.39	4.50	1.00	4.36	17.85	77.85	4.000	No	Yes	2.00
72	2.32	0.26	3.38	4.38	1.00	4.50	17.33	77.92	4.000	No	Yes	2.00
73	2.34	0.27	3.35	4.26	1.00	4.68	16.69	78.20	4.000	No	Yes	2.00
74	2.36	0.28	3.34	4.16	1.00	4.82	16.26	78.32	4.000	No	Yes	2.00
75	2.38	0.29	3.31	3.98	1.00	5.03	15.53	78.12	4.000	No	Yes	2.00
76	2.40	0.31	3.28	3.76	1.00	5.30	14.67	77.80	4.000	No	Yes	2.00
77	2.42	0.32	3.25	3.55	1.00	5.57	13.89	77.34	4.000	No	Yes	2.00
78	2.44	0.33	3.23	3.43	1.00	5.81	13.32	77.34	4.000	No	Yes	2.00
79	2.46	0.34	3.21	3.36	1.00	6.01	12.91	77.66	4.000	No	Yes	2.00
80	2.48	0.39	3.12	2.96	1.00	7.00	11.06	77.47	4.000	No	Yes	2.00
81	2.50	0.51	2.96	2.32	1.00	9.25	8.18	75.71	4.000	No	Yes	2.00
82	2.52	0.63	2.83	1.93	0.95	11.69	6.30	73.69	4.000	No	Yes	2.00
83	2.54	0.76	2.73	1.66	0.91	14.33	4.98	71.36	4.000	No	Yes	2.00
84	2.56	0.91	2.63	1.46	0.87	17.24	6.46	111.45	4.000	No	No	2.00
85	2.58	0.98	2.60	1.44	0.86	18.48	5.40	99.72	4.000	No	No	2.00
86	2.60	0.90	2.66	1.63	0.88	17.01	7.81	132.80	4.000	No	No	2.00
87	2.62	0.80	2.73	1.86	0.91	15.01	5.08	76.29	4.000	No	Yes	2.00
88	2.64	0.68	2.84	2.24	0.95	12.57	6.41	80.62	4.000	No	Yes	2.00
89	2.66	0.53	3.01	3.01	1.00	9.71	8.93	86.69	4.000	No	Yes	2.00
90	2.68	0.43	3.17	4.02	1.00	7.60	12.00	91.24	4.000	No	Yes	2.00
91	2.70	0.43	3.17	4.07	1.00	7.71	11.96	92.28	4.000	No	Yes	2.00
92	2.72	0.54	3.03	3.30	1.00	9.77	9.29	90.76	4.000	No	Yes	2.00
93	2.74	0.63	2.93	2.87	0.99	11.56	7.72	89.19	4.000	No	Yes	2.00
94	2.76	0.71	2.85	2.48	0.96	13.28	6.49	86.12	4.000	No	Yes	2.00
95	2.78	0.82	2.77	2.21	0.93	15.30	5.48	83.89	4.000	No	Yes	2.00
96	2.80	0.91	2.72	2.12	0.91	17.03	4.93	83.92	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.86	2.77	2.38	0.93	16.12	5.48	88.37	4.000	No	Yes	2.00
98	2.84	0.81	2.82	2.67	0.95	15.19	6.09	92.54	4.000	No	Yes	2.00
99	2.86	0.78	2.86	2.93	0.96	14.50	6.63	96.19	4.000	No	Yes	2.00
100	2.88	0.66	2.97	3.55	1.00	12.12	8.31	100.69	4.000	No	Yes	2.00
101	2.90	0.51	3.14	4.67	1.00	9.19	11.40	104.74	4.000	No	Yes	2.00
102	2.92	0.45	3.22	5.30	1.00	8.04	13.15	105.76	4.000	No	Yes	2.00
103	2.94	0.41	3.28	5.83	1.00	7.19	14.71	105.79	4.000	No	Yes	2.00
104	2.96	0.37	3.35	6.50	1.00	6.34	16.68	105.68	4.000	No	Yes	2.00
105	2.98	0.40	3.29	5.68	1.00	6.95	14.85	103.18	4.000	No	Yes	2.00
106	3.00	0.58	3.02	3.55	1.00	10.48	9.17	96.17	4.000	No	Yes	2.00
107	3.02	0.72	2.87	2.68	0.97	13.24	6.76	89.46	4.000	Yes	Yes	2.00
108	3.04	1.80	2.32	0.99	0.76	31.14	2.00	62.38	4.000	Yes	No	2.00
109	3.06	3.32	1.99	0.54	0.63	52.51	1.30	68.35	4.000	Yes	No	2.00
110	3.08	5.02	1.78	0.38	0.55	74.80	1.00	74.80	4.000	Yes	No	2.00
111	3.10	6.52	1.67	0.33	0.51	93.70	1.00	93.70	4.000	No	No	2.00
112	3.12	7.86	1.60	0.32	0.48	110.49	1.00	110.49	4.000	No	No	2.00
113	3.14	8.09	1.61	0.35	0.49	113.58	1.00	113.58	4.000	No	No	2.00
114	3.16	7.89	1.63	0.38	0.50	111.18	1.00	111.18	4.000	No	No	2.00
115	3.18	7.49	1.67	0.43	0.51	106.44	1.00	106.44	4.000	No	No	2.00
116	3.20	7.16	1.71	0.46	0.52	102.22	1.00	102.22	4.000	Yes	No	2.00
117	3.22	6.07	1.80	0.54	0.56	88.28	1.15	101.28	4.000	Yes	No	2.00
118	3.24	5.15	1.89	0.63	0.59	76.40	1.23	93.80	4.000	Yes	No	2.00
119	3.26	4.10	2.01	0.80	0.64	62.49	1.32	82.47	4.000	Yes	No	2.00
120	3.28	3.00	2.20	1.15	0.71	47.65	1.62	77.11	4.000	Yes	No	2.00
121	3.30	1.87	2.48	1.94	0.82	31.39	2.87	90.10	4.000	Yes	No	2.00
122	3.32	1.56	2.60	2.43	0.87	26.78	5.35	143.31	4.000	Yes	No	2.00
123	3.34	1.26	2.74	3.20	0.92	22.06	5.12	112.88	4.000	Yes	Yes	2.00
124	3.36	1.17	2.80	3.62	0.94	20.50	5.81	119.15	4.000	Yes	Yes	2.00
125	3.38	1.17	2.78	3.43	0.94	20.42	5.65	115.28	4.000	No	Yes	2.00
126	3.40	1.18	2.76	3.19	0.93	20.37	5.42	110.38	4.000	No	Yes	2.00
127	3.42	1.16	2.76	3.01	0.93	19.86	5.34	106.05	4.000	No	Yes	2.00
128	3.44	1.12	2.77	2.94	0.93	18.95	5.45	103.37	4.000	No	Yes	2.00
129	3.46	0.98	2.83	3.21	0.96	16.67	6.30	104.98	4.000	No	Yes	2.00
130	3.48	0.78	2.96	3.87	1.00	13.41	8.10	108.65	4.000	No	Yes	2.00
131	3.50	0.62	3.10	4.78	1.00	10.39	10.68	110.87	4.000	No	Yes	2.00
132	3.52	0.57	3.15	5.06	1.00	9.43	11.66	109.91	4.000	No	Yes	2.00
133	3.54	0.55	3.16	4.94	1.00	8.93	11.93	106.56	4.000	No	Yes	2.00
134	3.56	0.54	3.15	4.52	1.00	8.66	11.66	100.99	4.000	No	Yes	2.00
135	3.58	0.53	3.15	4.27	1.00	8.41	11.57	97.26	4.000	No	Yes	2.00
136	3.60	0.51	3.13	3.86	1.00	8.10	11.31	91.60	4.000	No	Yes	2.00
137	3.62	0.50	3.11	3.40	1.00	7.90	10.85	85.74	0.377	No	Yes	2.00
138	3.64	0.50	3.07	2.87	1.00	7.87	10.09	79.38	0.375	No	Yes	2.00
139	3.66	0.64	2.88	1.81	0.97	10.06	6.87	69.08	0.480	No	Yes	2.00
140	3.68	0.76	2.75	1.31	0.92	11.81	5.20	61.42	0.563	No	Yes	2.00
141	3.70	0.85	2.67	1.11	0.90	13.13	8.47	111.26	0.187	No	No	2.00
142	3.72	0.90	2.63	1.01	0.88	13.84	6.64	91.90	0.137	No	No	2.00
143	3.74	0.92	2.63	1.02	0.88	14.03	6.48	90.91	0.135	No	No	2.00
144	3.76	0.76	2.76	1.39	0.93	11.77	5.37	63.21	0.561	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.60	2.93	2.09	0.99	9.50	7.65	72.65	0.453	No	Yes	2.00
146	3.80	0.48	3.12	3.15	1.00	7.41	10.94	81.06	0.353	No	Yes	2.00
147	3.82	0.40	3.28	4.42	1.00	5.93	14.65	86.90	0.283	No	Yes	2.00
148	3.84	0.35	3.40	5.61	1.00	5.03	17.95	90.26	0.240	No	Yes	2.00
149	3.86	0.35	3.41	5.84	1.00	5.00	18.32	91.66	0.239	No	Yes	2.00
150	3.88	0.37	3.35	5.16	1.00	5.42	16.54	89.67	0.259	No	Yes	2.00
151	3.90	0.40	3.27	4.29	1.00	5.92	14.47	85.66	0.282	No	Yes	2.00
152	3.92	0.42	3.23	3.77	1.00	6.12	13.41	82.08	0.292	No	Yes	2.00
153	3.94	0.44	3.17	3.21	1.00	6.51	12.03	78.31	0.311	No	Yes	2.00
154	3.96	0.48	3.08	2.59	1.00	7.25	10.19	73.91	0.346	No	Yes	2.00
155	3.98	0.54	3.00	2.20	1.00	8.12	8.77	71.25	0.387	No	Yes	2.00
156	4.00	0.55	2.98	2.09	1.00	8.29	8.46	70.11	0.396	No	Yes	2.00
157	4.02	0.56	2.96	1.99	1.00	8.53	8.09	69.05	0.407	No	Yes	2.00
158	4.04	0.60	2.93	1.91	0.99	9.02	7.63	68.86	0.430	No	Yes	2.00
159	4.06	0.63	2.91	1.90	0.99	9.54	7.30	69.63	0.455	No	Yes	2.00
160	4.08	0.64	2.92	2.08	0.99	9.73	7.50	72.96	0.464	No	Yes	2.00
161	4.10	0.61	3.00	2.77	1.00	9.26	8.86	82.11	0.442	No	Yes	2.00
162	4.12	0.65	3.01	3.06	1.00	9.83	8.92	87.69	0.469	No	Yes	2.00
163	4.14	0.67	3.02	3.37	1.00	10.11	9.17	92.67	0.482	No	Yes	2.00
164	4.16	0.66	3.06	3.77	1.00	9.91	9.80	97.11	0.473	No	Yes	2.00
165	4.18	0.64	3.09	4.05	1.00	9.57	10.38	99.39	0.457	No	Yes	2.00
166	4.20	0.68	3.03	3.58	1.00	10.26	9.34	95.81	0.490	No	Yes	2.00
167	4.22	0.68	3.02	3.45	1.00	10.31	9.15	94.28	0.492	No	Yes	2.00
168	4.24	0.83	2.89	2.72	0.98	12.66	7.04	89.15	4.000	Yes	Yes	2.00
169	4.26	1.00	2.77	2.16	0.94	15.07	5.48	82.61	4.000	Yes	Yes	2.00
170	4.28	1.18	2.66	1.72	0.89	17.51	7.97	139.49	4.000	Yes	No	2.00
171	4.30	1.35	2.57	1.40	0.86	19.66	4.46	87.60	4.000	Yes	No	2.00
172	4.32	1.44	2.51	1.20	0.84	20.82	3.07	63.93	4.000	Yes	No	2.00
173	4.34	1.32	2.54	1.18	0.85	19.10	3.70	70.63	4.000	Yes	No	2.00
174	4.36	1.18	2.59	1.21	0.87	17.07	5.03	85.76	4.000	Yes	No	2.00
175	4.38	1.04	2.66	1.32	0.89	15.07	7.69	115.83	4.000	Yes	No	2.00
176	4.40	0.84	2.78	1.61	0.94	12.26	5.57	68.25	4.000	Yes	Yes	2.00
177	4.42	0.70	2.88	1.91	0.98	10.19	6.96	70.97	4.000	Yes	Yes	2.00
178	4.44	0.61	2.96	2.13	1.00	8.75	8.20	71.75	4.000	Yes	Yes	2.00
179	4.46	0.51	3.07	2.44	1.00	7.18	10.01	71.86	0.342	No	Yes	2.00
180	4.48	0.41	3.20	2.91	1.00	5.59	12.77	71.30	0.266	No	Yes	2.00
181	4.50	0.40	3.21	2.87	1.00	5.36	13.03	69.91	0.256	No	Yes	2.00
182	4.52	0.39	3.22	2.77	1.00	5.17	13.16	68.08	0.247	No	Yes	2.00
183	4.54	0.39	3.21	2.63	1.00	5.10	13.02	66.41	0.243	No	Yes	2.00
184	4.56	0.39	3.20	2.49	1.00	5.07	12.78	64.85	0.242	No	Yes	2.00
185	4.58	0.39	3.19	2.34	1.00	5.09	12.45	63.35	0.243	No	Yes	2.00
186	4.60	0.39	3.17	2.22	1.00	5.12	12.15	62.21	0.244	No	Yes	2.00
187	4.62	0.39	3.17	2.17	1.00	5.15	12.00	61.80	0.246	No	Yes	2.00
188	4.64	0.39	3.16	2.10	1.00	5.14	11.88	61.02	0.245	No	Yes	2.00
189	4.66	0.43	3.09	1.85	1.00	5.70	10.51	59.90	0.272	No	Yes	2.00
190	4.68	0.59	2.88	1.25	0.98	8.14	6.90	56.20	0.388	No	Yes	2.00
191	4.70	0.76	2.73	0.97	0.92	10.55	5.01	52.83	0.503	No	Yes	2.00
192	4.72	0.90	2.64	0.85	0.89	12.45	6.87	85.58	0.124	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	1.00	2.59	0.82	0.87	13.88	5.07	70.36	0.112	No	No	2.00
194	4.76	1.04	2.59	0.90	0.87	14.41	5.16	74.40	0.118	No	No	2.00
195	4.78	0.90	2.71	1.22	0.91	12.61	4.76	60.02	0.602	No	Yes	2.00
196	4.80	0.75	2.84	1.69	0.96	10.57	6.41	67.73	0.504	No	Yes	2.00
197	4.82	0.66	2.96	2.27	1.00	9.19	8.13	74.75	0.438	No	Yes	2.00
198	4.84	0.60	3.04	2.76	1.00	8.31	9.55	79.35	0.396	No	Yes	2.00
199	4.86	0.57	3.10	3.16	1.00	7.71	10.68	82.27	0.368	No	Yes	2.00
200	4.88	0.56	3.12	3.27	1.00	7.56	10.97	82.98	0.361	No	Yes	2.00
201	4.90	0.60	3.06	2.90	1.00	8.18	9.86	80.67	0.390	No	Yes	2.00
202	4.92	0.64	3.00	2.45	1.00	8.75	8.73	76.43	0.417	No	Yes	2.00
203	4.94	0.65	2.96	2.10	1.00	8.88	8.05	71.52	0.424	No	Yes	2.00
204	4.96	0.65	2.92	1.84	0.99	8.96	7.55	67.59	0.427	No	Yes	2.00
205	4.98	0.66	2.90	1.71	0.99	9.05	7.26	65.71	0.432	No	Yes	2.00
206	5.00	0.61	2.96	1.94	1.00	8.28	8.19	67.84	0.395	No	Yes	2.00
207	5.02	0.54	3.07	2.45	1.00	7.09	10.10	71.68	0.338	No	Yes	2.00
208	5.04	0.48	3.18	3.13	1.00	6.22	12.26	76.27	0.297	No	Yes	2.00
209	5.06	0.44	3.26	3.76	1.00	5.58	14.21	79.24	0.266	No	Yes	2.00
210	5.08	0.42	3.31	4.10	1.00	5.19	15.43	80.05	0.247	No	Yes	2.00
211	5.10	0.41	3.32	4.11	1.00	5.01	15.78	78.99	0.239	No	Yes	2.00
212	5.12	0.40	3.31	3.83	1.00	4.89	15.55	76.11	0.233	No	Yes	2.00
213	5.14	0.39	3.30	3.43	1.00	4.78	15.11	72.13	0.228	No	Yes	2.00
214	5.16	0.39	3.28	3.00	1.00	4.66	14.55	67.77	0.222	No	Yes	2.00
215	5.18	0.38	3.25	2.62	1.00	4.55	14.02	63.80	0.217	No	Yes	2.00
216	5.20	0.37	3.24	2.34	1.00	4.43	13.68	60.59	0.211	No	Yes	2.00
217	5.22	0.37	3.23	2.20	1.00	4.36	13.50	58.89	0.208	No	Yes	2.00
218	5.24	0.37	3.22	2.10	1.00	4.38	13.23	57.94	0.209	No	Yes	2.00
219	5.26	0.47	3.05	1.52	1.00	5.85	9.58	56.01	0.279	No	Yes	2.00
220	5.28	0.80	2.69	0.79	0.91	10.50	9.66	101.44	4.000	Yes	No	2.00
221	5.30	1.32	2.40	0.47	0.80	17.25	2.40	41.34	4.000	Yes	No	2.00
222	5.32	1.89	2.23	0.37	0.73	24.30	1.00	24.30	4.000	Yes	No	2.00
223	5.34	2.47	2.10	0.33	0.68	31.44	1.00	31.44	4.000	Yes	No	2.00
224	5.36	2.92	2.03	0.32	0.66	36.97	1.00	36.97	4.000	Yes	No	2.00
225	5.38	3.13	2.03	0.36	0.66	39.55	1.00	39.55	0.083	No	No	1.44
226	5.40	3.15	2.04	0.39	0.66	39.80	1.00	39.80	0.083	No	No	1.45
227	5.42	3.13	2.04	0.38	0.66	39.59	1.00	39.59	0.083	No	No	1.44
228	5.44	3.11	2.04	0.38	0.66	39.22	1.00	39.22	0.083	No	No	1.43
229	5.46	3.13	2.03	0.37	0.66	39.40	1.00	39.40	0.083	No	No	1.43
230	5.48	3.15	2.01	0.33	0.65	39.46	1.00	39.46	0.083	No	No	1.43
231	5.50	3.16	2.01	0.32	0.65	39.60	1.00	39.60	0.083	No	No	1.43
232	5.52	3.05	2.03	0.34	0.66	38.23	1.00	38.23	0.082	No	No	1.41
233	5.54	2.83	2.08	0.38	0.68	35.63	1.00	35.63	0.080	No	No	1.37
234	5.56	2.51	2.15	0.45	0.70	31.72	1.00	31.72	0.076	No	No	1.31
235	5.58	2.16	2.25	0.57	0.74	27.50	1.77	48.54	0.090	No	No	1.55
236	5.60	1.97	2.33	0.73	0.77	25.33	2.05	52.01	0.093	No	No	1.59
237	5.62	2.22	2.29	0.74	0.76	28.45	1.89	53.84	0.095	No	No	1.61
238	5.64	2.83	2.17	0.62	0.71	35.77	1.54	55.01	0.095	No	No	1.63
239	5.66	3.62	2.03	0.50	0.66	45.21	1.34	60.54	0.101	No	No	1.71
240	5.68	4.45	1.92	0.40	0.61	54.78	1.00	54.78	0.095	No	No	1.62

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	5.06	1.83	0.32	0.58	61.54	1.00	61.54	0.102	No	No	1.72
242	5.72	5.32	1.78	0.26	0.56	64.19	1.00	64.19	0.105	No	No	1.77
243	5.74	5.27	1.78	0.25	0.56	63.46	1.00	63.46	0.104	No	No	1.75
244	5.76	5.09	1.79	0.24	0.56	61.23	1.00	61.23	0.101	No	No	1.71
245	5.78	4.87	1.81	0.25	0.57	58.76	1.00	58.76	0.099	No	No	1.67
246	5.80	4.63	1.84	0.27	0.59	55.93	1.00	55.93	0.096	No	No	1.62
247	5.82	4.38	1.88	0.30	0.60	53.06	1.00	53.06	0.094	No	No	1.58
248	5.84	4.11	1.91	0.32	0.61	49.96	1.00	49.96	0.092	No	No	1.54
249	5.86	3.82	1.95	0.34	0.63	46.59	1.00	46.59	0.089	No	No	1.49
250	5.88	3.52	2.00	0.37	0.65	43.01	1.00	43.01	0.086	No	No	1.44
251	5.90	3.24	2.04	0.40	0.66	39.74	1.00	39.74	0.083	No	No	1.39
252	5.92	2.98	2.09	0.43	0.68	36.64	1.00	36.64	0.081	No	No	1.34
253	5.94	2.77	2.13	0.46	0.70	34.14	1.00	34.14	0.078	No	No	1.31
254	5.96	2.65	2.16	0.49	0.71	32.60	1.00	32.60	0.077	No	No	1.28
255	5.98	2.63	2.16	0.49	0.71	32.40	1.00	32.40	0.077	No	No	1.28
256	6.00	2.75	2.14	0.48	0.70	33.75	1.00	33.75	0.078	No	No	1.29
257	6.02	2.94	2.10	0.45	0.69	36.00	1.00	36.00	0.080	No	No	1.32
258	6.04	3.18	2.06	0.41	0.67	38.69	1.00	38.69	0.082	No	No	1.36
259	6.06	3.37	2.02	0.38	0.66	40.84	1.00	40.84	0.084	No	No	1.39
260	6.08	3.53	2.00	0.36	0.65	42.56	1.00	42.56	0.085	No	No	1.41
261	6.10	3.62	1.98	0.34	0.64	43.52	1.00	43.52	0.086	No	No	1.42
262	6.12	3.65	1.97	0.33	0.64	43.83	1.00	43.83	0.087	No	No	1.42
263	6.14	3.59	1.98	0.33	0.64	43.08	1.00	43.08	0.086	No	No	1.41
264	6.16	3.50	1.99	0.32	0.64	41.96	1.00	41.96	0.085	No	No	1.39
265	6.18	3.35	2.01	0.33	0.65	40.16	1.00	40.16	0.083	No	No	1.37
266	6.20	3.15	2.04	0.35	0.66	37.85	1.00	37.85	0.082	No	No	1.33
267	6.22	2.90	2.09	0.39	0.68	34.95	1.00	34.95	0.079	No	No	1.29
268	6.24	2.64	2.15	0.45	0.71	31.92	1.00	31.92	0.077	No	No	1.25
269	6.26	2.51	2.19	0.51	0.72	30.42	1.60	48.62	0.091	No	No	1.47
270	6.28	2.58	2.19	0.52	0.72	31.19	1.58	49.25	0.091	No	No	1.48
271	6.30	2.74	2.15	0.48	0.70	32.93	1.00	32.93	0.077	No	No	1.26
272	6.32	2.87	2.12	0.45	0.69	34.49	1.00	34.49	0.079	No	No	1.28
273	6.34	2.97	2.10	0.42	0.68	35.56	1.00	35.56	4.000	Yes	No	2.00
274	6.36	2.78	2.13	0.43	0.70	33.24	1.00	33.24	4.000	Yes	No	2.00
275	6.38	2.34	2.23	0.52	0.73	28.10	1.69	47.35	4.000	Yes	No	2.00
276	6.40	1.81	2.39	0.74	0.80	21.83	2.34	51.04	4.000	Yes	No	2.00
277	6.42	1.35	2.61	1.26	0.88	16.46	5.86	96.50	4.000	Yes	No	2.00
278	6.44	1.24	2.69	1.53	0.91	15.03	9.51	142.94	4.000	Yes	No	2.00
279	6.46	1.64	2.53	1.19	0.85	19.93	3.35	66.84	4.000	Yes	No	2.00
280	6.48	2.36	2.32	0.84	0.77	28.41	1.99	56.64	4.000	Yes	No	2.00
281	6.50	3.17	2.15	0.62	0.70	37.88	1.50	56.74	4.000	Yes	No	2.00
282	6.52	4.02	1.99	0.44	0.64	47.40	1.00	47.40	4.000	Yes	No	2.00
283	6.54	4.64	1.90	0.36	0.61	54.22	1.00	54.22	4.000	Yes	No	2.00
284	6.56	5.03	1.85	0.32	0.59	58.45	1.00	58.45	4.000	Yes	No	2.00
285	6.58	5.19	1.83	0.29	0.58	60.12	1.00	60.12	4.000	Yes	No	2.00
286	6.60	5.29	1.80	0.27	0.57	61.09	1.00	61.09	4.000	Yes	No	2.00
287	6.62	5.34	1.79	0.25	0.57	61.44	1.00	61.44	0.102	No	No	1.62
288	6.64	5.38	1.79	0.25	0.57	61.89	1.00	61.89	0.102	No	No	1.62

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	5.30	1.80	0.26	0.57	60.93	1.00	60.93	4.000	Yes	No	2.00
290	6.68	5.12	1.83	0.28	0.58	58.97	1.00	58.97	4.000	Yes	No	2.00
291	6.70	4.65	1.89	0.33	0.61	53.76	1.00	53.76	4.000	Yes	No	2.00
292	6.72	4.11	1.96	0.38	0.63	47.71	1.00	47.71	4.000	Yes	No	2.00
293	6.74	3.51	2.05	0.45	0.67	40.91	1.00	40.91	4.000	Yes	No	2.00
294	6.76	2.87	2.19	0.61	0.72	33.69	1.58	53.39	4.000	Yes	No	2.00
295	6.78	2.25	2.35	0.86	0.78	26.53	2.13	56.53	4.000	Yes	No	2.00
296	6.80	1.88	2.47	1.13	0.83	22.26	2.81	62.45	4.000	Yes	No	2.00
297	6.82	1.63	2.59	1.48	0.87	19.26	5.07	97.67	4.000	Yes	No	2.00
298	6.84	1.47	2.67	1.80	0.91	17.44	8.55	149.05	4.000	Yes	No	2.00
299	6.86	1.38	2.72	2.01	0.93	16.33	4.95	80.87	4.000	Yes	Yes	2.00
300	6.88	1.33	2.77	2.27	0.94	15.77	5.44	85.75	4.000	Yes	Yes	2.00
301	6.90	1.34	2.80	2.65	0.96	15.88	5.87	93.23	4.000	Yes	Yes	2.00
302	6.92	1.57	2.74	2.56	0.93	18.60	5.11	95.07	4.000	Yes	Yes	2.00
303	6.94	2.14	2.57	2.01	0.87	25.43	4.33	110.17	4.000	Yes	No	2.00
304	6.96	2.75	2.42	1.62	0.81	32.48	2.51	81.50	4.000	Yes	No	2.00
305	6.98	3.39	2.29	1.24	0.76	39.73	1.87	74.30	4.000	Yes	No	2.00
306	7.00	3.97	2.16	0.91	0.71	46.17	1.52	69.96	4.000	Yes	No	2.00
307	7.02	4.29	2.07	0.69	0.68	49.43	1.37	67.97	4.000	Yes	No	2.00
308	7.04	4.12	2.04	0.56	0.67	47.17	1.35	63.52	4.000	Yes	No	2.00
309	7.06	3.93	2.02	0.46	0.66	44.84	1.00	44.84	4.000	Yes	No	2.00
310	7.08	3.66	2.03	0.41	0.66	41.64	1.00	41.64	0.085	No	No	1.32
311	7.10	3.39	2.04	0.36	0.66	38.51	1.00	38.51	0.082	No	No	1.27
312	7.12	3.11	2.06	0.32	0.67	35.24	1.00	35.24	0.079	No	No	1.23
313	7.14	2.90	2.08	0.31	0.68	32.74	1.00	32.74	0.077	No	No	1.20
314	7.16	2.64	2.11	0.30	0.69	29.79	1.00	29.79	0.075	No	No	1.16
315	7.18	2.42	2.18	0.38	0.72	27.38	1.00	27.38	0.073	No	No	1.13
316	7.20	2.23	2.25	0.46	0.75	25.22	1.00	25.22	0.071	No	No	1.10
317	7.22	2.12	2.29	0.51	0.76	23.95	1.88	45.08	0.088	No	No	1.35
318	7.24	2.10	2.30	0.55	0.77	23.74	1.94	46.12	0.088	No	No	1.36
319	7.26	2.11	2.31	0.58	0.77	23.89	1.97	47.15	4.000	Yes	No	2.00
320	7.28	2.00	2.34	0.59	0.78	22.53	2.08	46.92	4.000	Yes	No	2.00
321	7.30	1.82	2.40	0.66	0.80	20.49	2.35	48.15	4.000	Yes	No	2.00
322	7.32	1.56	2.54	1.02	0.86	17.57	3.72	65.43	4.000	Yes	No	2.00
323	7.34	1.23	2.73	1.59	0.93	13.81	5.02	69.29	4.000	Yes	Yes	2.00
324	7.36	0.94	2.94	2.49	1.00	10.30	7.82	80.62	4.000	Yes	Yes	2.00
325	7.38	0.90	2.99	2.89	1.00	9.84	8.68	85.38	4.000	Yes	Yes	2.00
326	7.40	0.99	2.95	2.85	1.00	10.86	8.03	87.24	4.000	Yes	Yes	2.00
327	7.42	1.15	2.84	2.25	0.97	12.82	6.34	81.26	4.000	Yes	Yes	2.00
328	7.44	1.36	2.72	1.82	0.93	15.26	4.95	75.60	4.000	Yes	Yes	2.00
329	7.46	1.59	2.62	1.51	0.89	17.86	6.24	111.48	4.000	Yes	No	2.00
330	7.48	1.76	2.56	1.34	0.86	19.76	4.11	81.15	4.000	Yes	No	2.00
331	7.50	1.87	2.52	1.25	0.85	21.00	3.18	66.76	4.000	Yes	No	2.00
332	7.52	1.97	2.48	1.15	0.84	22.01	2.86	62.98	4.000	Yes	No	2.00
333	7.54	2.05	2.44	1.03	0.82	22.89	2.62	60.00	4.000	Yes	No	2.00
334	7.56	2.10	2.41	0.91	0.81	23.43	2.42	56.76	4.000	Yes	No	2.00
335	7.58	2.14	2.38	0.81	0.80	23.75	2.26	53.74	4.000	Yes	No	2.00
336	7.60	2.15	2.35	0.72	0.79	23.80	2.15	51.20	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	2.04	2.37	0.70	0.79	22.47	2.22	49.97	4.000	Yes	No	2.00
338	7.64	1.87	2.41	0.71	0.81	20.53	2.43	49.81	4.000	Yes	No	2.00
339	7.66	1.67	2.48	0.81	0.84	18.25	2.84	51.84	4.000	Yes	No	2.00
340	7.68	1.50	2.55	0.92	0.86	16.34	3.89	63.59	4.000	Yes	No	2.00
341	7.70	1.45	2.59	1.04	0.88	15.80	4.97	78.61	4.000	Yes	No	2.00
342	7.72	1.65	2.54	1.05	0.86	18.01	3.61	65.03	4.000	Yes	No	2.00
343	7.74	1.92	2.47	0.99	0.83	21.04	2.77	58.26	4.000	Yes	No	2.00
344	7.76	2.09	2.43	0.96	0.82	23.02	2.52	58.09	4.000	Yes	No	2.00
345	7.78	2.30	2.38	0.92	0.80	25.31	2.28	57.71	4.000	Yes	No	2.00
346	7.80	2.41	2.35	0.87	0.79	26.46	2.15	56.79	4.000	Yes	No	2.00
347	7.82	2.36	2.35	0.84	0.79	25.84	2.15	55.52	0.096	No	No	1.44
348	7.84	2.24	2.36	0.79	0.79	24.47	2.18	53.42	0.094	No	No	1.41
349	7.86	2.24	2.35	0.72	0.79	24.41	2.11	51.57	0.093	No	No	1.39
350	7.88	2.12	2.37	0.72	0.79	23.05	2.21	50.97	0.092	No	No	1.38
351	7.90	2.00	2.39	0.70	0.80	21.66	2.31	49.92	0.092	No	No	1.37
352	7.92	1.91	2.41	0.70	0.81	20.56	2.40	49.44	0.091	No	No	1.36
353	7.94	1.85	2.45	0.82	0.82	19.94	2.64	52.65	0.094	No	No	1.40
354	7.96	1.80	2.49	0.94	0.84	19.41	2.89	56.04	0.096	No	No	1.44
355	7.98	1.80	2.51	1.03	0.85	19.42	2.90	56.40	0.097	No	No	1.44
356	8.00	1.83	2.52	1.13	0.85	19.67	3.23	63.55	0.104	No	No	1.55
357	8.02	1.84	2.53	1.22	0.86	19.81	3.54	70.05	0.112	No	No	1.67
358	8.04	1.84	2.54	1.23	0.86	19.76	3.63	71.66	0.114	No	No	1.70
359	8.06	1.81	2.53	1.17	0.86	19.45	3.51	68.26	0.110	No	No	1.63
360	8.08	1.79	2.52	1.06	0.85	19.11	3.15	60.29	0.100	No	No	1.49
361	8.10	1.75	2.50	0.92	0.84	18.67	2.96	55.20	0.096	No	No	1.42
362	8.12	1.66	2.50	0.82	0.84	17.54	2.96	51.90	4.000	Yes	No	2.00
363	8.14	1.52	2.52	0.75	0.85	15.91	3.18	50.53	4.000	Yes	No	2.00
364	8.16	1.34	2.59	0.83	0.88	13.90	5.09	70.81	4.000	Yes	No	2.00
365	8.18	1.13	2.71	1.09	0.93	11.61	4.86	56.39	4.000	Yes	Yes	2.00
366	8.20	0.92	2.88	1.61	0.99	9.25	6.94	64.19	4.000	Yes	Yes	2.00
367	8.22	0.79	3.03	2.26	1.00	7.68	9.24	70.91	0.366	No	Yes	2.00
368	8.24	0.70	3.14	2.95	1.00	6.68	11.40	76.14	0.319	No	Yes	2.00
369	8.26	0.65	3.21	3.50	1.00	6.10	13.01	79.36	0.291	No	Yes	2.00
370	8.28	0.62	3.27	3.96	1.00	5.70	14.32	81.61	0.272	No	Yes	2.00
371	8.30	0.59	3.31	4.31	1.00	5.34	15.47	82.58	0.255	No	Yes	2.00
372	8.32	0.57	3.33	4.47	1.00	5.13	16.10	82.60	0.245	No	Yes	2.00
373	8.34	0.61	3.28	4.00	1.00	5.56	14.62	81.21	0.265	No	Yes	2.00
374	8.36	0.70	3.17	3.24	1.00	6.55	12.02	78.73	0.313	No	Yes	2.00
375	8.38	0.85	3.02	2.43	1.00	8.28	9.05	74.90	0.395	No	Yes	2.00
376	8.40	1.06	2.86	1.81	0.98	10.64	6.58	69.98	4.000	Yes	Yes	2.00
377	8.42	1.29	2.72	1.43	0.93	13.20	4.95	65.37	4.000	Yes	Yes	2.00
378	8.44	1.51	2.64	1.29	0.90	15.56	6.88	107.03	4.000	Yes	No	2.00
379	8.46	1.75	2.57	1.26	0.87	18.18	4.58	83.35	4.000	Yes	No	2.00
380	8.48	2.03	2.51	1.21	0.85	21.31	2.93	62.51	4.000	Yes	No	2.00
381	8.50	2.39	2.43	1.13	0.82	25.19	2.54	63.92	4.000	Yes	No	2.00
382	8.52	2.78	2.38	1.18	0.80	29.39	2.28	67.05	4.000	Yes	No	2.00
383	8.54	3.09	2.36	1.29	0.79	32.72	2.20	71.89	0.115	No	No	1.68
384	8.56	3.24	2.37	1.43	0.80	34.40	2.24	76.91	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	3.13	2.43	1.72	0.82	33.24	2.55	84.79	4.000	Yes	No	2.00
386	8.60	2.88	2.53	2.20	0.86	30.52	3.34	101.88	4.000	Yes	No	2.00
387	8.62	2.55	2.62	2.70	0.89	26.93	6.34	170.65	4.000	Yes	No	2.00
388	8.64	2.26	2.72	3.23	0.93	23.78	4.87	115.87	4.000	Yes	Yes	2.00
389	8.66	2.05	2.79	3.75	0.96	21.49	5.74	123.40	4.000	Yes	Yes	2.00
390	8.68	1.99	2.82	4.01	0.97	20.78	6.11	127.03	4.000	Yes	Yes	2.00
391	8.70	1.94	2.84	4.15	0.98	20.23	6.36	128.60	0.965	No	Yes	2.00
392	8.72	1.89	2.86	4.32	0.98	19.59	6.66	130.45	0.934	No	Yes	2.00
393	8.74	1.83	2.89	4.53	0.99	18.95	7.00	132.57	0.904	No	Yes	2.00
394	8.76	1.78	2.91	4.75	1.00	18.30	7.36	134.63	0.873	No	Yes	2.00
395	8.78	1.72	2.93	4.96	1.00	17.69	7.71	136.48	0.844	No	Yes	2.00
396	8.80	1.66	2.96	5.24	1.00	16.94	8.18	138.60	0.808	No	Yes	2.00
397	8.82	1.60	2.99	5.54	1.00	16.23	8.67	140.83	0.774	No	Yes	2.00
398	8.84	1.54	3.02	5.75	1.00	15.58	9.08	141.53	0.743	No	Yes	2.00
399	8.86	1.49	3.04	5.89	1.00	14.96	9.44	141.32	0.714	No	Yes	2.00
400	8.88	1.45	3.05	5.93	1.00	14.52	9.66	140.19	0.693	No	Yes	2.00
401	8.90	1.43	3.05	5.82	1.00	14.27	9.66	137.90	0.681	No	Yes	2.00
402	8.92	1.42	3.05	5.66	1.00	14.08	9.60	135.15	0.671	No	Yes	2.00
403	8.94	1.40	3.04	5.49	1.00	13.88	9.53	132.24	0.662	No	Yes	2.00
404	8.96	1.40	3.03	5.26	1.00	13.84	9.33	129.19	0.660	No	Yes	2.00
405	8.98	1.40	3.03	5.11	1.00	13.74	9.23	126.87	0.655	No	Yes	2.00
406	9.00	1.40	3.02	4.99	1.00	13.80	9.10	125.48	0.658	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	1.44	0.00	0.00	0.02	0.00	5.40	1.45	0.00	0.00	0.02	0.00
5.42	1.44	0.00	0.00	0.02	0.00	5.44	1.43	0.00	0.00	0.02	0.00
5.46	1.43	0.00	0.00	0.02	0.00	5.48	1.43	0.00	0.00	0.02	0.00
5.50	1.43	0.00	0.00	0.02	0.00	5.52	1.41	0.00	0.00	0.02	0.00
5.54	1.37	0.00	0.00	0.02	0.00	5.56	1.31	0.00	0.00	0.02	0.00
5.58	1.55	0.00	0.00	0.02	0.00	5.60	1.59	0.00	0.00	0.02	0.00
5.62	1.61	0.00	0.00	0.02	0.00	5.64	1.63	0.00	0.00	0.02	0.00
5.66	1.71	0.00	0.00	0.02	0.00	5.68	1.62	0.00	0.00	0.02	0.00
5.70	1.72	0.00	0.00	0.02	0.00	5.72	1.77	0.00	0.00	0.02	0.00
5.74	1.75	0.00	0.00	0.02	0.00	5.76	1.71	0.00	0.00	0.02	0.00
5.78	1.67	0.00	0.00	0.02	0.00	5.80	1.62	0.00	0.00	0.02	0.00
5.82	1.58	0.00	0.00	0.02	0.00	5.84	1.54	0.00	0.00	0.02	0.00
5.86	1.49	0.00	0.00	0.02	0.00	5.88	1.44	0.00	0.00	0.02	0.00
5.90	1.39	0.00	0.00	0.02	0.00	5.92	1.34	0.00	0.00	0.02	0.00
5.94	1.31	0.00	0.00	0.02	0.00	5.96	1.28	0.00	0.00	0.02	0.00
5.98	1.28	0.00	0.00	0.02	0.00	6.00	1.29	0.00	0.00	0.02	0.00
6.02	1.32	0.00	0.00	0.02	0.00	6.04	1.36	0.00	0.00	0.02	0.00
6.06	1.39	0.00	0.00	0.02	0.00	6.08	1.41	0.00	0.00	0.02	0.00
6.10	1.42	0.00	0.00	0.02	0.00	6.12	1.42	0.00	0.00	0.02	0.00
6.14	1.41	0.00	0.00	0.02	0.00	6.16	1.39	0.00	0.00	0.02	0.00
6.18	1.37	0.00	0.00	0.02	0.00	6.20	1.33	0.00	0.00	0.02	0.00
6.22	1.29	0.00	0.00	0.02	0.00	6.24	1.25	0.00	0.00	0.02	0.00
6.26	1.47	0.00	0.00	0.02	0.00	6.28	1.48	0.00	0.00	0.02	0.00
6.30	1.26	0.00	0.00	0.02	0.00	6.32	1.28	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	1.62	0.00	0.00	0.02	0.00	6.64	1.62	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	1.32	0.00	0.00	0.02	0.00
7.10	1.27	0.00	0.00	0.02	0.00	7.12	1.23	0.00	0.00	0.02	0.00
7.14	1.20	0.00	0.00	0.02	0.00	7.16	1.16	0.00	0.00	0.02	0.00
7.18	1.13	0.00	0.00	0.02	0.00	7.20	1.10	0.00	0.00	0.02	0.00
7.22	1.35	0.00	0.00	0.02	0.00	7.24	1.36	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	1.44	0.00	0.00	0.02	0.00	7.84	1.41	0.00	0.00	0.02	0.00
7.86	1.39	0.00	0.00	0.02	0.00	7.88	1.38	0.00	0.00	0.02	0.00
7.90	1.37	0.00	0.00	0.02	0.00	7.92	1.36	0.00	0.00	0.02	0.00
7.94	1.40	0.00	0.00	0.02	0.00	7.96	1.44	0.00	0.00	0.02	0.00
7.98	1.44	0.00	0.00	0.02	0.00	8.00	1.55	0.00	0.00	0.02	0.00
8.02	1.67	0.00	0.00	0.02	0.00	8.04	1.70	0.00	0.00	0.02	0.00
8.06	1.63	0.00	0.00	0.02	0.00	8.08	1.49	0.00	0.00	0.02	0.00
8.10	1.42	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	2.00	0.00	0.00	0.02	0.00
8.18	2.00	0.00	0.00	0.02	0.00	8.20	2.00	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	1.68	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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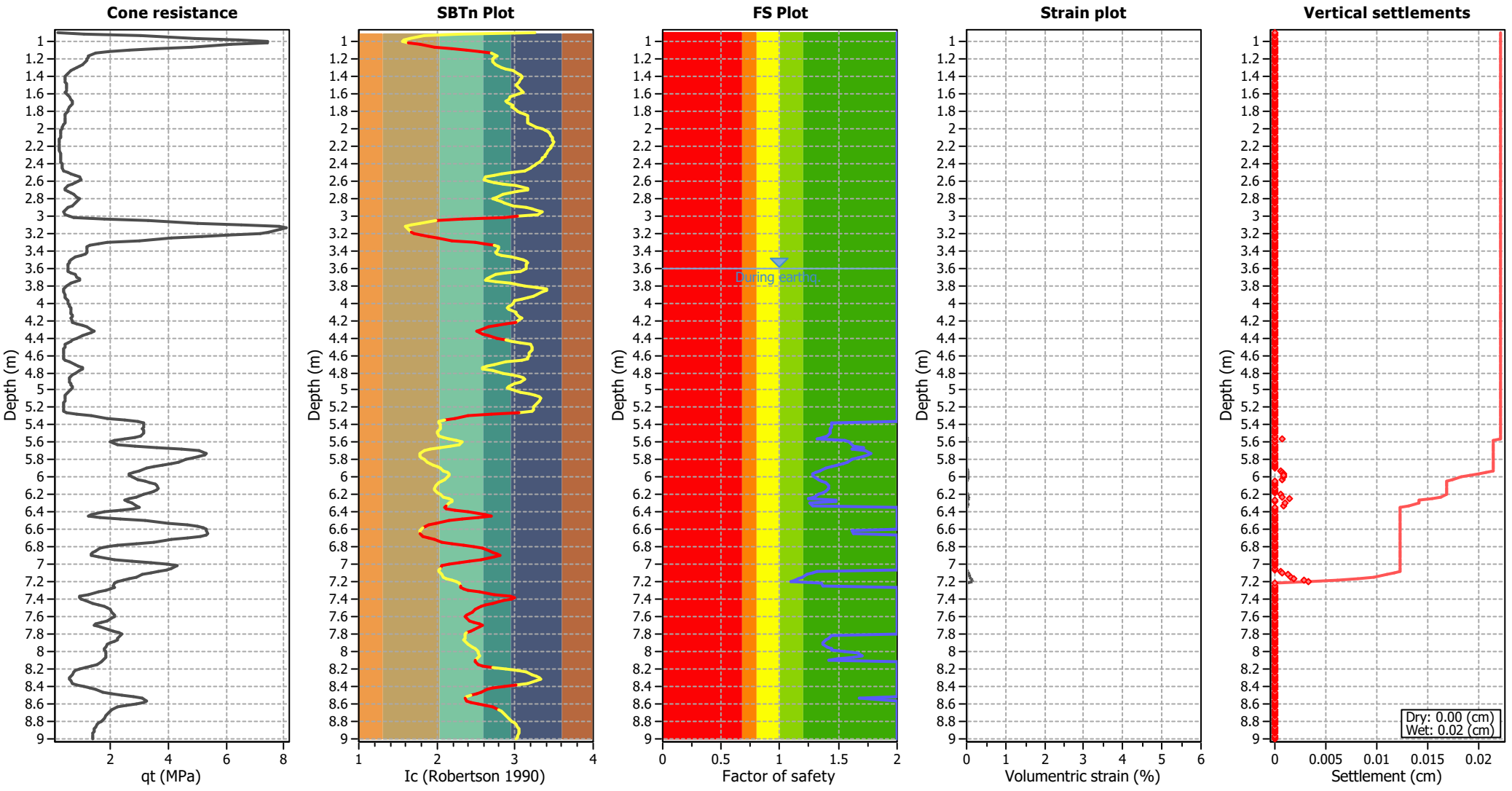
CPT name: CWLP CPT-3CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
3.60	91.60	2.00	0.00	0.80	0.00	3.62	85.74	2.00	0.00	0.80	0.00
3.64	79.38	2.00	0.00	0.80	0.00	3.66	69.08	2.00	0.00	0.80	0.00
3.68	61.42	2.00	0.00	0.80	0.00	3.70	111.26	2.00	0.00	0.79	0.00
3.72	91.90	2.00	0.00	0.79	0.00	3.74	90.91	2.00	0.00	0.79	0.00
3.76	63.21	2.00	0.00	0.79	0.00	3.78	72.65	2.00	0.00	0.79	0.00
3.80	81.06	2.00	0.00	0.79	0.00	3.82	86.90	2.00	0.00	0.79	0.00
3.84	90.26	2.00	0.00	0.79	0.00	3.86	91.66	2.00	0.00	0.79	0.00
3.88	89.67	2.00	0.00	0.78	0.00	3.90	85.66	2.00	0.00	0.78	0.00
3.92	82.08	2.00	0.00	0.78	0.00	3.94	78.31	2.00	0.00	0.78	0.00
3.96	73.91	2.00	0.00	0.78	0.00	3.98	71.25	2.00	0.00	0.78	0.00
4.00	70.11	2.00	0.00	0.78	0.00	4.02	69.05	2.00	0.00	0.78	0.00
4.04	68.86	2.00	0.00	0.78	0.00	4.06	69.63	2.00	0.00	0.77	0.00
4.08	72.96	2.00	0.00	0.77	0.00	4.10	82.11	2.00	0.00	0.77	0.00
4.12	87.69	2.00	0.00	0.77	0.00	4.14	92.67	2.00	0.00	0.77	0.00
4.16	97.11	2.00	0.00	0.77	0.00	4.18	99.39	2.00	0.00	0.77	0.00
4.20	95.81	2.00	0.00	0.77	0.00	4.22	94.28	2.00	0.00	0.77	0.00
4.24	89.15	2.00	0.00	0.76	0.00	4.26	82.61	2.00	0.00	0.76	0.00
4.28	139.49	2.00	0.00	0.76	0.00	4.30	87.60	2.00	0.00	0.76	0.00
4.32	63.93	2.00	0.00	0.76	0.00	4.34	70.63	2.00	0.00	0.76	0.00
4.36	85.76	2.00	0.00	0.76	0.00	4.38	115.83	2.00	0.00	0.76	0.00
4.40	68.25	2.00	0.00	0.76	0.00	4.42	70.97	2.00	0.00	0.75	0.00
4.44	71.75	2.00	0.00	0.75	0.00	4.46	71.86	2.00	0.00	0.75	0.00
4.48	71.30	2.00	0.00	0.75	0.00	4.50	69.91	2.00	0.00	0.75	0.00
4.52	68.08	2.00	0.00	0.75	0.00	4.54	66.41	2.00	0.00	0.75	0.00
4.56	64.85	2.00	0.00	0.75	0.00	4.58	63.35	2.00	0.00	0.75	0.00
4.60	62.21	2.00	0.00	0.74	0.00	4.62	61.80	2.00	0.00	0.74	0.00
4.64	61.02	2.00	0.00	0.74	0.00	4.66	59.90	2.00	0.00	0.74	0.00
4.68	56.20	2.00	0.00	0.74	0.00	4.70	52.83	2.00	0.00	0.74	0.00
4.72	85.58	2.00	0.00	0.74	0.00	4.74	70.36	2.00	0.00	0.74	0.00
4.76	74.40	2.00	0.00	0.74	0.00	4.78	60.02	2.00	0.00	0.73	0.00
4.80	67.73	2.00	0.00	0.73	0.00	4.82	74.75	2.00	0.00	0.73	0.00
4.84	79.35	2.00	0.00	0.73	0.00	4.86	82.27	2.00	0.00	0.73	0.00
4.88	82.98	2.00	0.00	0.73	0.00	4.90	80.67	2.00	0.00	0.73	0.00
4.92	76.43	2.00	0.00	0.73	0.00	4.94	71.52	2.00	0.00	0.73	0.00
4.96	67.59	2.00	0.00	0.72	0.00	4.98	65.71	2.00	0.00	0.72	0.00
5.00	67.84	2.00	0.00	0.72	0.00	5.02	71.68	2.00	0.00	0.72	0.00
5.04	76.27	2.00	0.00	0.72	0.00	5.06	79.24	2.00	0.00	0.72	0.00
5.08	80.05	2.00	0.00	0.72	0.00	5.10	78.99	2.00	0.00	0.72	0.00
5.12	76.11	2.00	0.00	0.72	0.00	5.14	72.13	2.00	0.00	0.71	0.00
5.16	67.77	2.00	0.00	0.71	0.00	5.18	63.80	2.00	0.00	0.71	0.00
5.20	60.59	2.00	0.00	0.71	0.00	5.22	58.89	2.00	0.00	0.71	0.00
5.24	57.94	2.00	0.00	0.71	0.00	5.26	56.01	2.00	0.00	0.71	0.00
5.28	101.44	2.00	0.00	0.71	0.00	5.30	41.34	2.00	0.00	0.71	0.00
5.32	24.30	2.00	0.00	0.70	0.00	5.34	31.44	2.00	0.00	0.70	0.00
5.36	36.97	2.00	0.00	0.70	0.00	5.38	39.55	1.44	0.00	0.70	0.00
5.40	39.80	1.45	0.00	0.70	0.00	5.42	39.59	1.44	0.00	0.70	0.00
5.44	39.22	1.43	0.00	0.70	0.00	5.46	39.40	1.43	0.00	0.70	0.00
5.48	39.46	1.43	0.00	0.70	0.00	5.50	39.60	1.43	0.00	0.69	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.52	38.23	1.41	0.00	0.69	0.00	5.54	35.63	1.37	0.00	0.69	0.00
5.56	31.72	1.31	0.04	0.69	0.00	5.58	48.54	1.55	0.00	0.69	0.00
5.60	52.01	1.59	0.00	0.69	0.00	5.62	53.84	1.61	0.00	0.69	0.00
5.64	55.01	1.63	0.00	0.69	0.00	5.66	60.54	1.71	0.00	0.69	0.00
5.68	54.78	1.62	0.00	0.68	0.00	5.70	61.54	1.72	0.00	0.68	0.00
5.72	64.19	1.77	0.00	0.68	0.00	5.74	63.46	1.75	0.00	0.68	0.00
5.76	61.23	1.71	0.00	0.68	0.00	5.78	58.76	1.67	0.00	0.68	0.00
5.80	55.93	1.62	0.00	0.68	0.00	5.82	53.06	1.58	0.00	0.68	0.00
5.84	49.96	1.54	0.00	0.68	0.00	5.86	46.59	1.49	0.00	0.67	0.00
5.88	43.01	1.44	0.00	0.67	0.00	5.90	39.74	1.39	0.00	0.67	0.00
5.92	36.64	1.34	0.03	0.67	0.00	5.94	34.14	1.31	0.04	0.67	0.00
5.96	32.60	1.28	0.04	0.67	0.00	5.98	32.40	1.28	0.04	0.67	0.00
6.00	33.75	1.29	0.04	0.67	0.00	6.02	36.00	1.32	0.03	0.67	0.00
6.04	38.69	1.36	0.00	0.66	0.00	6.06	40.84	1.39	0.00	0.66	0.00
6.08	42.56	1.41	0.00	0.66	0.00	6.10	43.52	1.42	0.00	0.66	0.00
6.12	43.83	1.42	0.00	0.66	0.00	6.14	43.08	1.41	0.00	0.66	0.00
6.16	41.96	1.39	0.00	0.66	0.00	6.18	40.16	1.37	0.00	0.66	0.00
6.20	37.85	1.33	0.03	0.66	0.00	6.22	34.95	1.29	0.04	0.65	0.00
6.24	31.92	1.25	0.07	0.65	0.00	6.26	48.62	1.47	0.00	0.65	0.00
6.28	49.25	1.48	0.00	0.65	0.00	6.30	32.93	1.26	0.05	0.65	0.00
6.32	34.49	1.28	0.04	0.65	0.00	6.34	35.56	2.00	0.00	0.65	0.00
6.36	33.24	2.00	0.00	0.65	0.00	6.38	47.35	2.00	0.00	0.65	0.00
6.40	51.04	2.00	0.00	0.64	0.00	6.42	96.50	2.00	0.00	0.64	0.00
6.44	142.94	2.00	0.00	0.64	0.00	6.46	66.84	2.00	0.00	0.64	0.00
6.48	56.64	2.00	0.00	0.64	0.00	6.50	56.74	2.00	0.00	0.64	0.00
6.52	47.40	2.00	0.00	0.64	0.00	6.54	54.22	2.00	0.00	0.64	0.00
6.56	58.45	2.00	0.00	0.64	0.00	6.58	60.12	2.00	0.00	0.63	0.00
6.60	61.09	2.00	0.00	0.63	0.00	6.62	61.44	1.62	0.00	0.63	0.00
6.64	61.89	1.62	0.00	0.63	0.00	6.66	60.93	2.00	0.00	0.63	0.00
6.68	58.97	2.00	0.00	0.63	0.00	6.70	53.76	2.00	0.00	0.63	0.00
6.72	47.71	2.00	0.00	0.63	0.00	6.74	40.91	2.00	0.00	0.63	0.00
6.76	53.39	2.00	0.00	0.62	0.00	6.78	56.53	2.00	0.00	0.62	0.00
6.80	62.45	2.00	0.00	0.62	0.00	6.82	97.67	2.00	0.00	0.62	0.00
6.84	149.05	2.00	0.00	0.62	0.00	6.86	80.87	2.00	0.00	0.62	0.00
6.88	85.75	2.00	0.00	0.62	0.00	6.90	93.23	2.00	0.00	0.62	0.00
6.92	95.07	2.00	0.00	0.62	0.00	6.94	110.17	2.00	0.00	0.61	0.00
6.96	81.50	2.00	0.00	0.61	0.00	6.98	74.30	2.00	0.00	0.61	0.00
7.00	69.96	2.00	0.00	0.61	0.00	7.02	67.97	2.00	0.00	0.61	0.00
7.04	63.52	2.00	0.00	0.61	0.00	7.06	44.84	2.00	0.00	0.61	0.00
7.08	41.64	1.32	0.03	0.61	0.00	7.10	38.51	1.27	0.04	0.61	0.00
7.12	35.24	1.23	0.07	0.60	0.00	7.14	32.74	1.20	0.08	0.60	0.00
7.16	29.79	1.16	0.10	0.60	0.00	7.18	27.38	1.13	0.14	0.60	0.00
7.20	25.22	1.10	0.16	0.60	0.00	7.22	45.08	1.35	0.00	0.60	0.00
7.24	46.12	1.36	0.00	0.60	0.00	7.26	47.15	2.00	0.00	0.60	0.00
7.28	46.92	2.00	0.00	0.60	0.00	7.30	48.15	2.00	0.00	0.59	0.00
7.32	65.43	2.00	0.00	0.59	0.00	7.34	69.29	2.00	0.00	0.59	0.00
7.36	80.62	2.00	0.00	0.59	0.00	7.38	85.38	2.00	0.00	0.59	0.00
7.40	87.24	2.00	0.00	0.59	0.00	7.42	81.26	2.00	0.00	0.59	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
7.44	75.60	2.00	0.00	0.59	0.00	7.46	111.48	2.00	0.00	0.59	0.00
7.48	81.15	2.00	0.00	0.58	0.00	7.50	66.76	2.00	0.00	0.58	0.00
7.52	62.98	2.00	0.00	0.58	0.00	7.54	60.00	2.00	0.00	0.58	0.00
7.56	56.76	2.00	0.00	0.58	0.00	7.58	53.74	2.00	0.00	0.58	0.00
7.60	51.20	2.00	0.00	0.58	0.00	7.62	49.97	2.00	0.00	0.58	0.00
7.64	49.81	2.00	0.00	0.58	0.00	7.66	51.84	2.00	0.00	0.57	0.00
7.68	63.59	2.00	0.00	0.57	0.00	7.70	78.61	2.00	0.00	0.57	0.00
7.72	65.03	2.00	0.00	0.57	0.00	7.74	58.26	2.00	0.00	0.57	0.00
7.76	58.09	2.00	0.00	0.57	0.00	7.78	57.71	2.00	0.00	0.57	0.00
7.80	56.79	2.00	0.00	0.57	0.00	7.82	55.52	1.44	0.00	0.57	0.00
7.84	53.42	1.41	0.00	0.56	0.00	7.86	51.57	1.39	0.00	0.56	0.00
7.88	50.97	1.38	0.00	0.56	0.00	7.90	49.92	1.37	0.00	0.56	0.00
7.92	49.44	1.36	0.00	0.56	0.00	7.94	52.65	1.40	0.00	0.56	0.00
7.96	56.04	1.44	0.00	0.56	0.00	7.98	56.40	1.44	0.00	0.56	0.00
8.00	63.55	1.55	0.00	0.56	0.00	8.02	70.05	1.67	0.00	0.55	0.00
8.04	71.66	1.70	0.00	0.55	0.00	8.06	68.26	1.63	0.00	0.55	0.00
8.08	60.29	1.49	0.00	0.55	0.00	8.10	55.20	1.42	0.00	0.55	0.00
8.12	51.90	2.00	0.00	0.55	0.00	8.14	50.53	2.00	0.00	0.55	0.00
8.16	70.81	2.00	0.00	0.55	0.00	8.18	56.39	2.00	0.00	0.55	0.00
8.20	64.19	2.00	0.00	0.54	0.00	8.22	70.91	2.00	0.00	0.54	0.00
8.24	76.14	2.00	0.00	0.54	0.00	8.26	79.36	2.00	0.00	0.54	0.00
8.28	81.61	2.00	0.00	0.54	0.00	8.30	82.58	2.00	0.00	0.54	0.00
8.32	82.60	2.00	0.00	0.54	0.00	8.34	81.21	2.00	0.00	0.54	0.00
8.36	78.73	2.00	0.00	0.54	0.00	8.38	74.90	2.00	0.00	0.53	0.00
8.40	69.98	2.00	0.00	0.53	0.00	8.42	65.37	2.00	0.00	0.53	0.00
8.44	107.03	2.00	0.00	0.53	0.00	8.46	83.35	2.00	0.00	0.53	0.00
8.48	62.51	2.00	0.00	0.53	0.00	8.50	63.92	2.00	0.00	0.53	0.00
8.52	67.05	2.00	0.00	0.53	0.00	8.54	71.89	1.68	0.00	0.53	0.00
8.56	76.91	2.00	0.00	0.52	0.00	8.58	84.79	2.00	0.00	0.52	0.00
8.60	101.88	2.00	0.00	0.52	0.00	8.62	170.65	2.00	0.00	0.52	0.00
8.64	115.87	2.00	0.00	0.52	0.00	8.66	123.40	2.00	0.00	0.52	0.00
8.68	127.03	2.00	0.00	0.52	0.00	8.70	128.60	2.00	0.00	0.52	0.00
8.72	130.45	2.00	0.00	0.52	0.00	8.74	132.57	2.00	0.00	0.51	0.00
8.76	134.63	2.00	0.00	0.51	0.00	8.78	136.48	2.00	0.00	0.51	0.00
8.80	138.60	2.00	0.00	0.51	0.00	8.82	140.83	2.00	0.00	0.51	0.00
8.84	141.53	2.00	0.00	0.51	0.00	8.86	141.32	2.00	0.00	0.51	0.00
8.88	140.19	2.00	0.00	0.51	0.00	8.90	137.90	2.00	0.00	0.51	0.00
8.92	135.15	2.00	0.00	0.50	0.00	8.94	132.24	2.00	0.00	0.50	0.00
8.96	129.19	2.00	0.00	0.50	0.00	8.98	126.87	2.00	0.00	0.50	0.00
9.00	125.48	2.00	0.00	0.50	0.00						

Total estimated settlement: 0.02

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.17	3.12	14.00	43.62	3.25	0.05	0.91
0.92	1.08	21.02	1.00	21.02	2.31	0.02	0.62
0.94	3.07	60.33	1.00	60.33	1.84	0.12	0.66
0.96	4.89	96.31	1.00	96.31	1.65	0.74	0.74
0.98	6.41	126.30	1.00	126.30	1.58	0.79	0.79
1.00	7.43	146.46	1.00	146.46	1.57	0.82	0.82
1.02	7.43	146.38	1.00	146.38	1.63	0.82	0.82
1.04	6.15	121.11	1.13	137.06	1.78	0.81	0.81
1.06	4.83	95.07	1.29	122.42	1.97	0.79	0.79
1.08	3.58	70.40	1.58	111.23	2.19	0.77	0.77
1.10	2.63	51.53	2.30	118.49	2.39	0.78	0.78
1.12	1.96	38.29	3.37	128.98	2.55	0.83	0.83
1.14	1.48	28.93	4.68	135.30	2.70	0.97	0.97
1.16	1.25	24.34	5.42	131.81	2.76	0.80	0.80
1.18	1.23	23.85	5.09	121.37	2.74	0.79	0.79
1.20	1.20	23.37	4.87	113.81	2.72	0.77	0.77
1.22	1.19	23.04	4.81	110.85	2.71	0.77	0.77
1.24	1.15	22.34	4.87	108.76	2.72	0.76	0.76
1.26	1.05	20.30	5.29	107.36	2.75	0.76	0.76
1.28	0.94	18.19	5.76	104.80	2.79	0.76	0.76
1.30	0.84	16.15	6.23	100.66	2.83	0.75	0.75
1.32	0.72	13.85	7.04	97.53	2.89	0.74	0.74
1.34	0.61	11.62	8.26	95.96	2.97	0.74	0.74
1.36	0.53	10.03	9.39	94.17	3.03	0.86	1.79
1.38	0.48	9.03	10.00	90.31	3.07	0.77	1.59
1.40	0.45	8.37	10.35	86.64	3.09	0.68	1.45
1.42	0.42	7.97	10.40	82.86	3.09	0.58	1.36
1.44	0.42	7.91	10.12	80.05	3.07	0.51	1.33
1.46	0.44	8.16	9.63	78.56	3.05	0.46	1.35
1.48	0.46	8.60	9.18	78.89	3.02	0.50	1.41
1.50	0.48	8.99	8.99	80.83	3.01	0.54	1.45
1.52	0.48	9.12	9.23	84.16	3.03	0.61	1.45
1.54	0.47	8.89	9.69	86.17	3.05	0.65	1.40
1.56	0.45	8.51	10.21	86.86	3.08	0.68	1.32
1.58	0.43	8.05	10.81	87.10	3.11	0.59	1.23
1.60	0.47	8.78	9.77	85.77	3.06	0.52	1.32
1.62	0.52	9.69	8.63	83.68	2.99	0.72	0.72
1.64	0.58	10.92	7.69	84.06	2.93	0.72	0.72
1.66	0.62	11.79	7.57	89.24	2.92	0.73	0.73
1.68	0.69	13.20	6.94	91.55	2.88	0.73	0.73
1.70	0.68	12.90	7.30	94.14	2.91	0.74	0.74
1.72	0.65	12.31	7.82	96.28	2.94	0.74	0.74
1.74	0.62	11.68	8.27	96.61	2.97	0.74	0.74
1.76	0.60	11.27	8.14	91.74	2.96	0.73	0.73
1.78	0.54	10.08	8.88	89.46	3.01	0.62	1.36
1.80	0.51	9.45	9.35	88.38	3.03	0.50	1.26
1.82	0.47	8.77	10.06	88.22	3.07	0.52	1.15
1.84	0.44	8.04	10.96	88.17	3.12	0.53	1.04

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.41	7.53	11.85	89.27	3.16	0.53	0.97
1.88	0.41	7.46	11.93	88.97	3.16	0.52	0.95
1.90	0.41	7.52	11.78	88.52	3.16	0.50	0.94
1.92	0.41	7.49	11.69	87.56	3.15	0.47	0.93
1.94	0.40	7.29	11.91	86.88	3.16	0.48	0.90
1.96	0.37	6.80	12.80	87.01	3.20	0.44	0.83
1.98	0.33	6.00	14.65	87.91	3.28	0.44	0.72
2.00	0.30	5.27	16.74	88.28	3.36	0.45	0.63
2.02	0.28	4.98	17.84	88.95	3.39	0.46	0.59
2.04	0.27	4.75	18.82	89.40	3.43	0.45	0.55
2.06	0.26	4.60	19.32	88.92	3.44	0.45	0.53
2.08	0.25	4.41	19.99	88.12	3.46	0.44	0.50
2.10	0.25	4.23	20.58	86.96	3.48	0.40	0.48
2.12	0.24	4.11	20.81	85.47	3.48	0.38	0.46
2.14	0.24	4.04	20.78	83.92	3.48	0.36	0.45
2.16	0.23	3.91	21.11	82.60	3.49	0.35	0.43
2.18	0.23	3.93	20.59	81.02	3.48	0.34	0.43
2.20	0.24	3.99	20.03	79.89	3.46	0.31	0.43
2.22	0.24	4.00	19.79	79.07	3.45	0.29	0.43
2.24	0.24	4.02	19.48	78.25	3.45	0.29	0.43
2.26	0.25	4.17	18.63	77.74	3.42	0.29	0.44
2.28	0.25	4.28	18.20	77.83	3.41	0.28	0.45
2.30	0.26	4.36	17.85	77.85	3.39	0.28	0.45
2.32	0.26	4.50	17.33	77.92	3.38	0.28	0.46
2.34	0.27	4.68	16.69	78.20	3.35	0.28	0.48
2.36	0.28	4.82	16.26	78.32	3.34	0.29	0.49
2.38	0.29	5.03	15.53	78.12	3.31	0.29	0.50
2.40	0.31	5.30	14.67	77.80	3.28	0.28	0.53
2.42	0.32	5.57	13.89	77.34	3.25	0.27	0.55
2.44	0.33	5.81	13.32	77.34	3.23	0.26	0.57
2.46	0.34	6.01	12.91	77.66	3.21	0.26	0.58
2.48	0.39	7.00	11.06	77.47	3.12	0.28	0.67
2.50	0.51	9.25	8.18	75.71	2.96	0.41	0.70
2.52	0.63	11.69	6.30	73.69	2.83	0.35	0.69
2.54	0.76	14.33	4.98	71.36	2.73	0.29	0.69
2.56	0.91	17.24	4.00	68.95	2.63	0.77	0.77
2.58	0.98	18.48	3.75	69.28	2.60	0.75	0.75
2.60	0.90	17.01	4.28	72.79	2.66	0.80	0.80
2.62	0.80	15.01	5.08	76.29	2.73	0.43	0.70
2.64	0.68	12.57	6.41	80.62	2.84	0.61	0.71
2.66	0.53	9.71	8.93	86.69	3.01	0.33	0.87
2.68	0.43	7.60	12.00	91.24	3.17	0.35	0.67
2.70	0.43	7.71	11.96	92.28	3.17	0.42	0.68
2.72	0.54	9.77	9.29	90.76	3.03	0.44	0.85
2.74	0.63	11.56	7.72	89.19	2.93	0.73	0.73
2.76	0.71	13.28	6.49	86.12	2.85	0.72	0.72
2.78	0.82	15.30	5.48	83.89	2.77	0.72	0.72
2.80	0.91	17.03	4.93	83.92	2.72	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.86	16.12	5.48	88.37	2.77	0.73	0.73
2.84	0.81	15.19	6.09	92.54	2.82	0.73	0.73
2.86	0.78	14.50	6.63	96.19	2.86	0.74	0.74
2.88	0.66	12.12	8.31	100.69	2.97	0.75	0.75
2.90	0.51	9.19	11.40	104.74	3.14	0.49	0.75
2.92	0.45	8.04	13.15	105.76	3.22	0.49	0.65
2.94	0.41	7.19	14.71	105.79	3.28	0.48	0.58
2.96	0.37	6.34	16.68	105.68	3.35	0.46	0.51
2.98	0.40	6.95	14.85	103.18	3.29	0.44	0.55
3.00	0.58	10.48	9.17	96.17	3.02	0.44	0.82
3.02	0.72	13.24	6.76	89.46	2.87	0.73	0.73
3.04	1.80	31.14	2.00	62.38	2.32	0.14	0.66
3.06	3.32	52.51	1.30	68.35	1.99	0.22	0.68
3.08	5.02	74.80	1.00	74.80	1.78	0.38	0.70
3.10	6.52	93.70	1.00	93.70	1.67	0.74	0.74
3.12	7.86	110.49	1.00	110.49	1.60	0.77	0.77
3.14	8.09	113.58	1.00	113.58	1.61	0.77	0.77
3.16	7.89	111.18	1.00	111.18	1.63	0.77	0.77
3.18	7.49	106.44	1.00	106.44	1.67	0.76	0.76
3.20	7.16	102.22	1.00	102.22	1.71	0.75	0.75
3.22	6.07	88.28	1.15	101.28	1.80	0.75	0.75
3.24	5.15	76.40	1.23	93.80	1.89	0.74	0.74
3.26	4.10	62.49	1.32	82.47	2.01	0.71	0.71
3.28	3.00	47.65	1.62	77.11	2.20	0.46	0.70
3.30	1.87	31.39	2.87	90.10	2.48	0.73	0.73
3.32	1.56	26.78	3.74	100.10	2.60	0.82	0.82
3.34	1.26	22.06	5.12	112.88	2.74	0.77	0.77
3.36	1.17	20.50	5.81	119.15	2.80	0.78	0.78
3.38	1.17	20.42	5.65	115.28	2.78	0.78	0.78
3.40	1.18	20.37	5.42	110.38	2.76	0.77	0.77
3.42	1.16	19.86	5.34	106.05	2.76	0.76	0.76
3.44	1.12	18.95	5.45	103.37	2.77	0.75	0.75
3.46	0.98	16.67	6.30	104.98	2.83	0.76	0.76
3.48	0.78	13.41	8.10	108.65	2.96	0.76	0.76
3.50	0.62	10.39	10.68	110.87	3.10	0.60	0.74
3.52	0.57	9.43	11.66	109.91	3.15	0.42	0.67
3.54	0.55	8.93	11.93	106.56	3.16	0.41	0.64
3.56	0.54	8.66	11.66	100.99	3.15	0.40	0.62
3.58	0.53	8.41	11.57	97.26	3.15	0.38	0.60
3.60	0.51	8.10	11.31	91.60	3.13	0.35	0.58
3.62	0.50	7.90	10.85	85.74	3.11	0.26	0.56
3.64	0.50	7.87	10.09	79.38	3.07	0.18	0.56
3.66	0.64	10.06	6.87	69.08	2.88	0.24	0.68
3.68	0.76	11.81	5.20	61.42	2.75	0.13	0.66
3.70	0.85	13.13	4.41	57.86	2.67	0.77	0.77
3.72	0.90	13.84	4.04	55.87	2.63	0.73	0.73
3.74	0.92	14.03	4.00	56.15	2.63	0.73	0.73
3.76	0.76	11.77	5.37	63.21	2.76	0.15	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.60	9.50	7.65	72.65	2.93	0.32	0.69
3.80	0.48	7.41	10.94	81.06	3.12	0.23	0.53
3.82	0.40	5.93	14.65	86.90	3.28	0.28	0.42
3.84	0.35	5.03	17.95	90.26	3.40	0.31	0.36
3.86	0.35	5.00	18.32	91.66	3.41	0.30	0.36
3.88	0.37	5.42	16.54	89.67	3.35	0.28	0.39
3.90	0.40	5.92	14.47	85.66	3.27	0.28	0.42
3.92	0.42	6.12	13.41	82.08	3.23	0.22	0.44
3.94	0.44	6.51	12.03	78.31	3.17	0.19	0.47
3.96	0.48	7.25	10.19	73.91	3.08	0.19	0.52
3.98	0.54	8.12	8.77	71.25	3.00	0.28	0.69
4.00	0.55	8.29	8.46	70.11	2.98	0.26	0.68
4.02	0.56	8.53	8.09	69.05	2.96	0.24	0.68
4.04	0.60	9.02	7.63	68.86	2.93	0.23	0.68
4.06	0.63	9.54	7.30	69.63	2.91	0.25	0.68
4.08	0.64	9.73	7.50	72.96	2.92	0.33	0.69
4.10	0.61	9.26	8.86	82.11	3.00	0.22	0.66
4.12	0.65	9.83	8.92	87.69	3.01	0.28	0.70
4.14	0.67	10.11	9.17	92.67	3.02	0.42	0.72
4.16	0.66	9.91	9.80	97.11	3.06	0.39	0.71
4.18	0.64	9.57	10.38	99.39	3.09	0.39	0.68
4.20	0.68	10.26	9.34	95.81	3.03	0.38	0.73
4.22	0.68	10.31	9.15	94.28	3.02	0.35	0.74
4.24	0.83	12.66	7.04	89.15	2.89	0.73	0.73
4.26	1.00	15.07	5.48	82.61	2.77	0.71	0.71
4.28	1.18	17.51	4.31	75.47	2.66	0.81	0.81
4.30	1.35	19.66	3.50	68.87	2.57	0.72	0.72
4.32	1.44	20.82	3.07	64.00	2.51	0.16	0.67
4.34	1.32	19.10	3.28	62.64	2.54	0.27	0.68
4.36	1.18	17.07	3.66	62.38	2.59	0.72	0.72
4.38	1.04	15.07	4.26	64.11	2.66	0.78	0.78
4.40	0.84	12.26	5.57	68.25	2.78	0.22	0.68
4.42	0.70	10.19	6.96	70.97	2.88	0.28	0.69
4.44	0.61	8.75	8.20	71.75	2.96	0.29	0.69
4.46	0.51	7.18	10.01	71.86	3.07	0.17	0.51
4.48	0.41	5.59	12.77	71.30	3.20	0.16	0.40
4.50	0.40	5.36	13.03	69.91	3.21	0.15	0.38
4.52	0.39	5.17	13.16	68.08	3.22	0.15	0.37
4.54	0.39	5.10	13.02	66.41	3.21	0.14	0.36
4.56	0.39	5.07	12.78	64.85	3.20	0.12	0.36
4.58	0.39	5.09	12.45	63.35	3.19	0.12	0.36
4.60	0.39	5.12	12.15	62.21	3.17	0.11	0.37
4.62	0.39	5.15	12.00	61.80	3.17	0.11	0.37
4.64	0.39	5.14	11.88	61.02	3.16	0.11	0.37
4.66	0.43	5.70	10.51	59.90	3.09	0.11	0.41
4.68	0.59	8.14	6.90	56.20	2.88	0.08	0.65
4.70	0.76	10.55	5.01	52.83	2.73	0.06	0.63
4.72	0.90	12.45	4.09	50.89	2.64	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	1.00	13.88	3.67	50.89	2.59	0.26	0.68
4.76	1.04	14.41	3.69	53.17	2.59	0.37	0.69
4.78	0.90	12.61	4.76	60.02	2.71	0.11	0.66
4.80	0.75	10.57	6.41	67.73	2.84	0.21	0.68
4.82	0.66	9.19	8.13	74.75	2.96	0.38	0.69
4.84	0.60	8.31	9.55	79.35	3.04	0.23	0.59
4.86	0.57	7.71	10.68	82.27	3.10	0.26	0.55
4.88	0.56	7.56	10.97	82.98	3.12	0.26	0.54
4.90	0.60	8.18	9.86	80.67	3.06	0.25	0.58
4.92	0.64	8.75	8.73	76.43	3.00	0.43	0.70
4.94	0.65	8.88	8.05	71.52	2.96	0.29	0.69
4.96	0.65	8.96	7.55	67.59	2.92	0.21	0.68
4.98	0.66	9.05	7.26	65.71	2.90	0.18	0.67
5.00	0.61	8.28	8.19	67.84	2.96	0.21	0.68
5.02	0.54	7.09	10.10	71.68	3.07	0.18	0.51
5.04	0.48	6.22	12.26	76.27	3.18	0.21	0.44
5.06	0.44	5.58	14.21	79.24	3.26	0.22	0.40
5.08	0.42	5.19	15.43	80.05	3.31	0.22	0.37
5.10	0.41	5.01	15.78	78.99	3.32	0.22	0.36
5.12	0.40	4.89	15.55	76.11	3.31	0.20	0.35
5.14	0.39	4.78	15.11	72.13	3.30	0.17	0.34
5.16	0.39	4.66	14.55	67.77	3.28	0.13	0.33
5.18	0.38	4.55	14.02	63.80	3.25	0.10	0.32
5.20	0.37	4.43	13.68	60.59	3.24	0.10	0.32
5.22	0.37	4.36	13.50	58.89	3.23	0.10	0.31
5.24	0.37	4.38	13.23	57.94	3.22	0.09	0.31
5.26	0.47	5.85	9.58	56.01	3.05	0.09	0.42
5.28	0.80	10.50	4.62	48.49	2.69	0.75	0.75
5.30	1.32	17.25	2.40	41.34	2.40	0.03	0.62
5.32	1.89	24.30	1.00	24.30	2.23	0.02	0.62
5.34	2.47	31.44	1.00	31.44	2.10	0.02	0.62
5.36	2.92	36.97	1.00	36.97	2.03	0.02	0.62
5.38	3.13	39.55	1.00	39.55	2.03	0.03	0.62
5.40	3.15	39.80	1.00	39.80	2.04	0.03	0.62
5.42	3.13	39.59	1.00	39.59	2.04	0.03	0.62
5.44	3.11	39.22	1.00	39.22	2.04	0.03	0.62
5.46	3.13	39.40	1.00	39.40	2.03	0.03	0.62
5.48	3.15	39.46	1.00	39.46	2.01	0.03	0.62
5.50	3.16	39.60	1.00	39.60	2.01	0.03	0.62
5.52	3.05	38.23	1.00	38.23	2.03	0.03	0.62
5.54	2.83	35.63	1.00	35.63	2.08	0.02	0.62
5.56	2.51	31.72	1.00	31.72	2.15	0.02	0.62
5.58	2.16	27.50	1.77	48.54	2.25	0.05	0.62
5.60	1.97	25.33	2.05	52.01	2.33	0.06	0.63
5.62	2.22	28.45	1.89	53.84	2.29	0.07	0.64
5.64	2.83	35.77	1.54	55.01	2.17	0.08	0.64
5.66	3.62	45.21	1.34	60.54	2.03	0.12	0.66
5.68	4.45	54.78	1.00	54.78	1.92	0.08	0.64

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	5.06	61.54	1.00	61.54	1.83	0.13	0.66
5.72	5.32	64.19	1.00	64.19	1.78	0.16	0.67
5.74	5.27	63.46	1.00	63.46	1.78	0.15	0.67
5.76	5.09	61.23	1.00	61.23	1.79	0.12	0.66
5.78	4.87	58.76	1.00	58.76	1.81	0.10	0.65
5.80	4.63	55.93	1.00	55.93	1.84	0.08	0.64
5.82	4.38	53.06	1.00	53.06	1.88	0.07	0.64
5.84	4.11	49.96	1.00	49.96	1.91	0.05	0.63
5.86	3.82	46.59	1.00	46.59	1.95	0.04	0.62
5.88	3.52	43.01	1.00	43.01	2.00	0.03	0.62
5.90	3.24	39.74	1.00	39.74	2.04	0.03	0.62
5.92	2.98	36.64	1.00	36.64	2.09	0.02	0.62
5.94	2.77	34.14	1.00	34.14	2.13	0.02	0.62
5.96	2.65	32.60	1.00	32.60	2.16	0.02	0.62
5.98	2.63	32.40	1.00	32.40	2.16	0.02	0.62
6.00	2.75	33.75	1.00	33.75	2.14	0.02	0.62
6.02	2.94	36.00	1.00	36.00	2.10	0.02	0.62
6.04	3.18	38.69	1.00	38.69	2.06	0.03	0.62
6.06	3.37	40.84	1.00	40.84	2.02	0.03	0.62
6.08	3.53	42.56	1.00	42.56	2.00	0.03	0.62
6.10	3.62	43.52	1.00	43.52	1.98	0.03	0.62
6.12	3.65	43.83	1.00	43.83	1.97	0.03	0.62
6.14	3.59	43.08	1.00	43.08	1.98	0.03	0.62
6.16	3.50	41.96	1.00	41.96	1.99	0.03	0.62
6.18	3.35	40.16	1.00	40.16	2.01	0.03	0.62
6.20	3.15	37.85	1.00	37.85	2.04	0.02	0.62
6.22	2.90	34.95	1.00	34.95	2.09	0.02	0.62
6.24	2.64	31.92	1.00	31.92	2.15	0.02	0.62
6.26	2.51	30.42	1.60	48.62	2.19	0.05	0.62
6.28	2.58	31.19	1.58	49.25	2.19	0.05	0.62
6.30	2.74	32.93	1.00	32.93	2.15	0.02	0.62
6.32	2.87	34.49	1.00	34.49	2.12	0.02	0.62
6.34	2.97	35.56	1.00	35.56	2.10	0.02	0.62
6.36	2.78	33.24	1.00	33.24	2.13	0.02	0.62
6.38	2.34	28.10	1.69	47.35	2.23	0.04	0.62
6.40	1.81	21.83	2.34	51.04	2.39	0.06	0.63
6.42	1.35	16.46	3.86	63.56	2.61	0.74	0.74
6.44	1.24	15.03	4.59	69.04	2.69	0.82	0.82
6.46	1.64	19.93	3.17	63.17	2.53	0.20	0.68
6.48	2.36	28.41	1.99	56.64	2.32	0.09	0.65
6.50	3.17	37.88	1.50	56.74	2.15	0.09	0.65
6.52	4.02	47.40	1.00	47.40	1.99	0.04	0.62
6.54	4.64	54.22	1.00	54.22	1.90	0.07	0.64
6.56	5.03	58.45	1.00	58.45	1.85	0.10	0.65
6.58	5.19	60.12	1.00	60.12	1.83	0.11	0.66
6.60	5.29	61.09	1.00	61.09	1.80	0.12	0.66
6.62	5.34	61.44	1.00	61.44	1.79	0.13	0.66
6.64	5.38	61.89	1.00	61.89	1.79	0.13	0.66

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	5.30	60.93	1.00	60.93	1.80	0.12	0.66
6.68	5.12	58.97	1.00	58.97	1.83	0.10	0.65
6.70	4.65	53.76	1.00	53.76	1.89	0.07	0.64
6.72	4.11	47.71	1.00	47.71	1.96	0.04	0.62
6.74	3.51	40.91	1.00	40.91	2.05	0.03	0.62
6.76	2.87	33.69	1.58	53.39	2.19	0.07	0.64
6.78	2.25	26.53	2.13	56.53	2.35	0.09	0.65
6.80	1.88	22.26	2.81	62.45	2.47	0.14	0.66
6.82	1.63	19.26	3.67	70.63	2.59	0.74	0.74
6.84	1.47	17.44	4.42	77.08	2.67	0.83	0.83
6.86	1.38	16.33	4.95	80.87	2.72	0.63	0.71
6.88	1.33	15.77	5.44	85.75	2.77	0.72	0.72
6.90	1.34	15.88	5.87	93.23	2.80	0.74	0.74
6.92	1.57	18.60	5.11	95.07	2.74	0.74	0.74
6.94	2.14	25.43	3.47	88.20	2.57	0.77	0.77
6.96	2.75	32.48	2.51	81.50	2.42	0.66	0.71
6.98	3.39	39.73	1.87	74.30	2.29	0.36	0.69
7.00	3.97	46.17	1.52	69.96	2.16	0.25	0.68
7.02	4.29	49.43	1.37	67.97	2.07	0.22	0.68
7.04	4.12	47.17	1.35	63.52	2.04	0.15	0.67
7.06	3.93	44.84	1.00	44.84	2.02	0.04	0.62
7.08	3.66	41.64	1.00	41.64	2.03	0.03	0.62
7.10	3.39	38.51	1.00	38.51	2.04	0.03	0.62
7.12	3.11	35.24	1.00	35.24	2.06	0.02	0.62
7.14	2.90	32.74	1.00	32.74	2.08	0.02	0.62
7.16	2.64	29.79	1.00	29.79	2.11	0.02	0.62
7.18	2.42	27.38	1.00	27.38	2.18	0.02	0.62
7.20	2.23	25.22	1.00	25.22	2.25	0.02	0.62
7.22	2.12	23.95	1.88	45.08	2.29	0.04	0.62
7.24	2.10	23.74	1.94	46.12	2.30	0.04	0.62
7.26	2.11	23.89	1.97	47.15	2.31	0.04	0.62
7.28	2.00	22.53	2.08	46.92	2.34	0.04	0.62
7.30	1.82	20.49	2.35	48.15	2.40	0.05	0.62
7.32	1.56	17.57	3.29	57.77	2.54	0.18	0.67
7.34	1.23	13.81	5.02	69.29	2.73	0.24	0.68
7.36	0.94	10.30	7.82	80.62	2.94	0.61	0.71
7.38	0.90	9.84	8.68	85.38	2.99	0.72	0.72
7.40	0.99	10.86	8.03	87.24	2.95	0.72	0.72
7.42	1.15	12.82	6.34	81.26	2.84	0.65	0.71
7.44	1.36	15.26	4.95	75.60	2.72	0.40	0.70
7.46	1.59	17.86	3.95	70.54	2.62	0.77	0.77
7.48	1.76	19.76	3.40	67.26	2.56	0.64	0.71
7.50	1.87	21.00	3.11	65.33	2.52	0.20	0.68
7.52	1.97	22.01	2.86	62.98	2.48	0.14	0.66
7.54	2.05	22.89	2.62	60.00	2.44	0.11	0.66
7.56	2.10	23.43	2.42	56.76	2.41	0.09	0.65
7.58	2.14	23.75	2.26	53.74	2.38	0.07	0.64
7.60	2.15	23.80	2.15	51.20	2.35	0.06	0.63

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	2.04	22.47	2.22	49.97	2.37	0.05	0.63
7.64	1.87	20.53	2.43	49.81	2.41	0.05	0.62
7.66	1.67	18.25	2.84	51.84	2.48	0.06	0.63
7.68	1.50	16.34	3.34	54.56	2.55	0.15	0.67
7.70	1.45	15.80	3.64	57.55	2.59	0.52	0.70
7.72	1.65	18.01	3.25	58.58	2.54	0.17	0.67
7.74	1.92	21.04	2.77	58.26	2.47	0.10	0.65
7.76	2.09	23.02	2.52	58.09	2.43	0.10	0.65
7.78	2.30	25.31	2.28	57.71	2.38	0.09	0.65
7.80	2.41	26.46	2.15	56.79	2.35	0.09	0.65
7.82	2.36	25.84	2.15	55.52	2.35	0.08	0.64
7.84	2.24	24.47	2.18	53.42	2.36	0.07	0.64
7.86	2.24	24.41	2.11	51.57	2.35	0.06	0.63
7.88	2.12	23.05	2.21	50.97	2.37	0.06	0.63
7.90	2.00	21.66	2.31	49.92	2.39	0.05	0.63
7.92	1.91	20.56	2.40	49.44	2.41	0.05	0.62
7.94	1.85	19.94	2.64	52.65	2.45	0.06	0.63
7.96	1.80	19.41	2.89	56.04	2.49	0.08	0.64
7.98	1.80	19.42	3.02	58.56	2.51	0.09	0.65
8.00	1.83	19.67	3.13	61.54	2.52	0.15	0.67
8.02	1.84	19.81	3.23	63.97	2.53	0.26	0.68
8.04	1.84	19.76	3.26	64.37	2.54	0.29	0.69
8.06	1.81	19.45	3.22	62.64	2.53	0.22	0.68
8.08	1.79	19.11	3.10	59.31	2.52	0.12	0.66
8.10	1.75	18.67	2.96	55.20	2.50	0.08	0.64
8.12	1.66	17.54	2.96	51.90	2.50	0.06	0.63
8.14	1.52	15.91	3.11	49.49	2.52	0.05	0.63
8.16	1.34	13.90	3.67	51.06	2.59	0.27	0.69
8.18	1.13	11.61	4.86	56.39	2.71	0.09	0.65
8.20	0.92	9.25	6.94	64.19	2.88	0.16	0.67
8.22	0.79	7.68	9.24	70.91	3.03	0.18	0.55
8.24	0.70	6.68	11.40	76.14	3.14	0.20	0.48
8.26	0.65	6.10	13.01	79.36	3.21	0.22	0.44
8.28	0.62	5.70	14.32	81.61	3.27	0.23	0.41
8.30	0.59	5.34	15.47	82.58	3.31	0.23	0.38
8.32	0.57	5.13	16.10	82.60	3.33	0.24	0.37
8.34	0.61	5.56	14.62	81.21	3.28	0.23	0.40
8.36	0.70	6.55	12.02	78.73	3.17	0.22	0.47
8.38	0.85	8.28	9.05	74.90	3.02	0.19	0.59
8.40	1.06	10.64	6.58	69.98	2.86	0.25	0.68
8.42	1.29	13.20	4.95	65.37	2.72	0.17	0.67
8.44	1.51	15.56	4.09	63.63	2.64	0.76	0.76
8.46	1.75	18.18	3.54	64.32	2.57	0.71	0.71
8.48	2.03	21.31	3.03	64.48	2.51	0.14	0.66
8.50	2.39	25.19	2.54	63.92	2.43	0.15	0.67
8.52	2.78	29.39	2.28	67.05	2.38	0.20	0.68
8.54	3.09	32.72	2.20	71.89	2.36	0.30	0.69
8.56	3.24	34.40	2.24	76.91	2.37	0.45	0.70

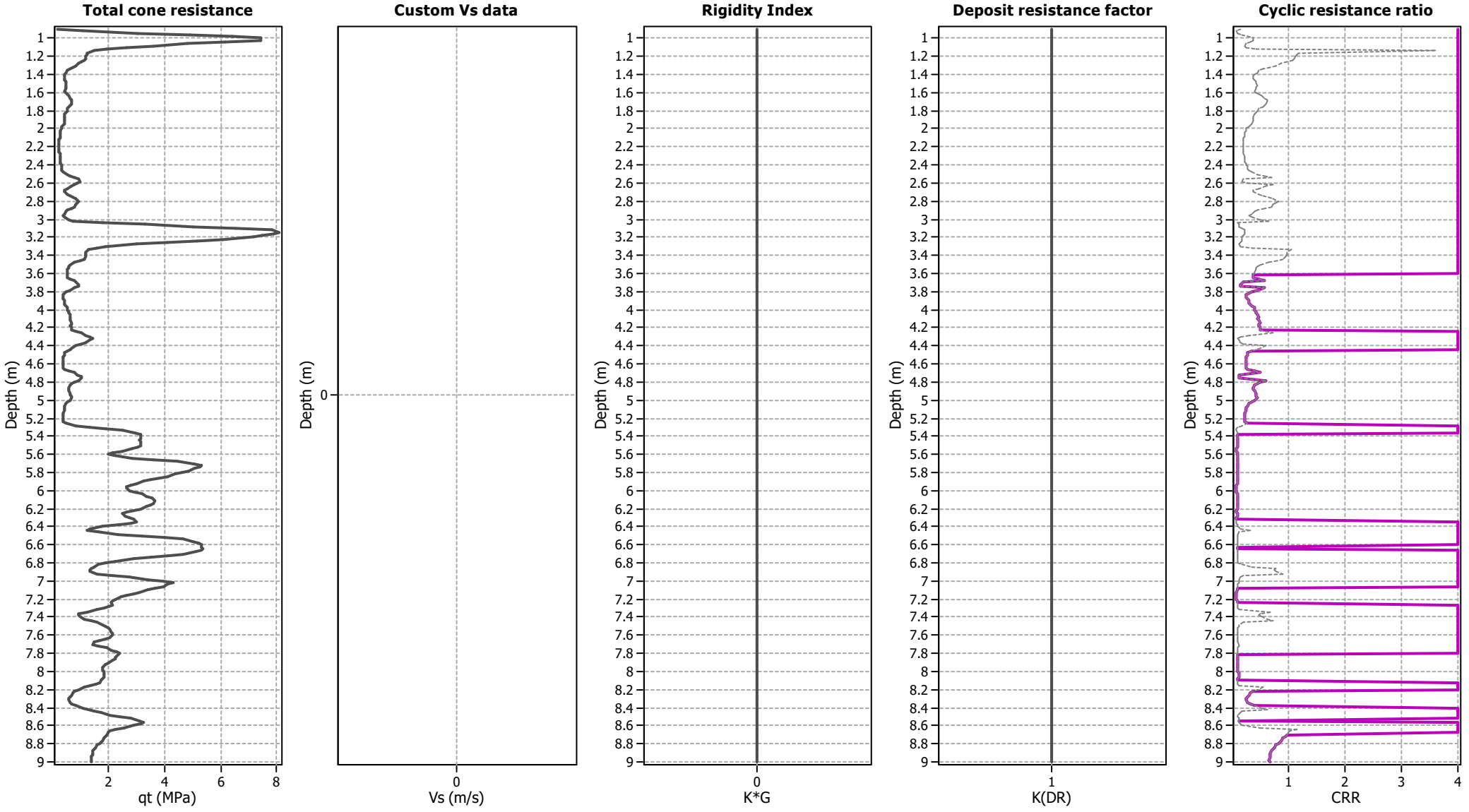
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	3.13	33.24	2.55	84.79	2.43	0.72	0.72
8.60	2.88	30.52	3.16	96.57	2.53	0.75	0.75
8.62	2.55	26.93	3.97	106.93	2.62	0.85	0.85
8.64	2.26	23.78	4.87	115.87	2.72	0.78	0.78
8.66	2.05	21.49	5.74	123.40	2.79	0.79	0.79
8.68	1.99	20.78	6.11	127.03	2.82	0.79	0.79
8.70	1.94	20.23	6.36	128.60	2.84	0.80	0.80
8.72	1.89	19.59	6.66	130.45	2.86	0.80	0.80
8.74	1.83	18.95	7.00	132.57	2.89	0.80	0.80
8.76	1.78	18.30	7.36	134.63	2.91	0.81	0.81
8.78	1.72	17.69	7.71	136.48	2.93	0.81	0.81
8.80	1.66	16.94	8.18	138.60	2.96	0.81	0.81
8.82	1.60	16.23	8.67	140.83	2.99	0.81	0.81
8.84	1.54	15.58	9.08	141.53	3.02	0.90	1.11
8.86	1.49	14.96	9.44	141.32	3.04	0.89	1.07
8.88	1.45	14.52	9.66	140.19	3.05	0.86	1.04
8.90	1.43	14.27	9.66	137.90	3.05	0.85	1.02
8.92	1.42	14.08	9.60	135.15	3.05	0.81	1.01
8.94	1.40	13.88	9.53	132.24	3.04	0.75	0.99
8.96	1.40	13.84	9.33	129.19	3.03	0.72	0.99
8.98	1.40	13.74	9.23	126.87	3.03	0.68	0.98
9.00	1.40	13.80	9.10	125.48	3.02	0.68	0.99

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



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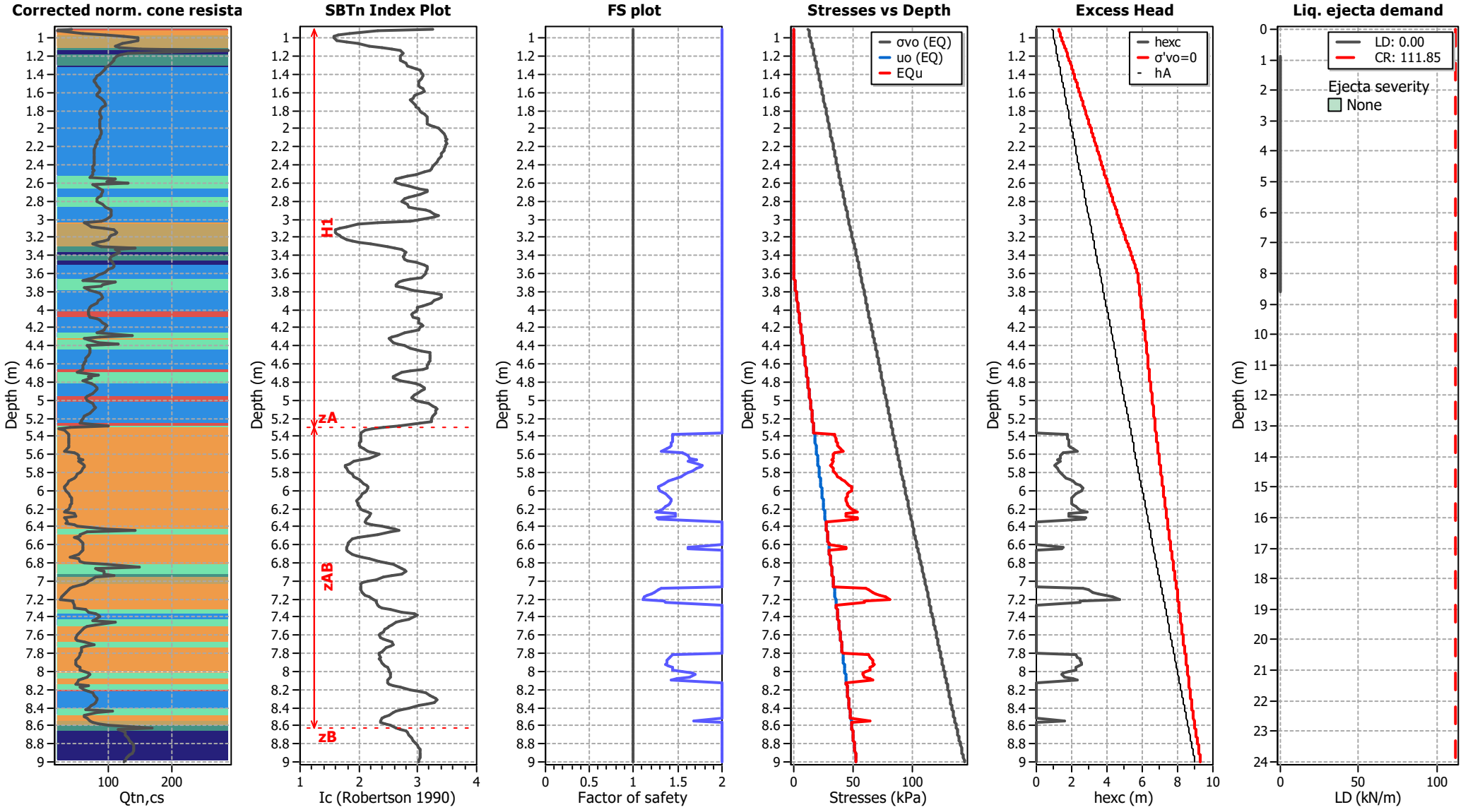
CPT name: CWLP CPT-3CCR

Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

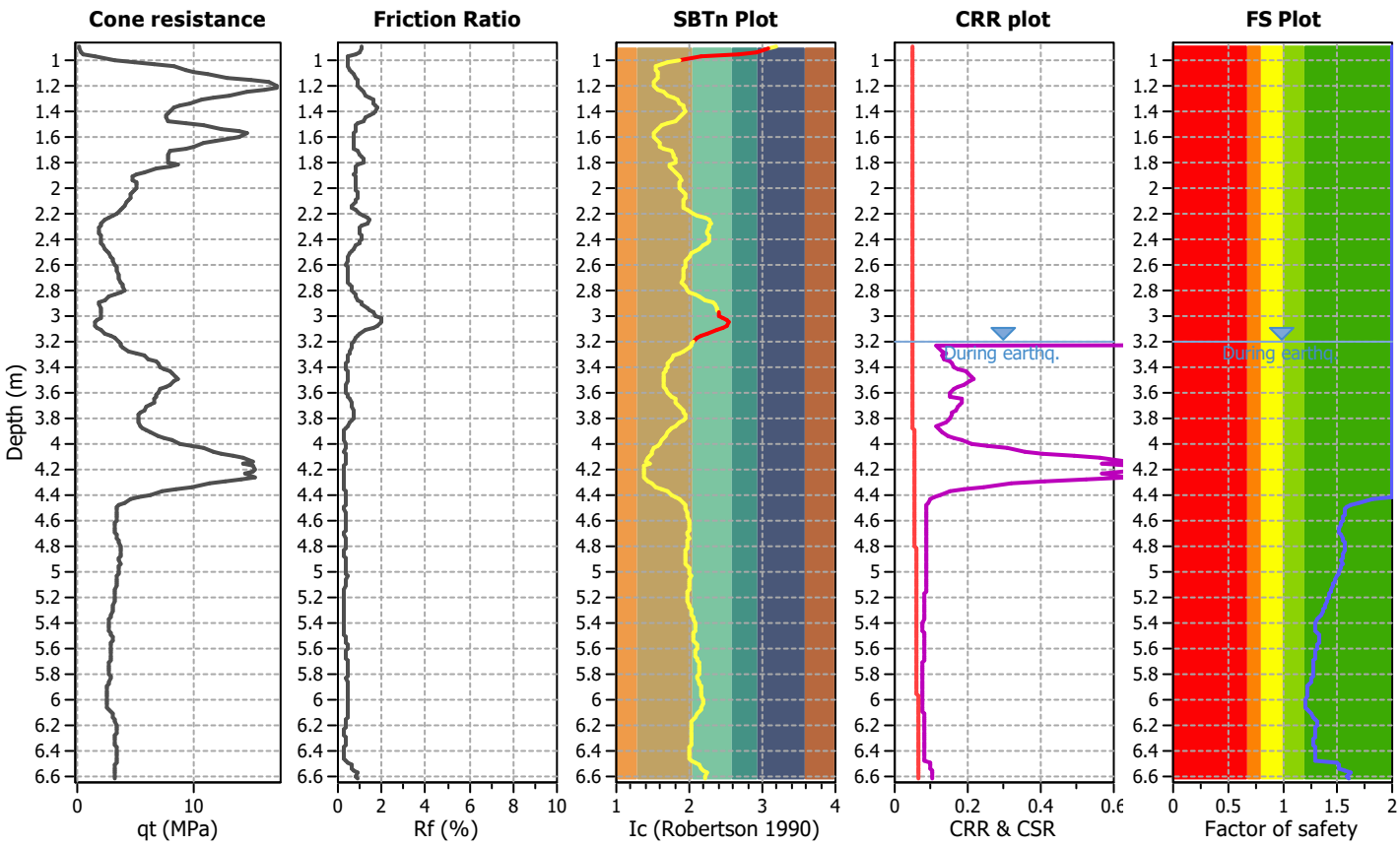
Project title : CWLP Liquefaction Analysis

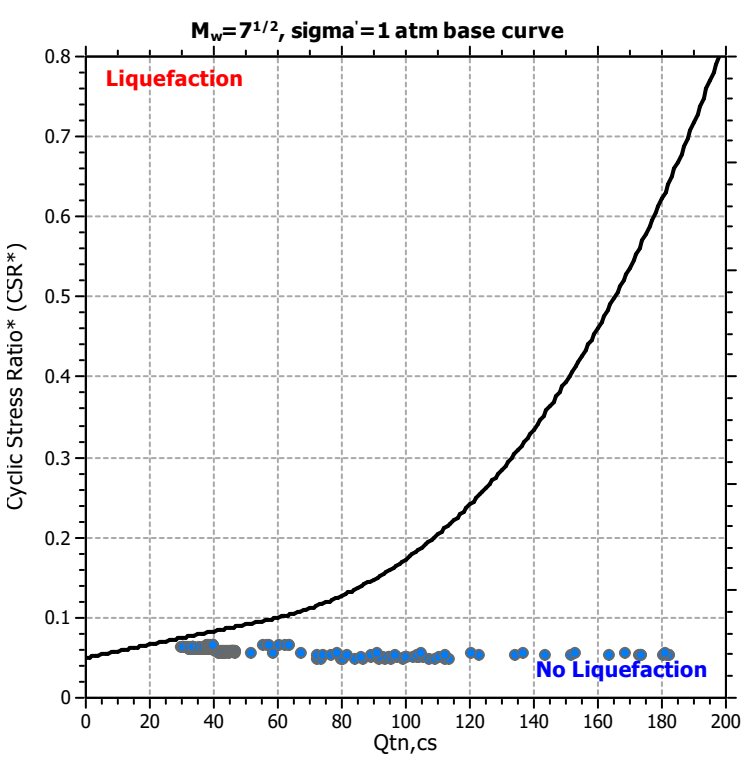
Location : East Lake Shore Drive, Springfield, Illinois

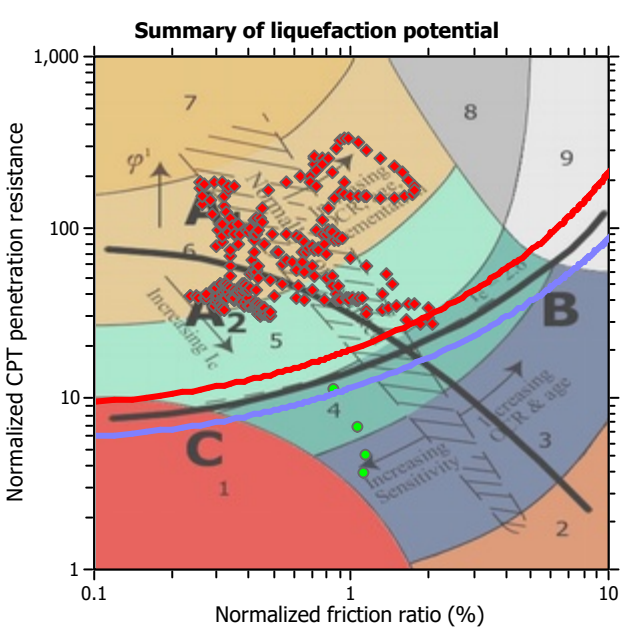
CPT file : CWLP CPT- 5CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.20 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	3.20 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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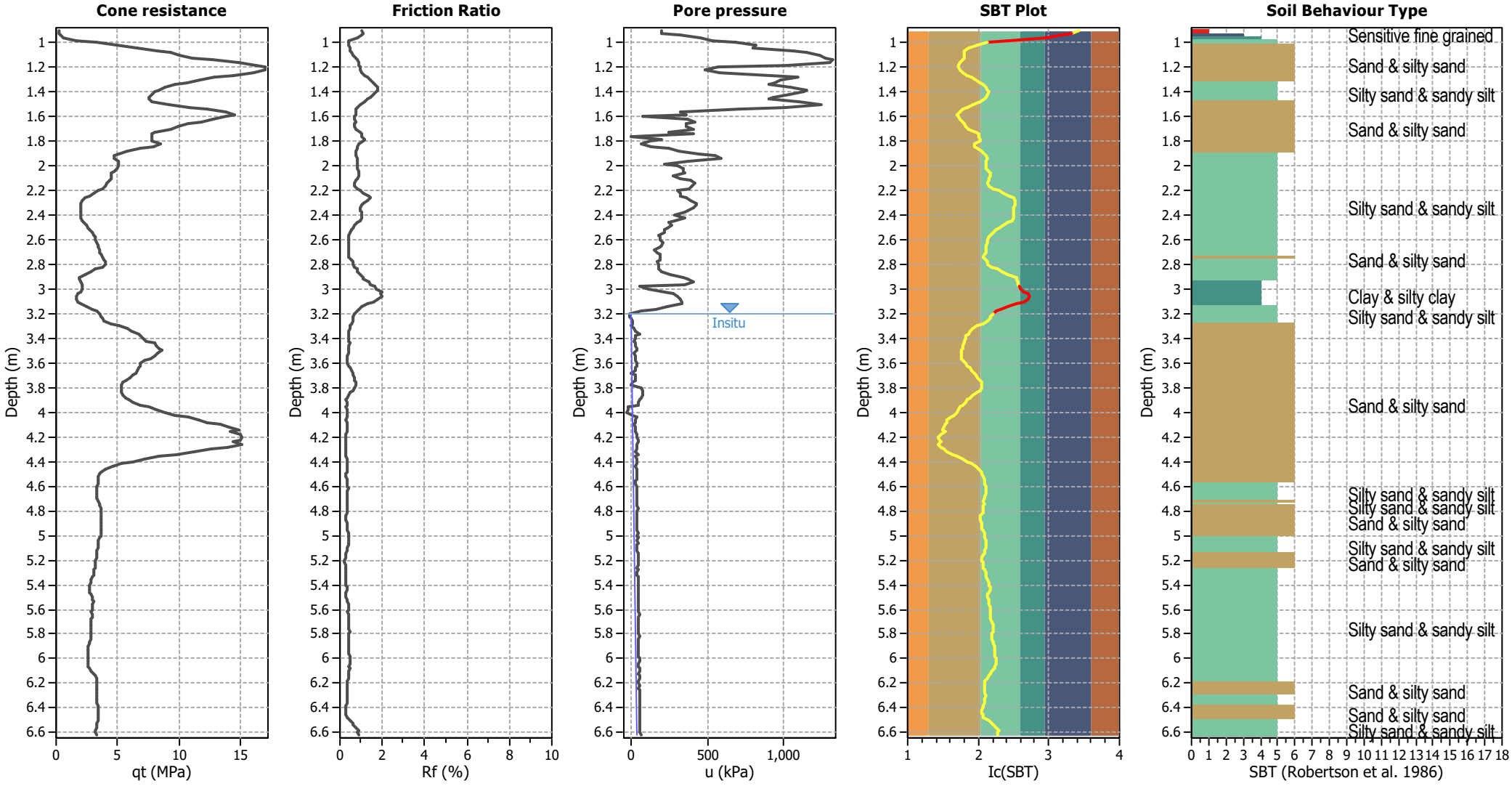
CPT name: CWLP CPT- 5CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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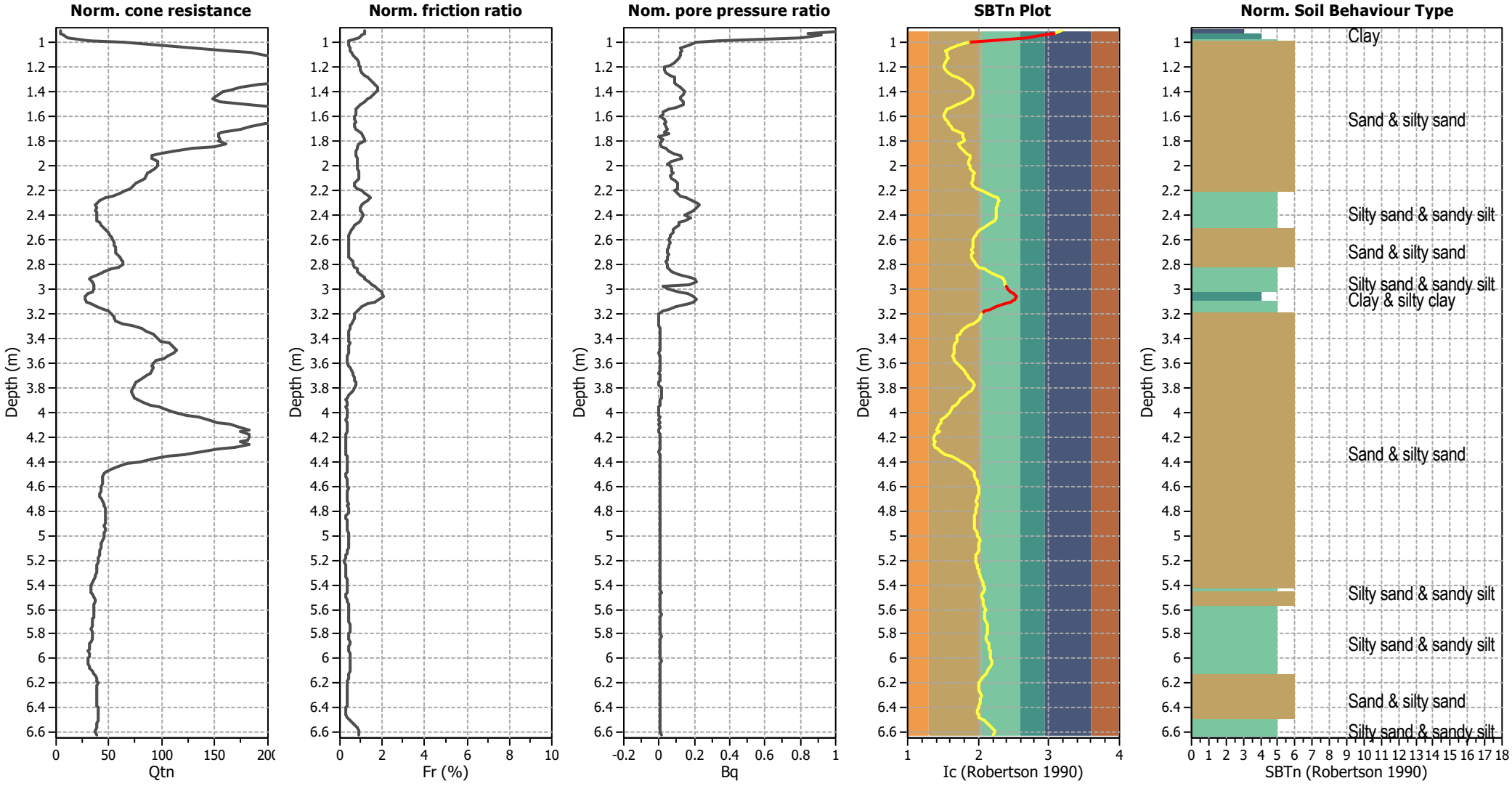
CPT name: CWLP CPT- 5CCR

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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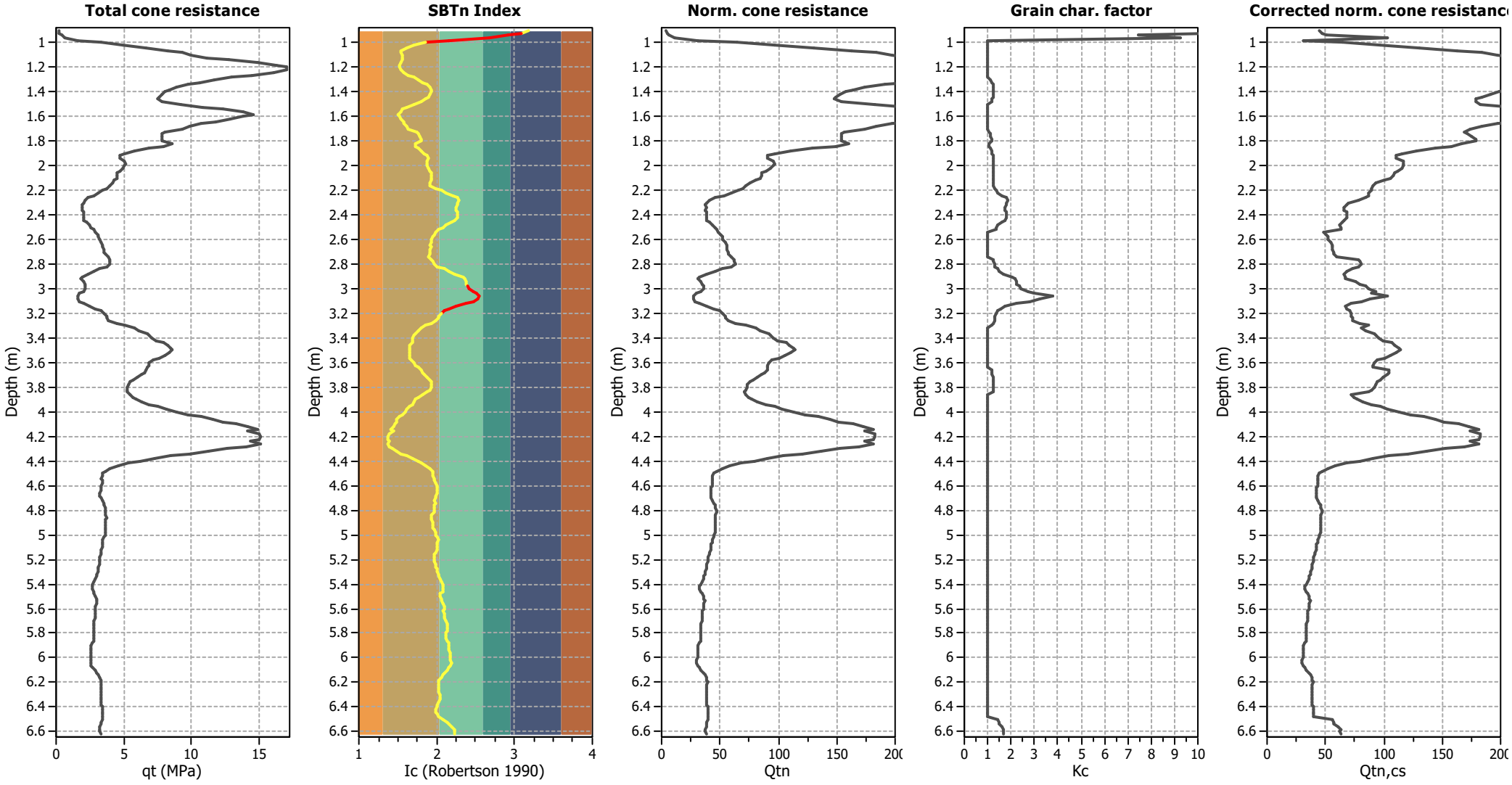
CPT name: CWLP CPT- 5CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

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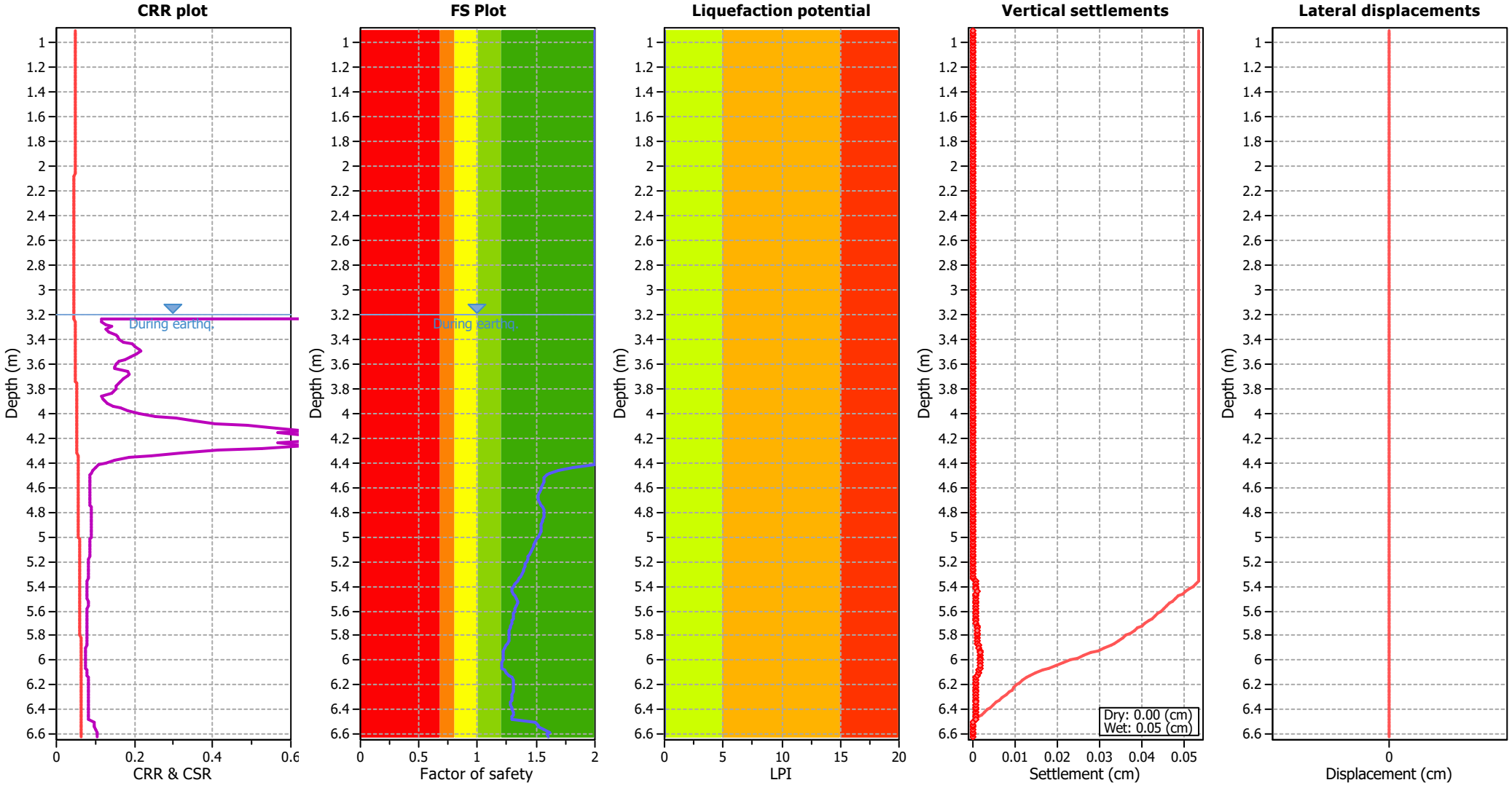
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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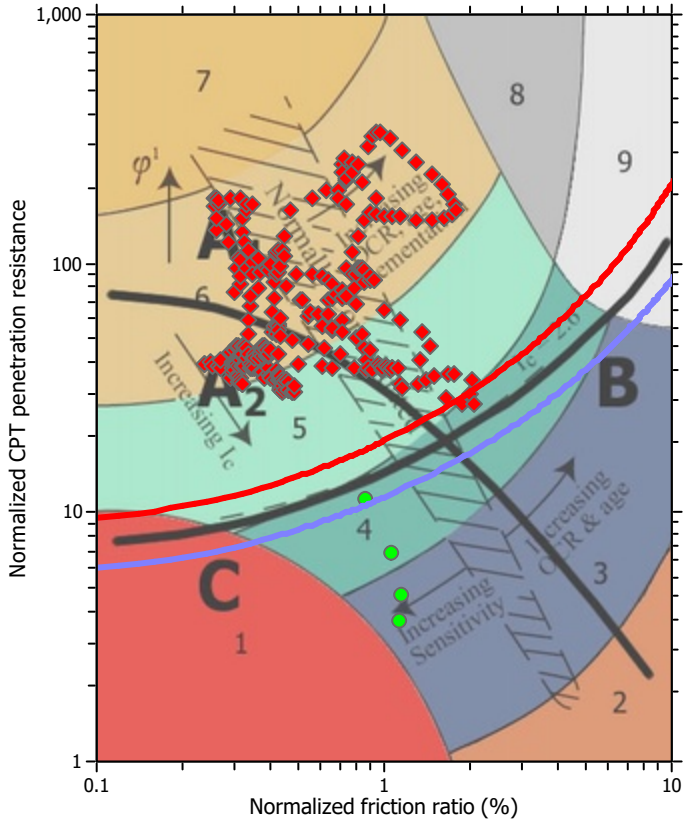
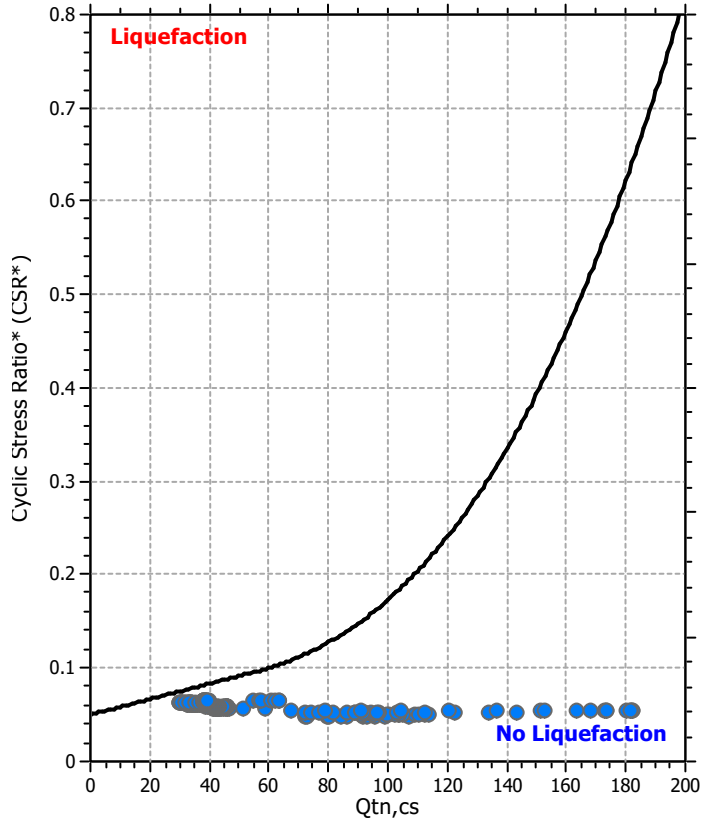
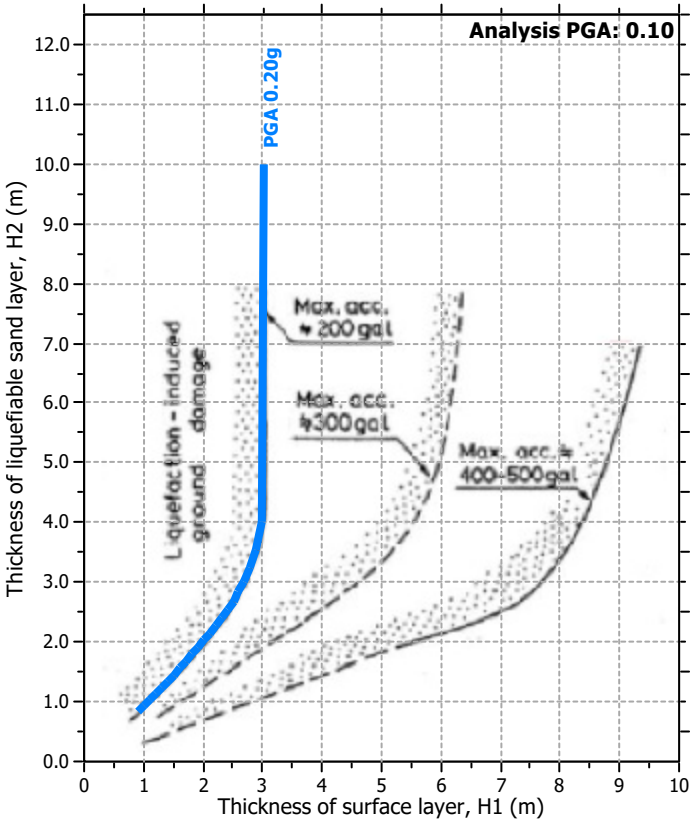
CPT name: CWLP CPT- 5CCR

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

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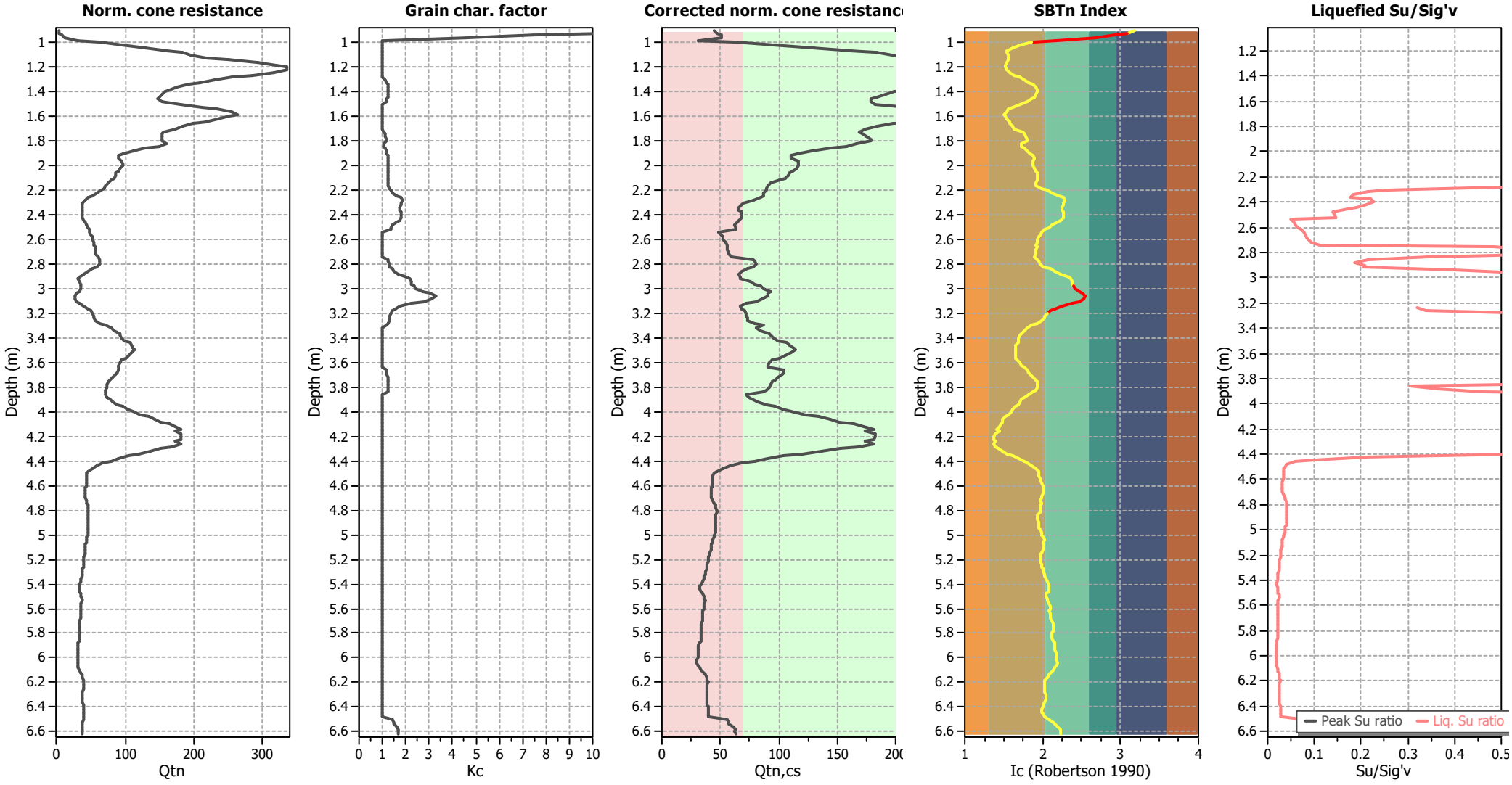
CPT name: CWLP CPT- 5CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

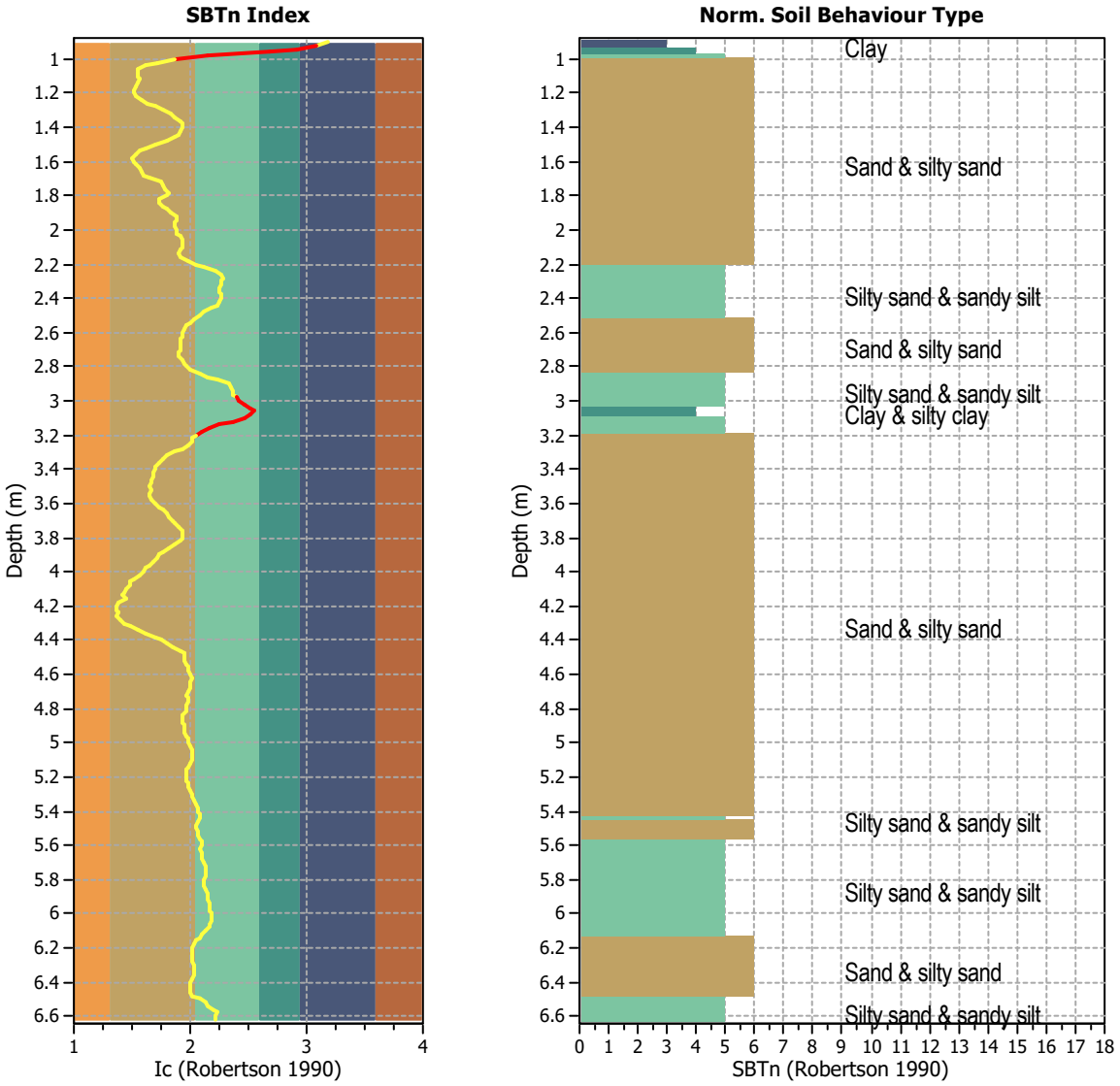
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	3.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.20 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	2

General statistics

Total points in CPT file:	287
Total points excluded:	18
Exclusion percentage:	6.27%
Number of layers detected:	3

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 0.94 (m)	4	Clay & silty clay
		End depth: 1.02 (m)	6	Sand & silty sand
Transition layer 2	4	Start depth: 3.00 (m)	5	Silty sand & sandy silt
		End depth: 3.06 (m)	4	Clay & silty clay
Transition layer 3	9	Start depth: 3.06 (m)	4	Clay & silty clay
		End depth: 3.22 (m)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.15	1.50	199.80	71.17	13.73
2	0.92	0.15	1.50	199.80	64.12	13.73
3	0.94	0.21	4.40	316.50	53.00	14.09
4	0.96	0.36	4.70	455.40	39.64	14.61
5	0.98	0.64	6.20	533.90	5.00	15.40
6	1.00	1.17	7.70	688.00	5.00	16.42
7	1.02	5.20	11.60	815.70	5.00	17.12
8	1.04	8.41	36.30	797.80	4.60	17.62
9	1.06	8.52	44.80	1067.20	3.47	18.01
10	1.08	8.92	48.50	1154.90	3.55	18.40
11	1.10	9.49	54.20	1233.10	3.67	18.64
12	1.12	10.31	78.30	1274.00	3.84	18.97
13	1.14	11.80	90.40	1322.90	3.65	19.30
14	1.16	13.94	136.60	1305.50	3.36	19.62
15	1.18	17.27	157.80	1016.40	3.13	19.80
16	1.20	20.10	188.20	570.40	3.12	19.91
17	1.22	17.72	165.00	482.30	3.33	19.95
18	1.24	15.54	149.00	576.90	3.98	19.96
19	1.26	13.81	168.00	921.30	4.96	19.90
20	1.28	12.59	177.10	1090.70	6.21	19.86
21	1.30	11.88	173.30	982.30	7.55	19.84
22	1.32	10.06	168.40	938.60	8.69	19.79
23	1.34	9.19	162.10	903.30	9.64	19.71
24	1.36	8.56	157.60	1041.40	10.66	19.62
25	1.38	7.99	144.50	1151.90	11.14	19.55
26	1.40	7.57	141.50	1132.90	11.20	19.45
27	1.42	7.54	131.20	1033.70	10.87	19.33
28	1.44	7.58	114.80	929.60	10.36	19.18
29	1.46	7.32	91.20	907.20	9.50	19.03
30	1.48	7.01	76.60	1103.20	8.29	18.94
31	1.50	7.31	74.30	1242.60	6.12	18.98
32	1.52	9.12	87.10	1011.20	4.64	19.09
33	1.54	14.67	106.80	714.60	3.78	19.19
34	1.56	15.26	108.70	322.60	3.34	19.36
35	1.58	14.59	100.50	361.80	2.90	19.37
36	1.60	14.86	129.30	76.30	3.06	19.28
37	1.62	13.11	79.10	363.80	3.43	19.17
38	1.64	11.31	77.00	420.20	3.86	19.07
39	1.66	9.92	73.60	355.70	4.07	18.85
40	1.68	9.69	74.30	359.10	4.49	18.73
41	1.70	9.31	66.30	404.70	5.07	18.70
42	1.72	8.93	51.90	246.30	7.02	18.75
43	1.74	8.22	74.50	405.20	7.51	18.78
44	1.76	3.55	106.90	-0.20	7.88	18.86
45	1.78	8.84	89.30	200.40	8.32	18.94
46	1.80	9.40	91.10	116.50	8.30	18.93
47	1.82	9.05	82.90	62.60	6.61	18.80
48	1.84	8.26	71.20	127.80	6.77	18.63

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	7.11	49.40	241.90	7.45	18.34
50	1.88	5.81	43.00	312.00	8.26	18.03
51	1.90	3.79	30.70	441.80	8.99	17.75
52	1.92	3.78	29.10	552.50	9.83	17.70
53	1.94	4.30	31.30	589.90	10.05	17.75
54	1.96	5.32	45.90	370.90	9.66	17.86
55	1.98	5.86	50.00	219.20	9.65	17.90
56	2.00	5.45	45.60	297.50	9.84	17.91
57	2.02	4.21	34.60	342.80	10.10	17.89
58	2.04	4.21	34.60	342.80	10.84	17.88
59	2.06	4.79	43.70	350.40	11.36	17.85
60	2.08	4.64	51.70	269.20	11.23	17.82
61	2.10	4.49	42.50	324.20	11.11	17.75
62	2.12	4.20	28.60	391.80	10.97	17.60
63	2.14	3.96	24.20	418.50	10.57	17.35
64	2.16	4.00	22.40	401.40	10.89	17.26
65	2.18	3.64	20.60	375.70	12.41	17.38
66	2.20	3.57	33.90	300.90	14.45	17.51
67	2.22	3.08	46.30	324.00	16.46	17.50
68	2.24	2.62	46.30	324.00	19.28	17.51
69	2.26	2.19	26.30	361.70	21.40	17.37
70	2.28	1.87	29.90	388.80	22.21	17.10
71	2.30	1.86	19.90	422.90	21.53	16.78
72	2.32	1.74	16.30	428.00	21.29	16.69
73	2.34	1.86	15.00	404.50	20.53	16.62
74	2.36	2.05	19.40	370.60	20.69	16.60
75	2.38	1.97	23.40	345.80	21.15	16.72
76	2.40	1.76	18.60	284.00	21.14	16.74
77	2.42	1.93	26.00	347.70	21.00	16.72
78	2.44	1.99	16.60	284.70	20.28	16.69
79	2.46	2.10	17.30	239.90	18.62	16.68
80	2.48	2.25	19.60	261.80	16.50	16.55
81	2.50	2.63	15.20	232.20	15.09	16.52
82	2.52	2.84	13.90	214.60	13.86	16.46
83	2.54	2.91	12.50	218.70	5.00	16.41
84	2.56	2.90	11.90	177.50	5.00	16.37
85	2.58	3.00	15.00	190.50	5.00	16.38
86	2.60	3.43	11.70	183.50	5.00	16.38
87	2.62	3.21	14.10	206.50	5.00	16.50
88	2.64	3.42	11.80	192.10	5.00	16.50
89	2.66	3.42	18.10	191.40	5.00	16.55
90	2.68	3.50	14.50	151.20	5.00	16.54
91	2.70	3.58	14.40	163.90	5.00	16.59
92	2.72	3.51	13.40	191.30	5.00	16.60
93	2.74	3.63	14.50	184.40	5.00	16.71
94	2.76	3.77	18.60	190.50	11.15	17.01
95	2.78	4.43	20.50	164.50	11.52	17.13
96	2.80	4.05	37.80	177.00	11.90	17.23

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	3.77	24.80	182.00	13.12	17.24
98	2.84	3.77	24.80	182.00	15.54	17.21
99	2.86	2.40	22.20	192.60	17.25	16.99
100	2.88	1.92	22.90	256.40	20.00	16.87
101	2.90	1.76	20.60	337.30	23.92	16.75
102	2.92	1.65	19.90	367.30	24.56	16.71
103	2.94	1.57	20.70	404.60	25.23	17.04
104	2.96	2.03	19.50	347.60	25.37	17.18
105	2.98	2.69	54.30	49.10	26.23	17.35
106	3.00	2.21	35.90	114.60	26.88	17.41
107	3.02	1.90	41.50	217.40	29.11	17.47
108	3.04	1.59	31.20	269.20	31.12	17.25
109	3.06	1.43	32.60	306.20	32.70	17.15
110	3.08	1.36	27.90	322.70	31.65	17.04
111	3.10	1.50	26.30	331.50	29.32	17.03
112	3.12	1.89	26.30	334.00	25.22	16.99
113	3.14	2.28	26.60	231.90	20.64	17.01
114	3.16	2.78	21.20	160.00	17.74	17.14
115	3.18	3.64	21.80	62.10	15.79	17.21
116	3.20	3.93	33.10	-13.00	14.44	17.18
117	3.22	3.85	28.60	-17.60	13.52	17.14
118	3.24	3.45	20.30	-2.30	13.43	17.16
119	3.26	3.59	15.80	4.50	12.65	17.13
120	3.28	3.90	23.70	1.20	11.01	17.23
121	3.30	4.63	27.90	-1.30	9.48	17.33
122	3.32	6.62	34.10	19.70	5.00	17.42
123	3.34	6.62	25.80	29.20	5.00	17.40
124	3.36	7.16	19.90	51.80	5.00	17.57
125	3.38	5.60	19.30	21.50	5.00	17.52
126	3.40	7.51	42.80	22.10	5.00	17.55
127	3.42	7.53	26.80	18.30	5.00	17.65
128	3.44	7.58	28.10	25.00	5.00	17.89
129	3.46	8.59	30.30	27.80	5.00	17.85
130	3.48	8.64	50.00	33.10	5.00	17.96
131	3.50	8.62	35.20	30.50	5.00	17.94
132	3.52	8.74	41.10	11.80	5.00	17.89
133	3.54	8.24	25.10	23.10	5.00	17.65
134	3.56	7.29	23.20	25.40	5.00	17.52
135	3.58	7.03	19.80	21.70	5.00	17.37
136	3.60	6.76	21.40	31.30	5.00	17.44
137	3.62	6.53	27.80	32.80	5.00	17.57
138	3.64	6.74	34.30	20.70	5.00	17.74
139	3.66	6.91	38.30	25.10	8.08	17.87
140	3.68	6.86	43.00	-4.90	8.61	17.93
141	3.70	6.25	41.80	26.80	9.14	17.92
142	3.72	5.84	38.50	20.80	9.68	17.89
143	3.74	5.56	36.20	20.20	10.53	17.90
144	3.76	5.53	36.20	4.70	11.10	17.88

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	5.28	47.20	-3.70	11.34	17.84
146	3.80	5.10	41.40	66.00	11.24	17.80
147	3.82	5.15	33.80	73.50	10.70	17.65
148	3.84	5.37	29.10	69.20	9.62	17.41
149	3.86	5.31	14.60	68.20	5.00	17.21
150	3.88	5.33	15.20	64.70	5.00	17.03
151	3.90	5.79	18.90	54.90	5.00	16.95
152	3.92	6.24	16.90	45.50	5.00	17.11
153	3.94	6.68	21.50	45.70	5.00	17.26
154	3.96	7.42	25.30	-21.20	5.00	17.36
155	3.98	8.29	25.30	-21.20	4.74	17.51
156	4.00	8.98	25.10	-32.40	4.42	17.73
157	4.02	9.17	29.80	4.20	3.76	17.83
158	4.04	10.45	43.30	31.40	3.19	17.96
159	4.06	11.82	33.60	22.90	2.50	17.94
160	4.08	13.26	38.60	26.30	2.55	18.17
161	4.10	13.26	18.50	18.90	2.26	18.33
162	4.12	12.57	62.30	28.40	2.00	18.43
163	4.14	15.64	66.80	25.80	1.63	18.46
164	4.16	15.90	48.20	26.60	2.11	18.48
165	4.18	17.34	40.00	31.20	1.42	18.38
166	4.20	9.40	27.70	32.20	1.11	18.25
167	4.22	16.97	37.60	42.40	1.22	18.27
168	4.24	16.15	41.90	39.70	1.40	18.20
169	4.26	15.21	52.40	35.60	1.11	18.24
170	4.28	14.28	31.80	38.00	1.44	18.12
171	4.30	13.07	30.00	35.80	1.97	17.98
172	4.32	11.33	23.00	21.70	2.54	17.80
173	4.34	9.21	27.80	41.70	3.49	17.69
174	4.36	8.30	34.20	29.20	4.59	17.55
175	4.38	7.11	24.50	33.90	5.00	17.45
176	4.40	6.21	19.90	30.50	5.00	17.26
177	4.42	5.32	18.50	31.60	5.00	16.94
178	4.44	4.12	14.60	27.60	5.00	16.70
179	4.46	3.73	11.40	32.20	5.00	16.49
180	4.48	3.52	11.20	33.10	5.00	16.28
181	4.50	3.25	10.60	35.20	5.00	16.14
182	4.52	3.34	9.10	33.80	5.00	16.07
183	4.54	3.46	8.70	37.70	5.00	16.17
184	4.56	3.36	8.80	27.80	5.00	16.23
185	4.58	3.32	15.80	29.50	5.00	16.27
186	4.60	3.36	13.30	32.50	5.00	16.31
187	4.62	3.30	11.50	33.00	5.00	16.35
188	4.64	3.26	10.60	33.80	5.00	16.26
189	4.66	3.22	11.20	35.30	5.00	16.22
190	4.68	3.11	11.30	35.40	5.00	16.15
191	4.70	3.26	11.50	36.20	5.00	16.12
192	4.72	3.34	8.10	32.80	5.00	16.16

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	3.47	9.20	36.20	5.00	16.41
194	4.76	3.67	12.40	35.30	5.00	16.42
195	4.78	3.61	23.20	41.10	5.00	16.47
196	4.80	3.65	12.00	34.70	5.00	16.50
197	4.82	3.67	10.50	33.30	5.00	16.49
198	4.84	3.69	10.50	37.60	5.00	16.25
199	4.86	3.66	11.80	37.10	5.00	16.25
200	4.88	3.72	10.60	38.70	5.00	16.27
201	4.90	3.65	11.90	37.00	5.00	16.31
202	4.92	3.64	11.30	34.80	5.00	16.32
203	4.94	3.53	12.90	37.70	5.00	16.33
204	4.96	3.62	12.00	37.80	5.00	16.46
205	4.98	3.87	10.90	43.50	5.00	16.50
206	5.00	3.50	19.40	32.00	5.00	16.49
207	5.02	3.45	13.80	42.90	5.00	16.50
208	5.04	3.48	12.70	37.80	5.00	16.52
209	5.06	3.37	12.90	40.00	5.00	16.43
210	5.08	3.40	12.80	37.20	5.00	16.41
211	5.10	3.35	14.10	37.20	5.00	16.35
212	5.12	3.38	12.90	37.40	5.00	16.24
213	5.14	3.30	9.10	40.20	5.00	16.11
214	5.16	3.24	7.70	40.40	5.00	15.93
215	5.18	3.24	7.00	39.50	5.00	15.81
216	5.20	3.20	6.60	42.40	5.00	15.73
217	5.22	3.16	8.80	41.20	5.00	15.73
218	5.24	3.19	6.70	41.30	5.00	15.79
219	5.26	3.04	7.70	38.20	5.00	15.83
220	5.28	3.12	9.10	41.70	5.00	15.84
221	5.30	3.10	8.10	37.20	5.00	15.92
222	5.32	2.99	9.20	39.10	5.00	15.92
223	5.34	3.02	10.00	40.00	5.00	15.87
224	5.36	2.84	7.80	42.40	5.00	15.86
225	5.38	2.78	7.60	40.40	5.00	15.84
226	5.40	2.66	8.30	41.80	5.00	15.78
227	5.42	2.58	8.80	42.40	5.00	15.78
228	5.44	2.59	8.10	43.50	5.00	15.79
229	5.46	2.61	8.20	47.40	5.00	15.81
230	5.48	2.75	7.80	40.50	5.00	15.77
231	5.50	3.04	8.70	43.00	5.00	15.88
232	5.52	3.05	6.90	41.70	5.00	16.13
233	5.54	3.06	11.60	48.30	5.00	16.16
234	5.56	2.96	18.20	41.80	5.00	16.19
235	5.58	2.81	9.20	41.80	5.00	16.26
236	5.60	2.83	10.30	43.90	5.00	16.25
237	5.62	2.91	10.90	43.00	5.00	16.11
238	5.64	2.90	11.10	56.00	5.00	16.17
239	5.66	2.83	11.50	40.70	5.00	16.17
240	5.68	2.83	12.00	46.10	5.00	16.16

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	2.89	10.20	45.20	5.00	16.24
242	5.72	2.78	10.80	45.60	5.00	16.26
243	5.74	2.70	15.30	47.00	5.00	16.24
244	5.76	2.69	12.90	45.20	5.00	16.23
245	5.78	2.69	11.00	45.40	5.00	16.27
246	5.80	2.87	10.00	45.00	5.00	16.21
247	5.82	2.84	12.50	51.90	5.00	16.21
248	5.84	2.83	12.20	46.70	5.00	16.17
249	5.86	2.79	12.40	45.80	5.00	16.21
250	5.88	2.69	9.30	45.00	5.00	16.16
251	5.90	2.47	12.30	46.70	5.00	16.10
252	5.92	2.44	10.70	46.20	5.00	16.08
253	5.94	2.53	9.80	46.30	5.00	16.08
254	5.96	2.69	11.70	45.80	5.00	16.12
255	5.98	2.59	9.40	48.30	5.00	16.16
256	6.00	2.53	13.80	48.80	5.00	16.19
257	6.02	2.46	12.70	51.90	5.00	16.16
258	6.04	2.47	11.60	47.50	5.00	16.18
259	6.06	2.54	10.50	47.90	5.00	16.16
260	6.08	2.64	10.30	50.00	5.00	16.28
261	6.10	2.79	12.20	49.10	5.00	16.30
262	6.12	3.01	18.20	47.50	5.00	16.32
263	6.14	3.17	11.70	50.40	5.00	16.35
264	6.16	3.29	10.60	50.40	5.00	16.33
265	6.18	3.33	10.90	48.50	5.00	16.22
266	6.20	3.33	10.30	48.00	5.00	16.16
267	6.22	3.34	12.20	52.40	5.00	16.16
268	6.24	3.35	8.70	47.20	5.00	16.14
269	6.26	3.25	10.50	50.80	5.00	16.13
270	6.28	3.31	10.30	48.80	5.00	16.13
271	6.30	3.29	9.90	49.60	5.00	16.21
272	6.32	3.22	12.20	57.70	5.00	16.20
273	6.34	3.22	12.70	50.80	5.00	16.20
274	6.36	3.26	9.90	52.40	5.00	16.19
275	6.38	3.29	10.20	52.10	5.00	16.11
276	6.40	3.40	9.40	50.70	5.00	16.09
277	6.42	3.52	8.40	56.10	5.00	16.10
278	6.44	3.43	11.30	52.80	5.00	16.11
279	6.46	3.50	10.40	51.50	5.00	16.14
280	6.48	3.41	10.20	57.50	5.00	16.26
281	6.50	3.33	10.80	57.00	15.40	16.68
282	6.52	3.52	14.10	49.90	16.93	16.86
283	6.54	3.21	36.90	51.30	17.60	16.93
284	6.56	2.99	25.30	54.90	18.88	17.13
285	6.58	3.19	16.70	53.50	20.16	17.27
286	6.60	3.26	30.70	52.00	19.76	17.22
287	6.62	3.26	30.70	63.90	19.73	17.27

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.92	0.00	12.92	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
4	0.96	13.21	0.00	13.21	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
5	0.98	13.52	0.00	13.52	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
6	1.00	13.85	0.00	13.85	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
7	1.02	14.19	0.00	14.19	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
8	1.04	14.54	0.00	14.54	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	14.90	0.00	14.90	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.27	0.00	15.27	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.64	0.00	15.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	16.02	0.00	16.02	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	16.41	0.00	16.41	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	16.80	0.00	16.80	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	17.20	0.00	17.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.59	0.00	17.59	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.99	0.00	17.99	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	18.39	0.00	18.39	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	18.79	0.00	18.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	19.19	0.00	19.19	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	19.58	0.00	19.58	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	19.98	0.00	19.98	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	20.37	0.00	20.37	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	20.77	0.00	20.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	21.16	0.00	21.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	21.55	0.00	21.55	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	21.93	0.00	21.93	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	22.32	0.00	22.32	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	22.70	0.00	22.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	23.08	0.00	23.08	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	23.45	0.00	23.45	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	23.84	0.00	23.84	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	24.22	0.00	24.22	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	24.61	0.00	24.61	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	25.00	0.00	25.00	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	25.38	0.00	25.38	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	25.76	0.00	25.76	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	26.15	0.00	26.15	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	26.52	0.00	26.52	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	26.90	0.00	26.90	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	27.27	0.00	27.27	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	27.65	0.00	27.65	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	28.02	0.00	28.02	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	28.40	0.00	28.40	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	28.78	0.00	28.78	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	29.16	0.00	29.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	29.53	0.00	29.53	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	29.90	0.00	29.90	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	30.27	0.00	30.27	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	30.63	0.00	30.63	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	30.99	0.00	30.99	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	31.34	0.00	31.34	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	31.70	0.00	31.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	32.05	0.00	32.05	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	32.41	0.00	32.41	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	32.77	0.00	32.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	33.13	0.00	33.13	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	33.49	0.00	33.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	33.84	0.00	33.84	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	34.20	0.00	34.20	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	34.55	0.00	34.55	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	34.91	0.00	34.91	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	35.25	0.00	35.25	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	35.60	0.00	35.60	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	35.95	0.00	35.95	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	36.30	0.00	36.30	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	36.65	0.00	36.65	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	37.00	0.00	37.00	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	37.34	0.00	37.34	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	37.69	0.00	37.69	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
71	2.30	38.02	0.00	38.02	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
72	2.32	38.35	0.00	38.35	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
73	2.34	38.69	0.00	38.69	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
74	2.36	39.02	0.00	39.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
75	2.38	39.35	0.00	39.35	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
76	2.40	39.69	0.00	39.69	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
77	2.42	40.02	0.00	40.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
78	2.44	40.36	0.00	40.36	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
79	2.46	40.69	0.00	40.69	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
80	2.48	41.02	0.00	41.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	41.35	0.00	41.35	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	41.68	0.00	41.68	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	42.01	0.00	42.01	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
84	2.56	42.34	0.00	42.34	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
85	2.58	42.66	0.00	42.66	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
86	2.60	42.99	0.00	42.99	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
87	2.62	43.32	0.00	43.32	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
88	2.64	43.65	0.00	43.65	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
89	2.66	43.98	0.00	43.98	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
90	2.68	44.31	0.00	44.31	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	44.64	0.00	44.64	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	44.98	0.00	44.98	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	45.31	0.00	45.31	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	45.65	0.00	45.65	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	45.99	0.00	45.99	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	46.34	0.00	46.34	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	46.68	0.00	46.68	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
98	2.84	47.03	0.00	47.03	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
99	2.86	47.37	0.00	47.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
100	2.88	47.70	0.00	47.70	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
101	2.90	48.04	0.00	48.04	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	48.37	0.00	48.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	48.71	0.00	48.71	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	49.06	0.00	49.06	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	49.41	0.00	49.41	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	49.75	0.00	49.75	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
107	3.02	50.10	0.00	50.10	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
108	3.04	50.45	0.00	50.45	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
109	3.06	50.79	0.00	50.79	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
110	3.08	51.13	0.00	51.13	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
111	3.10	51.47	0.00	51.47	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
112	3.12	51.81	0.00	51.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
113	3.14	52.15	0.00	52.15	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
114	3.16	52.50	0.00	52.50	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
115	3.18	52.84	0.00	52.84	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
116	3.20	53.18	0.00	53.18	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
117	3.22	53.53	0.20	53.33	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
118	3.24	53.87	0.39	53.48	0.98	0.064	1.38	0.047	1.00	1.00	0.047	No
119	3.26	54.21	0.59	53.62	0.98	0.064	1.38	0.047	1.00	1.00	0.047	No
120	3.28	54.56	0.78	53.77	0.98	0.064	1.38	0.047	1.00	1.00	0.047	No
121	3.30	54.90	0.98	53.92	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
122	3.32	55.25	1.18	54.07	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
123	3.34	55.60	1.37	54.23	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
124	3.36	55.95	1.57	54.38	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
125	3.38	56.30	1.77	54.54	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
126	3.40	56.65	1.96	54.69	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
127	3.42	57.00	2.16	54.85	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
128	3.44	57.36	2.35	55.01	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
129	3.46	57.72	2.55	55.17	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
130	3.48	58.08	2.75	55.33	0.98	0.067	1.38	0.048	1.00	1.00	0.048	No
131	3.50	58.44	2.94	55.49	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
132	3.52	58.80	3.14	55.66	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
133	3.54	59.15	3.34	55.81	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
134	3.56	59.50	3.53	55.97	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
135	3.58	59.85	3.73	56.12	0.98	0.068	1.38	0.049	1.00	1.00	0.049	No
136	3.60	60.20	3.92	56.27	0.98	0.068	1.38	0.049	1.00	1.00	0.049	No
137	3.62	60.55	4.12	56.43	0.98	0.068	1.38	0.049	1.00	1.00	0.049	No
138	3.64	60.90	4.32	56.59	0.98	0.068	1.38	0.050	1.00	1.00	0.050	No
139	3.66	61.26	4.51	56.75	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
140	3.68	61.62	4.71	56.91	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
141	3.70	61.98	4.91	57.07	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
142	3.72	62.33	5.10	57.23	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
143	3.74	62.69	5.30	57.39	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
144	3.76	63.05	5.49	57.56	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	63.41	5.69	57.72	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
146	3.80	63.76	5.89	57.88	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
147	3.82	64.12	6.08	58.03	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
148	3.84	64.46	6.28	58.19	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
149	3.86	64.81	6.47	58.33	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
150	3.88	65.15	6.67	58.48	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
151	3.90	65.49	6.87	58.62	0.97	0.071	1.38	0.051	1.00	1.00	0.051	No
152	3.92	65.83	7.06	58.77	0.97	0.071	1.38	0.051	1.00	1.00	0.051	No
153	3.94	66.17	7.26	58.92	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
154	3.96	66.52	7.46	59.07	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
155	3.98	66.87	7.65	59.22	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
156	4.00	67.23	7.85	59.38	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
157	4.02	67.58	8.04	59.54	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
158	4.04	67.94	8.24	59.70	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
159	4.06	68.30	8.44	59.86	0.97	0.072	1.38	0.052	1.00	1.00	0.052	No
160	4.08	68.66	8.63	60.03	0.97	0.072	1.38	0.053	1.00	1.00	0.053	No
161	4.10	69.03	8.83	60.20	0.97	0.072	1.38	0.053	1.00	1.00	0.053	No
162	4.12	69.40	9.03	60.37	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
163	4.14	69.77	9.22	60.55	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
164	4.16	70.14	9.42	60.72	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
165	4.18	70.51	9.61	60.89	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
166	4.20	70.87	9.81	61.06	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
167	4.22	71.24	10.01	61.23	0.97	0.073	1.38	0.053	1.00	1.00	0.053	No
168	4.24	71.60	10.20	61.40	0.97	0.074	1.38	0.053	1.00	1.00	0.053	No
169	4.26	71.97	10.40	61.57	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
170	4.28	72.33	10.59	61.73	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
171	4.30	72.69	10.79	61.90	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
172	4.32	73.04	10.99	62.06	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
173	4.34	73.40	11.18	62.21	0.97	0.074	1.38	0.054	1.00	1.00	0.054	No
174	4.36	73.75	11.38	62.37	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
175	4.38	74.10	11.58	62.52	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
176	4.40	74.44	11.77	62.67	0.97	0.075	1.38	0.054	1.00	1.00	0.054	No
177	4.42	74.78	11.97	62.81	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
178	4.44	75.12	12.16	62.95	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
179	4.46	75.45	12.36	63.08	0.97	0.075	1.38	0.055	1.00	1.00	0.055	No
180	4.48	75.77	12.56	63.21	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
181	4.50	76.09	12.75	63.34	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
182	4.52	76.41	12.95	63.47	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
183	4.54	76.74	13.15	63.59	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
184	4.56	77.06	13.34	63.72	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
185	4.58	77.39	13.54	63.85	0.97	0.076	1.38	0.055	1.00	1.00	0.055	No
186	4.60	77.71	13.73	63.98	0.97	0.076	1.38	0.056	1.00	1.00	0.056	No
187	4.62	78.04	13.93	64.11	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
188	4.64	78.37	14.13	64.24	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
189	4.66	78.69	14.32	64.37	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
190	4.68	79.01	14.52	64.49	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
191	4.70	79.34	14.72	64.62	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No
192	4.72	79.66	14.91	64.75	0.97	0.077	1.38	0.056	1.00	1.00	0.056	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	4.74	79.99	15.11	64.88	0.97	0.078	1.38	0.056	1.00	1.00	0.056	No
194	4.76	80.32	15.30	65.01	0.97	0.078	1.38	0.056	1.00	1.00	0.056	No
195	4.78	80.65	15.50	65.15	0.97	0.078	1.38	0.057	1.00	1.00	0.057	No
196	4.80	80.98	15.70	65.28	0.97	0.078	1.38	0.057	1.00	1.00	0.057	No
197	4.82	81.31	15.89	65.41	0.97	0.078	1.38	0.057	1.00	1.00	0.057	No
198	4.84	81.63	16.09	65.54	0.97	0.078	1.38	0.057	1.00	1.00	0.057	No
199	4.86	81.96	16.28	65.67	0.97	0.078	1.38	0.057	1.00	1.00	0.057	No
200	4.88	82.28	16.48	65.80	0.97	0.079	1.38	0.057	1.00	1.00	0.057	No
201	4.90	82.61	16.68	65.93	0.97	0.079	1.38	0.057	1.00	1.00	0.057	No
202	4.92	82.93	16.87	66.06	0.97	0.079	1.38	0.057	1.00	1.00	0.057	No
203	4.94	83.26	17.07	66.19	0.97	0.079	1.38	0.057	1.00	1.00	0.057	No
204	4.96	83.59	17.27	66.32	0.97	0.079	1.38	0.057	1.00	1.00	0.057	No
205	4.98	83.92	17.46	66.46	0.97	0.079	1.38	0.058	1.00	1.00	0.058	No
206	5.00	84.25	17.66	66.59	0.97	0.079	1.38	0.058	1.00	1.00	0.058	No
207	5.02	84.58	17.85	66.72	0.97	0.080	1.38	0.058	1.00	1.00	0.058	No
208	5.04	84.91	18.05	66.86	0.97	0.080	1.38	0.058	1.00	1.00	0.058	No
209	5.06	85.24	18.25	66.99	0.97	0.080	1.38	0.058	1.00	1.00	0.058	No
210	5.08	85.57	18.44	67.12	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
211	5.10	85.89	18.64	67.25	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
212	5.12	86.22	18.84	67.38	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
213	5.14	86.54	19.03	67.51	0.96	0.080	1.38	0.058	1.00	1.00	0.058	No
214	5.16	86.86	19.23	67.63	0.96	0.080	1.38	0.059	1.00	1.00	0.059	No
215	5.18	87.17	19.42	67.75	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
216	5.20	87.49	19.62	67.87	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
217	5.22	87.80	19.82	67.99	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
218	5.24	88.12	20.01	68.11	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
219	5.26	88.44	20.21	68.23	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
220	5.28	88.75	20.40	68.35	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
221	5.30	89.07	20.60	68.47	0.96	0.081	1.38	0.059	1.00	1.00	0.059	No
222	5.32	89.39	20.80	68.59	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
223	5.34	89.71	20.99	68.71	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
224	5.36	90.02	21.19	68.84	0.96	0.082	1.38	0.059	1.00	1.00	0.059	No
225	5.38	90.34	21.39	68.96	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
226	5.40	90.66	21.58	69.08	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
227	5.42	90.97	21.78	69.19	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
228	5.44	91.29	21.97	69.31	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
229	5.46	91.60	22.17	69.43	0.96	0.082	1.38	0.060	1.00	1.00	0.060	No
230	5.48	91.92	22.37	69.55	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
231	5.50	92.24	22.56	69.67	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
232	5.52	92.56	22.76	69.80	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
233	5.54	92.88	22.96	69.93	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
234	5.56	93.21	23.15	70.06	0.96	0.083	1.38	0.060	1.00	1.00	0.060	No
235	5.58	93.53	23.35	70.18	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
236	5.60	93.86	23.54	70.31	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
237	5.62	94.18	23.74	70.44	0.96	0.083	1.38	0.061	1.00	1.00	0.061	No
238	5.64	94.50	23.94	70.57	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
239	5.66	94.83	24.13	70.69	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
240	5.68	95.15	24.33	70.82	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	5.70	95.47	24.53	70.95	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
242	5.72	95.80	24.72	71.08	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
243	5.74	96.12	24.92	71.21	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
244	5.76	96.45	25.11	71.34	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
245	5.78	96.77	25.31	71.46	0.96	0.084	1.38	0.061	1.00	1.00	0.061	No
246	5.80	97.10	25.51	71.59	0.96	0.085	1.38	0.061	1.00	1.00	0.061	No
247	5.82	97.42	25.70	71.72	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
248	5.84	97.75	25.90	71.85	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
249	5.86	98.07	26.09	71.98	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
250	5.88	98.39	26.29	72.10	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
251	5.90	98.72	26.49	72.23	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
252	5.92	99.04	26.68	72.35	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
253	5.94	99.36	26.88	72.48	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
254	5.96	99.68	27.08	72.61	0.96	0.085	1.38	0.062	1.00	1.00	0.062	No
255	5.98	100.00	27.27	72.73	0.96	0.086	1.38	0.062	1.00	1.00	0.062	No
256	6.00	100.33	27.47	72.86	0.96	0.086	1.38	0.062	1.00	1.00	0.062	No
257	6.02	100.65	27.66	72.99	0.96	0.086	1.38	0.062	1.00	1.00	0.062	No
258	6.04	100.97	27.86	73.11	0.96	0.086	1.38	0.062	1.00	1.00	0.062	No
259	6.06	101.30	28.06	73.24	0.96	0.086	1.38	0.063	1.00	1.00	0.063	No
260	6.08	101.62	28.25	73.37	0.96	0.086	1.38	0.063	1.00	1.00	0.063	No
261	6.10	101.95	28.45	73.50	0.96	0.086	1.38	0.063	1.00	1.00	0.063	No
262	6.12	102.28	28.65	73.63	0.96	0.086	1.38	0.063	1.00	1.00	0.063	No
263	6.14	102.60	28.84	73.76	0.96	0.086	1.38	0.063	1.00	1.00	0.063	No
264	6.16	102.93	29.04	73.89	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
265	6.18	103.25	29.23	74.02	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
266	6.20	103.58	29.43	74.15	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
267	6.22	103.90	29.63	74.27	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
268	6.24	104.22	29.82	74.40	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
269	6.26	104.55	30.02	74.53	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
270	6.28	104.87	30.21	74.65	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
271	6.30	105.19	30.41	74.78	0.96	0.087	1.38	0.063	1.00	1.00	0.063	No
272	6.32	105.52	30.61	74.91	0.95	0.087	1.38	0.064	1.00	1.00	0.064	No
273	6.34	105.84	30.80	75.04	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
274	6.36	106.16	31.00	75.16	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
275	6.38	106.49	31.20	75.29	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
276	6.40	106.81	31.39	75.42	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
277	6.42	107.13	31.59	75.54	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
278	6.44	107.45	31.78	75.67	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
279	6.46	107.78	31.98	75.79	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
280	6.48	108.10	32.18	75.92	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
281	6.50	108.43	32.37	76.06	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
282	6.52	108.77	32.57	76.20	0.95	0.088	1.38	0.064	1.00	1.00	0.064	No
283	6.54	109.11	32.77	76.34	0.95	0.089	1.38	0.064	1.00	1.00	0.064	No
284	6.56	109.45	32.96	76.49	0.95	0.089	1.38	0.064	1.00	1.00	0.064	No
285	6.58	109.80	33.16	76.64	0.95	0.089	1.38	0.064	1.00	1.00	0.064	No
286	6.60	110.14	33.35	76.79	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No
287	6.62	110.49	33.55	76.94	0.95	0.089	1.38	0.065	1.00	1.00	0.065	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.20	3.18	1.13	1.00	3.63	12.20	44.31	4.000	No	Yes	2.00
2	0.92	0.25	3.08	1.15	1.00	4.66	10.25	47.73	4.000	No	Yes	2.00
3	0.94	0.36	2.92	1.06	0.97	6.81	7.44	50.70	4.000	Yes	Yes	2.00
4	0.96	0.58	2.68	0.87	0.88	11.16	9.25	103.31	4.000	Yes	No	2.00
5	0.98	1.61	2.15	0.43	0.68	31.51	1.00	31.51	4.000	Yes	No	2.00
6	1.00	3.27	1.86	0.41	0.57	64.19	1.00	64.19	4.000	Yes	No	2.00
7	1.02	4.92	1.71	0.43	0.51	96.79	1.00	96.79	4.000	Yes	No	2.00
8	1.04	6.60	1.61	0.45	0.47	129.89	1.00	129.89	4.000	No	No	2.00
9	1.06	8.28	1.54	0.47	0.45	163.12	1.00	163.12	4.000	No	No	2.00
10	1.08	9.32	1.55	0.56	0.45	183.59	1.00	183.59	4.000	No	No	2.00
11	1.10	10.01	1.56	0.63	0.45	197.31	1.00	197.31	4.000	No	No	2.00
12	1.12	11.10	1.57	0.74	0.46	218.87	1.00	218.87	4.000	No	No	2.00
13	1.14	12.77	1.55	0.81	0.45	251.74	1.00	251.74	4.000	No	No	2.00
14	1.16	14.87	1.54	0.88	0.44	293.15	1.00	293.15	4.000	No	No	2.00
15	1.18	16.32	1.52	0.91	0.44	321.87	1.00	321.87	4.000	No	No	2.00
16	1.20	17.05	1.52	0.94	0.44	336.14	1.00	336.14	4.000	No	No	2.00
17	1.22	17.01	1.53	0.97	0.44	335.34	1.00	335.34	4.000	No	No	2.00
18	1.24	16.07	1.58	1.06	0.46	316.91	1.00	316.91	4.000	No	No	2.00
19	1.26	14.44	1.64	1.15	0.48	284.73	1.00	284.73	4.000	No	No	2.00
20	1.28	12.93	1.70	1.30	0.51	254.78	1.00	254.78	4.000	No	No	2.00
21	1.30	11.67	1.77	1.46	0.54	229.93	1.12	257.28	4.000	No	No	2.00
22	1.32	10.62	1.83	1.58	0.56	209.30	1.18	246.93	4.000	No	No	2.00
23	1.34	9.71	1.87	1.66	0.57	191.20	1.21	232.22	4.000	No	No	2.00
24	1.36	8.85	1.91	1.75	0.59	174.31	1.24	216.89	4.000	No	No	2.00
25	1.38	8.35	1.93	1.77	0.60	164.43	1.26	206.70	4.000	No	No	2.00
26	1.40	8.03	1.93	1.72	0.60	158.08	1.26	198.95	4.000	No	No	2.00
27	1.42	7.78	1.92	1.61	0.59	153.07	1.25	191.33	4.000	No	No	2.00
28	1.44	7.58	1.90	1.47	0.58	149.16	1.24	184.37	4.000	No	No	2.00
29	1.46	7.53	1.86	1.30	0.57	148.18	1.21	179.33	4.000	No	No	2.00
30	1.48	7.85	1.81	1.14	0.55	154.40	1.16	179.31	4.000	No	No	2.00
31	1.50	9.26	1.70	0.94	0.51	182.25	1.00	182.25	4.000	No	No	2.00
32	1.52	10.82	1.62	0.84	0.48	212.80	1.00	212.80	4.000	No	No	2.00
33	1.54	12.31	1.56	0.78	0.46	233.81	1.00	233.81	4.000	No	No	2.00
34	1.56	13.78	1.53	0.77	0.45	256.11	1.00	256.11	4.000	No	No	2.00
35	1.58	14.56	1.50	0.72	0.44	263.76	1.00	263.76	4.000	No	No	2.00
36	1.60	13.88	1.52	0.71	0.44	251.28	1.00	251.28	4.000	No	No	2.00
37	1.62	12.81	1.54	0.72	0.45	233.45	1.00	233.45	4.000	No	No	2.00
38	1.64	11.83	1.57	0.73	0.46	217.85	1.00	217.85	4.000	No	No	2.00
39	1.66	10.73	1.58	0.69	0.47	197.67	1.00	197.67	4.000	No	No	2.00
40	1.68	9.89	1.61	0.70	0.48	183.38	1.00	183.38	4.000	No	No	2.00
41	1.70	9.28	1.64	0.74	0.49	173.69	1.00	173.69	4.000	No	No	2.00
42	1.72	7.99	1.75	0.94	0.53	156.26	1.08	168.64	4.000	No	No	2.00
43	1.74	7.81	1.77	1.00	0.54	153.54	1.12	171.35	4.000	No	No	2.00
44	1.76	7.82	1.79	1.06	0.55	153.83	1.14	175.26	4.000	No	No	2.00
45	1.78	7.84	1.81	1.14	0.55	154.18	1.16	179.28	4.000	No	No	2.00
46	1.80	7.84	1.81	1.13	0.55	153.55	1.16	178.39	4.000	No	No	2.00
47	1.82	8.56	1.73	0.90	0.52	160.44	1.04	167.02	4.000	No	No	2.00
48	1.84	7.96	1.73	0.85	0.53	148.72	1.06	157.19	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	6.84	1.77	0.81	0.54	129.03	1.11	143.50	4.000	No	No	2.00
50	1.88	5.81	1.81	0.77	0.55	110.59	1.16	128.28	4.000	No	No	2.00
51	1.90	5.03	1.84	0.73	0.57	96.54	1.19	115.10	4.000	No	No	2.00
52	1.92	4.68	1.88	0.78	0.58	90.58	1.22	110.55	4.000	No	No	2.00
53	1.94	4.68	1.89	0.80	0.58	90.55	1.23	111.12	4.000	No	No	2.00
54	1.96	5.01	1.87	0.81	0.58	95.65	1.22	116.23	4.000	No	No	2.00
55	1.98	5.09	1.87	0.82	0.58	96.55	1.22	117.30	4.000	No	No	2.00
56	2.00	5.06	1.88	0.84	0.58	95.79	1.22	116.96	4.000	No	No	2.00
57	2.02	4.96	1.89	0.85	0.59	93.61	1.23	115.01	4.000	No	No	2.00
58	2.04	4.72	1.92	0.90	0.60	89.60	1.25	111.91	4.000	No	No	2.00
59	2.06	4.52	1.94	0.92	0.61	86.13	1.26	108.75	4.000	No	No	2.00
60	2.08	4.52	1.93	0.90	0.60	85.43	1.26	107.59	4.000	No	No	2.00
61	2.10	4.48	1.93	0.86	0.60	83.89	1.26	105.38	4.000	No	No	2.00
62	2.12	4.32	1.92	0.79	0.60	80.26	1.25	100.53	4.000	No	No	2.00
63	2.14	4.12	1.91	0.68	0.59	75.51	1.24	93.77	4.000	No	No	2.00
64	2.16	3.94	1.92	0.66	0.60	72.04	1.25	90.07	4.000	No	No	2.00
65	2.18	3.71	1.98	0.80	0.62	69.20	1.29	89.37	4.000	No	No	2.00
66	2.20	3.44	2.05	1.00	0.65	65.54	1.36	89.08	4.000	No	No	2.00
67	2.22	3.08	2.12	1.14	0.68	59.73	1.45	86.73	4.000	No	No	2.00
68	2.24	2.72	2.21	1.36	0.71	53.05	1.64	86.78	4.000	No	No	2.00
69	2.26	2.39	2.27	1.44	0.73	46.39	1.81	84.20	4.000	No	No	2.00
70	2.28	2.12	2.29	1.33	0.74	41.13	1.89	77.87	4.000	No	No	2.00
71	2.30	1.97	2.27	1.11	0.73	38.18	1.83	69.79	4.000	No	No	2.00
72	2.32	1.94	2.27	1.05	0.73	37.61	1.81	67.88	4.000	No	No	2.00
73	2.34	1.96	2.24	0.98	0.72	37.96	1.74	65.95	4.000	No	No	2.00
74	2.36	1.94	2.25	0.98	0.73	37.46	1.75	65.62	4.000	No	No	2.00
75	2.38	1.97	2.26	1.06	0.73	38.10	1.79	68.31	4.000	No	No	2.00
76	2.40	1.99	2.26	1.06	0.73	38.28	1.79	68.56	4.000	No	No	2.00
77	2.42	2.00	2.26	1.04	0.73	38.11	1.78	67.77	4.000	No	No	2.00
78	2.44	2.05	2.24	0.97	0.72	38.65	1.72	66.31	4.000	No	No	2.00
79	2.46	2.22	2.19	0.87	0.70	41.01	1.59	65.06	4.000	No	No	2.00
80	2.48	2.40	2.12	0.70	0.68	43.05	1.45	62.60	4.000	No	No	2.00
81	2.50	2.58	2.08	0.62	0.66	45.37	1.39	62.87	4.000	No	No	2.00
82	2.52	2.74	2.03	0.54	0.64	47.24	1.34	63.18	4.000	No	No	2.00
83	2.54	2.89	2.00	0.48	0.63	48.95	1.00	48.95	4.000	No	No	2.00
84	2.56	3.05	1.96	0.43	0.62	50.82	1.00	50.82	4.000	No	No	2.00
85	2.58	3.12	1.95	0.42	0.61	51.64	1.00	51.64	4.000	No	No	2.00
86	2.60	3.22	1.93	0.41	0.61	52.79	1.00	52.79	4.000	No	No	2.00
87	2.62	3.33	1.93	0.43	0.61	54.31	1.00	54.31	4.000	No	No	2.00
88	2.64	3.43	1.92	0.42	0.60	55.42	1.00	55.42	4.000	No	No	2.00
89	2.66	3.45	1.92	0.43	0.60	55.71	1.00	55.71	4.000	No	No	2.00
90	2.68	3.52	1.91	0.42	0.60	56.28	1.00	56.28	4.000	No	No	2.00
91	2.70	3.56	1.92	0.43	0.60	56.74	1.00	56.74	4.000	No	No	2.00
92	2.72	3.63	1.91	0.42	0.60	57.46	1.00	57.46	4.000	No	No	2.00
93	2.74	3.81	1.90	0.43	0.59	59.98	1.00	59.98	4.000	No	No	2.00
94	2.76	3.91	1.93	0.54	0.61	61.88	1.26	77.80	4.000	No	No	2.00
95	2.78	3.96	1.95	0.59	0.61	62.70	1.27	79.45	4.000	No	No	2.00
96	2.80	3.99	1.96	0.64	0.62	63.15	1.28	80.66	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	3.72	2.01	0.71	0.64	59.32	1.31	77.86	4.000	No	No	2.00
98	2.84	3.22	2.09	0.84	0.67	52.29	1.41	73.53	4.000	No	No	2.00
99	2.86	2.76	2.15	0.85	0.69	45.35	1.50	67.90	4.000	No	No	2.00
100	2.88	2.35	2.23	0.96	0.72	39.12	1.69	66.22	4.000	No	No	2.00
101	2.90	1.91	2.34	1.14	0.76	32.56	2.07	67.50	4.000	No	No	2.00
102	2.92	1.84	2.35	1.15	0.77	31.34	2.15	67.29	4.000	No	No	2.00
103	2.94	1.99	2.37	1.39	0.78	33.90	2.23	75.46	4.000	No	No	2.00
104	2.96	2.07	2.37	1.48	0.78	35.17	2.24	78.91	4.000	No	No	2.00
105	2.98	2.12	2.40	1.66	0.79	35.95	2.35	84.52	4.000	No	No	2.00
106	3.00	2.12	2.41	1.76	0.79	35.92	2.44	87.46	4.000	Yes	No	2.00
107	3.02	2.00	2.46	2.01	0.81	34.08	2.74	93.51	4.000	Yes	No	2.00
108	3.04	1.74	2.51	2.00	0.83	29.78	2.99	89.09	4.000	Yes	No	2.00
109	3.06	1.60	2.54	2.05	0.84	27.48	3.76	103.36	4.000	Yes	No	2.00
110	3.08	1.61	2.52	1.85	0.84	27.20	3.23	87.99	4.000	Yes	No	2.00
111	3.10	1.74	2.47	1.65	0.82	29.02	2.77	80.51	4.000	Yes	No	2.00
112	3.12	2.01	2.37	1.31	0.78	32.58	2.23	72.49	4.000	Yes	No	2.00
113	3.14	2.46	2.25	1.02	0.73	38.59	1.75	67.41	4.000	Yes	No	2.00
114	3.16	2.93	2.16	0.90	0.70	45.03	1.53	68.78	4.000	Yes	No	2.00
115	3.18	3.31	2.10	0.81	0.68	49.94	1.42	70.80	4.000	Yes	No	2.00
116	3.20	3.54	2.05	0.72	0.66	52.58	1.36	71.44	4.000	Yes	No	2.00
117	3.22	3.70	2.02	0.66	0.65	54.41	1.33	72.12	4.000	Yes	No	2.00
118	3.24	3.74	2.02	0.66	0.64	54.99	1.32	72.72	0.116	No	No	2.00
119	3.26	3.88	1.99	0.61	0.63	56.58	1.30	73.46	0.117	No	No	2.00
120	3.28	4.44	1.93	0.56	0.61	63.67	1.25	79.81	0.127	No	No	2.00
121	3.30	5.07	1.86	0.51	0.59	71.64	1.21	86.64	0.140	No	No	2.00
122	3.32	5.79	1.80	0.46	0.56	80.44	1.00	80.44	0.128	No	No	2.00
123	3.34	6.13	1.76	0.42	0.55	84.34	1.00	84.34	0.136	No	No	2.00
124	3.36	6.71	1.73	0.43	0.54	91.62	1.00	91.62	0.152	No	No	2.00
125	3.38	6.89	1.71	0.39	0.53	93.46	1.00	93.46	0.156	No	No	2.00
126	3.40	7.08	1.70	0.39	0.52	95.71	1.00	95.71	0.162	No	No	2.00
127	3.42	7.37	1.69	0.40	0.52	99.28	1.00	99.28	0.171	No	No	2.00
128	3.44	7.98	1.68	0.45	0.52	107.27	1.00	107.27	0.195	No	No	2.00
129	3.46	8.20	1.66	0.42	0.51	109.49	1.00	109.49	0.202	No	No	2.00
130	3.48	8.44	1.66	0.44	0.51	112.61	1.00	112.61	0.213	No	No	2.00
131	3.50	8.57	1.65	0.43	0.51	113.91	1.00	113.91	0.217	No	No	2.00
132	3.52	8.31	1.66	0.42	0.51	110.50	1.00	110.50	0.205	No	No	2.00
133	3.54	7.99	1.64	0.36	0.50	105.66	1.00	105.66	0.190	No	No	2.00
134	3.56	7.62	1.65	0.35	0.51	100.75	1.00	100.75	0.175	No	No	2.00
135	3.58	7.18	1.66	0.33	0.51	95.02	1.00	95.02	0.160	No	No	2.00
136	3.60	6.88	1.70	0.37	0.53	91.64	1.00	91.64	0.152	No	No	2.00
137	3.62	6.80	1.73	0.42	0.54	91.04	1.00	91.04	0.150	No	No	2.00
138	3.64	6.76	1.76	0.49	0.55	91.12	1.00	91.12	0.150	No	No	2.00
139	3.66	6.66	1.80	0.56	0.56	90.26	1.15	103.86	0.184	No	No	2.00
140	3.68	6.52	1.82	0.61	0.57	88.69	1.18	104.36	0.186	No	No	2.00
141	3.70	6.29	1.85	0.64	0.58	85.77	1.20	102.70	0.181	No	No	2.00
142	3.72	6.01	1.87	0.66	0.59	82.24	1.22	99.99	0.173	No	No	2.00
143	3.74	5.69	1.91	0.71	0.60	78.35	1.24	97.20	0.165	No	No	2.00
144	3.76	5.47	1.93	0.74	0.61	75.42	1.26	94.73	0.159	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	5.33	1.94	0.74	0.62	73.53	1.26	92.82	0.154	No	No	2.00
146	3.80	5.29	1.93	0.72	0.62	72.85	1.26	91.76	0.152	No	No	2.00
147	3.82	5.25	1.91	0.64	0.61	71.82	1.25	89.43	0.147	No	No	2.00
148	3.84	5.26	1.87	0.52	0.59	71.18	1.21	86.41	0.140	No	No	2.00
149	3.86	5.40	1.82	0.42	0.57	72.20	1.00	72.20	0.115	No	No	2.00
150	3.88	5.62	1.77	0.34	0.55	74.27	1.00	74.27	0.118	No	No	2.00
151	3.90	5.88	1.73	0.30	0.54	77.03	1.00	77.03	0.123	No	No	2.00
152	3.92	6.30	1.71	0.31	0.53	82.17	1.00	82.17	0.132	No	No	2.00
153	3.94	6.89	1.68	0.32	0.52	89.23	1.00	89.23	0.146	No	No	2.00
154	3.96	7.52	1.64	0.31	0.51	96.67	1.00	96.67	0.164	No	No	2.00
155	3.98	8.11	1.62	0.32	0.50	103.66	1.00	103.66	0.184	No	No	2.00
156	4.00	8.86	1.60	0.34	0.49	112.79	1.00	112.79	0.213	No	No	2.00
157	4.02	9.74	1.56	0.32	0.47	122.90	1.00	122.90	0.253	No	No	2.00
158	4.04	10.74	1.52	0.32	0.46	134.34	1.00	134.34	0.305	No	No	2.00
159	4.06	11.60	1.48	0.28	0.44	143.53	1.00	143.53	0.355	No	No	2.00
160	4.08	12.28	1.48	0.32	0.44	151.93	1.00	151.93	0.406	No	No	2.00
161	4.10	13.31	1.46	0.33	0.43	163.94	1.00	163.94	0.490	No	No	2.00
162	4.12	14.13	1.44	0.33	0.43	173.16	1.00	173.16	0.563	No	No	2.00
163	4.14	14.95	1.41	0.32	0.42	181.92	1.00	181.92	0.640	No	No	2.00
164	4.16	14.17	1.45	0.35	0.43	173.56	1.00	173.56	0.566	No	No	2.00
165	4.18	15.06	1.39	0.29	0.41	182.22	1.00	182.22	0.643	No	No	2.00
166	4.20	15.16	1.36	0.26	0.40	182.32	1.00	182.32	0.644	No	No	2.00
167	4.22	15.02	1.37	0.27	0.40	180.79	1.00	180.79	0.630	No	No	2.00
168	4.24	14.41	1.39	0.27	0.41	173.71	1.00	173.71	0.567	No	No	2.00
169	4.26	15.14	1.37	0.26	0.40	181.55	1.00	181.55	0.637	No	No	2.00
170	4.28	14.01	1.39	0.26	0.41	168.67	1.00	168.67	0.526	No	No	2.00
171	4.30	12.62	1.44	0.26	0.43	152.91	1.00	152.91	0.413	No	No	2.00
172	4.32	11.24	1.48	0.26	0.44	137.02	1.00	137.02	0.319	No	No	2.00
173	4.34	9.81	1.54	0.29	0.47	120.77	1.00	120.77	0.244	No	No	2.00
174	4.36	8.44	1.61	0.31	0.50	104.96	1.00	104.96	0.188	No	No	2.00
175	4.38	7.24	1.69	0.35	0.53	91.09	1.00	91.09	0.150	No	No	2.00
176	4.40	6.22	1.76	0.36	0.55	78.96	1.00	78.96	0.126	No	No	2.00
177	4.42	5.31	1.80	0.34	0.57	67.72	1.00	67.72	0.109	No	No	2.00
178	4.44	4.59	1.86	0.34	0.59	58.90	1.00	58.90	0.099	No	No	1.81
179	4.46	3.99	1.91	0.34	0.61	51.61	1.00	51.61	0.093	No	No	1.69
180	4.48	3.60	1.94	0.32	0.62	46.61	1.00	46.61	0.089	No	No	1.62
181	4.50	3.47	1.95	0.30	0.62	44.84	1.00	44.84	0.087	No	No	1.59
182	4.52	3.39	1.95	0.29	0.63	43.83	1.00	43.83	0.087	No	No	1.57
183	4.54	3.35	1.97	0.32	0.63	43.41	1.00	43.41	0.086	No	No	1.56
184	4.56	3.38	1.98	0.34	0.63	43.69	1.00	43.69	0.086	No	No	1.56
185	4.58	3.37	1.99	0.35	0.64	43.59	1.00	43.59	0.086	No	No	1.56
186	4.60	3.33	2.00	0.37	0.64	43.09	1.00	43.09	0.086	No	No	1.55
187	4.62	3.30	2.01	0.39	0.65	42.76	1.00	42.76	0.086	No	No	1.54
188	4.64	3.26	2.00	0.36	0.65	42.10	1.00	42.10	0.085	No	No	1.52
189	4.66	3.24	2.00	0.36	0.64	41.77	1.00	41.77	0.085	No	No	1.52
190	4.68	3.25	1.99	0.33	0.64	41.74	1.00	41.74	0.085	No	No	1.51
191	4.70	3.29	1.98	0.32	0.64	42.14	1.00	42.14	0.085	No	No	1.52
192	4.72	3.38	1.97	0.32	0.63	43.19	1.00	43.19	0.086	No	No	1.53

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	3.48	1.99	0.38	0.64	44.57	1.00	44.57	0.087	No	No	1.55
194	4.76	3.55	1.98	0.37	0.64	45.45	1.00	45.45	0.088	No	No	1.56
195	4.78	3.62	1.97	0.38	0.63	46.21	1.00	46.21	0.088	No	No	1.56
196	4.80	3.66	1.97	0.38	0.63	46.71	1.00	46.71	0.089	No	No	1.57
197	4.82	3.66	1.97	0.38	0.63	46.62	1.00	46.62	0.089	No	No	1.56
198	4.84	3.68	1.94	0.31	0.62	46.58	1.00	46.58	0.089	No	No	1.56
199	4.86	3.68	1.94	0.31	0.62	46.53	1.00	46.53	0.089	No	No	1.56
200	4.88	3.68	1.94	0.31	0.62	46.43	1.00	46.43	0.089	No	No	1.55
201	4.90	3.65	1.95	0.33	0.63	46.04	1.00	46.04	0.088	No	No	1.54
202	4.92	3.64	1.95	0.33	0.63	45.89	1.00	45.89	0.088	No	No	1.54
203	4.94	3.67	1.95	0.33	0.63	46.20	1.00	46.20	0.088	No	No	1.54
204	4.96	3.64	1.97	0.37	0.63	45.92	1.00	45.92	0.088	No	No	1.53
205	4.98	3.60	1.99	0.39	0.64	45.47	1.00	45.47	0.088	No	No	1.53
206	5.00	3.59	1.99	0.39	0.64	45.29	1.00	45.29	0.088	No	No	1.52
207	5.02	3.54	2.00	0.40	0.64	44.66	1.00	44.66	0.087	No	No	1.51
208	5.04	3.45	2.02	0.43	0.65	43.52	1.00	43.52	0.086	No	No	1.49
209	5.06	3.42	2.01	0.40	0.65	43.02	1.00	43.02	0.086	No	No	1.48
210	5.08	3.40	2.01	0.39	0.65	42.77	1.00	42.77	0.086	No	No	1.47
211	5.10	3.37	2.01	0.38	0.65	42.22	1.00	42.22	0.085	No	No	1.46
212	5.12	3.34	2.00	0.35	0.65	41.77	1.00	41.77	0.085	No	No	1.45
213	5.14	3.31	1.99	0.32	0.64	41.24	1.00	41.24	0.084	No	No	1.44
214	5.16	3.28	1.97	0.27	0.63	40.70	1.00	40.70	0.084	No	No	1.43
215	5.18	3.24	1.97	0.25	0.63	40.08	1.00	40.08	0.083	No	No	1.42
216	5.20	3.22	1.96	0.24	0.63	39.75	1.00	39.75	0.083	No	No	1.42
217	5.22	3.17	1.97	0.24	0.63	39.23	1.00	39.23	0.083	No	No	1.41
218	5.24	3.15	1.98	0.25	0.64	38.95	1.00	38.95	0.082	No	No	1.40
219	5.26	3.13	1.99	0.27	0.64	38.69	1.00	38.69	0.082	No	No	1.39
220	5.28	3.10	2.00	0.27	0.64	38.25	1.00	38.25	0.082	No	No	1.39
221	5.30	3.06	2.01	0.30	0.65	37.87	1.00	37.87	0.082	No	No	1.38
222	5.32	3.02	2.02	0.30	0.65	37.34	1.00	37.34	0.081	No	No	1.37
223	5.34	2.95	2.03	0.30	0.66	36.48	1.00	36.48	0.080	No	No	1.35
224	5.36	2.87	2.05	0.31	0.66	35.42	1.00	35.42	0.080	No	No	1.34
225	5.38	2.78	2.06	0.32	0.67	34.39	1.00	34.39	0.079	No	No	1.32
226	5.40	2.70	2.07	0.31	0.67	33.30	1.00	33.30	0.078	No	No	1.30
227	5.42	2.65	2.09	0.32	0.68	32.73	1.00	32.73	0.077	No	No	1.29
228	5.44	2.65	2.09	0.32	0.68	32.63	1.00	32.63	0.077	No	No	1.29
229	5.46	2.72	2.07	0.32	0.67	33.50	1.00	33.50	0.078	No	No	1.30
230	5.48	2.82	2.05	0.29	0.67	34.53	1.00	34.53	0.079	No	No	1.31
231	5.50	2.91	2.04	0.31	0.66	35.64	1.00	35.64	0.080	No	No	1.32
232	5.52	2.98	2.06	0.37	0.67	36.59	1.00	36.59	0.080	No	No	1.34
233	5.54	2.99	2.06	0.38	0.67	36.70	1.00	36.70	0.081	No	No	1.34
234	5.56	2.95	2.08	0.39	0.68	36.18	1.00	36.18	0.080	No	No	1.33
235	5.58	2.92	2.10	0.43	0.68	35.87	1.00	35.87	0.080	No	No	1.32
236	5.60	2.89	2.10	0.43	0.68	35.44	1.00	35.44	0.080	No	No	1.31
237	5.62	2.86	2.09	0.38	0.68	35.00	1.00	35.00	0.079	No	No	1.30
238	5.64	2.87	2.09	0.40	0.68	35.05	1.00	35.05	0.079	No	No	1.30
239	5.66	2.88	2.09	0.40	0.68	35.13	1.00	35.13	0.079	No	No	1.30
240	5.68	2.85	2.10	0.40	0.68	34.78	1.00	34.78	0.079	No	No	1.30

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	2.81	2.12	0.44	0.69	34.33	1.00	34.33	0.079	No	No	1.29
242	5.72	2.79	2.13	0.46	0.70	33.98	1.00	33.98	0.078	No	No	1.28
243	5.74	2.76	2.13	0.45	0.70	33.59	1.00	33.59	0.078	No	No	1.27
244	5.76	2.76	2.13	0.45	0.70	33.52	1.00	33.52	0.078	No	No	1.27
245	5.78	2.77	2.14	0.46	0.70	33.64	1.00	33.64	0.078	No	No	1.27
246	5.80	2.79	2.12	0.43	0.69	33.85	1.00	33.85	0.078	No	No	1.27
247	5.82	2.81	2.12	0.43	0.69	34.02	1.00	34.02	0.078	No	No	1.27
248	5.84	2.81	2.11	0.42	0.69	33.96	1.00	33.96	0.078	No	No	1.27
249	5.86	2.73	2.14	0.45	0.70	33.01	1.00	33.01	0.077	No	No	1.26
250	5.88	2.65	2.15	0.45	0.70	32.00	1.00	32.00	0.077	No	No	1.24
251	5.90	2.59	2.15	0.44	0.71	31.24	1.00	31.24	0.076	No	No	1.23
252	5.92	2.57	2.16	0.44	0.71	30.97	1.00	30.97	0.076	No	No	1.22
253	5.94	2.55	2.16	0.44	0.71	30.71	1.00	30.71	0.076	No	No	1.22
254	5.96	2.57	2.16	0.45	0.71	30.84	1.00	30.84	0.076	No	No	1.22
255	5.98	2.57	2.17	0.46	0.71	30.88	1.00	30.88	0.076	No	No	1.22
256	6.00	2.56	2.18	0.48	0.72	30.71	1.00	30.71	0.076	No	No	1.21
257	6.02	2.53	2.18	0.48	0.72	30.30	1.00	30.30	0.075	No	No	1.21
258	6.04	2.54	2.18	0.48	0.72	30.38	1.00	30.38	0.075	No	No	1.21
259	6.06	2.59	2.17	0.46	0.71	30.91	1.00	30.91	0.076	No	No	1.21
260	6.08	2.70	2.16	0.48	0.71	32.19	1.00	32.19	0.077	No	No	1.23
261	6.10	2.84	2.13	0.46	0.70	33.79	1.00	33.79	0.078	No	No	1.25
262	6.12	2.99	2.10	0.44	0.69	35.47	1.00	35.47	0.080	No	No	1.27
263	6.14	3.13	2.08	0.42	0.68	37.01	1.00	37.01	0.081	No	No	1.29
264	6.16	3.23	2.06	0.39	0.67	38.18	1.00	38.18	0.082	No	No	1.30
265	6.18	3.30	2.03	0.35	0.66	38.82	1.00	38.82	0.082	No	No	1.31
266	6.20	3.34	2.02	0.33	0.65	39.13	1.00	39.13	0.083	No	No	1.31
267	6.22	3.33	2.02	0.33	0.66	39.01	1.00	39.01	0.082	No	No	1.31
268	6.24	3.32	2.02	0.32	0.65	38.91	1.00	38.91	0.082	No	No	1.30
269	6.26	3.32	2.02	0.32	0.66	38.77	1.00	38.77	0.082	No	No	1.30
270	6.28	3.29	2.02	0.32	0.66	38.46	1.00	38.46	0.082	No	No	1.29
271	6.30	3.27	2.04	0.35	0.66	38.18	1.00	38.18	0.082	No	No	1.29
272	6.32	3.27	2.04	0.35	0.66	38.15	1.00	38.15	0.082	No	No	1.29
273	6.34	3.27	2.04	0.35	0.66	38.06	1.00	38.06	0.082	No	No	1.28
274	6.36	3.29	2.03	0.34	0.66	38.26	1.00	38.26	0.082	No	No	1.29
275	6.38	3.35	2.01	0.31	0.65	38.83	1.00	38.83	0.082	No	No	1.29
276	6.40	3.39	2.00	0.30	0.65	39.23	1.00	39.23	0.083	No	No	1.29
277	6.42	3.44	2.00	0.30	0.65	39.73	1.00	39.73	0.083	No	No	1.30
278	6.44	3.46	1.99	0.30	0.65	39.95	1.00	39.95	0.083	No	No	1.30
279	6.46	3.44	2.00	0.31	0.65	39.76	1.00	39.76	0.083	No	No	1.30
280	6.48	3.45	2.02	0.34	0.66	39.80	1.00	39.80	0.083	No	No	1.30
281	6.50	3.40	2.09	0.50	0.68	39.53	1.40	55.33	0.096	No	No	1.49
282	6.52	3.30	2.14	0.61	0.70	38.46	1.48	56.85	0.097	No	No	1.51
283	6.54	3.26	2.16	0.66	0.71	37.96	1.52	57.65	0.098	No	No	1.52
284	6.56	3.24	2.20	0.79	0.72	37.91	1.61	60.88	0.101	No	No	1.57
285	6.58	3.19	2.23	0.91	0.74	37.37	1.71	63.75	0.104	No	No	1.61
286	6.60	3.20	2.22	0.87	0.73	37.41	1.67	62.60	0.103	No	No	1.59
287	6.62	3.26	2.22	0.89	0.73	38.02	1.67	63.51	0.104	No	No	1.61

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	1.81	0.00	0.00	0.02	0.00
4.46	1.69	0.00	0.00	0.02	0.00	4.48	1.62	0.00	0.00	0.02	0.00
4.50	1.59	0.00	0.00	0.02	0.00	4.52	1.57	0.00	0.00	0.02	0.00
4.54	1.56	0.00	0.00	0.02	0.00	4.56	1.56	0.00	0.00	0.02	0.00
4.58	1.56	0.00	0.00	0.02	0.00	4.60	1.55	0.00	0.00	0.02	0.00
4.62	1.54	0.00	0.00	0.02	0.00	4.64	1.52	0.00	0.00	0.02	0.00
4.66	1.52	0.00	0.00	0.02	0.00	4.68	1.51	0.00	0.00	0.02	0.00
4.70	1.52	0.00	0.00	0.02	0.00	4.72	1.53	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	1.55	0.00	0.00	0.02	0.00	4.76	1.56	0.00	0.00	0.02	0.00
4.78	1.56	0.00	0.00	0.02	0.00	4.80	1.57	0.00	0.00	0.02	0.00
4.82	1.56	0.00	0.00	0.02	0.00	4.84	1.56	0.00	0.00	0.02	0.00
4.86	1.56	0.00	0.00	0.02	0.00	4.88	1.55	0.00	0.00	0.02	0.00
4.90	1.54	0.00	0.00	0.02	0.00	4.92	1.54	0.00	0.00	0.02	0.00
4.94	1.54	0.00	0.00	0.02	0.00	4.96	1.53	0.00	0.00	0.02	0.00
4.98	1.53	0.00	0.00	0.02	0.00	5.00	1.52	0.00	0.00	0.02	0.00
5.02	1.51	0.00	0.00	0.02	0.00	5.04	1.49	0.00	0.00	0.02	0.00
5.06	1.48	0.00	0.00	0.02	0.00	5.08	1.47	0.00	0.00	0.02	0.00
5.10	1.46	0.00	0.00	0.02	0.00	5.12	1.45	0.00	0.00	0.02	0.00
5.14	1.44	0.00	0.00	0.02	0.00	5.16	1.43	0.00	0.00	0.02	0.00
5.18	1.42	0.00	0.00	0.02	0.00	5.20	1.42	0.00	0.00	0.02	0.00
5.22	1.41	0.00	0.00	0.02	0.00	5.24	1.40	0.00	0.00	0.02	0.00
5.26	1.39	0.00	0.00	0.02	0.00	5.28	1.39	0.00	0.00	0.02	0.00
5.30	1.38	0.00	0.00	0.02	0.00	5.32	1.37	0.00	0.00	0.02	0.00
5.34	1.35	0.00	0.00	0.02	0.00	5.36	1.34	0.00	0.00	0.02	0.00
5.38	1.32	0.00	0.00	0.02	0.00	5.40	1.30	0.00	0.00	0.02	0.00
5.42	1.29	0.00	0.00	0.02	0.00	5.44	1.29	0.00	0.00	0.02	0.00
5.46	1.30	0.00	0.00	0.02	0.00	5.48	1.31	0.00	0.00	0.02	0.00
5.50	1.32	0.00	0.00	0.02	0.00	5.52	1.34	0.00	0.00	0.02	0.00
5.54	1.34	0.00	0.00	0.02	0.00	5.56	1.33	0.00	0.00	0.02	0.00
5.58	1.32	0.00	0.00	0.02	0.00	5.60	1.31	0.00	0.00	0.02	0.00
5.62	1.30	0.00	0.00	0.02	0.00	5.64	1.30	0.00	0.00	0.02	0.00
5.66	1.30	0.00	0.00	0.02	0.00	5.68	1.30	0.00	0.00	0.02	0.00
5.70	1.29	0.00	0.00	0.02	0.00	5.72	1.28	0.00	0.00	0.02	0.00
5.74	1.27	0.00	0.00	0.02	0.00	5.76	1.27	0.00	0.00	0.02	0.00
5.78	1.27	0.00	0.00	0.02	0.00	5.80	1.27	0.00	0.00	0.02	0.00
5.82	1.27	0.00	0.00	0.02	0.00	5.84	1.27	0.00	0.00	0.02	0.00
5.86	1.26	0.00	0.00	0.02	0.00	5.88	1.24	0.00	0.00	0.02	0.00
5.90	1.23	0.00	0.00	0.02	0.00	5.92	1.22	0.00	0.00	0.02	0.00
5.94	1.22	0.00	0.00	0.02	0.00	5.96	1.22	0.00	0.00	0.02	0.00
5.98	1.22	0.00	0.00	0.02	0.00	6.00	1.21	0.00	0.00	0.02	0.00
6.02	1.21	0.00	0.00	0.02	0.00	6.04	1.21	0.00	0.00	0.02	0.00
6.06	1.21	0.00	0.00	0.02	0.00	6.08	1.23	0.00	0.00	0.02	0.00
6.10	1.25	0.00	0.00	0.02	0.00	6.12	1.27	0.00	0.00	0.02	0.00
6.14	1.29	0.00	0.00	0.02	0.00	6.16	1.30	0.00	0.00	0.02	0.00
6.18	1.31	0.00	0.00	0.02	0.00	6.20	1.31	0.00	0.00	0.02	0.00
6.22	1.31	0.00	0.00	0.02	0.00	6.24	1.30	0.00	0.00	0.02	0.00
6.26	1.30	0.00	0.00	0.02	0.00	6.28	1.29	0.00	0.00	0.02	0.00
6.30	1.29	0.00	0.00	0.02	0.00	6.32	1.29	0.00	0.00	0.02	0.00
6.34	1.28	0.00	0.00	0.02	0.00	6.36	1.29	0.00	0.00	0.02	0.00
6.38	1.29	0.00	0.00	0.02	0.00	6.40	1.29	0.00	0.00	0.02	0.00
6.42	1.30	0.00	0.00	0.02	0.00	6.44	1.30	0.00	0.00	0.02	0.00
6.46	1.30	0.00	0.00	0.02	0.00	6.48	1.30	0.00	0.00	0.02	0.00
6.50	1.49	0.00	0.00	0.02	0.00	6.52	1.51	0.00	0.00	0.02	0.00
6.54	1.52	0.00	0.00	0.02	0.00	6.56	1.57	0.00	0.00	0.02	0.00
6.58	1.61	0.00	0.00	0.02	0.00	6.60	1.59	0.00	0.00	0.02	0.00
6.62	1.61	0.00	0.00	0.02	0.00						

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

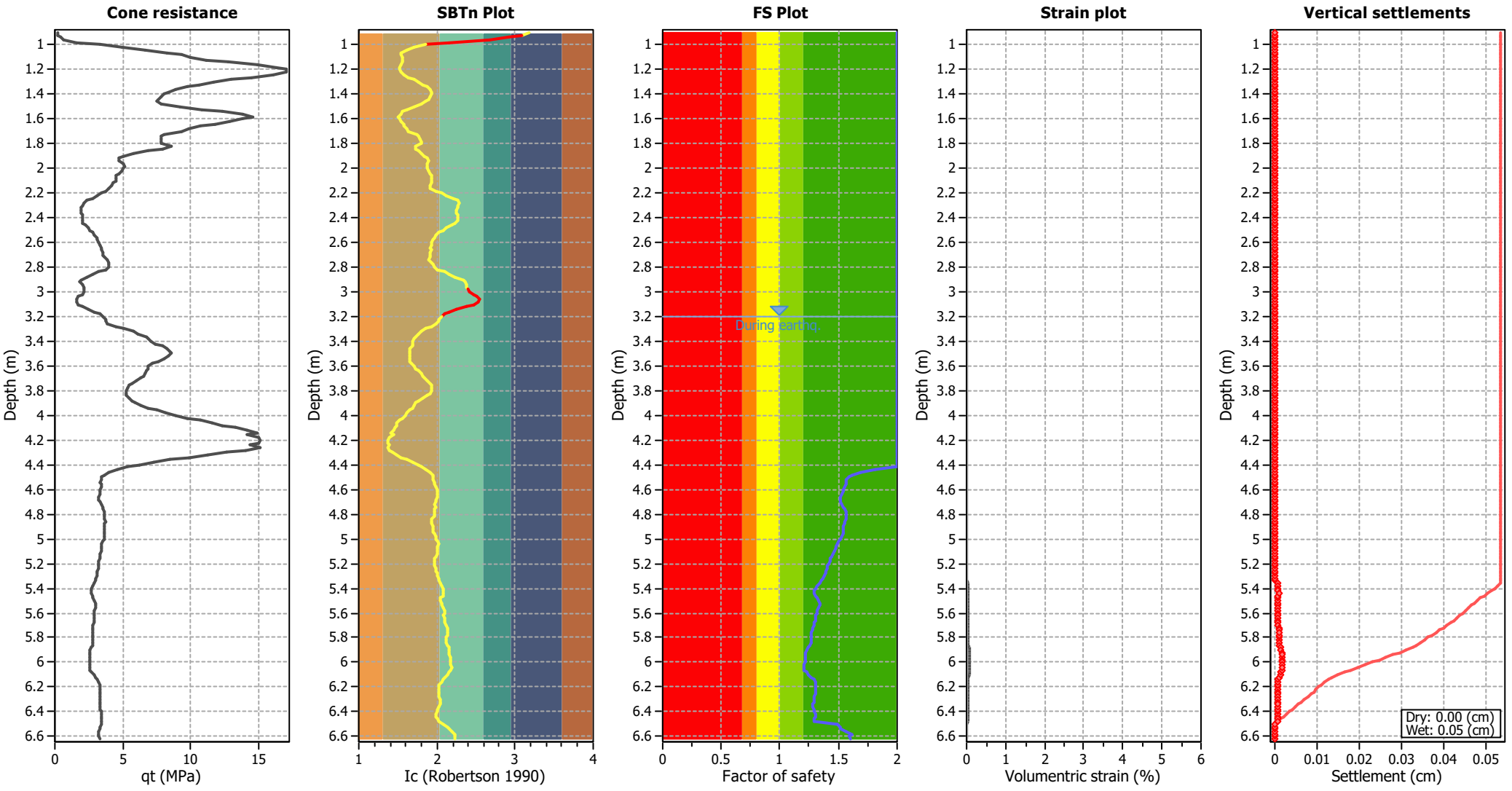
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
3.20	71.44	2.00	0.00	0.82	0.00	3.22	72.12	2.00	0.00	0.82	0.00
3.24	72.72	2.00	0.00	0.82	0.00	3.26	73.46	2.00	0.00	0.82	0.00
3.28	79.81	2.00	0.00	0.82	0.00	3.30	86.64	2.00	0.00	0.82	0.00
3.32	80.44	2.00	0.00	0.82	0.00	3.34	84.34	2.00	0.00	0.81	0.00
3.36	91.62	2.00	0.00	0.81	0.00	3.38	93.46	2.00	0.00	0.81	0.00
3.40	95.71	2.00	0.00	0.81	0.00	3.42	99.28	2.00	0.00	0.81	0.00
3.44	107.27	2.00	0.00	0.81	0.00	3.46	109.49	2.00	0.00	0.81	0.00
3.48	112.61	2.00	0.00	0.81	0.00	3.50	113.91	2.00	0.00	0.81	0.00
3.52	110.50	2.00	0.00	0.80	0.00	3.54	105.66	2.00	0.00	0.80	0.00
3.56	100.75	2.00	0.00	0.80	0.00	3.58	95.02	2.00	0.00	0.80	0.00
3.60	91.64	2.00	0.00	0.80	0.00	3.62	91.04	2.00	0.00	0.80	0.00
3.64	91.12	2.00	0.00	0.80	0.00	3.66	103.86	2.00	0.00	0.80	0.00
3.68	104.36	2.00	0.00	0.80	0.00	3.70	102.70	2.00	0.00	0.79	0.00
3.72	99.99	2.00	0.00	0.79	0.00	3.74	97.20	2.00	0.00	0.79	0.00
3.76	94.73	2.00	0.00	0.79	0.00	3.78	92.82	2.00	0.00	0.79	0.00
3.80	91.76	2.00	0.00	0.79	0.00	3.82	89.43	2.00	0.00	0.79	0.00
3.84	86.41	2.00	0.00	0.79	0.00	3.86	72.20	2.00	0.00	0.79	0.00
3.88	74.27	2.00	0.00	0.78	0.00	3.90	77.03	2.00	0.00	0.78	0.00
3.92	82.17	2.00	0.00	0.78	0.00	3.94	89.23	2.00	0.00	0.78	0.00
3.96	96.67	2.00	0.00	0.78	0.00	3.98	103.66	2.00	0.00	0.78	0.00
4.00	112.79	2.00	0.00	0.78	0.00	4.02	122.90	2.00	0.00	0.78	0.00
4.04	134.34	2.00	0.00	0.78	0.00	4.06	143.53	2.00	0.00	0.77	0.00
4.08	151.93	2.00	0.00	0.77	0.00	4.10	163.94	2.00	0.00	0.77	0.00
4.12	173.16	2.00	0.00	0.77	0.00	4.14	181.92	2.00	0.00	0.77	0.00
4.16	173.56	2.00	0.00	0.77	0.00	4.18	182.22	2.00	0.00	0.77	0.00
4.20	182.32	2.00	0.00	0.77	0.00	4.22	180.79	2.00	0.00	0.77	0.00
4.24	173.71	2.00	0.00	0.76	0.00	4.26	181.55	2.00	0.00	0.76	0.00
4.28	168.67	2.00	0.00	0.76	0.00	4.30	152.91	2.00	0.00	0.76	0.00
4.32	137.02	2.00	0.00	0.76	0.00	4.34	120.77	2.00	0.00	0.76	0.00
4.36	104.96	2.00	0.00	0.76	0.00	4.38	91.09	2.00	0.00	0.76	0.00
4.40	78.96	2.00	0.00	0.76	0.00	4.42	67.72	2.00	0.00	0.75	0.00
4.44	58.90	1.81	0.00	0.75	0.00	4.46	51.61	1.69	0.00	0.75	0.00
4.48	46.61	1.62	0.00	0.75	0.00	4.50	44.84	1.59	0.00	0.75	0.00
4.52	43.83	1.57	0.00	0.75	0.00	4.54	43.41	1.56	0.00	0.75	0.00
4.56	43.69	1.56	0.00	0.75	0.00	4.58	43.59	1.56	0.00	0.75	0.00
4.60	43.09	1.55	0.00	0.74	0.00	4.62	42.76	1.54	0.00	0.74	0.00
4.64	42.10	1.52	0.00	0.74	0.00	4.66	41.77	1.52	0.00	0.74	0.00
4.68	41.74	1.51	0.00	0.74	0.00	4.70	42.14	1.52	0.00	0.74	0.00
4.72	43.19	1.53	0.00	0.74	0.00	4.74	44.57	1.55	0.00	0.74	0.00
4.76	45.45	1.56	0.00	0.74	0.00	4.78	46.21	1.56	0.00	0.73	0.00
4.80	46.71	1.57	0.00	0.73	0.00	4.82	46.62	1.56	0.00	0.73	0.00
4.84	46.58	1.56	0.00	0.73	0.00	4.86	46.53	1.56	0.00	0.73	0.00
4.88	46.43	1.55	0.00	0.73	0.00	4.90	46.04	1.54	0.00	0.73	0.00
4.92	45.89	1.54	0.00	0.73	0.00	4.94	46.20	1.54	0.00	0.73	0.00
4.96	45.92	1.53	0.00	0.72	0.00	4.98	45.47	1.53	0.00	0.72	0.00
5.00	45.29	1.52	0.00	0.72	0.00	5.02	44.66	1.51	0.00	0.72	0.00
5.04	43.52	1.49	0.00	0.72	0.00	5.06	43.02	1.48	0.00	0.72	0.00
5.08	42.77	1.47	0.00	0.72	0.00	5.10	42.22	1.46	0.00	0.72	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.12	41.77	1.45	0.00	0.72	0.00	5.14	41.24	1.44	0.00	0.71	0.00
5.16	40.70	1.43	0.00	0.71	0.00	5.18	40.08	1.42	0.00	0.71	0.00
5.20	39.75	1.42	0.00	0.71	0.00	5.22	39.23	1.41	0.00	0.71	0.00
5.24	38.95	1.40	0.00	0.71	0.00	5.26	38.69	1.39	0.00	0.71	0.00
5.28	38.25	1.39	0.00	0.71	0.00	5.30	37.87	1.38	0.00	0.71	0.00
5.32	37.34	1.37	0.00	0.70	0.00	5.34	36.48	1.35	0.00	0.70	0.00
5.36	35.42	1.34	0.03	0.70	0.00	5.38	34.39	1.32	0.04	0.70	0.00
5.40	33.30	1.30	0.04	0.70	0.00	5.42	32.73	1.29	0.04	0.70	0.00
5.44	32.63	1.29	0.04	0.70	0.00	5.46	33.50	1.30	0.04	0.70	0.00
5.48	34.53	1.31	0.04	0.70	0.00	5.50	35.64	1.32	0.03	0.69	0.00
5.52	36.59	1.34	0.03	0.69	0.00	5.54	36.70	1.34	0.03	0.69	0.00
5.56	36.18	1.33	0.03	0.69	0.00	5.58	35.87	1.32	0.03	0.69	0.00
5.60	35.44	1.31	0.04	0.69	0.00	5.62	35.00	1.30	0.04	0.69	0.00
5.64	35.05	1.30	0.04	0.69	0.00	5.66	35.13	1.30	0.04	0.69	0.00
5.68	34.78	1.30	0.04	0.68	0.00	5.70	34.33	1.29	0.04	0.68	0.00
5.72	33.98	1.28	0.04	0.68	0.00	5.74	33.59	1.27	0.05	0.68	0.00
5.76	33.52	1.27	0.05	0.68	0.00	5.78	33.64	1.27	0.05	0.68	0.00
5.80	33.85	1.27	0.05	0.68	0.00	5.82	34.02	1.27	0.04	0.68	0.00
5.84	33.96	1.27	0.05	0.68	0.00	5.86	33.01	1.26	0.05	0.67	0.00
5.88	32.00	1.24	0.07	0.67	0.00	5.90	31.24	1.23	0.08	0.67	0.00
5.92	30.97	1.22	0.08	0.67	0.00	5.94	30.71	1.22	0.08	0.67	0.00
5.96	30.84	1.22	0.08	0.67	0.00	5.98	30.88	1.22	0.08	0.67	0.00
6.00	30.71	1.21	0.08	0.67	0.00	6.02	30.30	1.21	0.09	0.67	0.00
6.04	30.38	1.21	0.09	0.66	0.00	6.06	30.91	1.21	0.08	0.66	0.00
6.08	32.19	1.23	0.08	0.66	0.00	6.10	33.79	1.25	0.07	0.66	0.00
6.12	35.47	1.27	0.04	0.66	0.00	6.14	37.01	1.29	0.04	0.66	0.00
6.16	38.18	1.30	0.04	0.66	0.00	6.18	38.82	1.31	0.03	0.66	0.00
6.20	39.13	1.31	0.03	0.66	0.00	6.22	39.01	1.31	0.03	0.65	0.00
6.24	38.91	1.30	0.03	0.65	0.00	6.26	38.77	1.30	0.03	0.65	0.00
6.28	38.46	1.29	0.04	0.65	0.00	6.30	38.18	1.29	0.04	0.65	0.00
6.32	38.15	1.29	0.04	0.65	0.00	6.34	38.06	1.28	0.04	0.65	0.00
6.36	38.26	1.29	0.04	0.65	0.00	6.38	38.83	1.29	0.04	0.65	0.00
6.40	39.23	1.29	0.03	0.64	0.00	6.42	39.73	1.30	0.03	0.64	0.00
6.44	39.95	1.30	0.03	0.64	0.00	6.46	39.76	1.30	0.03	0.64	0.00
6.48	39.80	1.30	0.03	0.64	0.00	6.50	55.33	1.49	0.00	0.64	0.00
6.52	56.85	1.51	0.00	0.64	0.00	6.54	57.65	1.52	0.00	0.64	0.00
6.56	60.88	1.57	0.00	0.64	0.00	6.58	63.75	1.61	0.00	0.63	0.00
6.60	62.60	1.59	0.00	0.63	0.00	6.62	63.51	1.61	0.00	0.63	0.00

Total estimated settlement: 0.05

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.20	3.63	12.20	44.31	3.18	0.12	1.06
0.92	0.25	4.66	10.25	47.73	3.08	0.12	1.33
0.94	0.36	6.81	7.44	50.70	2.92	0.06	0.63
0.96	0.58	11.16	4.55	50.77	2.68	0.75	0.75
0.98	1.61	31.51	1.00	31.51	2.15	0.02	0.62
1.00	3.27	64.19	1.00	64.19	1.86	0.16	0.67
1.02	4.92	96.79	1.00	96.79	1.71	0.74	0.74
1.04	6.60	129.89	1.00	129.89	1.61	0.80	0.80
1.06	8.28	163.12	1.00	163.12	1.54	0.84	0.84
1.08	9.32	183.59	1.00	183.59	1.55	0.87	0.87
1.10	10.01	197.31	1.00	197.31	1.56	0.88	0.88
1.12	11.10	218.87	1.00	218.87	1.57	0.91	0.91
1.14	12.77	251.74	1.00	251.74	1.55	0.94	0.94
1.16	14.87	293.15	1.00	293.15	1.54	0.97	0.97
1.18	16.32	321.87	1.00	321.87	1.52	0.99	0.99
1.20	17.05	336.14	1.00	336.14	1.52	1.00	1.00
1.22	17.01	335.34	1.00	335.34	1.53	1.00	1.00
1.24	16.07	316.91	1.00	316.91	1.58	0.99	0.99
1.26	14.44	284.73	1.00	284.73	1.64	0.97	0.97
1.28	12.93	254.78	1.00	254.78	1.70	0.94	0.94
1.30	11.67	229.93	1.12	257.28	1.77	0.94	0.94
1.32	10.62	209.30	1.18	246.93	1.83	0.93	0.93
1.34	9.71	191.20	1.21	232.22	1.87	0.92	0.92
1.36	8.85	174.31	1.24	216.89	1.91	0.90	0.90
1.38	8.35	164.43	1.26	206.70	1.93	0.89	0.89
1.40	8.03	158.08	1.26	198.95	1.93	0.89	0.89
1.42	7.78	153.07	1.25	191.33	1.92	0.88	0.88
1.44	7.58	149.16	1.24	184.37	1.90	0.87	0.87
1.46	7.53	148.18	1.21	179.33	1.86	0.86	0.86
1.48	7.85	154.40	1.16	179.31	1.81	0.86	0.86
1.50	9.26	182.25	1.00	182.25	1.70	0.87	0.87
1.52	10.82	212.80	1.00	212.80	1.62	0.90	0.90
1.54	12.31	233.81	1.00	233.81	1.56	0.92	0.92
1.56	13.78	256.11	1.00	256.11	1.53	0.94	0.94
1.58	14.56	263.76	1.00	263.76	1.50	0.95	0.95
1.60	13.88	251.28	1.00	251.28	1.52	0.94	0.94
1.62	12.81	233.45	1.00	233.45	1.54	0.92	0.92
1.64	11.83	217.85	1.00	217.85	1.57	0.91	0.91
1.66	10.73	197.67	1.00	197.67	1.58	0.88	0.88
1.68	9.89	183.38	1.00	183.38	1.61	0.87	0.87
1.70	9.28	173.69	1.00	173.69	1.64	0.86	0.86
1.72	7.99	156.26	1.08	168.64	1.75	0.85	0.85
1.74	7.81	153.54	1.12	171.35	1.77	0.85	0.85
1.76	7.82	153.83	1.14	175.26	1.79	0.86	0.86
1.78	7.84	154.18	1.16	179.28	1.81	0.86	0.86
1.80	7.84	153.55	1.16	178.39	1.81	0.86	0.86
1.82	8.56	160.44	1.04	167.02	1.73	0.85	0.85
1.84	7.96	148.72	1.06	157.19	1.73	0.84	0.84

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	6.84	129.03	1.11	143.50	1.77	0.82	0.82
1.88	5.81	110.59	1.16	128.28	1.81	0.80	0.80
1.90	5.03	96.54	1.19	115.10	1.84	0.77	0.77
1.92	4.68	90.58	1.22	110.55	1.88	0.77	0.77
1.94	4.68	90.55	1.23	111.12	1.89	0.77	0.77
1.96	5.01	95.65	1.22	116.23	1.87	0.78	0.78
1.98	5.09	96.55	1.22	117.30	1.87	0.78	0.78
2.00	5.06	95.79	1.22	116.96	1.88	0.78	0.78
2.02	4.96	93.61	1.23	115.01	1.89	0.77	0.77
2.04	4.72	89.60	1.25	111.91	1.92	0.77	0.77
2.06	4.52	86.13	1.26	108.75	1.94	0.76	0.76
2.08	4.52	85.43	1.26	107.59	1.93	0.76	0.76
2.10	4.48	83.89	1.26	105.38	1.93	0.76	0.76
2.12	4.32	80.26	1.25	100.53	1.92	0.75	0.75
2.14	4.12	75.51	1.24	93.77	1.91	0.74	0.74
2.16	3.94	72.04	1.25	90.07	1.92	0.73	0.73
2.18	3.71	69.20	1.29	89.37	1.98	0.73	0.73
2.20	3.44	65.54	1.36	89.08	2.05	0.73	0.73
2.22	3.08	59.73	1.45	86.73	2.12	0.72	0.72
2.24	2.72	53.05	1.64	86.78	2.21	0.72	0.72
2.26	2.39	46.39	1.81	84.20	2.27	0.72	0.72
2.28	2.12	41.13	1.89	77.87	2.29	0.49	0.70
2.30	1.97	38.18	1.83	69.79	2.27	0.25	0.68
2.32	1.94	37.61	1.81	67.88	2.27	0.21	0.68
2.34	1.96	37.96	1.74	65.95	2.24	0.18	0.67
2.36	1.94	37.46	1.75	65.62	2.25	0.18	0.67
2.38	1.97	38.10	1.79	68.31	2.26	0.22	0.68
2.40	1.99	38.28	1.79	68.56	2.26	0.23	0.68
2.42	2.00	38.11	1.78	67.77	2.26	0.21	0.68
2.44	2.05	38.65	1.72	66.31	2.24	0.19	0.67
2.46	2.22	41.01	1.59	65.06	2.19	0.17	0.67
2.48	2.40	43.05	1.45	62.60	2.12	0.14	0.66
2.50	2.58	45.37	1.39	62.87	2.08	0.14	0.66
2.52	2.74	47.24	1.34	63.18	2.03	0.15	0.67
2.54	2.89	48.95	1.00	48.95	2.00	0.05	0.62
2.56	3.05	50.82	1.00	50.82	1.96	0.06	0.63
2.58	3.12	51.64	1.00	51.64	1.95	0.06	0.63
2.60	3.22	52.79	1.00	52.79	1.93	0.06	0.63
2.62	3.33	54.31	1.00	54.31	1.93	0.07	0.64
2.64	3.43	55.42	1.00	55.42	1.92	0.08	0.64
2.66	3.45	55.71	1.00	55.71	1.92	0.08	0.64
2.68	3.52	56.28	1.00	56.28	1.91	0.08	0.65
2.70	3.56	56.74	1.00	56.74	1.92	0.09	0.65
2.72	3.63	57.46	1.00	57.46	1.91	0.09	0.65
2.74	3.81	59.98	1.00	59.98	1.90	0.11	0.66
2.76	3.91	61.88	1.26	77.80	1.93	0.49	0.70
2.78	3.96	62.70	1.27	79.45	1.95	0.56	0.71
2.80	3.99	63.15	1.28	80.66	1.96	0.62	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	3.72	59.32	1.31	77.86	2.01	0.49	0.70
2.84	3.22	52.29	1.41	73.53	2.09	0.34	0.69
2.86	2.76	45.35	1.50	67.90	2.15	0.21	0.68
2.88	2.35	39.12	1.69	66.22	2.23	0.19	0.67
2.90	1.91	32.56	2.07	67.50	2.34	0.21	0.68
2.92	1.84	31.34	2.15	67.29	2.35	0.20	0.68
2.94	1.99	33.90	2.23	75.46	2.37	0.40	0.70
2.96	2.07	35.17	2.24	78.91	2.37	0.53	0.70
2.98	2.12	35.95	2.35	84.52	2.40	0.72	0.72
3.00	2.12	35.92	2.44	87.46	2.41	0.72	0.72
3.02	2.00	34.08	2.74	93.51	2.46	0.74	0.74
3.04	1.74	29.78	3.05	90.71	2.51	0.73	0.73
3.06	1.60	27.48	3.30	90.66	2.54	0.75	0.75
3.08	1.61	27.20	3.13	85.14	2.52	0.72	0.72
3.10	1.74	29.02	2.77	80.51	2.47	0.61	0.71
3.12	2.01	32.58	2.23	72.49	2.37	0.31	0.69
3.14	2.46	38.59	1.75	67.41	2.25	0.21	0.68
3.16	2.93	45.03	1.53	68.78	2.16	0.23	0.68
3.18	3.31	49.94	1.42	70.80	2.10	0.27	0.69
3.20	3.54	52.58	1.36	71.44	2.05	0.29	0.69
3.22	3.70	54.41	1.33	72.12	2.02	0.30	0.69
3.24	3.74	54.99	1.32	72.72	2.02	0.32	0.69
3.26	3.88	56.58	1.30	73.46	1.99	0.34	0.69
3.28	4.44	63.67	1.25	79.81	1.93	0.57	0.71
3.30	5.07	71.64	1.21	86.64	1.86	0.72	0.72
3.32	5.79	80.44	1.00	80.44	1.80	0.61	0.71
3.34	6.13	84.34	1.00	84.34	1.76	0.72	0.72
3.36	6.71	91.62	1.00	91.62	1.73	0.73	0.73
3.38	6.89	93.46	1.00	93.46	1.71	0.74	0.74
3.40	7.08	95.71	1.00	95.71	1.70	0.74	0.74
3.42	7.37	99.28	1.00	99.28	1.69	0.75	0.75
3.44	7.98	107.27	1.00	107.27	1.68	0.76	0.76
3.46	8.20	109.49	1.00	109.49	1.66	0.77	0.77
3.48	8.44	112.61	1.00	112.61	1.66	0.77	0.77
3.50	8.57	113.91	1.00	113.91	1.65	0.77	0.77
3.52	8.31	110.50	1.00	110.50	1.66	0.77	0.77
3.54	7.99	105.66	1.00	105.66	1.64	0.76	0.76
3.56	7.62	100.75	1.00	100.75	1.65	0.75	0.75
3.58	7.18	95.02	1.00	95.02	1.66	0.74	0.74
3.60	6.88	91.64	1.00	91.64	1.70	0.73	0.73
3.62	6.80	91.04	1.00	91.04	1.73	0.73	0.73
3.64	6.76	91.12	1.00	91.12	1.76	0.73	0.73
3.66	6.66	90.26	1.15	103.86	1.80	0.76	0.76
3.68	6.52	88.69	1.18	104.36	1.82	0.76	0.76
3.70	6.29	85.77	1.20	102.70	1.85	0.75	0.75
3.72	6.01	82.24	1.22	99.99	1.87	0.75	0.75
3.74	5.69	78.35	1.24	97.20	1.91	0.74	0.74
3.76	5.47	75.42	1.26	94.73	1.93	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	5.33	73.53	1.26	92.82	1.94	0.73	0.73
3.80	5.29	72.85	1.26	91.76	1.93	0.73	0.73
3.82	5.25	71.82	1.25	89.43	1.91	0.73	0.73
3.84	5.26	71.18	1.21	86.41	1.87	0.72	0.72
3.86	5.40	72.20	1.00	72.20	1.82	0.31	0.69
3.88	5.62	74.27	1.00	74.27	1.77	0.36	0.69
3.90	5.88	77.03	1.00	77.03	1.73	0.46	0.70
3.92	6.30	82.17	1.00	82.17	1.71	0.70	0.71
3.94	6.89	89.23	1.00	89.23	1.68	0.73	0.73
3.96	7.52	96.67	1.00	96.67	1.64	0.74	0.74
3.98	8.11	103.66	1.00	103.66	1.62	0.75	0.75
4.00	8.86	112.79	1.00	112.79	1.60	0.77	0.77
4.02	9.74	122.90	1.00	122.90	1.56	0.79	0.79
4.04	10.74	134.34	1.00	134.34	1.52	0.80	0.80
4.06	11.60	143.53	1.00	143.53	1.48	0.82	0.82
4.08	12.28	151.93	1.00	151.93	1.48	0.83	0.83
4.10	13.31	163.94	1.00	163.94	1.46	0.85	0.85
4.12	14.13	173.16	1.00	173.16	1.44	0.86	0.86
4.14	14.95	181.92	1.00	181.92	1.41	0.87	0.87
4.16	14.17	173.56	1.00	173.56	1.45	0.86	0.86
4.18	15.06	182.22	1.00	182.22	1.39	0.87	0.87
4.20	15.16	182.32	1.00	182.32	1.36	0.87	0.87
4.22	15.02	180.79	1.00	180.79	1.37	0.87	0.87
4.24	14.41	173.71	1.00	173.71	1.39	0.86	0.86
4.26	15.14	181.55	1.00	181.55	1.37	0.87	0.87
4.28	14.01	168.67	1.00	168.67	1.39	0.85	0.85
4.30	12.62	152.91	1.00	152.91	1.44	0.83	0.83
4.32	11.24	137.02	1.00	137.02	1.48	0.81	0.81
4.34	9.81	120.77	1.00	120.77	1.54	0.78	0.78
4.36	8.44	104.96	1.00	104.96	1.61	0.76	0.76
4.38	7.24	91.09	1.00	91.09	1.69	0.73	0.73
4.40	6.22	78.96	1.00	78.96	1.76	0.54	0.70
4.42	5.31	67.72	1.00	67.72	1.80	0.21	0.68
4.44	4.59	58.90	1.00	58.90	1.86	0.10	0.65
4.46	3.99	51.61	1.00	51.61	1.91	0.06	0.63
4.48	3.60	46.61	1.00	46.61	1.94	0.04	0.62
4.50	3.47	44.84	1.00	44.84	1.95	0.04	0.62
4.52	3.39	43.83	1.00	43.83	1.95	0.03	0.62
4.54	3.35	43.41	1.00	43.41	1.97	0.03	0.62
4.56	3.38	43.69	1.00	43.69	1.98	0.03	0.62
4.58	3.37	43.59	1.00	43.59	1.99	0.03	0.62
4.60	3.33	43.09	1.00	43.09	2.00	0.03	0.62
4.62	3.30	42.76	1.00	42.76	2.01	0.03	0.62
4.64	3.26	42.10	1.00	42.10	2.00	0.03	0.62
4.66	3.24	41.77	1.00	41.77	2.00	0.03	0.62
4.68	3.25	41.74	1.00	41.74	1.99	0.03	0.62
4.70	3.29	42.14	1.00	42.14	1.98	0.03	0.62
4.72	3.38	43.19	1.00	43.19	1.97	0.03	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	3.48	44.57	1.00	44.57	1.99	0.04	0.62
4.76	3.55	45.45	1.00	45.45	1.98	0.04	0.62
4.78	3.62	46.21	1.00	46.21	1.97	0.04	0.62
4.80	3.66	46.71	1.00	46.71	1.97	0.04	0.62
4.82	3.66	46.62	1.00	46.62	1.97	0.04	0.62
4.84	3.68	46.58	1.00	46.58	1.94	0.04	0.62
4.86	3.68	46.53	1.00	46.53	1.94	0.04	0.62
4.88	3.68	46.43	1.00	46.43	1.94	0.04	0.62
4.90	3.65	46.04	1.00	46.04	1.95	0.04	0.62
4.92	3.64	45.89	1.00	45.89	1.95	0.04	0.62
4.94	3.67	46.20	1.00	46.20	1.95	0.04	0.62
4.96	3.64	45.92	1.00	45.92	1.97	0.04	0.62
4.98	3.60	45.47	1.00	45.47	1.99	0.04	0.62
5.00	3.59	45.29	1.00	45.29	1.99	0.04	0.62
5.02	3.54	44.66	1.00	44.66	2.00	0.04	0.62
5.04	3.45	43.52	1.00	43.52	2.02	0.03	0.62
5.06	3.42	43.02	1.00	43.02	2.01	0.03	0.62
5.08	3.40	42.77	1.00	42.77	2.01	0.03	0.62
5.10	3.37	42.22	1.00	42.22	2.01	0.03	0.62
5.12	3.34	41.77	1.00	41.77	2.00	0.03	0.62
5.14	3.31	41.24	1.00	41.24	1.99	0.03	0.62
5.16	3.28	40.70	1.00	40.70	1.97	0.03	0.62
5.18	3.24	40.08	1.00	40.08	1.97	0.03	0.62
5.20	3.22	39.75	1.00	39.75	1.96	0.03	0.62
5.22	3.17	39.23	1.00	39.23	1.97	0.03	0.62
5.24	3.15	38.95	1.00	38.95	1.98	0.03	0.62
5.26	3.13	38.69	1.00	38.69	1.99	0.03	0.62
5.28	3.10	38.25	1.00	38.25	2.00	0.03	0.62
5.30	3.06	37.87	1.00	37.87	2.01	0.02	0.62
5.32	3.02	37.34	1.00	37.34	2.02	0.02	0.62
5.34	2.95	36.48	1.00	36.48	2.03	0.02	0.62
5.36	2.87	35.42	1.00	35.42	2.05	0.02	0.62
5.38	2.78	34.39	1.00	34.39	2.06	0.02	0.62
5.40	2.70	33.30	1.00	33.30	2.07	0.02	0.62
5.42	2.65	32.73	1.00	32.73	2.09	0.02	0.62
5.44	2.65	32.63	1.00	32.63	2.09	0.02	0.62
5.46	2.72	33.50	1.00	33.50	2.07	0.02	0.62
5.48	2.82	34.53	1.00	34.53	2.05	0.02	0.62
5.50	2.91	35.64	1.00	35.64	2.04	0.02	0.62
5.52	2.98	36.59	1.00	36.59	2.06	0.02	0.62
5.54	2.99	36.70	1.00	36.70	2.06	0.02	0.62
5.56	2.95	36.18	1.00	36.18	2.08	0.02	0.62
5.58	2.92	35.87	1.00	35.87	2.10	0.02	0.62
5.60	2.89	35.44	1.00	35.44	2.10	0.02	0.62
5.62	2.86	35.00	1.00	35.00	2.09	0.02	0.62
5.64	2.87	35.05	1.00	35.05	2.09	0.02	0.62
5.66	2.88	35.13	1.00	35.13	2.09	0.02	0.62
5.68	2.85	34.78	1.00	34.78	2.10	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	2.81	34.33	1.00	34.33	2.12	0.02	0.62
5.72	2.79	33.98	1.00	33.98	2.13	0.02	0.62
5.74	2.76	33.59	1.00	33.59	2.13	0.02	0.62
5.76	2.76	33.52	1.00	33.52	2.13	0.02	0.62
5.78	2.77	33.64	1.00	33.64	2.14	0.02	0.62
5.80	2.79	33.85	1.00	33.85	2.12	0.02	0.62
5.82	2.81	34.02	1.00	34.02	2.12	0.02	0.62
5.84	2.81	33.96	1.00	33.96	2.11	0.02	0.62
5.86	2.73	33.01	1.00	33.01	2.14	0.02	0.62
5.88	2.65	32.00	1.00	32.00	2.15	0.02	0.62
5.90	2.59	31.24	1.00	31.24	2.15	0.02	0.62
5.92	2.57	30.97	1.00	30.97	2.16	0.02	0.62
5.94	2.55	30.71	1.00	30.71	2.16	0.02	0.62
5.96	2.57	30.84	1.00	30.84	2.16	0.02	0.62
5.98	2.57	30.88	1.00	30.88	2.17	0.02	0.62
6.00	2.56	30.71	1.00	30.71	2.18	0.02	0.62
6.02	2.53	30.30	1.00	30.30	2.18	0.02	0.62
6.04	2.54	30.38	1.00	30.38	2.18	0.02	0.62
6.06	2.59	30.91	1.00	30.91	2.17	0.02	0.62
6.08	2.70	32.19	1.00	32.19	2.16	0.02	0.62
6.10	2.84	33.79	1.00	33.79	2.13	0.02	0.62
6.12	2.99	35.47	1.00	35.47	2.10	0.02	0.62
6.14	3.13	37.01	1.00	37.01	2.08	0.02	0.62
6.16	3.23	38.18	1.00	38.18	2.06	0.03	0.62
6.18	3.30	38.82	1.00	38.82	2.03	0.03	0.62
6.20	3.34	39.13	1.00	39.13	2.02	0.03	0.62
6.22	3.33	39.01	1.00	39.01	2.02	0.03	0.62
6.24	3.32	38.91	1.00	38.91	2.02	0.03	0.62
6.26	3.32	38.77	1.00	38.77	2.02	0.03	0.62
6.28	3.29	38.46	1.00	38.46	2.02	0.03	0.62
6.30	3.27	38.18	1.00	38.18	2.04	0.03	0.62
6.32	3.27	38.15	1.00	38.15	2.04	0.03	0.62
6.34	3.27	38.06	1.00	38.06	2.04	0.03	0.62
6.36	3.29	38.26	1.00	38.26	2.03	0.03	0.62
6.38	3.35	38.83	1.00	38.83	2.01	0.03	0.62
6.40	3.39	39.23	1.00	39.23	2.00	0.03	0.62
6.42	3.44	39.73	1.00	39.73	2.00	0.03	0.62
6.44	3.46	39.95	1.00	39.95	1.99	0.03	0.62
6.46	3.44	39.76	1.00	39.76	2.00	0.03	0.62
6.48	3.45	39.80	1.00	39.80	2.02	0.03	0.62
6.50	3.40	39.53	1.40	55.33	2.09	0.08	0.64
6.52	3.30	38.46	1.48	56.85	2.14	0.09	0.65
6.54	3.26	37.96	1.52	57.65	2.16	0.09	0.65
6.56	3.24	37.91	1.61	60.88	2.20	0.12	0.66
6.58	3.19	37.37	1.71	63.75	2.23	0.15	0.67
6.60	3.20	37.41	1.67	62.60	2.22	0.14	0.66
6.62	3.26	38.02	1.67	63.51	2.22	0.15	0.67

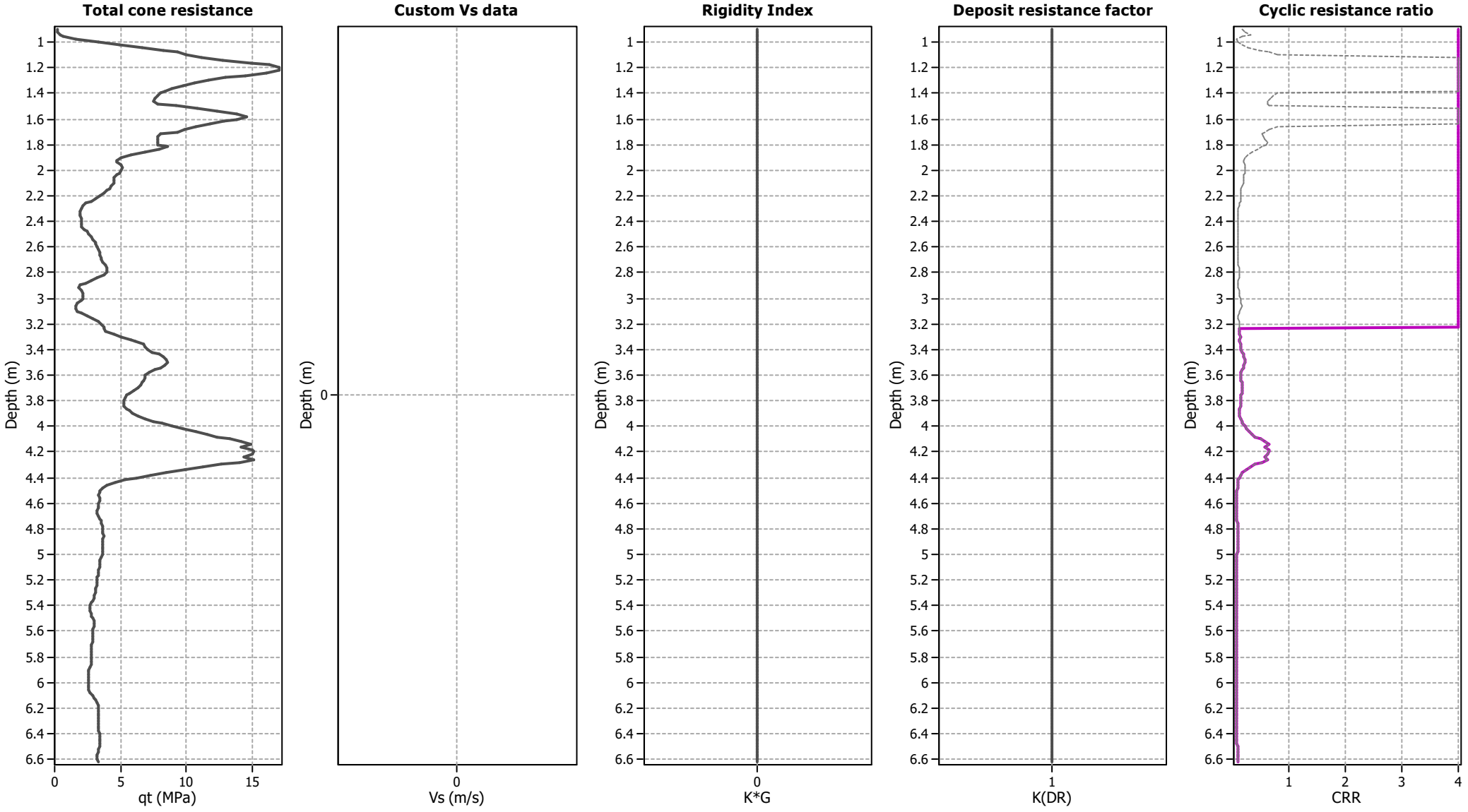
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



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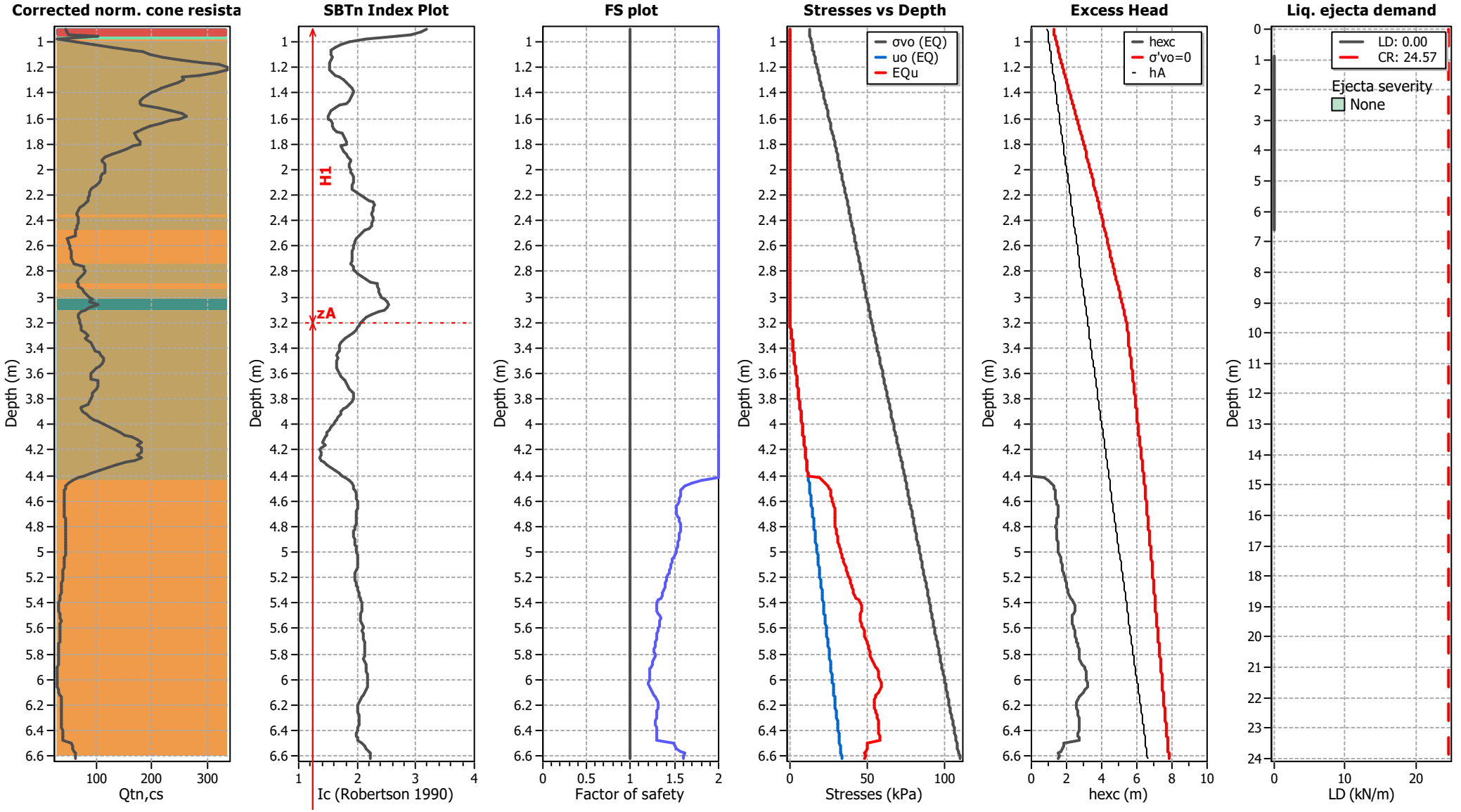
Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

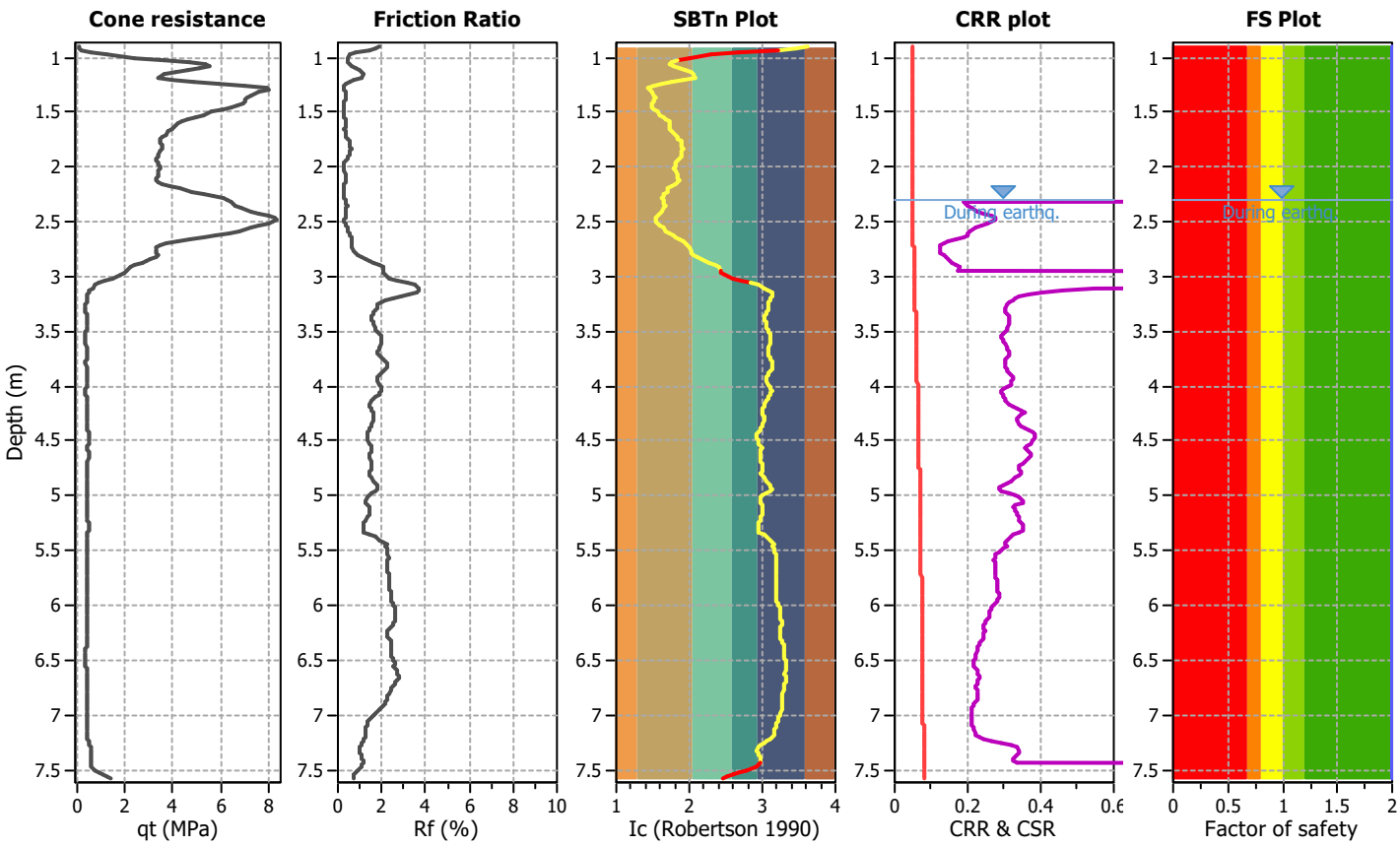
LIQUEFACTION ANALYSIS REPORT

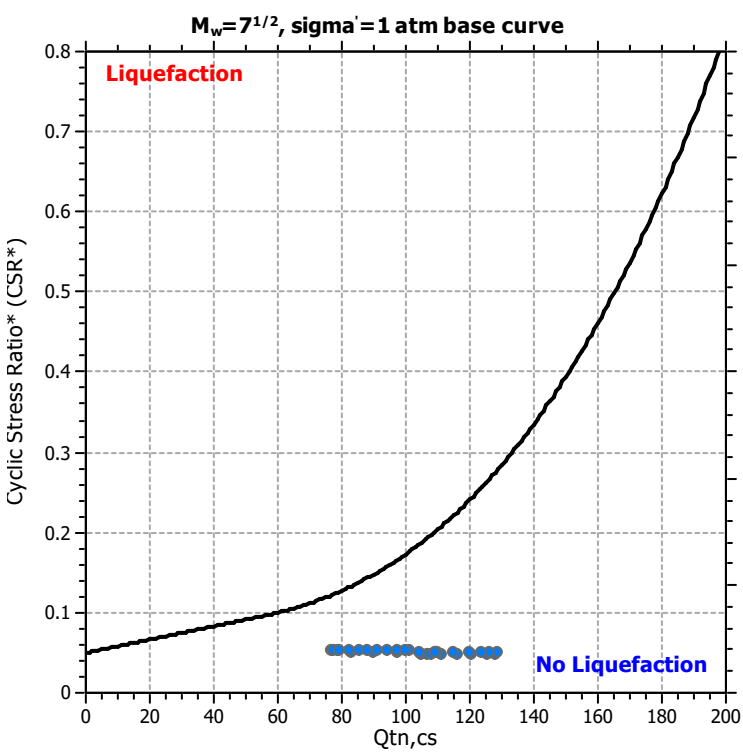
Project title : CWLP Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

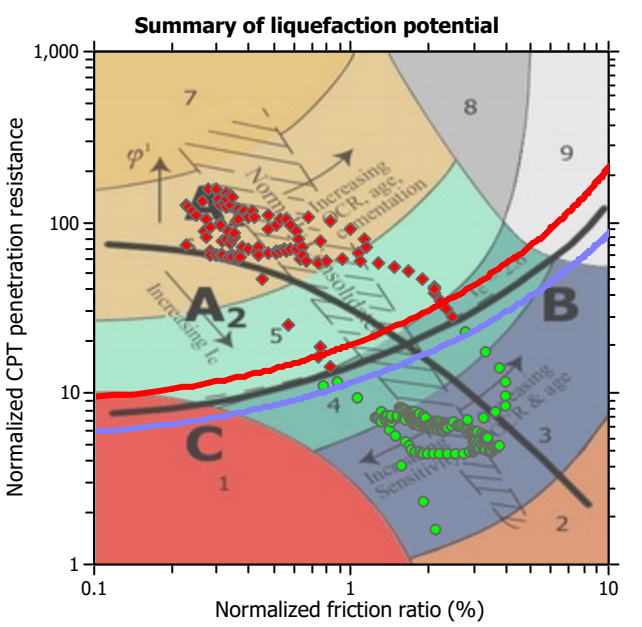
CPT file : CWLP CPT-6CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	2.30 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.30 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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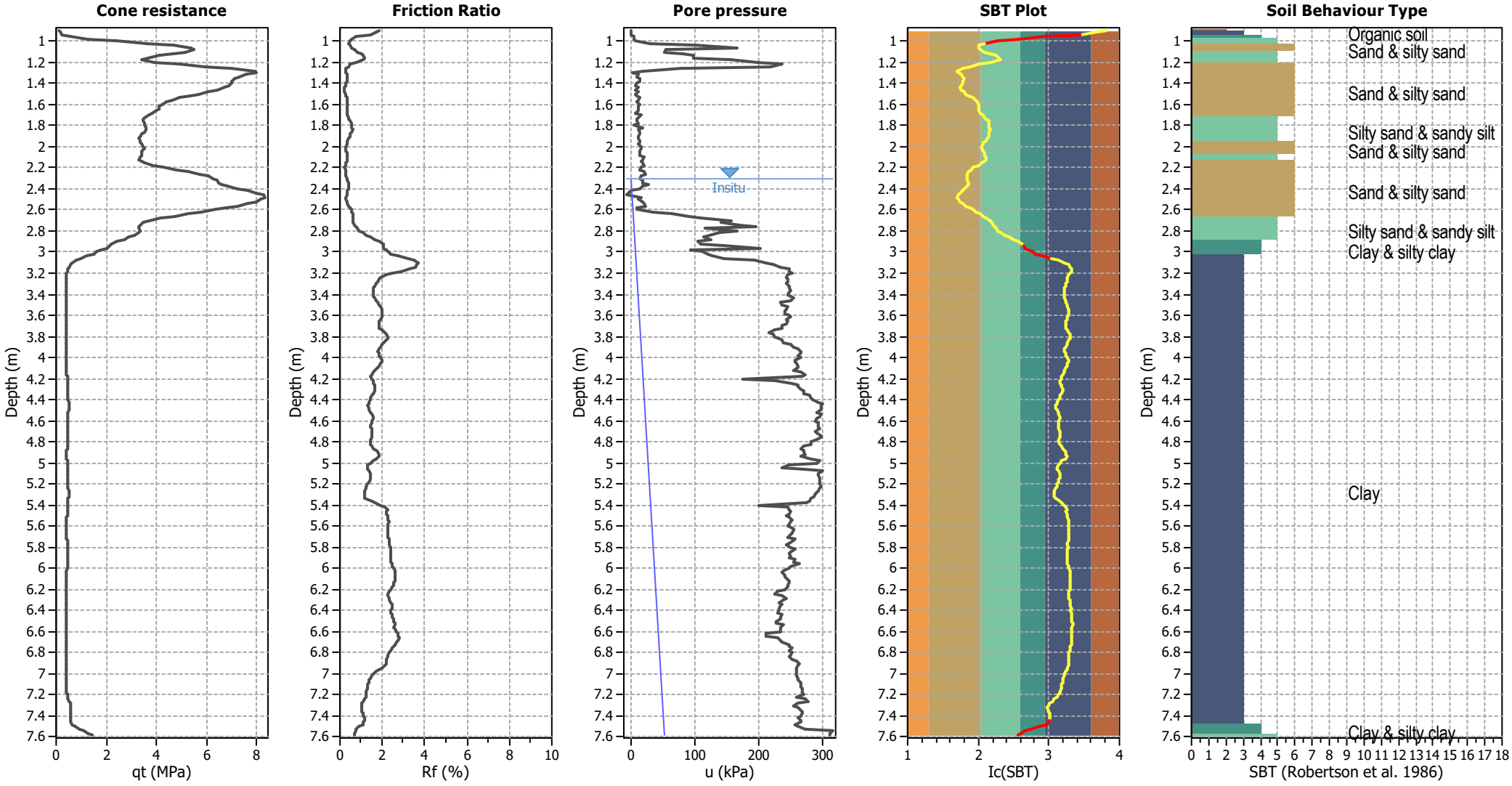
CPT name: CWLP CPT-6CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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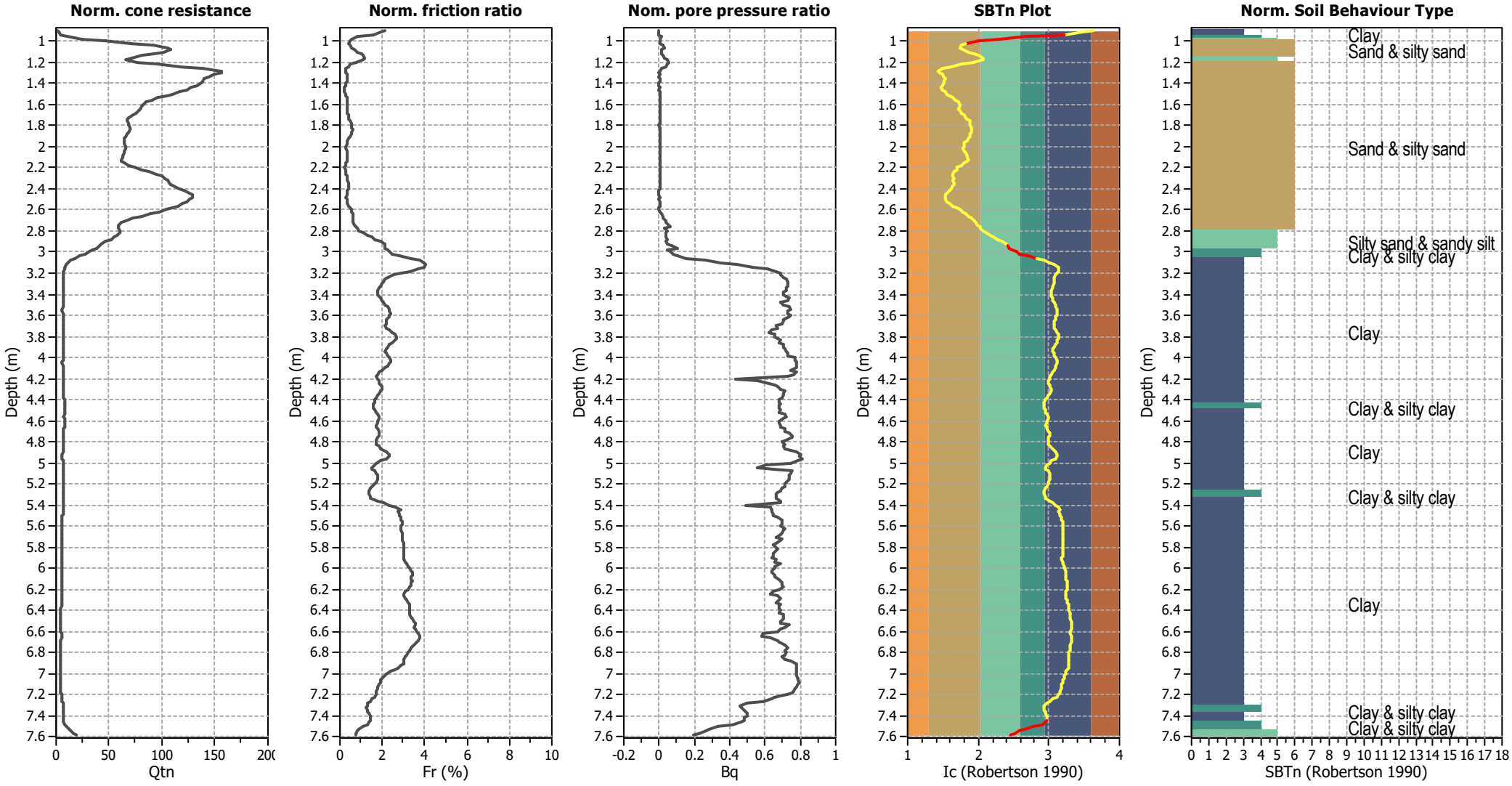
CPT name: CWLP CPT-6CCR

CPT basic interpretation plots (normalized)



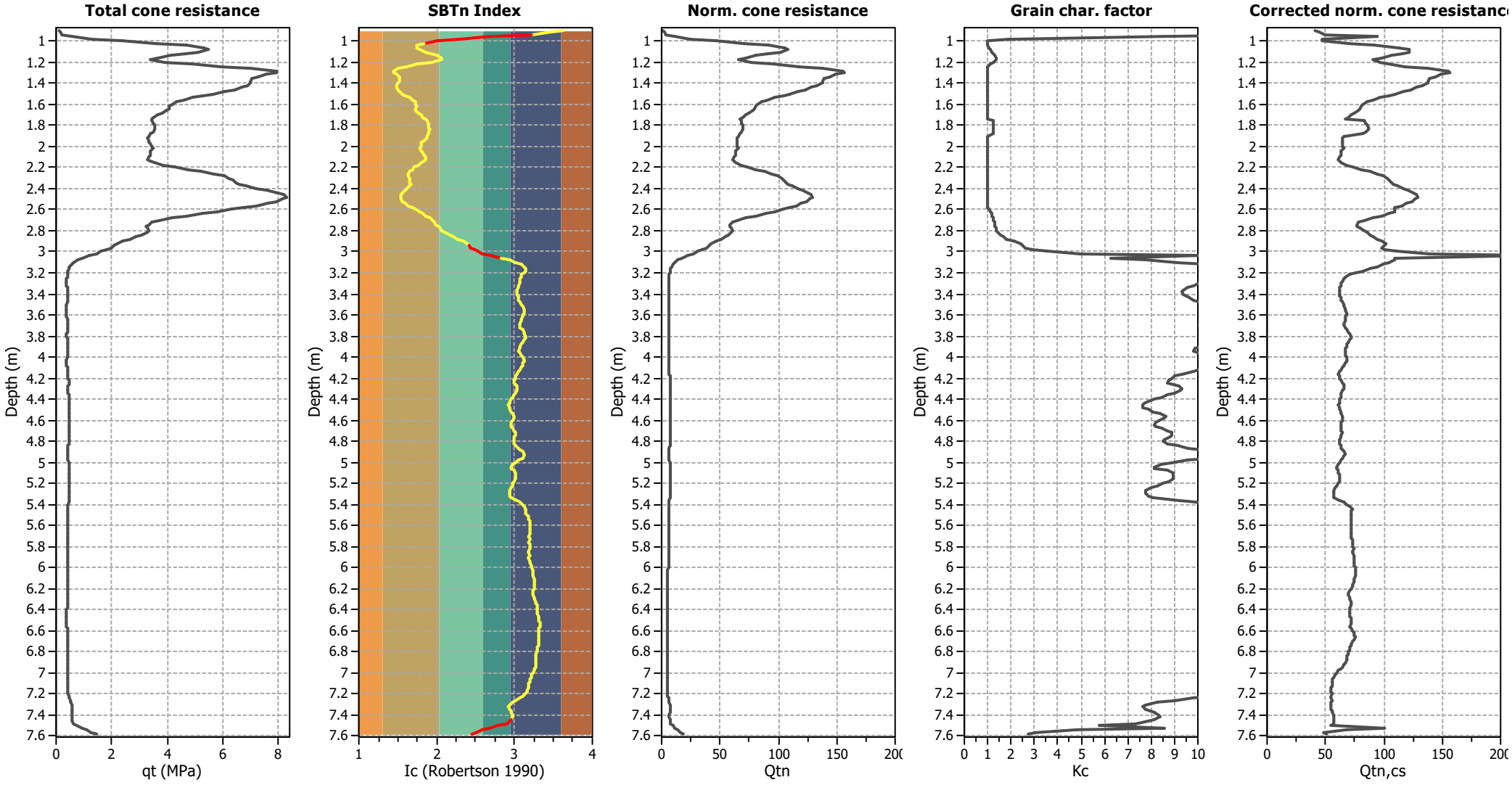
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

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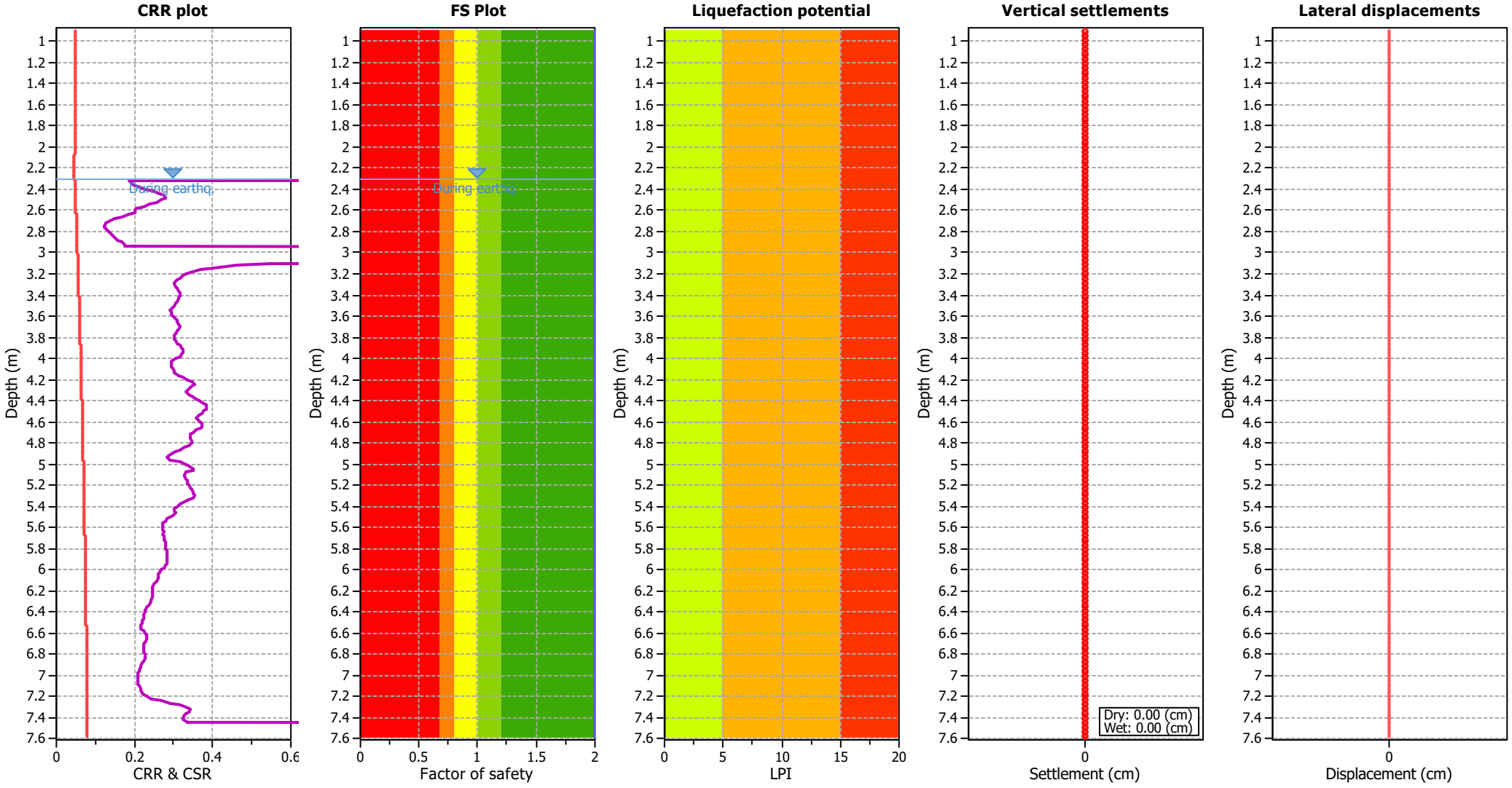
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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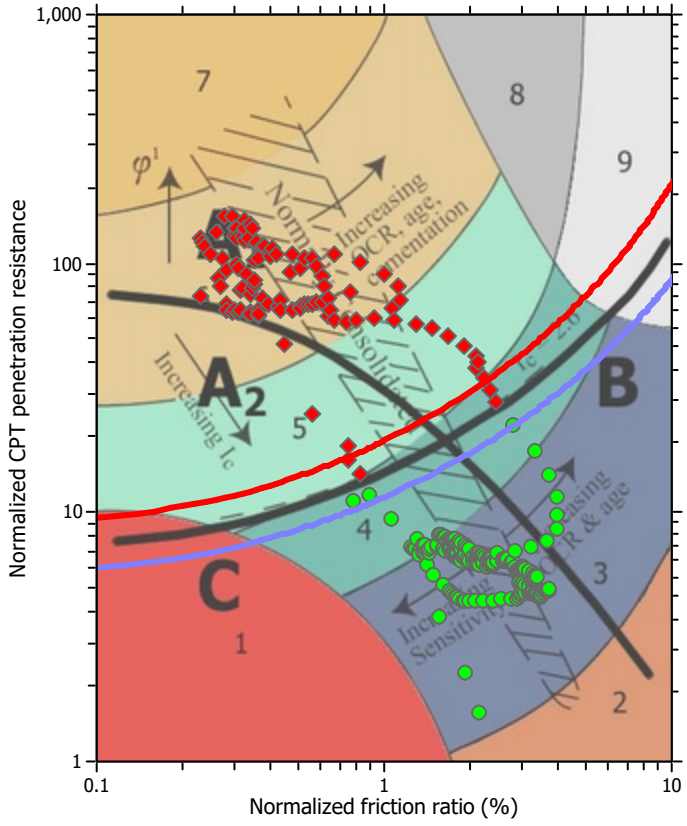
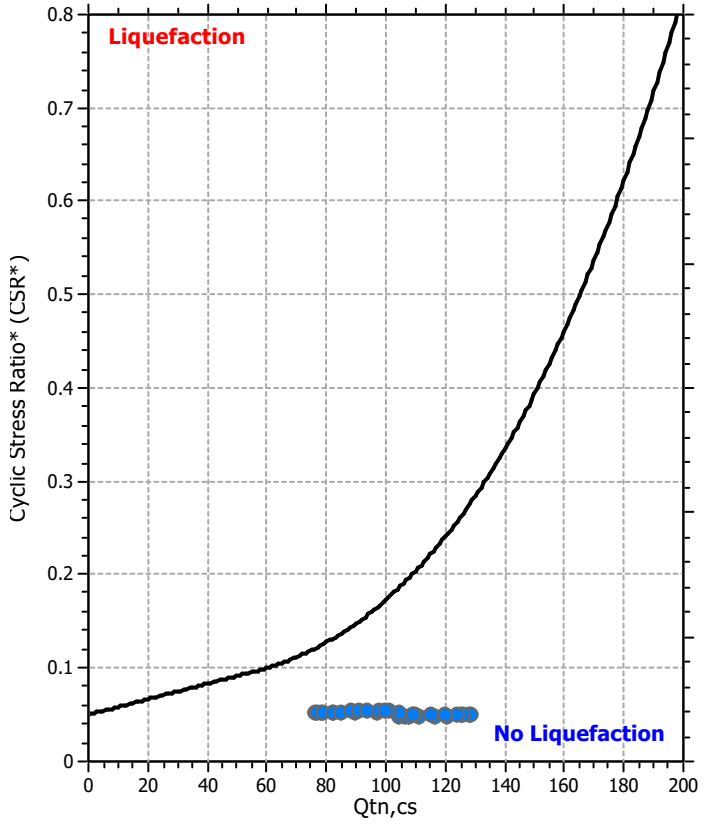
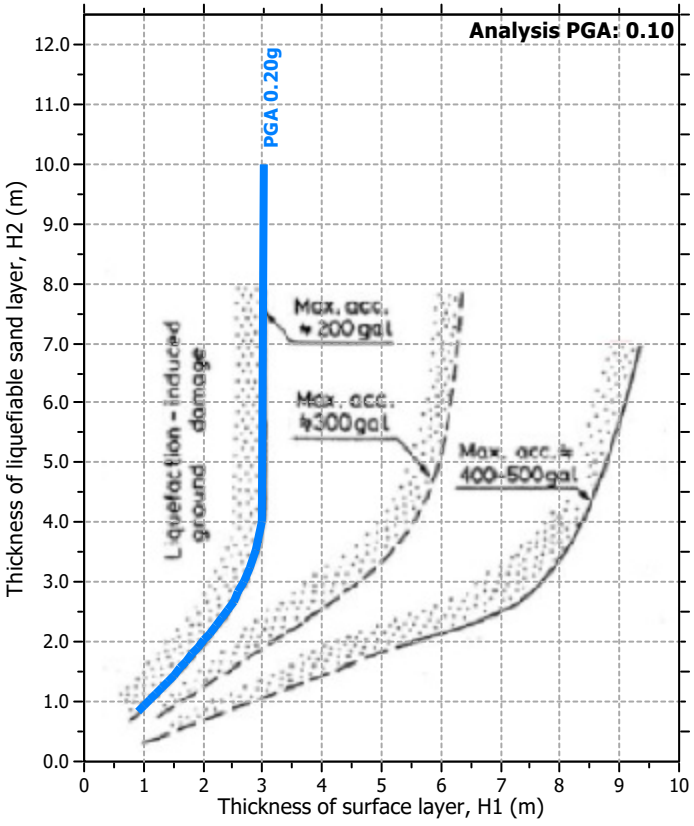
Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

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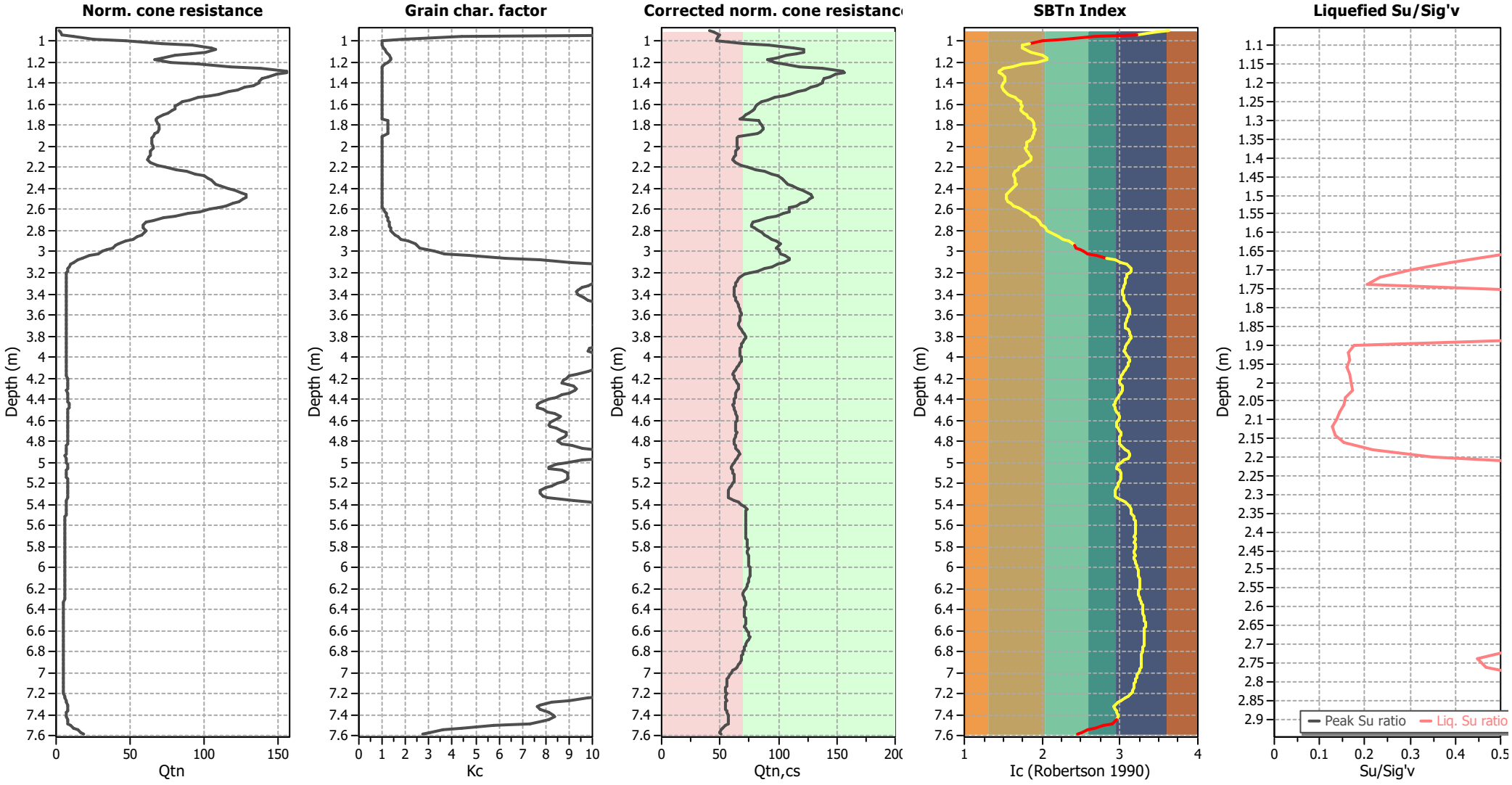
CPT name: CWLP CPT-6CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

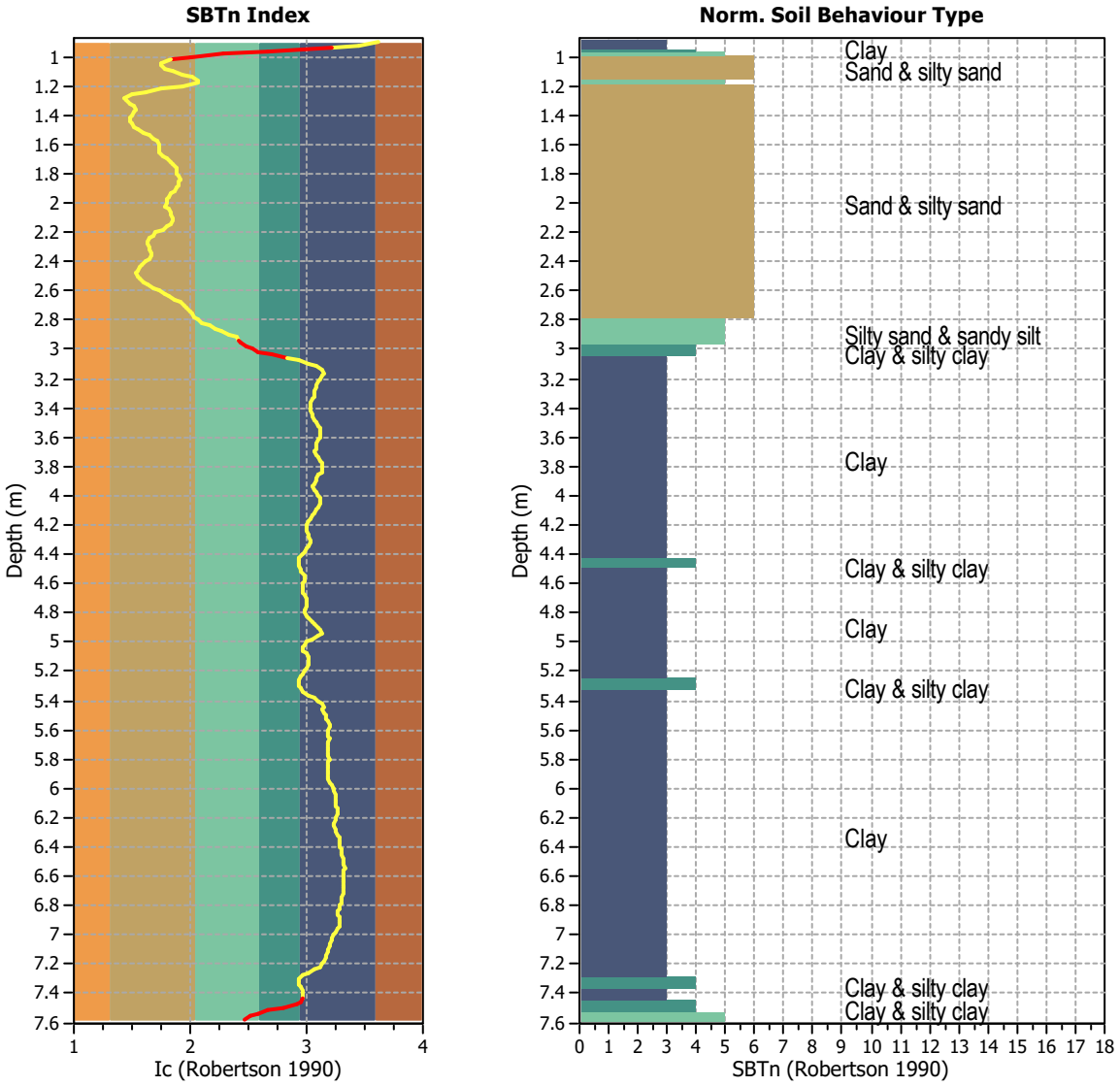
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.30 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	335
I_c maximum check value:	3.00	Total points excluded:	19
I_c change ratio value:	0.0100	Exclusion percentage:	5.67%
Minimum number of points in layer:	2	Number of layers detected:	3

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 0.96 (m)	4	Clay & silty clay
		End depth: 1.04 (m)	6	Sand & silty sand
Transition layer 2	7	Start depth: 2.96 (m)	5	Silty sand & sandy silt
		End depth: 3.08 (m)	3	Clay
Transition layer 3	7	Start depth: 7.46 (m)	4	Clay & silty clay
		End depth: 7.58 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.07	1.40	-0.20	100.00	13.73
2	0.92	0.07	1.40	-0.20	94.95	13.73
3	0.94	0.18	2.90	0.20	74.54	13.73
4	0.96	0.25	4.00	5.40	38.93	14.49
5	0.98	0.45	5.30	4.70	22.20	15.34
6	1.00	1.92	8.60	5.70	5.00	16.06
7	1.02	3.56	14.90	30.50	5.00	16.64
8	1.04	5.79	21.00	101.20	5.00	17.14
9	1.06	6.35	28.30	166.90	6.95	17.55
10	1.08	5.78	37.80	55.10	7.68	17.79
11	1.10	5.21	48.40	51.20	9.32	17.93
12	1.12	4.24	49.30	82.10	11.40	17.99
13	1.14	4.09	48.40	97.80	13.32	17.93
14	1.16	3.82	47.20	96.80	14.60	17.77
15	1.18	3.12	36.40	156.10	14.89	17.57
16	1.20	2.90	26.90	199.70	11.06	17.41
17	1.22	2.80	20.70	237.80	7.12	17.29
18	1.24	6.83	16.70	218.30	4.55	17.26
19	1.26	8.67	23.30	76.70	2.88	17.25
20	1.28	8.55	25.40	17.80	2.01	17.33
21	1.30	8.12	19.70	2.00	2.18	17.42
22	1.32	7.48	24.50	12.30	2.67	17.45
23	1.34	6.95	25.00	8.60	3.02	17.44
24	1.36	6.83	28.50	12.60	3.24	17.42
25	1.38	7.08	26.20	13.70	3.14	17.34
26	1.40	7.08	18.20	9.30	2.94	17.26
27	1.42	7.06	16.70	6.80	2.70	17.06
28	1.44	7.01	17.10	10.20	2.59	16.85
29	1.46	6.28	12.30	6.90	2.83	16.80
30	1.48	5.99	11.90	12.30	3.19	16.75
31	1.50	5.71	16.00	7.70	3.66	16.68
32	1.52	5.33	14.90	9.40	4.26	16.70
33	1.54	4.84	14.30	13.00	5.00	16.73
34	1.56	4.63	15.20	11.60	5.00	16.70
35	1.58	4.04	15.40	8.80	5.00	16.69
36	1.60	4.10	16.00	13.30	5.00	16.63
37	1.62	4.16	15.60	11.30	5.00	16.57
38	1.64	4.04	11.40	11.10	5.00	16.49
39	1.66	4.11	11.90	11.20	5.00	16.42
40	1.68	3.98	10.80	7.70	5.00	16.45
41	1.70	3.56	12.70	14.80	5.00	16.50
42	1.72	3.44	17.90	10.30	5.00	16.50
43	1.74	3.26	15.50	10.00	5.00	16.55
44	1.76	3.36	12.80	8.80	9.98	16.75
45	1.78	3.55	14.20	11.20	10.13	16.82
46	1.80	3.69	26.90	3.30	10.15	16.86
47	1.82	3.57	22.50	18.80	10.37	16.95
48	1.84	3.49	19.10	11.30	10.67	17.01

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	3.54	19.60	13.80	10.42	16.88
50	1.88	3.54	19.60	13.80	10.21	16.74
51	1.90	3.29	16.00	10.40	5.00	16.62
52	1.92	3.13	12.30	11.60	5.00	16.50
53	1.94	3.24	11.40	12.50	5.00	16.30
54	1.96	3.28	11.60	13.20	5.00	16.16
55	1.98	3.67	8.50	11.80	5.00	16.18
56	2.00	3.46	8.70	15.40	5.00	16.14
57	2.02	3.35	13.20	16.00	5.00	16.10
58	2.04	3.49	9.40	12.70	5.00	16.16
59	2.06	3.49	9.40	12.70	5.00	16.26
60	2.08	3.26	11.70	14.20	5.00	16.26
61	2.10	3.37	13.70	21.40	5.00	16.31
62	2.12	3.24	13.20	17.60	5.00	16.28
63	2.14	3.27	12.40	16.80	5.00	16.24
64	2.16	3.29	8.00	17.60	5.00	16.16
65	2.18	3.76	8.90	20.10	5.00	16.23
66	2.20	4.13	9.40	16.70	5.00	16.17
67	2.22	4.78	14.90	13.80	5.00	16.53
68	2.24	5.50	7.70	20.70	5.00	16.65
69	2.26	5.72	23.40	21.50	4.99	16.84
70	2.28	6.13	14.30	14.80	4.91	17.05
71	2.30	6.48	19.60	13.50	5.00	17.25
72	2.32	6.56	28.20	18.60	5.00	17.31
73	2.34	6.33	25.20	18.90	5.00	17.45
74	2.36	6.44	28.40	27.70	5.00	17.52
75	2.38	6.60	27.80	18.50	5.00	17.52
76	2.40	7.01	27.60	13.10	4.67	17.57
77	2.42	7.79	26.90	-0.50	4.22	17.57
78	2.44	8.35	28.10	-5.40	3.77	17.57
79	2.46	8.26	26.30	-7.00	3.48	17.56
80	2.48	8.53	25.40	16.50	3.29	17.51
81	2.50	8.27	25.00	11.00	3.45	17.50
82	2.52	8.22	21.00	19.00	3.74	17.53
83	2.54	7.48	27.40	20.80	4.25	17.57
84	2.56	7.27	30.90	21.90	4.96	17.64
85	2.58	6.85	32.10	7.90	5.00	17.72
86	2.60	6.32	35.60	9.30	6.72	17.73
87	2.62	5.92	35.20	34.00	7.70	17.69
88	2.64	5.30	32.80	64.10	8.61	17.60
89	2.66	4.53	30.90	90.70	9.48	17.45
90	2.68	4.15	24.20	110.00	10.61	17.30
91	2.70	3.59	21.20	156.30	11.64	17.14
92	2.72	3.21	23.10	140.50	12.19	17.01
93	2.74	2.98	19.40	171.40	12.85	17.00
94	2.76	3.25	21.30	195.00	13.56	17.09
95	2.78	3.43	24.90	115.10	13.98	17.20
96	2.80	3.32	30.20	165.90	14.72	17.38

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	3.38	35.00	139.60	16.00	17.52
98	2.84	3.24	41.00	122.50	17.86	17.64
99	2.86	2.86	42.50	114.00	19.69	17.70
100	2.88	2.53	46.60	124.90	21.55	17.72
101	2.90	2.36	45.70	103.90	24.00	17.70
102	2.92	2.33	43.90	109.40	26.55	17.67
103	2.94	1.93	45.40	146.20	27.22	17.60
104	2.96	1.69	43.80	202.30	27.94	17.52
105	2.98	2.06	37.00	92.70	30.18	17.43
106	3.00	1.82	33.70	112.30	32.32	17.32
107	3.02	1.37	35.40	121.10	34.76	17.20
108	3.04	1.07	34.50	127.40	40.40	17.04
109	3.06	0.85	31.80	145.40	47.83	16.87
110	3.08	0.68	24.70	192.90	54.26	16.67
111	3.10	0.56	22.90	210.70	59.91	16.43
112	3.12	0.49	20.20	222.50	64.21	16.18
113	3.14	0.40	16.50	234.70	67.52	15.98
114	3.16	0.38	14.30	247.80	68.57	15.74
115	3.18	0.37	12.00	249.10	68.28	15.51
116	3.20	0.36	9.10	252.10	66.67	15.30
117	3.22	0.36	7.90	246.10	65.20	15.10
118	3.24	0.35	7.20	243.90	64.09	14.94
119	3.26	0.33	6.70	245.80	63.82	14.85
120	3.28	0.33	6.70	245.80	63.66	14.78
121	3.30	0.33	6.30	242.50	63.46	14.74
122	3.32	0.33	6.10	247.00	62.51	14.72
123	3.34	0.34	6.00	247.60	61.54	14.70
124	3.36	0.35	6.00	250.90	60.86	14.69
125	3.38	0.35	6.00	247.20	60.62	14.69
126	3.40	0.35	6.00	245.90	60.73	14.70
127	3.42	0.34	6.00	249.40	61.32	14.72
128	3.44	0.34	6.30	255.60	61.66	14.74
129	3.46	0.34	6.50	251.00	62.44	14.77
130	3.48	0.36	6.70	235.30	63.40	14.80
131	3.50	0.34	6.80	237.20	64.49	14.83
132	3.52	0.32	7.00	245.80	65.55	14.85
133	3.54	0.32	7.30	244.40	66.64	14.87
134	3.56	0.32	7.40	240.20	66.82	14.90
135	3.58	0.33	7.50	242.10	66.73	14.92
136	3.60	0.34	7.50	247.50	66.40	14.93
137	3.62	0.34	7.50	249.50	65.62	14.92
138	3.64	0.33	7.50	244.30	64.56	14.90
139	3.66	0.34	7.20	245.10	64.15	14.89
140	3.68	0.36	6.60	243.10	63.80	14.89
141	3.70	0.35	7.00	236.20	63.33	14.90
142	3.72	0.35	7.50	236.60	63.77	14.91
143	3.74	0.36	7.60	224.70	65.35	14.97
144	3.76	0.34	7.70	216.90	66.65	15.02

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.34	8.70	223.30	67.82	15.06
146	3.80	0.34	8.90	224.90	68.17	15.08
147	3.82	0.33	8.90	232.30	68.02	15.10
148	3.84	0.36	8.40	237.00	67.36	15.08
149	3.86	0.35	8.20	239.00	66.06	15.04
150	3.88	0.35	7.90	250.70	64.69	15.00
151	3.90	0.36	7.30	255.20	63.76	14.97
152	3.92	0.36	7.20	260.90	62.81	14.95
153	3.94	0.37	7.30	265.40	62.48	14.94
154	3.96	0.37	7.40	265.50	63.09	14.95
155	3.98	0.35	7.50	262.60	63.87	14.95
156	4.00	0.34	7.70	265.40	65.40	14.95
157	4.02	0.33	7.50	257.80	66.93	14.93
158	4.04	0.32	7.50	258.10	67.14	14.92
159	4.06	0.32	7.40	260.00	66.53	14.89
160	4.08	0.34	7.20	262.20	65.85	14.86
161	4.10	0.35	6.70	262.50	64.69	14.80
162	4.12	0.34	6.30	255.20	63.29	14.74
163	4.14	0.33	5.80	266.80	62.37	14.68
164	4.16	0.34	5.60	272.70	60.52	14.68
165	4.18	0.35	5.60	269.60	59.40	14.72
166	4.20	0.43	6.30	174.80	58.78	14.78
167	4.22	0.40	6.90	224.20	58.40	14.86
168	4.24	0.40	7.30	253.10	58.19	14.92
169	4.26	0.40	7.50	261.50	59.20	14.93
170	4.28	0.39	7.20	261.90	60.01	14.93
171	4.30	0.38	6.90	265.80	60.47	14.90
172	4.32	0.36	6.80	271.00	60.36	14.87
173	4.34	0.36	6.80	271.80	59.31	14.84
174	4.36	0.38	6.50	279.40	58.12	14.84
175	4.38	0.42	6.30	282.60	57.07	14.85
176	4.40	0.43	6.60	284.90	55.85	14.84
177	4.42	0.40	6.70	293.70	54.61	14.84
178	4.44	0.41	6.40	300.30	54.02	14.85
179	4.46	0.44	6.30	298.80	53.72	14.83
180	4.48	0.45	6.20	297.20	53.92	14.84
181	4.50	0.43	6.20	297.20	54.75	14.86
182	4.52	0.40	7.00	291.50	55.64	14.88
183	4.54	0.38	7.00	298.00	56.83	14.90
184	4.56	0.41	7.00	295.90	57.86	14.94
185	4.58	0.41	7.10	291.30	57.54	14.93
186	4.60	0.41	7.30	290.20	56.55	14.93
187	4.62	0.42	6.90	292.70	56.08	14.92
188	4.64	0.43	6.70	294.60	55.93	14.90
189	4.66	0.43	6.60	292.90	56.18	14.88
190	4.68	0.41	6.60	295.20	57.16	14.88
191	4.70	0.39	6.80	288.80	58.20	14.87
192	4.72	0.37	7.10	290.60	58.99	14.87

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.38	6.60	298.00	58.99	14.86
194	4.76	0.39	6.60	297.90	58.60	14.84
195	4.78	0.40	6.40	289.70	57.71	14.81
196	4.80	0.39	6.20	282.50	57.46	14.79
197	4.82	0.40	6.10	282.80	58.12	14.78
198	4.84	0.39	6.10	271.30	59.82	14.78
199	4.86	0.37	6.40	267.00	61.62	14.81
200	4.88	0.34	6.90	269.90	63.67	14.84
201	4.90	0.34	7.20	271.80	65.53	14.87
202	4.92	0.35	7.40	274.10	66.97	14.88
203	4.94	0.34	7.20	267.20	67.40	14.86
204	4.96	0.32	6.80	282.00	65.57	14.83
205	4.98	0.32	6.60	294.90	61.44	14.80
206	5.00	0.39	6.00	291.80	58.90	14.76
207	5.02	0.48	5.70	248.10	57.23	14.73
208	5.04	0.42	5.60	237.20	55.80	14.71
209	5.06	0.38	5.80	270.90	55.93	14.71
210	5.08	0.38	5.90	299.70	58.12	14.72
211	5.10	0.39	6.10	294.20	59.10	14.75
212	5.12	0.39	6.30	293.80	59.17	14.79
213	5.14	0.39	6.50	295.50	59.10	14.81
214	5.16	0.40	6.70	296.30	59.07	14.83
215	5.18	0.40	6.50	294.80	58.31	14.80
216	5.20	0.40	6.50	294.80	57.40	14.76
217	5.22	0.41	5.30	297.80	56.35	14.71
218	5.24	0.41	5.30	295.70	55.34	14.67
219	5.26	0.42	5.40	294.30	54.45	14.63
220	5.28	0.43	5.40	290.70	54.25	14.64
221	5.30	0.43	5.40	289.90	54.29	14.65
222	5.32	0.43	5.50	287.00	54.74	14.65
223	5.34	0.42	5.50	282.40	55.73	14.65
224	5.36	0.41	5.50	279.90	60.11	14.84
225	5.38	0.39	5.50	274.30	62.68	14.96
226	5.40	0.36	10.80	200.90	65.47	15.08
227	5.42	0.40	9.30	244.90	67.68	15.18
228	5.44	0.39	9.60	247.30	69.22	15.27
229	5.46	0.39	9.50	250.90	68.00	15.23
230	5.48	0.39	9.10	248.30	69.07	15.23
231	5.50	0.38	9.20	244.60	69.92	15.22
232	5.52	0.36	9.40	248.50	70.84	15.20
233	5.54	0.35	9.30	252.10	71.90	15.19
234	5.56	0.35	9.10	250.20	72.50	15.18
235	5.58	0.35	9.00	247.60	72.57	15.17
236	5.60	0.36	9.00	246.40	72.34	15.17
237	5.62	0.36	9.00	255.20	72.29	15.18
238	5.64	0.36	9.20	254.80	72.19	15.19
239	5.66	0.36	9.30	253.10	72.47	15.19
240	5.68	0.36	9.30	250.30	72.32	15.20

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.36	9.30	244.70	72.13	15.21
242	5.72	0.37	9.30	256.20	72.28	15.22
243	5.74	0.38	9.50	255.90	72.30	15.24
244	5.76	0.37	9.70	248.60	72.13	15.26
245	5.78	0.37	10.00	243.80	72.23	15.27
246	5.80	0.37	10.00	251.00	72.39	15.29
247	5.82	0.37	9.70	256.20	72.30	15.30
248	5.84	0.38	10.00	250.00	72.14	15.31
249	5.86	0.38	10.20	248.50	72.16	15.31
250	5.88	0.38	10.10	249.70	72.21	15.32
251	5.90	0.38	10.10	248.90	72.07	15.33
252	5.92	0.38	10.20	257.80	72.01	15.34
253	5.94	0.39	10.40	254.80	72.25	15.34
254	5.96	0.38	10.30	263.70	72.89	15.35
255	5.98	0.38	10.30	249.80	73.97	15.36
256	6.00	0.37	10.60	247.00	75.03	15.36
257	6.02	0.36	10.80	238.20	75.83	15.36
258	6.04	0.37	10.80	237.80	76.42	15.37
259	6.06	0.37	10.60	240.80	76.46	15.36
260	6.08	0.37	10.60	241.70	76.44	15.35
261	6.10	0.37	10.40	246.70	76.90	15.34
262	6.12	0.36	10.30	248.80	77.31	15.33
263	6.14	0.35	10.30	247.40	77.74	15.30
264	6.16	0.35	10.30	244.90	78.03	15.28
265	6.18	0.35	9.60	246.90	77.92	15.25
266	6.20	0.35	9.50	240.20	77.39	15.21
267	6.22	0.35	9.10	230.50	76.46	15.17
268	6.24	0.36	8.80	226.40	75.92	15.15
269	6.26	0.37	8.60	237.80	76.20	15.15
270	6.28	0.36	8.70	242.80	76.61	15.17
271	6.30	0.35	9.50	238.50	77.39	15.19
272	6.32	0.35	9.70	233.10	78.45	15.20
273	6.34	0.34	9.70	236.30	79.36	15.21
274	6.36	0.35	9.40	234.10	79.73	15.20
275	6.38	0.34	9.30	231.10	79.97	15.18
276	6.40	0.33	9.10	233.00	80.11	15.17
277	6.42	0.34	9.00	230.30	80.46	15.16
278	6.44	0.34	9.10	235.70	80.66	15.17
279	6.46	0.34	9.40	234.60	81.23	15.18
280	6.48	0.34	9.40	234.60	81.93	15.20
281	6.50	0.33	9.70	228.60	82.57	15.20
282	6.52	0.33	9.70	227.90	83.04	15.20
283	6.54	0.33	9.50	239.10	83.24	15.20
284	6.56	0.33	9.40	234.50	82.88	15.19
285	6.58	0.34	9.30	234.60	82.17	15.26
286	6.60	0.34	9.30	234.60	82.03	15.32
287	6.62	0.38	12.00	211.70	81.95	15.35
288	6.64	0.37	12.00	211.70	82.20	15.38

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	0.35	10.70	228.90	82.18	15.41
290	6.68	0.35	10.60	235.50	82.43	15.36
291	6.70	0.35	10.40	237.80	82.10	15.31
292	6.72	0.35	9.90	247.50	81.77	15.28
293	6.74	0.35	9.80	249.10	81.40	15.26
294	6.76	0.35	9.60	252.60	80.99	15.23
295	6.78	0.35	9.50	248.40	80.42	15.21
296	6.80	0.35	9.30	251.60	79.71	15.19
297	6.82	0.36	9.00	250.50	79.14	15.17
298	6.84	0.36	8.80	248.80	78.68	15.15
299	6.86	0.36	8.80	251.60	78.85	15.13
300	6.88	0.35	8.70	258.60	79.20	15.10
301	6.90	0.34	8.50	263.50	79.58	15.07
302	6.92	0.34	8.20	261.70	79.51	15.02
303	6.94	0.34	7.80	259.50	79.00	14.95
304	6.96	0.34	7.00	259.40	77.86	14.87
305	6.98	0.34	6.40	259.00	76.67	14.78
306	7.00	0.34	5.90	258.80	75.46	14.69
307	7.02	0.34	5.60	259.90	74.59	14.62
308	7.04	0.34	5.40	260.90	73.82	14.57
309	7.06	0.34	5.30	262.30	73.25	14.54
310	7.08	0.34	5.10	265.70	72.72	14.52
311	7.10	0.34	5.10	265.80	72.05	14.51
312	7.12	0.35	5.10	266.50	71.37	14.50
313	7.14	0.35	5.10	268.10	70.84	14.51
314	7.16	0.36	5.10	268.90	70.13	14.50
315	7.18	0.36	5.10	268.80	69.72	14.52
316	7.20	0.36	4.80	270.90	68.44	14.54
317	7.22	0.37	5.40	259.90	66.21	14.57
318	7.24	0.41	5.50	273.00	62.60	14.62
319	7.26	0.45	5.40	277.80	59.43	14.69
320	7.28	0.52	5.50	261.10	56.36	14.73
321	7.30	0.54	5.90	255.00	54.43	14.76
322	7.32	0.54	5.80	262.50	53.74	14.79
323	7.34	0.53	5.70	266.90	54.29	14.80
324	7.36	0.51	5.90	269.00	55.13	14.81
325	7.38	0.50	6.00	268.10	55.94	14.83
326	7.40	0.50	6.20	266.30	56.52	14.85
327	7.42	0.51	6.30	261.10	56.80	14.88
328	7.44	0.52	6.40	266.40	56.01	14.90
329	7.46	0.52	6.70	267.40	54.92	14.93
330	7.48	0.56	6.40	257.10	52.57	14.97
331	7.50	0.58	6.60	261.50	45.52	15.06
332	7.52	0.69	6.90	274.10	39.00	15.20
333	7.54	1.12	6.80	316.40	34.51	15.42
334	7.56	1.35	8.60	312.60	31.19	15.53
335	7.58	1.47	11.40	312.60	28.86	15.76

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.91	0.00	12.91	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.20	0.00	13.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
5	0.98	13.51	0.00	13.51	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
6	1.00	13.83	0.00	13.83	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
7	1.02	14.16	0.00	14.16	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
8	1.04	14.50	0.00	14.50	0.99	0.065	1.38	0.047	1.00	1.00	2.000	Yes
9	1.06	14.85	0.00	14.85	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.21	0.00	15.21	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.57	0.00	15.57	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	15.93	0.00	15.93	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	16.29	0.00	16.29	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	16.64	0.00	16.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	16.99	0.00	16.99	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.34	0.00	17.34	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.69	0.00	17.69	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	18.03	0.00	18.03	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	18.38	0.00	18.38	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	18.72	0.00	18.72	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	19.07	0.00	19.07	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	19.42	0.00	19.42	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	19.77	0.00	19.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	20.12	0.00	20.12	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	20.47	0.00	20.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	20.81	0.00	20.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	21.15	0.00	21.15	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	21.49	0.00	21.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	21.83	0.00	21.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	22.16	0.00	22.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	22.49	0.00	22.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	22.83	0.00	22.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	23.16	0.00	23.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	23.50	0.00	23.50	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	23.83	0.00	23.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	24.16	0.00	24.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	24.49	0.00	24.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	24.82	0.00	24.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	25.15	0.00	25.15	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	25.48	0.00	25.48	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	25.81	0.00	25.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	26.14	0.00	26.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	26.47	0.00	26.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	26.81	0.00	26.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	27.14	0.00	27.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	27.48	0.00	27.48	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	27.82	0.00	27.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	28.16	0.00	28.16	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	28.50	0.00	28.50	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	28.83	0.00	28.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	29.17	0.00	29.17	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	29.49	0.00	29.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	29.82	0.00	29.82	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	30.14	0.00	30.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	30.47	0.00	30.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	30.79	0.00	30.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	31.11	0.00	31.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	31.44	0.00	31.44	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	31.76	0.00	31.76	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	32.09	0.00	32.09	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	32.41	0.00	32.41	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	32.74	0.00	32.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	33.06	0.00	33.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	33.39	0.00	33.39	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	33.71	0.00	33.71	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	34.03	0.00	34.03	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	34.36	0.00	34.36	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	34.70	0.00	34.70	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	35.03	0.00	35.03	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	35.38	0.00	35.38	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
71	2.30	35.72	0.00	35.72	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
72	2.32	36.07	0.20	35.87	0.98	0.064	1.38	0.047	1.00	1.00	0.047	No
73	2.34	36.42	0.39	36.02	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
74	2.36	36.77	0.59	36.18	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
75	2.38	37.12	0.78	36.33	0.98	0.065	1.38	0.047	1.00	1.00	0.047	No
76	2.40	37.47	0.98	36.49	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
77	2.42	37.82	1.18	36.64	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
78	2.44	38.17	1.37	36.80	0.98	0.066	1.38	0.048	1.00	1.00	0.048	No
79	2.46	38.52	1.57	36.95	0.98	0.067	1.38	0.048	1.00	1.00	0.048	No
80	2.48	38.87	1.77	37.11	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
81	2.50	39.22	1.96	37.26	0.98	0.067	1.38	0.049	1.00	1.00	0.049	No
82	2.52	39.57	2.16	37.41	0.98	0.068	1.38	0.049	1.00	1.00	0.049	No
83	2.54	39.92	2.35	37.57	0.98	0.068	1.38	0.049	1.00	1.00	0.049	No
84	2.56	40.28	2.55	37.73	0.98	0.068	1.38	0.050	1.00	1.00	0.050	No
85	2.58	40.63	2.75	37.88	0.98	0.068	1.38	0.050	1.00	1.00	0.050	No
86	2.60	40.99	2.94	38.04	0.98	0.069	1.38	0.050	1.00	1.00	0.050	No
87	2.62	41.34	3.14	38.20	0.98	0.069	1.38	0.050	1.00	1.00	0.050	No
88	2.64	41.69	3.34	38.36	0.98	0.069	1.38	0.050	1.00	1.00	0.050	No
89	2.66	42.04	3.53	38.51	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
90	2.68	42.39	3.73	38.66	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
91	2.70	42.73	3.92	38.81	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
92	2.72	43.07	4.12	38.95	0.98	0.071	1.38	0.051	1.00	1.00	0.051	No
93	2.74	43.41	4.32	39.09	0.98	0.071	1.38	0.051	1.00	1.00	0.051	No
94	2.76	43.75	4.51	39.24	0.98	0.071	1.38	0.052	1.00	1.00	0.052	No
95	2.78	44.10	4.71	39.39	0.98	0.071	1.38	0.052	1.00	1.00	0.052	No
96	2.80	44.44	4.91	39.54	0.98	0.072	1.38	0.052	1.00	1.00	0.052	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	44.79	5.10	39.69	0.98	0.072	1.38	0.052	1.00	1.00	0.052	No
98	2.84	45.15	5.30	39.85	0.98	0.072	1.38	0.052	1.00	1.00	0.052	No
99	2.86	45.50	5.49	40.01	0.98	0.072	1.38	0.053	1.00	1.00	0.053	No
100	2.88	45.85	5.69	40.17	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
101	2.90	46.21	5.89	40.32	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
102	2.92	46.56	6.08	40.48	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
103	2.94	46.91	6.28	40.64	0.98	0.074	1.38	0.053	1.00	1.00	0.053	No
104	2.96	47.26	6.47	40.79	0.98	0.074	1.38	0.054	1.00	1.00	2.000	Yes
105	2.98	47.61	6.67	40.94	0.98	0.074	1.38	0.054	1.00	1.00	2.000	Yes
106	3.00	47.96	6.87	41.09	0.98	0.074	1.38	0.054	1.00	1.00	2.000	Yes
107	3.02	48.30	7.06	41.24	0.98	0.075	1.38	0.054	1.00	1.00	2.000	Yes
108	3.04	48.64	7.26	41.39	0.98	0.075	1.38	0.054	1.00	1.00	2.000	Yes
109	3.06	48.98	7.46	41.53	0.98	0.075	1.38	0.055	1.00	1.00	2.000	Yes
110	3.08	49.32	7.65	41.66	0.98	0.075	1.38	0.055	1.00	1.00	2.000	Yes
111	3.10	49.64	7.85	41.80	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
112	3.12	49.97	8.04	41.92	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
113	3.14	50.29	8.24	42.05	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
114	3.16	50.60	8.44	42.17	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
115	3.18	50.91	8.63	42.28	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
116	3.20	51.22	8.83	42.39	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
117	3.22	51.52	9.03	42.50	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
118	3.24	51.82	9.22	42.60	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
119	3.26	52.12	9.42	42.70	0.98	0.078	1.38	0.056	1.00	1.00	0.056	No
120	3.28	52.41	9.61	42.80	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No
121	3.30	52.71	9.81	42.90	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No
122	3.32	53.00	10.01	42.99	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No
123	3.34	53.29	10.20	43.09	0.98	0.079	1.38	0.057	1.00	1.00	0.057	No
124	3.36	53.59	10.40	43.19	0.98	0.079	1.38	0.057	1.00	1.00	0.057	No
125	3.38	53.88	10.59	43.29	0.98	0.079	1.38	0.057	1.00	1.00	0.057	No
126	3.40	54.18	10.79	43.39	0.98	0.079	1.38	0.058	1.00	1.00	0.058	No
127	3.42	54.47	10.99	43.48	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
128	3.44	54.77	11.18	43.58	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
129	3.46	55.06	11.38	43.68	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
130	3.48	55.36	11.58	43.78	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
131	3.50	55.65	11.77	43.88	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
132	3.52	55.95	11.97	43.98	0.98	0.081	1.38	0.059	1.00	1.00	0.059	No
133	3.54	56.25	12.16	44.08	0.98	0.081	1.38	0.059	1.00	1.00	0.059	No
134	3.56	56.55	12.36	44.19	0.98	0.081	1.38	0.059	1.00	1.00	0.059	No
135	3.58	56.84	12.56	44.29	0.98	0.081	1.38	0.059	1.00	1.00	0.059	No
136	3.60	57.14	12.75	44.39	0.98	0.082	1.38	0.059	1.00	1.00	0.059	No
137	3.62	57.44	12.95	44.49	0.98	0.082	1.38	0.059	1.00	1.00	0.059	No
138	3.64	57.74	13.15	44.59	0.98	0.082	1.38	0.060	1.00	1.00	0.060	No
139	3.66	58.04	13.34	44.70	0.97	0.082	1.38	0.060	1.00	1.00	0.060	No
140	3.68	58.33	13.54	44.80	0.97	0.083	1.38	0.060	1.00	1.00	0.060	No
141	3.70	58.63	13.73	44.90	0.97	0.083	1.38	0.060	1.00	1.00	0.060	No
142	3.72	58.93	13.93	45.00	0.97	0.083	1.38	0.060	1.00	1.00	0.060	No
143	3.74	59.23	14.13	45.10	0.97	0.083	1.38	0.060	1.00	1.00	0.060	No
144	3.76	59.53	14.32	45.21	0.97	0.083	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	59.83	14.52	45.31	0.97	0.084	1.38	0.061	1.00	1.00	0.061	No
146	3.80	60.13	14.72	45.42	0.97	0.084	1.38	0.061	1.00	1.00	0.061	No
147	3.82	60.44	14.91	45.52	0.97	0.084	1.38	0.061	1.00	1.00	0.061	No
148	3.84	60.74	15.11	45.63	0.97	0.084	1.38	0.061	1.00	1.00	0.061	No
149	3.86	61.04	15.30	45.73	0.97	0.084	1.38	0.061	1.00	1.00	0.061	No
150	3.88	61.34	15.50	45.84	0.97	0.085	1.38	0.062	1.00	1.00	0.062	No
151	3.90	61.64	15.70	45.94	0.97	0.085	1.38	0.062	1.00	1.00	0.062	No
152	3.92	61.94	15.89	46.04	0.97	0.085	1.38	0.062	1.00	1.00	0.062	No
153	3.94	62.23	16.09	46.15	0.97	0.085	1.38	0.062	1.00	1.00	0.062	No
154	3.96	62.53	16.28	46.25	0.97	0.085	1.38	0.062	1.00	1.00	0.062	No
155	3.98	62.83	16.48	46.35	0.97	0.086	1.38	0.062	1.00	1.00	0.062	No
156	4.00	63.13	16.68	46.45	0.97	0.086	1.38	0.062	1.00	1.00	0.062	No
157	4.02	63.43	16.87	46.56	0.97	0.086	1.38	0.063	1.00	1.00	0.063	No
158	4.04	63.73	17.07	46.66	0.97	0.086	1.38	0.063	1.00	1.00	0.063	No
159	4.06	64.03	17.27	46.76	0.97	0.087	1.38	0.063	1.00	1.00	0.063	No
160	4.08	64.32	17.46	46.86	0.97	0.087	1.38	0.063	1.00	1.00	0.063	No
161	4.10	64.62	17.66	46.96	0.97	0.087	1.38	0.063	1.00	1.00	0.063	No
162	4.12	64.91	17.85	47.06	0.97	0.087	1.38	0.063	1.00	1.00	0.063	No
163	4.14	65.21	18.05	47.16	0.97	0.087	1.38	0.063	1.00	1.00	0.063	No
164	4.16	65.50	18.25	47.26	0.97	0.088	1.38	0.064	1.00	1.00	0.064	No
165	4.18	65.80	18.44	47.35	0.97	0.088	1.38	0.064	1.00	1.00	0.064	No
166	4.20	66.09	18.64	47.45	0.97	0.088	1.38	0.064	1.00	1.00	0.064	No
167	4.22	66.39	18.84	47.55	0.97	0.088	1.38	0.064	1.00	1.00	0.064	No
168	4.24	66.69	19.03	47.66	0.97	0.088	1.38	0.064	1.00	1.00	0.064	No
169	4.26	66.99	19.23	47.76	0.97	0.089	1.38	0.064	1.00	1.00	0.064	No
170	4.28	67.28	19.42	47.86	0.97	0.089	1.38	0.064	1.00	1.00	0.064	No
171	4.30	67.58	19.62	47.96	0.97	0.089	1.38	0.065	1.00	1.00	0.065	No
172	4.32	67.88	19.82	48.06	0.97	0.089	1.38	0.065	1.00	1.00	0.065	No
173	4.34	68.18	20.01	48.16	0.97	0.089	1.38	0.065	1.00	1.00	0.065	No
174	4.36	68.47	20.21	48.27	0.97	0.089	1.38	0.065	1.00	1.00	0.065	No
175	4.38	68.77	20.40	48.37	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
176	4.40	69.07	20.60	48.47	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
177	4.42	69.36	20.80	48.57	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
178	4.44	69.66	20.99	48.67	0.97	0.090	1.38	0.066	1.00	1.00	0.066	No
179	4.46	69.96	21.19	48.77	0.97	0.090	1.38	0.066	1.00	1.00	0.066	No
180	4.48	70.26	21.39	48.87	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
181	4.50	70.55	21.58	48.97	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
182	4.52	70.85	21.78	49.07	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
183	4.54	71.15	21.97	49.17	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
184	4.56	71.45	22.17	49.28	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
185	4.58	71.75	22.37	49.38	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
186	4.60	72.04	22.56	49.48	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
187	4.62	72.34	22.76	49.58	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
188	4.64	72.64	22.96	49.69	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
189	4.66	72.94	23.15	49.79	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
190	4.68	73.24	23.35	49.89	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
191	4.70	73.53	23.54	49.99	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No
192	4.72	73.83	23.74	50.09	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	4.74	74.13	23.94	50.19	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No
194	4.76	74.42	24.13	50.29	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
195	4.78	74.72	24.33	50.39	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
196	4.80	75.02	24.53	50.49	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
197	4.82	75.31	24.72	50.59	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
198	4.84	75.61	24.92	50.69	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
199	4.86	75.90	25.11	50.79	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
200	4.88	76.20	25.31	50.89	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
201	4.90	76.50	25.51	50.99	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
202	4.92	76.80	25.70	51.09	0.97	0.094	1.38	0.069	1.00	1.00	0.069	No
203	4.94	77.09	25.90	51.19	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
204	4.96	77.39	26.09	51.30	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
205	4.98	77.69	26.29	51.39	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
206	5.00	77.98	26.49	51.49	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
207	5.02	78.28	26.68	51.59	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
208	5.04	78.57	26.88	51.69	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
209	5.06	78.86	27.08	51.79	0.97	0.096	1.38	0.069	1.00	1.00	0.069	No
210	5.08	79.16	27.27	51.89	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
211	5.10	79.45	27.47	51.99	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
212	5.12	79.75	27.66	52.09	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
213	5.14	80.05	27.86	52.19	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
214	5.16	80.34	28.06	52.29	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
215	5.18	80.64	28.25	52.39	0.96	0.096	1.38	0.070	1.00	1.00	0.070	No
216	5.20	80.93	28.45	52.48	0.96	0.097	1.38	0.070	1.00	1.00	0.070	No
217	5.22	81.23	28.65	52.58	0.96	0.097	1.38	0.070	1.00	1.00	0.070	No
218	5.24	81.52	28.84	52.68	0.96	0.097	1.38	0.070	1.00	1.00	0.070	No
219	5.26	81.81	29.04	52.78	0.96	0.097	1.38	0.071	1.00	1.00	0.071	No
220	5.28	82.11	29.23	52.87	0.96	0.097	1.38	0.071	1.00	1.00	0.071	No
221	5.30	82.40	29.43	52.97	0.96	0.097	1.38	0.071	1.00	1.00	0.071	No
222	5.32	82.69	29.63	53.07	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
223	5.34	82.99	29.82	53.16	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
224	5.36	83.28	30.02	53.26	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
225	5.38	83.58	30.21	53.37	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
226	5.40	83.88	30.41	53.47	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
227	5.42	84.19	30.61	53.58	0.96	0.098	1.38	0.071	1.00	1.00	0.071	No
228	5.44	84.49	30.80	53.69	0.96	0.098	1.38	0.072	1.00	1.00	0.072	No
229	5.46	84.80	31.00	53.80	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
230	5.48	85.10	31.20	53.91	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
231	5.50	85.41	31.39	54.01	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
232	5.52	85.71	31.59	54.12	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
233	5.54	86.01	31.78	54.23	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
234	5.56	86.32	31.98	54.34	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
235	5.58	86.62	32.18	54.44	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
236	5.60	86.92	32.37	54.55	0.96	0.100	1.38	0.072	1.00	1.00	0.072	No
237	5.62	87.23	32.57	54.66	0.96	0.100	1.38	0.072	1.00	1.00	0.072	No
238	5.64	87.53	32.77	54.77	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
239	5.66	87.84	32.96	54.87	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
240	5.68	88.14	33.16	54.98	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	5.70	88.44	33.35	55.09	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
242	5.72	88.75	33.55	55.20	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
243	5.74	89.05	33.75	55.31	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
244	5.76	89.36	33.94	55.42	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
245	5.78	89.66	34.14	55.52	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
246	5.80	89.97	34.34	55.63	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
247	5.82	90.28	34.53	55.74	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
248	5.84	90.58	34.73	55.85	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
249	5.86	90.89	34.92	55.96	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
250	5.88	91.19	35.12	56.07	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
251	5.90	91.50	35.32	56.18	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
252	5.92	91.81	35.51	56.30	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
253	5.94	92.11	35.71	56.41	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
254	5.96	92.42	35.90	56.52	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
255	5.98	92.73	36.10	56.63	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
256	6.00	93.04	36.30	56.74	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
257	6.02	93.34	36.49	56.85	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
258	6.04	93.65	36.69	56.96	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
259	6.06	93.96	36.89	57.07	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
260	6.08	94.26	37.08	57.18	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
261	6.10	94.57	37.28	57.29	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
262	6.12	94.88	37.47	57.40	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
263	6.14	95.18	37.67	57.51	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
264	6.16	95.49	37.87	57.62	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
265	6.18	95.79	38.06	57.73	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
266	6.20	96.10	38.26	57.84	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
267	6.22	96.40	38.46	57.95	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
268	6.24	96.71	38.65	58.05	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
269	6.26	97.01	38.85	58.16	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
270	6.28	97.31	39.04	58.27	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
271	6.30	97.62	39.24	58.38	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
272	6.32	97.92	39.44	58.48	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
273	6.34	98.22	39.63	58.59	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
274	6.36	98.53	39.83	58.70	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
275	6.38	98.83	40.02	58.81	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
276	6.40	99.13	40.22	58.91	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
277	6.42	99.44	40.42	59.02	0.95	0.104	1.38	0.076	1.00	1.00	0.076	No
278	6.44	99.74	40.61	59.13	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
279	6.46	100.04	40.81	59.24	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
280	6.48	100.35	41.01	59.34	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
281	6.50	100.65	41.20	59.45	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
282	6.52	100.96	41.40	59.56	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
283	6.54	101.26	41.59	59.67	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
284	6.56	101.56	41.79	59.77	0.95	0.105	1.38	0.076	1.00	1.00	0.076	No
285	6.58	101.87	41.99	59.88	0.95	0.105	1.38	0.077	1.00	1.00	0.077	No
286	6.60	102.18	42.18	59.99	0.95	0.105	1.38	0.077	1.00	1.00	0.077	No
287	6.62	102.48	42.38	60.10	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
288	6.64	102.79	42.58	60.22	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
289	6.66	103.10	42.77	60.33	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
290	6.68	103.41	42.97	60.44	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
291	6.70	103.71	43.16	60.55	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
292	6.72	104.02	43.36	60.66	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
293	6.74	104.32	43.56	60.77	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
294	6.76	104.63	43.75	60.88	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
295	6.78	104.93	43.95	60.98	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
296	6.80	105.24	44.15	61.09	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
297	6.82	105.54	44.34	61.20	0.95	0.107	1.38	0.077	1.00	1.00	0.077	No
298	6.84	105.84	44.54	61.30	0.95	0.107	1.38	0.077	1.00	1.00	0.077	No
299	6.86	106.14	44.73	61.41	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
300	6.88	106.45	44.93	61.52	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
301	6.90	106.75	45.13	61.62	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
302	6.92	107.05	45.32	61.73	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
303	6.94	107.35	45.52	61.83	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
304	6.96	107.64	45.71	61.93	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
305	6.98	107.94	45.91	62.03	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
306	7.00	108.23	46.11	62.13	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
307	7.02	108.53	46.30	62.22	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
308	7.04	108.82	46.50	62.32	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
309	7.06	109.11	46.70	62.41	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
310	7.08	109.40	46.89	62.51	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
311	7.10	109.69	47.09	62.60	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
312	7.12	109.98	47.28	62.70	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
313	7.14	110.27	47.48	62.79	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
314	7.16	110.56	47.68	62.88	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
315	7.18	110.85	47.87	62.98	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
316	7.20	111.14	48.07	63.07	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
317	7.22	111.43	48.27	63.17	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
318	7.24	111.72	48.46	63.26	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
319	7.26	112.02	48.66	63.36	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
320	7.28	112.31	48.85	63.46	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
321	7.30	112.61	49.05	63.56	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
322	7.32	112.90	49.25	63.66	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
323	7.34	113.20	49.44	63.76	0.94	0.109	1.38	0.079	1.00	1.00	0.079	No
324	7.36	113.50	49.64	63.86	0.94	0.109	1.38	0.079	1.00	1.00	0.079	No
325	7.38	113.79	49.83	63.96	0.94	0.109	1.38	0.079	1.00	1.00	0.079	No
326	7.40	114.09	50.03	64.06	0.94	0.109	1.38	0.079	1.00	1.00	0.079	No
327	7.42	114.39	50.23	64.16	0.94	0.109	1.38	0.080	1.00	1.00	0.080	No
328	7.44	114.69	50.42	64.26	0.94	0.109	1.38	0.080	1.00	1.00	0.080	No
329	7.46	114.98	50.62	64.36	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
330	7.48	115.28	50.82	64.47	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
331	7.50	115.58	51.01	64.57	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
332	7.52	115.89	51.21	64.68	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
333	7.54	116.20	51.40	64.79	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
334	7.56	116.51	51.60	64.91	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes
335	7.58	116.82	51.80	65.03	0.94	0.110	1.38	0.080	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.09	3.62	2.14	1.00	1.57	26.23	41.13	4.000	No	Yes	2.00
2	0.92	0.13	3.46	1.93	1.00	2.27	19.88	45.23	4.000	No	Yes	2.00
3	0.94	0.20	3.22	1.57	1.00	3.78	13.19	49.88	4.000	No	Yes	2.00
4	0.96	0.57	2.67	0.79	0.87	11.08	8.49	94.06	4.000	Yes	No	2.00
5	0.98	1.27	2.29	0.57	0.73	24.88	1.89	47.06	4.000	Yes	No	2.00
6	1.00	2.40	2.00	0.45	0.62	47.11	1.00	47.11	4.000	Yes	No	2.00
7	1.02	3.63	1.83	0.43	0.55	71.29	1.00	71.29	4.000	Yes	No	2.00
8	1.04	4.69	1.75	0.47	0.52	92.34	1.00	92.34	4.000	Yes	No	2.00
9	1.06	5.35	1.74	0.56	0.52	105.35	1.07	112.99	4.000	No	No	2.00
10	1.08	5.49	1.78	0.68	0.54	108.05	1.13	121.79	4.000	No	No	2.00
11	1.10	5.15	1.85	0.83	0.56	101.31	1.20	121.98	4.000	No	No	2.00
12	1.12	4.64	1.94	1.00	0.60	91.27	1.26	115.35	4.000	No	No	2.00
13	1.14	4.11	2.01	1.12	0.63	80.82	1.32	106.58	4.000	No	No	2.00
14	1.16	3.65	2.06	1.15	0.64	71.78	1.37	98.00	4.000	No	No	2.00
15	1.18	3.37	2.07	1.07	0.65	66.20	1.38	91.18	4.000	No	No	2.00
16	1.20	3.92	1.93	0.76	0.59	77.09	1.25	96.74	4.000	No	No	2.00
17	1.22	4.89	1.75	0.51	0.53	96.24	1.09	104.64	4.000	No	No	2.00
18	1.24	5.98	1.61	0.38	0.47	117.60	1.00	117.60	4.000	No	No	2.00
19	1.26	7.01	1.50	0.30	0.43	138.10	1.00	138.10	4.000	No	No	2.00
20	1.28	7.94	1.44	0.28	0.41	155.68	1.00	155.68	4.000	No	No	2.00
21	1.30	7.96	1.45	0.30	0.41	156.17	1.00	156.17	4.000	No	No	2.00
22	1.32	7.59	1.49	0.33	0.43	149.42	1.00	149.42	4.000	No	No	2.00
23	1.34	7.29	1.51	0.34	0.44	143.60	1.00	143.60	4.000	No	No	2.00
24	1.36	7.09	1.53	0.35	0.44	139.46	1.00	139.46	4.000	No	No	2.00
25	1.38	7.00	1.52	0.33	0.44	137.79	1.00	137.79	4.000	No	No	2.00
26	1.40	7.01	1.51	0.31	0.43	137.34	1.00	137.34	4.000	No	No	2.00
27	1.42	6.90	1.49	0.26	0.43	133.05	1.00	133.05	4.000	No	No	2.00
28	1.44	6.68	1.48	0.23	0.43	127.49	1.00	127.49	4.000	No	No	2.00
29	1.46	6.41	1.50	0.23	0.43	122.70	1.00	122.70	4.000	No	No	2.00
30	1.48	6.07	1.52	0.24	0.44	116.91	1.00	116.91	4.000	No	No	2.00
31	1.50	5.63	1.56	0.25	0.45	109.69	1.00	109.69	4.000	No	No	2.00
32	1.52	5.30	1.59	0.27	0.47	104.21	1.00	104.21	4.000	No	No	2.00
33	1.54	4.91	1.65	0.31	0.49	96.49	1.00	96.49	4.000	No	No	2.00
34	1.56	4.59	1.69	0.33	0.50	90.13	1.00	90.13	4.000	No	No	2.00
35	1.58	4.36	1.72	0.35	0.52	85.52	1.00	85.52	4.000	No	No	2.00
36	1.60	4.20	1.73	0.35	0.52	82.34	1.00	82.34	4.000	No	No	2.00
37	1.62	4.09	1.74	0.35	0.52	80.30	1.00	80.30	4.000	No	No	2.00
38	1.64	4.08	1.73	0.32	0.52	80.08	1.00	80.08	4.000	No	No	2.00
39	1.66	3.97	1.73	0.32	0.52	77.94	1.00	77.94	4.000	No	No	2.00
40	1.68	3.83	1.76	0.34	0.53	75.08	1.00	75.08	4.000	No	No	2.00
41	1.70	3.67	1.80	0.38	0.55	72.00	1.00	72.00	4.000	No	No	2.00
42	1.72	3.52	1.83	0.40	0.56	69.01	1.00	69.01	4.000	No	No	2.00
43	1.74	3.44	1.85	0.43	0.57	67.29	1.00	67.29	4.000	No	No	2.00
44	1.76	3.46	1.88	0.51	0.58	67.77	1.23	83.02	4.000	No	No	2.00
45	1.78	3.49	1.89	0.53	0.58	68.28	1.23	83.96	4.000	No	No	2.00
46	1.80	3.53	1.89	0.54	0.58	69.18	1.23	85.10	4.000	No	No	2.00
47	1.82	3.57	1.90	0.58	0.59	69.88	1.24	86.39	4.000	No	No	2.00
48	1.84	3.57	1.91	0.61	0.59	69.82	1.24	86.89	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	3.49	1.90	0.56	0.59	68.23	1.24	84.44	4.000	No	No	2.00
50	1.88	3.40	1.89	0.51	0.59	66.47	1.23	81.88	4.000	No	No	2.00
51	1.90	3.35	1.88	0.48	0.58	65.50	1.00	65.50	4.000	No	No	2.00
52	1.92	3.30	1.87	0.43	0.58	64.50	1.00	64.50	4.000	No	No	2.00
53	1.94	3.32	1.83	0.36	0.56	64.74	1.00	64.74	4.000	No	No	2.00
54	1.96	3.36	1.81	0.32	0.56	64.40	1.00	64.40	4.000	No	No	2.00
55	1.98	3.40	1.81	0.32	0.55	64.83	1.00	64.83	4.000	No	No	2.00
56	2.00	3.45	1.80	0.30	0.55	65.11	1.00	65.11	4.000	No	No	2.00
57	2.02	3.49	1.79	0.28	0.55	65.24	1.00	65.24	4.000	No	No	2.00
58	2.04	3.41	1.81	0.31	0.56	63.97	1.00	63.97	4.000	No	No	2.00
59	2.06	3.39	1.83	0.34	0.56	63.78	1.00	63.78	4.000	No	No	2.00
60	2.08	3.37	1.83	0.34	0.57	63.15	1.00	63.15	4.000	No	No	2.00
61	2.10	3.33	1.85	0.37	0.57	62.40	1.00	62.40	4.000	No	No	2.00
62	2.12	3.29	1.85	0.36	0.57	61.43	1.00	61.43	4.000	No	No	2.00
63	2.14	3.39	1.83	0.33	0.56	62.32	1.00	62.32	4.000	No	No	2.00
64	2.16	3.54	1.80	0.30	0.55	63.92	1.00	63.92	4.000	No	No	2.00
65	2.18	3.85	1.77	0.28	0.54	68.17	1.00	68.17	4.000	No	No	2.00
66	2.20	4.29	1.70	0.23	0.52	73.77	1.00	73.77	4.000	No	No	2.00
67	2.22	4.78	1.69	0.27	0.51	81.35	1.00	81.35	4.000	No	No	2.00
68	2.24	5.26	1.66	0.27	0.50	87.85	1.00	87.85	4.000	No	No	2.00
69	2.26	5.73	1.64	0.28	0.49	94.52	1.00	94.52	4.000	No	No	2.00
70	2.28	6.08	1.63	0.31	0.49	99.80	1.00	99.80	4.000	No	No	2.00
71	2.30	6.25	1.65	0.36	0.50	102.77	1.00	102.77	4.000	No	No	2.00
72	2.32	6.39	1.65	0.36	0.49	104.79	1.00	104.79	0.187	No	No	2.00
73	2.34	6.48	1.66	0.40	0.50	106.68	1.00	106.68	0.193	No	No	2.00
74	2.36	6.59	1.66	0.42	0.50	108.38	1.00	108.38	0.198	No	No	2.00
75	2.38	6.84	1.64	0.40	0.49	111.31	1.00	111.31	0.208	No	No	2.00
76	2.40	7.24	1.62	0.39	0.48	116.52	1.00	116.52	0.227	No	No	2.00
77	2.42	7.60	1.59	0.36	0.47	120.84	1.00	120.84	0.244	No	No	2.00
78	2.44	7.99	1.56	0.34	0.46	125.38	1.00	125.38	0.263	No	No	2.00
79	2.46	8.24	1.54	0.32	0.46	128.15	1.00	128.15	0.276	No	No	2.00
80	2.48	8.32	1.53	0.30	0.45	128.62	1.00	128.62	0.278	No	No	2.00
81	2.50	8.15	1.54	0.31	0.45	126.21	1.00	126.21	0.267	No	No	2.00
82	2.52	7.96	1.56	0.33	0.46	123.85	1.00	123.85	0.257	No	No	2.00
83	2.54	7.62	1.59	0.36	0.47	119.84	1.00	119.84	0.240	No	No	2.00
84	2.56	7.23	1.64	0.41	0.49	115.29	1.00	115.29	0.223	No	No	2.00
85	2.58	6.77	1.69	0.48	0.51	109.91	1.00	109.91	0.203	No	No	2.00
86	2.60	6.34	1.73	0.53	0.53	104.27	1.05	109.68	0.203	No	No	2.00
87	2.62	5.79	1.78	0.58	0.55	96.77	1.13	109.24	0.201	No	No	2.00
88	2.64	5.26	1.82	0.61	0.56	88.93	1.18	104.63	0.187	No	No	2.00
89	2.66	4.72	1.86	0.62	0.58	80.68	1.21	97.60	0.166	No	No	2.00
90	2.68	4.18	1.91	0.64	0.60	72.46	1.24	90.06	0.148	No	No	2.00
91	2.70	3.72	1.95	0.65	0.61	65.21	1.27	82.83	0.133	No	No	2.00
92	2.72	3.46	1.97	0.64	0.62	61.07	1.29	78.49	0.125	No	No	2.00
93	2.74	3.32	2.00	0.67	0.63	58.88	1.30	76.80	0.122	No	No	2.00
94	2.76	3.26	2.02	0.74	0.64	58.29	1.33	77.34	0.123	No	No	2.00
95	2.78	3.30	2.04	0.80	0.65	59.09	1.34	79.27	0.126	No	No	2.00
96	2.80	3.35	2.06	0.92	0.66	60.42	1.37	82.77	0.133	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	3.27	2.11	1.08	0.67	59.78	1.43	85.37	0.138	No	No	2.00
98	2.84	3.09	2.17	1.28	0.70	57.49	1.54	88.27	0.144	No	No	2.00
99	2.86	2.90	2.22	1.48	0.72	54.74	1.67	91.28	0.151	No	No	2.00
100	2.88	2.69	2.27	1.66	0.74	51.49	1.83	94.21	0.158	No	No	2.00
101	2.90	2.42	2.34	1.89	0.76	46.93	2.08	97.71	0.167	No	No	2.00
102	2.92	2.19	2.40	2.10	0.79	42.34	2.39	101.29	0.177	No	No	2.00
103	2.94	2.10	2.42	2.11	0.79	40.43	2.48	100.26	0.174	No	No	2.00
104	2.96	1.99	2.44	2.10	0.80	38.30	2.58	98.75	4.000	Yes	No	2.00
105	2.98	1.80	2.49	2.23	0.82	34.53	2.90	100.19	4.000	Yes	No	2.00
106	3.00	1.63	2.54	2.34	0.84	31.14	3.56	110.96	4.000	Yes	No	2.00
107	3.02	1.46	2.59	2.45	0.86	27.77	4.99	138.70	4.000	Yes	No	2.00
108	3.04	1.18	2.70	2.82	0.90	22.39	10.12	226.62	4.000	Yes	No	2.00
109	3.06	0.93	2.83	3.37	0.95	17.48	6.25	109.32	4.000	Yes	Yes	2.00
110	3.08	0.76	2.94	3.77	0.99	14.05	7.74	108.80	4.000	Yes	Yes	2.00
111	3.10	0.63	3.02	3.99	1.00	11.48	9.15	104.97	0.547	No	Yes	2.00
112	3.12	0.54	3.08	4.02	1.00	9.67	10.27	99.38	0.461	No	Yes	2.00
113	3.14	0.48	3.13	4.00	1.00	8.47	11.17	94.65	0.404	No	Yes	2.00
114	3.16	0.44	3.14	3.70	1.00	7.70	11.47	88.26	0.367	No	Yes	2.00
115	3.18	0.41	3.14	3.29	1.00	7.18	11.39	81.78	0.343	No	Yes	2.00
116	3.20	0.40	3.12	2.86	1.00	6.97	10.94	76.22	0.332	No	Yes	2.00
117	3.22	0.39	3.10	2.50	1.00	6.77	10.54	71.33	0.323	No	Yes	2.00
118	3.24	0.39	3.08	2.25	1.00	6.61	10.24	67.68	0.315	No	Yes	2.00
119	3.26	0.38	3.08	2.13	1.00	6.46	10.17	65.72	0.308	No	Yes	2.00
120	3.28	0.37	3.07	2.05	1.00	6.36	10.13	64.43	0.303	No	Yes	2.00
121	3.30	0.37	3.07	1.99	1.00	6.31	10.07	63.54	0.301	No	Yes	2.00
122	3.32	0.38	3.06	1.92	1.00	6.40	9.82	62.87	0.305	No	Yes	2.00
123	3.34	0.38	3.04	1.85	1.00	6.50	9.57	62.18	0.310	No	Yes	2.00
124	3.36	0.39	3.03	1.80	1.00	6.58	9.39	61.83	0.314	No	Yes	2.00
125	3.38	0.39	3.03	1.79	1.00	6.61	9.33	61.71	0.316	No	Yes	2.00
126	3.40	0.39	3.03	1.81	1.00	6.62	9.36	61.96	0.316	No	Yes	2.00
127	3.42	0.39	3.04	1.85	1.00	6.56	9.51	62.43	0.313	No	Yes	2.00
128	3.44	0.39	3.05	1.89	1.00	6.56	9.60	63.00	0.313	No	Yes	2.00
129	3.46	0.38	3.06	1.96	1.00	6.50	9.80	63.72	0.310	No	Yes	2.00
130	3.48	0.38	3.07	2.05	1.00	6.42	10.06	64.60	0.306	No	Yes	2.00
131	3.50	0.38	3.09	2.14	1.00	6.33	10.35	65.49	0.302	No	Yes	2.00
132	3.52	0.37	3.10	2.23	1.00	6.23	10.63	66.29	0.297	No	Yes	2.00
133	3.54	0.37	3.12	2.32	1.00	6.13	10.93	67.01	0.292	No	Yes	2.00
134	3.56	0.37	3.12	2.36	1.00	6.15	10.98	67.51	0.293	No	Yes	2.00
135	3.58	0.37	3.12	2.37	1.00	6.19	10.96	67.84	0.295	No	Yes	2.00
136	3.60	0.37	3.11	2.36	1.00	6.25	10.87	67.93	0.298	No	Yes	2.00
137	3.62	0.38	3.10	2.31	1.00	6.35	10.65	67.67	0.303	No	Yes	2.00
138	3.64	0.38	3.09	2.22	1.00	6.45	10.37	66.88	0.308	No	Yes	2.00
139	3.66	0.39	3.08	2.18	1.00	6.48	10.26	66.47	0.309	No	Yes	2.00
140	3.68	0.39	3.08	2.16	1.00	6.53	10.16	66.41	0.312	No	Yes	2.00
141	3.70	0.39	3.07	2.14	1.00	6.61	10.04	66.40	0.316	No	Yes	2.00
142	3.72	0.39	3.08	2.18	1.00	6.58	10.16	66.82	0.314	No	Yes	2.00
143	3.74	0.39	3.10	2.35	1.00	6.47	10.58	68.50	0.309	No	Yes	2.00
144	3.76	0.38	3.12	2.49	1.00	6.40	10.93	69.96	0.305	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.38	3.13	2.61	1.00	6.31	11.26	71.06	0.301	No	Yes	2.00
146	3.80	0.38	3.14	2.67	1.00	6.31	11.36	71.62	0.301	No	Yes	2.00
147	3.82	0.38	3.13	2.68	1.00	6.36	11.31	71.92	0.303	No	Yes	2.00
148	3.84	0.39	3.13	2.61	1.00	6.41	11.13	71.31	0.306	No	Yes	2.00
149	3.86	0.39	3.11	2.47	1.00	6.50	10.77	70.07	0.310	No	Yes	2.00
150	3.88	0.40	3.09	2.33	1.00	6.61	10.40	68.72	0.315	No	Yes	2.00
151	3.90	0.40	3.08	2.24	1.00	6.68	10.15	67.82	0.319	No	Yes	2.00
152	3.92	0.41	3.06	2.16	1.00	6.78	9.90	67.11	0.323	No	Yes	2.00
153	3.94	0.41	3.06	2.13	1.00	6.80	9.81	66.78	0.325	No	Yes	2.00
154	3.96	0.40	3.07	2.18	1.00	6.73	9.97	67.16	0.321	No	Yes	2.00
155	3.98	0.40	3.08	2.23	1.00	6.63	10.18	67.51	0.316	No	Yes	2.00
156	4.00	0.39	3.10	2.32	1.00	6.41	10.59	67.91	0.306	No	Yes	2.00
157	4.02	0.38	3.12	2.40	1.00	6.19	11.01	68.14	0.295	No	Yes	2.00
158	4.04	0.37	3.12	2.40	1.00	6.14	11.07	67.97	0.293	No	Yes	2.00
159	4.06	0.38	3.11	2.32	1.00	6.16	10.90	67.20	0.294	No	Yes	2.00
160	4.08	0.38	3.11	2.24	1.00	6.18	10.72	66.26	0.295	No	Yes	2.00
161	4.10	0.38	3.09	2.11	1.00	6.24	10.40	64.88	0.298	No	Yes	2.00
162	4.12	0.39	3.07	1.97	1.00	6.32	10.03	63.36	0.301	No	Yes	2.00
163	4.14	0.39	3.06	1.87	1.00	6.34	9.79	62.03	0.302	No	Yes	2.00
164	4.16	0.40	3.03	1.77	1.00	6.60	9.30	61.40	0.315	No	Yes	2.00
165	4.18	0.41	3.01	1.74	1.00	6.83	9.02	61.62	0.326	No	Yes	2.00
166	4.20	0.42	3.00	1.77	1.00	7.06	8.86	62.56	0.337	No	Yes	2.00
167	4.22	0.44	3.00	1.82	1.00	7.28	8.76	63.80	0.347	No	Yes	2.00
168	4.24	0.44	3.00	1.87	1.00	7.44	8.71	64.84	0.355	No	Yes	2.00
169	4.26	0.44	3.01	1.93	1.00	7.30	8.96	65.48	0.348	No	Yes	2.00
170	4.28	0.43	3.02	1.97	1.00	7.15	9.17	65.60	0.341	No	Yes	2.00
171	4.30	0.42	3.03	1.98	1.00	7.03	9.29	65.36	0.336	No	Yes	2.00
172	4.32	0.42	3.03	1.93	1.00	6.98	9.26	64.65	0.333	No	Yes	2.00
173	4.34	0.43	3.01	1.85	1.00	7.09	8.99	63.80	0.338	No	Yes	2.00
174	4.36	0.44	2.99	1.79	1.00	7.29	8.69	63.32	0.348	No	Yes	2.00
175	4.38	0.45	2.98	1.74	1.00	7.47	8.43	63.00	0.356	No	Yes	2.00
176	4.40	0.46	2.96	1.67	1.00	7.68	8.13	62.41	0.366	No	Yes	2.00
177	4.42	0.47	2.94	1.61	0.99	7.91	7.83	61.93	0.377	No	Yes	2.00
178	4.44	0.48	2.93	1.58	0.99	8.03	7.68	61.69	0.383	No	Yes	2.00
179	4.46	0.48	2.93	1.56	0.99	8.06	7.61	61.33	0.384	No	Yes	2.00
180	4.48	0.48	2.93	1.58	0.99	8.04	7.66	61.59	0.384	No	Yes	2.00
181	4.50	0.47	2.94	1.63	1.00	7.92	7.86	62.24	0.378	No	Yes	2.00
182	4.52	0.47	2.96	1.69	1.00	7.80	8.08	62.96	0.372	No	Yes	2.00
183	4.54	0.46	2.98	1.77	1.00	7.63	8.37	63.89	0.364	No	Yes	2.00
184	4.56	0.45	2.99	1.86	1.00	7.52	8.63	64.89	0.359	No	Yes	2.00
185	4.58	0.46	2.99	1.84	1.00	7.58	8.55	64.74	0.361	No	Yes	2.00
186	4.60	0.46	2.97	1.78	1.00	7.74	8.30	64.29	0.369	No	Yes	2.00
187	4.62	0.47	2.96	1.75	1.00	7.81	8.19	63.89	0.372	No	Yes	2.00
188	4.64	0.47	2.96	1.73	1.00	7.80	8.15	63.52	0.372	No	Yes	2.00
189	4.66	0.46	2.97	1.72	1.00	7.70	8.21	63.25	0.367	No	Yes	2.00
190	4.68	0.45	2.98	1.77	1.00	7.53	8.45	63.64	0.359	No	Yes	2.00
191	4.70	0.44	3.00	1.82	1.00	7.33	8.71	63.82	0.349	No	Yes	2.00
192	4.72	0.44	3.01	1.85	1.00	7.18	8.91	64.00	0.343	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.44	3.01	1.85	1.00	7.17	8.91	63.87	0.342	No	Yes	2.00
194	4.76	0.44	3.00	1.81	1.00	7.19	8.81	63.36	0.343	No	Yes	2.00
195	4.78	0.44	2.99	1.73	1.00	7.27	8.59	62.46	0.347	No	Yes	2.00
196	4.80	0.44	2.98	1.70	1.00	7.28	8.53	62.05	0.347	No	Yes	2.00
197	4.82	0.44	2.99	1.72	1.00	7.14	8.69	62.06	0.341	No	Yes	2.00
198	4.84	0.42	3.02	1.82	1.00	6.88	9.12	62.77	0.328	No	Yes	2.00
199	4.86	0.41	3.05	1.94	1.00	6.65	9.59	63.80	0.317	No	Yes	2.00
200	4.88	0.40	3.07	2.08	1.00	6.42	10.13	65.03	0.306	No	Yes	2.00
201	4.90	0.39	3.10	2.22	1.00	6.22	10.63	66.05	0.296	No	Yes	2.00
202	4.92	0.39	3.12	2.30	1.00	6.03	11.02	66.50	0.288	No	Yes	2.00
203	4.94	0.38	3.13	2.31	1.00	5.95	11.14	66.30	0.284	No	Yes	2.00
204	4.96	0.39	3.10	2.17	1.00	6.12	10.64	65.15	0.292	No	Yes	2.00
205	4.98	0.42	3.04	1.90	1.00	6.62	9.54	63.21	0.316	No	Yes	2.00
206	5.00	0.43	3.01	1.72	1.00	6.92	8.89	61.52	0.330	No	Yes	2.00
207	5.02	0.45	2.98	1.61	1.00	7.13	8.47	60.39	0.340	No	Yes	2.00
208	5.04	0.46	2.96	1.53	1.00	7.33	8.12	59.50	0.350	No	Yes	2.00
209	5.06	0.46	2.96	1.54	1.00	7.31	8.15	59.56	0.349	No	Yes	2.00
210	5.08	0.44	2.99	1.65	1.00	6.96	8.69	60.46	0.332	No	Yes	2.00
211	5.10	0.44	3.01	1.72	1.00	6.86	8.94	61.28	0.327	No	Yes	2.00
212	5.12	0.44	3.01	1.75	1.00	6.91	8.96	61.89	0.330	No	Yes	2.00
213	5.14	0.44	3.01	1.77	1.00	6.96	8.94	62.25	0.332	No	Yes	2.00
214	5.16	0.45	3.01	1.78	1.00	6.99	8.93	62.48	0.334	No	Yes	2.00
215	5.18	0.45	3.00	1.71	1.00	7.04	8.74	61.57	0.336	No	Yes	2.00
216	5.20	0.45	2.98	1.62	1.00	7.11	8.51	60.49	0.339	No	Yes	2.00
217	5.22	0.46	2.97	1.54	1.00	7.18	8.25	59.28	0.343	No	Yes	2.00
218	5.24	0.46	2.95	1.46	1.00	7.27	8.00	58.21	0.347	No	Yes	2.00
219	5.26	0.47	2.94	1.38	1.00	7.33	7.79	57.09	0.350	No	Yes	2.00
220	5.28	0.47	2.94	1.38	0.99	7.38	7.74	57.13	0.352	No	Yes	2.00
221	5.30	0.48	2.94	1.38	0.99	7.39	7.75	57.25	0.352	No	Yes	2.00
222	5.32	0.47	2.94	1.41	1.00	7.31	7.86	57.44	0.349	No	Yes	2.00
223	5.34	0.46	2.96	1.45	1.00	7.13	8.10	57.75	0.340	No	Yes	2.00
224	5.36	0.45	3.02	1.81	1.00	6.79	9.20	62.48	0.324	No	Yes	2.00
225	5.38	0.44	3.06	2.07	1.00	6.64	9.87	65.48	0.317	No	Yes	2.00
226	5.40	0.43	3.10	2.36	1.00	6.46	10.61	68.56	0.308	No	Yes	2.00
227	5.42	0.42	3.13	2.62	1.00	6.36	11.22	71.34	0.303	No	Yes	2.00
228	5.44	0.42	3.15	2.85	1.00	6.32	11.65	73.66	0.302	No	Yes	2.00
229	5.46	0.43	3.13	2.71	1.00	6.41	11.31	72.47	0.306	No	Yes	2.00
230	5.48	0.42	3.15	2.77	1.00	6.26	11.61	72.64	0.299	No	Yes	2.00
231	5.50	0.42	3.16	2.81	1.00	6.12	11.85	72.52	0.292	No	Yes	2.00
232	5.52	0.41	3.17	2.85	1.00	5.97	12.11	72.34	0.285	No	Yes	2.00
233	5.54	0.40	3.19	2.91	1.00	5.83	12.41	72.36	0.278	No	Yes	2.00
234	5.56	0.40	3.19	2.94	1.00	5.74	12.59	72.25	0.274	No	Yes	2.00
235	5.58	0.40	3.19	2.92	1.00	5.71	12.61	71.96	0.272	No	Yes	2.00
236	5.60	0.40	3.19	2.90	1.00	5.73	12.54	71.82	0.273	No	Yes	2.00
237	5.62	0.40	3.19	2.90	1.00	5.74	12.53	71.88	0.274	No	Yes	2.00
238	5.64	0.40	3.19	2.90	1.00	5.76	12.50	72.00	0.275	No	Yes	2.00
239	5.66	0.40	3.19	2.93	1.00	5.74	12.58	72.15	0.274	No	Yes	2.00
240	5.68	0.41	3.19	2.93	1.00	5.76	12.54	72.26	0.275	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.41	3.19	2.92	1.00	5.80	12.48	72.37	0.277	No	Yes	2.00
242	5.72	0.41	3.19	2.95	1.00	5.79	12.52	72.57	0.276	No	Yes	2.00
243	5.74	0.41	3.19	2.97	1.00	5.82	12.53	72.93	0.278	No	Yes	2.00
244	5.76	0.41	3.19	2.98	1.00	5.87	12.48	73.26	0.280	No	Yes	2.00
245	5.78	0.42	3.19	3.00	1.00	5.87	12.51	73.45	0.280	No	Yes	2.00
246	5.80	0.42	3.19	3.03	1.00	5.87	12.56	73.70	0.280	No	Yes	2.00
247	5.82	0.42	3.19	3.03	1.00	5.90	12.53	73.92	0.281	No	Yes	2.00
248	5.84	0.42	3.19	3.02	1.00	5.92	12.48	73.90	0.282	No	Yes	2.00
249	5.86	0.42	3.19	3.03	1.00	5.92	12.49	73.91	0.282	No	Yes	2.00
250	5.88	0.42	3.19	3.04	1.00	5.93	12.50	74.14	0.283	No	Yes	2.00
251	5.90	0.43	3.19	3.05	1.00	5.96	12.46	74.29	0.284	No	Yes	2.00
252	5.92	0.43	3.19	3.04	1.00	5.97	12.45	74.28	0.285	No	Yes	2.00
253	5.94	0.43	3.19	3.06	1.00	5.94	12.51	74.37	0.283	No	Yes	2.00
254	5.96	0.42	3.20	3.12	1.00	5.88	12.70	74.67	0.280	No	Yes	2.00
255	5.98	0.42	3.21	3.21	1.00	5.77	13.02	75.07	0.275	No	Yes	2.00
256	6.00	0.41	3.23	3.29	1.00	5.65	13.33	75.34	0.270	No	Yes	2.00
257	6.02	0.41	3.24	3.36	1.00	5.57	13.57	75.53	0.265	No	Yes	2.00
258	6.04	0.41	3.24	3.41	1.00	5.50	13.75	75.70	0.263	No	Yes	2.00
259	6.06	0.41	3.24	3.40	1.00	5.49	13.76	75.53	0.262	No	Yes	2.00
260	6.08	0.41	3.24	3.37	1.00	5.47	13.75	75.19	0.261	No	Yes	2.00
261	6.10	0.40	3.25	3.38	1.00	5.39	13.90	74.90	0.257	No	Yes	2.00
262	6.12	0.40	3.25	3.39	1.00	5.33	14.02	74.71	0.254	No	Yes	2.00
263	6.14	0.40	3.26	3.38	1.00	5.24	14.15	74.13	0.250	No	Yes	2.00
264	6.16	0.39	3.26	3.36	1.00	5.17	14.24	73.58	0.247	No	Yes	2.00
265	6.18	0.39	3.26	3.30	1.00	5.13	14.21	72.83	0.245	No	Yes	2.00
266	6.20	0.39	3.26	3.20	1.00	5.12	14.04	71.87	0.244	No	Yes	2.00
267	6.22	0.39	3.24	3.06	1.00	5.14	13.76	70.75	0.245	No	Yes	2.00
268	6.24	0.40	3.24	2.99	1.00	5.16	13.60	70.12	0.246	No	Yes	2.00
269	6.26	0.39	3.24	3.00	1.00	5.12	13.68	70.09	0.244	No	Yes	2.00
270	6.28	0.39	3.25	3.05	1.00	5.10	13.81	70.43	0.243	No	Yes	2.00
271	6.30	0.39	3.26	3.13	1.00	5.05	14.05	70.97	0.241	No	Yes	2.00
272	6.32	0.39	3.27	3.23	1.00	4.97	14.37	71.47	0.237	No	Yes	2.00
273	6.34	0.39	3.28	3.31	1.00	4.90	14.65	71.83	0.234	No	Yes	2.00
274	6.36	0.38	3.28	3.32	1.00	4.85	14.77	71.57	0.231	No	Yes	2.00
275	6.38	0.38	3.29	3.30	1.00	4.79	14.84	71.13	0.229	No	Yes	2.00
276	6.40	0.38	3.29	3.28	1.00	4.75	14.88	70.73	0.227	No	Yes	2.00
277	6.42	0.38	3.29	3.30	1.00	4.71	15.00	70.70	0.225	No	Yes	2.00
278	6.44	0.38	3.30	3.31	1.00	4.70	15.06	70.72	0.224	No	Yes	2.00
279	6.46	0.38	3.30	3.37	1.00	4.66	15.24	71.06	0.222	No	Yes	2.00
280	6.48	0.37	3.31	3.45	1.00	4.62	15.46	71.46	0.220	No	Yes	2.00
281	6.50	0.37	3.32	3.51	1.00	4.58	15.66	71.67	0.218	No	Yes	2.00
282	6.52	0.37	3.32	3.54	1.00	4.53	15.81	71.65	0.216	No	Yes	2.00
283	6.54	0.37	3.33	3.54	1.00	4.51	15.88	71.55	0.215	No	Yes	2.00
284	6.56	0.37	3.32	3.49	1.00	4.52	15.77	71.25	0.216	No	Yes	2.00
285	6.58	0.38	3.31	3.54	1.00	4.66	15.54	72.48	0.223	No	Yes	2.00
286	6.60	0.39	3.31	3.64	1.00	4.77	15.49	73.82	0.227	No	Yes	2.00
287	6.62	0.39	3.31	3.68	1.00	4.82	15.47	74.48	0.230	No	Yes	2.00
288	6.64	0.39	3.31	3.75	1.00	4.83	15.55	75.14	0.231	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	0.40	3.31	3.79	1.00	4.87	15.54	75.68	0.232	No	Yes	2.00
290	6.68	0.39	3.32	3.72	1.00	4.77	15.62	74.51	0.228	No	Yes	2.00
291	6.70	0.39	3.31	3.60	1.00	4.72	15.52	73.23	0.225	No	Yes	2.00
292	6.72	0.39	3.31	3.52	1.00	4.71	15.41	72.55	0.225	No	Yes	2.00
293	6.74	0.39	3.30	3.45	1.00	4.70	15.29	71.86	0.224	No	Yes	2.00
294	6.76	0.39	3.30	3.37	1.00	4.69	15.16	71.17	0.224	No	Yes	2.00
295	6.78	0.39	3.29	3.29	1.00	4.71	14.98	70.57	0.225	No	Yes	2.00
296	6.80	0.39	3.28	3.19	1.00	4.74	14.76	69.91	0.226	No	Yes	2.00
297	6.82	0.40	3.28	3.12	1.00	4.76	14.58	69.36	0.227	No	Yes	2.00
298	6.84	0.40	3.27	3.05	1.00	4.77	14.44	68.82	0.227	No	Yes	2.00
299	6.86	0.40	3.27	3.03	1.00	4.71	14.49	68.32	0.225	No	Yes	2.00
300	6.88	0.39	3.28	3.01	1.00	4.65	14.60	67.82	0.222	No	Yes	2.00
301	6.90	0.39	3.28	2.99	1.00	4.56	14.72	67.20	0.218	No	Yes	2.00
302	6.92	0.38	3.28	2.90	1.00	4.49	14.70	66.06	0.214	No	Yes	2.00
303	6.94	0.38	3.28	2.76	1.00	4.44	14.54	64.56	0.212	No	Yes	2.00
304	6.96	0.38	3.26	2.58	1.00	4.43	14.19	62.79	0.211	No	Yes	2.00
305	6.98	0.38	3.25	2.39	1.00	4.41	13.82	60.97	0.210	No	Yes	2.00
306	7.00	0.38	3.23	2.22	1.00	4.40	13.46	59.22	0.210	No	Yes	2.00
307	7.02	0.38	3.22	2.09	1.00	4.39	13.20	57.94	0.209	No	Yes	2.00
308	7.04	0.38	3.21	2.00	1.00	4.39	12.98	56.93	0.209	No	Yes	2.00
309	7.06	0.38	3.20	1.93	1.00	4.39	12.81	56.28	0.210	No	Yes	2.00
310	7.08	0.39	3.20	1.88	1.00	4.41	12.65	55.85	0.211	No	Yes	2.00
311	7.10	0.39	3.19	1.84	1.00	4.46	12.46	55.55	0.213	No	Yes	2.00
312	7.12	0.39	3.18	1.80	1.00	4.51	12.26	55.33	0.215	No	Yes	2.00
313	7.14	0.40	3.17	1.78	1.00	4.56	12.11	55.26	0.218	No	Yes	2.00
314	7.16	0.40	3.16	1.74	1.00	4.62	11.91	54.96	0.220	No	Yes	2.00
315	7.18	0.41	3.16	1.73	1.00	4.68	11.79	55.12	0.223	No	Yes	2.00
316	7.20	0.42	3.14	1.70	1.00	4.84	11.43	55.28	0.231	No	Yes	2.00
317	7.22	0.43	3.11	1.62	1.00	5.11	10.81	55.26	0.244	No	Yes	2.00
318	7.24	0.47	3.06	1.50	1.00	5.60	9.84	55.08	0.267	No	Yes	2.00
319	7.26	0.50	3.01	1.43	1.00	6.13	9.02	55.32	0.292	No	Yes	2.00
320	7.28	0.53	2.97	1.33	1.00	6.66	8.25	54.98	0.318	No	Yes	2.00
321	7.30	0.56	2.94	1.27	1.00	7.02	7.78	54.65	0.335	No	Yes	2.00
322	7.32	0.57	2.93	1.26	1.00	7.19	7.62	54.75	0.343	No	Yes	2.00
323	7.34	0.57	2.94	1.29	1.00	7.12	7.75	55.20	0.340	No	Yes	2.00
324	7.36	0.56	2.95	1.33	1.00	6.99	7.95	55.56	0.333	No	Yes	2.00
325	7.38	0.55	2.96	1.37	1.00	6.87	8.15	56.03	0.328	No	Yes	2.00
326	7.40	0.55	2.97	1.41	1.00	6.82	8.29	56.57	0.325	No	Yes	2.00
327	7.42	0.55	2.97	1.44	1.00	6.83	8.36	57.10	0.326	No	Yes	2.00
328	7.44	0.56	2.96	1.42	1.00	7.00	8.17	57.14	0.334	No	Yes	2.00
329	7.46	0.58	2.95	1.39	1.00	7.23	7.90	57.09	4.000	Yes	Yes	2.00
330	7.48	0.62	2.91	1.32	0.99	7.73	7.34	56.72	4.000	Yes	Yes	2.00
331	7.50	0.74	2.79	1.07	0.95	9.42	5.75	54.14	4.000	Yes	Yes	2.00
332	7.52	0.91	2.67	0.89	0.90	11.69	8.57	100.17	4.000	Yes	No	2.00
333	7.54	1.09	2.58	0.83	0.87	14.17	4.83	68.45	4.000	Yes	No	2.00
334	7.56	1.25	2.51	0.75	0.84	16.21	3.02	48.96	4.000	Yes	No	2.00
335	7.58	1.43	2.46	0.76	0.82	18.64	2.71	50.47	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00						

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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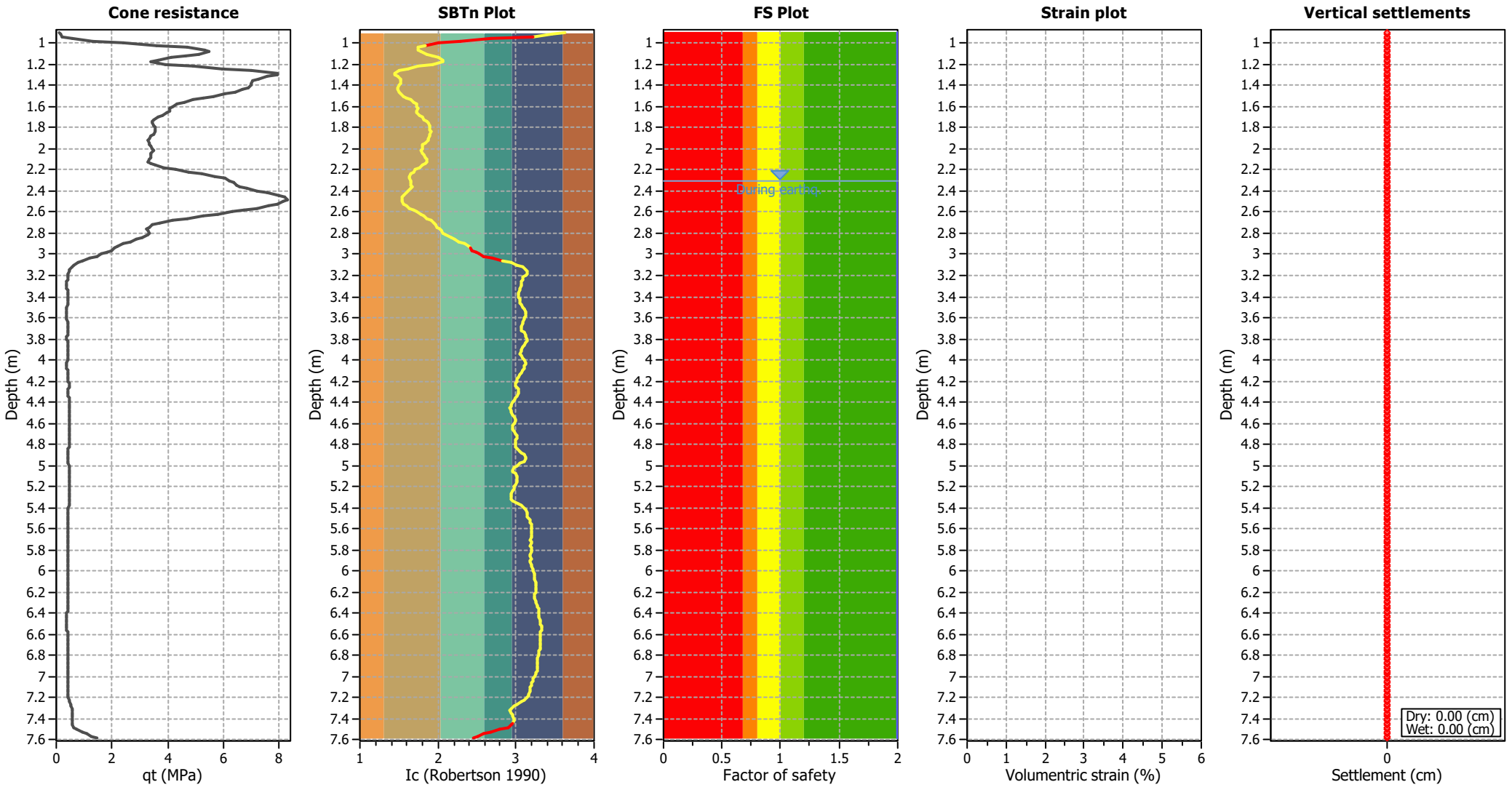
CPT name: CWLP CPT-6CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.30	102.77	2.00	0.00	0.87	0.00	2.32	104.79	2.00	0.00	0.87	0.00
2.34	106.68	2.00	0.00	0.87	0.00	2.36	108.38	2.00	0.00	0.87	0.00
2.38	111.31	2.00	0.00	0.87	0.00	2.40	116.52	2.00	0.00	0.87	0.00
2.42	120.84	2.00	0.00	0.87	0.00	2.44	125.38	2.00	0.00	0.86	0.00
2.46	128.15	2.00	0.00	0.86	0.00	2.48	128.62	2.00	0.00	0.86	0.00
2.50	126.21	2.00	0.00	0.86	0.00	2.52	123.85	2.00	0.00	0.86	0.00
2.54	119.84	2.00	0.00	0.86	0.00	2.56	115.29	2.00	0.00	0.86	0.00
2.58	109.91	2.00	0.00	0.86	0.00	2.60	109.68	2.00	0.00	0.86	0.00
2.62	109.24	2.00	0.00	0.85	0.00	2.64	104.63	2.00	0.00	0.85	0.00
2.66	97.60	2.00	0.00	0.85	0.00	2.68	90.06	2.00	0.00	0.85	0.00
2.70	82.83	2.00	0.00	0.85	0.00	2.72	78.49	2.00	0.00	0.85	0.00
2.74	76.80	2.00	0.00	0.85	0.00	2.76	77.34	2.00	0.00	0.85	0.00
2.78	79.27	2.00	0.00	0.85	0.00	2.80	82.77	2.00	0.00	0.84	0.00
2.82	85.37	2.00	0.00	0.84	0.00	2.84	88.27	2.00	0.00	0.84	0.00
2.86	91.28	2.00	0.00	0.84	0.00	2.88	94.21	2.00	0.00	0.84	0.00
2.90	97.71	2.00	0.00	0.84	0.00	2.92	101.29	2.00	0.00	0.84	0.00
2.94	100.26	2.00	0.00	0.84	0.00	2.96	98.75	2.00	0.00	0.84	0.00
2.98	100.19	2.00	0.00	0.83	0.00	3.00	110.96	2.00	0.00	0.83	0.00
3.02	138.70	2.00	0.00	0.83	0.00	3.04	226.62	2.00	0.00	0.83	0.00
3.06	109.32	2.00	0.00	0.83	0.00	3.08	108.80	2.00	0.00	0.83	0.00
3.10	104.97	2.00	0.00	0.83	0.00	3.12	99.38	2.00	0.00	0.83	0.00
3.14	94.65	2.00	0.00	0.83	0.00	3.16	88.26	2.00	0.00	0.82	0.00
3.18	81.78	2.00	0.00	0.82	0.00	3.20	76.22	2.00	0.00	0.82	0.00
3.22	71.33	2.00	0.00	0.82	0.00	3.24	67.68	2.00	0.00	0.82	0.00
3.26	65.72	2.00	0.00	0.82	0.00	3.28	64.43	2.00	0.00	0.82	0.00
3.30	63.54	2.00	0.00	0.82	0.00	3.32	62.87	2.00	0.00	0.82	0.00
3.34	62.18	2.00	0.00	0.81	0.00	3.36	61.83	2.00	0.00	0.81	0.00
3.38	61.71	2.00	0.00	0.81	0.00	3.40	61.96	2.00	0.00	0.81	0.00
3.42	62.43	2.00	0.00	0.81	0.00	3.44	63.00	2.00	0.00	0.81	0.00
3.46	63.72	2.00	0.00	0.81	0.00	3.48	64.60	2.00	0.00	0.81	0.00
3.50	65.49	2.00	0.00	0.81	0.00	3.52	66.29	2.00	0.00	0.80	0.00
3.54	67.01	2.00	0.00	0.80	0.00	3.56	67.51	2.00	0.00	0.80	0.00
3.58	67.84	2.00	0.00	0.80	0.00	3.60	67.93	2.00	0.00	0.80	0.00
3.62	67.67	2.00	0.00	0.80	0.00	3.64	66.88	2.00	0.00	0.80	0.00
3.66	66.47	2.00	0.00	0.80	0.00	3.68	66.41	2.00	0.00	0.80	0.00
3.70	66.40	2.00	0.00	0.79	0.00	3.72	66.82	2.00	0.00	0.79	0.00
3.74	68.50	2.00	0.00	0.79	0.00	3.76	69.96	2.00	0.00	0.79	0.00
3.78	71.06	2.00	0.00	0.79	0.00	3.80	71.62	2.00	0.00	0.79	0.00
3.82	71.92	2.00	0.00	0.79	0.00	3.84	71.31	2.00	0.00	0.79	0.00
3.86	70.07	2.00	0.00	0.79	0.00	3.88	68.72	2.00	0.00	0.78	0.00
3.90	67.82	2.00	0.00	0.78	0.00	3.92	67.11	2.00	0.00	0.78	0.00
3.94	66.78	2.00	0.00	0.78	0.00	3.96	67.16	2.00	0.00	0.78	0.00
3.98	67.51	2.00	0.00	0.78	0.00	4.00	67.91	2.00	0.00	0.78	0.00
4.02	68.14	2.00	0.00	0.78	0.00	4.04	67.97	2.00	0.00	0.78	0.00
4.06	67.20	2.00	0.00	0.77	0.00	4.08	66.26	2.00	0.00	0.77	0.00
4.10	64.88	2.00	0.00	0.77	0.00	4.12	63.36	2.00	0.00	0.77	0.00
4.14	62.03	2.00	0.00	0.77	0.00	4.16	61.40	2.00	0.00	0.77	0.00
4.18	61.62	2.00	0.00	0.77	0.00	4.20	62.56	2.00	0.00	0.77	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.22	63.80	2.00	0.00	0.77	0.00	4.24	64.84	2.00	0.00	0.76	0.00
4.26	65.48	2.00	0.00	0.76	0.00	4.28	65.60	2.00	0.00	0.76	0.00
4.30	65.36	2.00	0.00	0.76	0.00	4.32	64.65	2.00	0.00	0.76	0.00
4.34	63.80	2.00	0.00	0.76	0.00	4.36	63.32	2.00	0.00	0.76	0.00
4.38	63.00	2.00	0.00	0.76	0.00	4.40	62.41	2.00	0.00	0.76	0.00
4.42	61.93	2.00	0.00	0.75	0.00	4.44	61.69	2.00	0.00	0.75	0.00
4.46	61.33	2.00	0.00	0.75	0.00	4.48	61.59	2.00	0.00	0.75	0.00
4.50	62.24	2.00	0.00	0.75	0.00	4.52	62.96	2.00	0.00	0.75	0.00
4.54	63.89	2.00	0.00	0.75	0.00	4.56	64.89	2.00	0.00	0.75	0.00
4.58	64.74	2.00	0.00	0.75	0.00	4.60	64.29	2.00	0.00	0.74	0.00
4.62	63.89	2.00	0.00	0.74	0.00	4.64	63.52	2.00	0.00	0.74	0.00
4.66	63.25	2.00	0.00	0.74	0.00	4.68	63.64	2.00	0.00	0.74	0.00
4.70	63.82	2.00	0.00	0.74	0.00	4.72	64.00	2.00	0.00	0.74	0.00
4.74	63.87	2.00	0.00	0.74	0.00	4.76	63.36	2.00	0.00	0.74	0.00
4.78	62.46	2.00	0.00	0.73	0.00	4.80	62.05	2.00	0.00	0.73	0.00
4.82	62.06	2.00	0.00	0.73	0.00	4.84	62.77	2.00	0.00	0.73	0.00
4.86	63.80	2.00	0.00	0.73	0.00	4.88	65.03	2.00	0.00	0.73	0.00
4.90	66.05	2.00	0.00	0.73	0.00	4.92	66.50	2.00	0.00	0.73	0.00
4.94	66.30	2.00	0.00	0.73	0.00	4.96	65.15	2.00	0.00	0.72	0.00
4.98	63.21	2.00	0.00	0.72	0.00	5.00	61.52	2.00	0.00	0.72	0.00
5.02	60.39	2.00	0.00	0.72	0.00	5.04	59.50	2.00	0.00	0.72	0.00
5.06	59.56	2.00	0.00	0.72	0.00	5.08	60.46	2.00	0.00	0.72	0.00
5.10	61.28	2.00	0.00	0.72	0.00	5.12	61.89	2.00	0.00	0.72	0.00
5.14	62.25	2.00	0.00	0.71	0.00	5.16	62.48	2.00	0.00	0.71	0.00
5.18	61.57	2.00	0.00	0.71	0.00	5.20	60.49	2.00	0.00	0.71	0.00
5.22	59.28	2.00	0.00	0.71	0.00	5.24	58.21	2.00	0.00	0.71	0.00
5.26	57.09	2.00	0.00	0.71	0.00	5.28	57.13	2.00	0.00	0.71	0.00
5.30	57.25	2.00	0.00	0.71	0.00	5.32	57.44	2.00	0.00	0.70	0.00
5.34	57.75	2.00	0.00	0.70	0.00	5.36	62.48	2.00	0.00	0.70	0.00
5.38	65.48	2.00	0.00	0.70	0.00	5.40	68.56	2.00	0.00	0.70	0.00
5.42	71.34	2.00	0.00	0.70	0.00	5.44	73.66	2.00	0.00	0.70	0.00
5.46	72.47	2.00	0.00	0.70	0.00	5.48	72.64	2.00	0.00	0.70	0.00
5.50	72.52	2.00	0.00	0.69	0.00	5.52	72.34	2.00	0.00	0.69	0.00
5.54	72.36	2.00	0.00	0.69	0.00	5.56	72.25	2.00	0.00	0.69	0.00
5.58	71.96	2.00	0.00	0.69	0.00	5.60	71.82	2.00	0.00	0.69	0.00
5.62	71.88	2.00	0.00	0.69	0.00	5.64	72.00	2.00	0.00	0.69	0.00
5.66	72.15	2.00	0.00	0.69	0.00	5.68	72.26	2.00	0.00	0.68	0.00
5.70	72.37	2.00	0.00	0.68	0.00	5.72	72.57	2.00	0.00	0.68	0.00
5.74	72.93	2.00	0.00	0.68	0.00	5.76	73.26	2.00	0.00	0.68	0.00
5.78	73.45	2.00	0.00	0.68	0.00	5.80	73.70	2.00	0.00	0.68	0.00
5.82	73.92	2.00	0.00	0.68	0.00	5.84	73.90	2.00	0.00	0.68	0.00
5.86	73.91	2.00	0.00	0.67	0.00	5.88	74.14	2.00	0.00	0.67	0.00
5.90	74.29	2.00	0.00	0.67	0.00	5.92	74.28	2.00	0.00	0.67	0.00
5.94	74.37	2.00	0.00	0.67	0.00	5.96	74.67	2.00	0.00	0.67	0.00
5.98	75.07	2.00	0.00	0.67	0.00	6.00	75.34	2.00	0.00	0.67	0.00
6.02	75.53	2.00	0.00	0.67	0.00	6.04	75.70	2.00	0.00	0.66	0.00
6.06	75.53	2.00	0.00	0.66	0.00	6.08	75.19	2.00	0.00	0.66	0.00
6.10	74.90	2.00	0.00	0.66	0.00	6.12	74.71	2.00	0.00	0.66	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.14	74.13	2.00	0.00	0.66	0.00	6.16	73.58	2.00	0.00	0.66	0.00
6.18	72.83	2.00	0.00	0.66	0.00	6.20	71.87	2.00	0.00	0.66	0.00
6.22	70.75	2.00	0.00	0.65	0.00	6.24	70.12	2.00	0.00	0.65	0.00
6.26	70.09	2.00	0.00	0.65	0.00	6.28	70.43	2.00	0.00	0.65	0.00
6.30	70.97	2.00	0.00	0.65	0.00	6.32	71.47	2.00	0.00	0.65	0.00
6.34	71.83	2.00	0.00	0.65	0.00	6.36	71.57	2.00	0.00	0.65	0.00
6.38	71.13	2.00	0.00	0.65	0.00	6.40	70.73	2.00	0.00	0.64	0.00
6.42	70.70	2.00	0.00	0.64	0.00	6.44	70.72	2.00	0.00	0.64	0.00
6.46	71.06	2.00	0.00	0.64	0.00	6.48	71.46	2.00	0.00	0.64	0.00
6.50	71.67	2.00	0.00	0.64	0.00	6.52	71.65	2.00	0.00	0.64	0.00
6.54	71.55	2.00	0.00	0.64	0.00	6.56	71.25	2.00	0.00	0.64	0.00
6.58	72.48	2.00	0.00	0.63	0.00	6.60	73.82	2.00	0.00	0.63	0.00
6.62	74.48	2.00	0.00	0.63	0.00	6.64	75.14	2.00	0.00	0.63	0.00
6.66	75.68	2.00	0.00	0.63	0.00	6.68	74.51	2.00	0.00	0.63	0.00
6.70	73.23	2.00	0.00	0.63	0.00	6.72	72.55	2.00	0.00	0.63	0.00
6.74	71.86	2.00	0.00	0.63	0.00	6.76	71.17	2.00	0.00	0.62	0.00
6.78	70.57	2.00	0.00	0.62	0.00	6.80	69.91	2.00	0.00	0.62	0.00
6.82	69.36	2.00	0.00	0.62	0.00	6.84	68.82	2.00	0.00	0.62	0.00
6.86	68.32	2.00	0.00	0.62	0.00	6.88	67.82	2.00	0.00	0.62	0.00
6.90	67.20	2.00	0.00	0.62	0.00	6.92	66.06	2.00	0.00	0.62	0.00
6.94	64.56	2.00	0.00	0.61	0.00	6.96	62.79	2.00	0.00	0.61	0.00
6.98	60.97	2.00	0.00	0.61	0.00	7.00	59.22	2.00	0.00	0.61	0.00
7.02	57.94	2.00	0.00	0.61	0.00	7.04	56.93	2.00	0.00	0.61	0.00
7.06	56.28	2.00	0.00	0.61	0.00	7.08	55.85	2.00	0.00	0.61	0.00
7.10	55.55	2.00	0.00	0.61	0.00	7.12	55.33	2.00	0.00	0.60	0.00
7.14	55.26	2.00	0.00	0.60	0.00	7.16	54.96	2.00	0.00	0.60	0.00
7.18	55.12	2.00	0.00	0.60	0.00	7.20	55.28	2.00	0.00	0.60	0.00
7.22	55.26	2.00	0.00	0.60	0.00	7.24	55.08	2.00	0.00	0.60	0.00
7.26	55.32	2.00	0.00	0.60	0.00	7.28	54.98	2.00	0.00	0.60	0.00
7.30	54.65	2.00	0.00	0.59	0.00	7.32	54.75	2.00	0.00	0.59	0.00
7.34	55.20	2.00	0.00	0.59	0.00	7.36	55.56	2.00	0.00	0.59	0.00
7.38	56.03	2.00	0.00	0.59	0.00	7.40	56.57	2.00	0.00	0.59	0.00
7.42	57.10	2.00	0.00	0.59	0.00	7.44	57.14	2.00	0.00	0.59	0.00
7.46	57.09	2.00	0.00	0.59	0.00	7.48	56.72	2.00	0.00	0.58	0.00
7.50	54.14	2.00	0.00	0.58	0.00	7.52	100.17	2.00	0.00	0.58	0.00
7.54	68.45	2.00	0.00	0.58	0.00	7.56	48.96	2.00	0.00	0.58	0.00
7.58	50.47	2.00	0.00	0.58	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.09	1.57	26.23	41.13	3.62	0.11	0.46
0.92	0.13	2.27	19.88	45.23	3.46	0.11	0.65
0.94	0.20	3.78	13.19	49.88	3.22	0.22	1.06
0.96	0.57	11.08	4.41	48.85	2.67	0.74	0.74
0.98	1.27	24.88	1.89	47.06	2.29	0.04	0.62
1.00	2.40	47.11	1.00	47.11	2.00	0.04	0.62
1.02	3.63	71.29	1.00	71.29	1.83	0.28	0.69
1.04	4.69	92.34	1.00	92.34	1.75	0.73	0.73
1.06	5.35	105.35	1.07	112.99	1.74	0.77	0.77
1.08	5.49	108.05	1.13	121.79	1.78	0.79	0.79
1.10	5.15	101.31	1.20	121.98	1.85	0.79	0.79
1.12	4.64	91.27	1.26	115.35	1.94	0.78	0.78
1.14	4.11	80.82	1.32	106.58	2.01	0.76	0.76
1.16	3.65	71.78	1.37	98.00	2.06	0.74	0.74
1.18	3.37	66.20	1.38	91.18	2.07	0.73	0.73
1.20	3.92	77.09	1.25	96.74	1.93	0.74	0.74
1.22	4.89	96.24	1.09	104.64	1.75	0.76	0.76
1.24	5.98	117.60	1.00	117.60	1.61	0.78	0.78
1.26	7.01	138.10	1.00	138.10	1.50	0.81	0.81
1.28	7.94	155.68	1.00	155.68	1.44	0.83	0.83
1.30	7.96	156.17	1.00	156.17	1.45	0.84	0.84
1.32	7.59	149.42	1.00	149.42	1.49	0.83	0.83
1.34	7.29	143.60	1.00	143.60	1.51	0.82	0.82
1.36	7.09	139.46	1.00	139.46	1.53	0.81	0.81
1.38	7.00	137.79	1.00	137.79	1.52	0.81	0.81
1.40	7.01	137.34	1.00	137.34	1.51	0.81	0.81
1.42	6.90	133.05	1.00	133.05	1.49	0.80	0.80
1.44	6.68	127.49	1.00	127.49	1.48	0.79	0.79
1.46	6.41	122.70	1.00	122.70	1.50	0.79	0.79
1.48	6.07	116.91	1.00	116.91	1.52	0.78	0.78
1.50	5.63	109.69	1.00	109.69	1.56	0.77	0.77
1.52	5.30	104.21	1.00	104.21	1.59	0.76	0.76
1.54	4.91	96.49	1.00	96.49	1.65	0.74	0.74
1.56	4.59	90.13	1.00	90.13	1.69	0.73	0.73
1.58	4.36	85.52	1.00	85.52	1.72	0.72	0.72
1.60	4.20	82.34	1.00	82.34	1.73	0.71	0.71
1.62	4.09	80.30	1.00	80.30	1.74	0.60	0.71
1.64	4.08	80.08	1.00	80.08	1.73	0.59	0.71
1.66	3.97	77.94	1.00	77.94	1.73	0.49	0.70
1.68	3.83	75.08	1.00	75.08	1.76	0.39	0.70
1.70	3.67	72.00	1.00	72.00	1.80	0.30	0.69
1.72	3.52	69.01	1.00	69.01	1.83	0.23	0.68
1.74	3.44	67.29	1.00	67.29	1.85	0.20	0.68
1.76	3.46	67.77	1.23	83.02	1.88	0.71	0.71
1.78	3.49	68.28	1.23	83.96	1.89	0.72	0.72
1.80	3.53	69.18	1.23	85.10	1.89	0.72	0.72
1.82	3.57	69.88	1.24	86.39	1.90	0.72	0.72
1.84	3.57	69.82	1.24	86.89	1.91	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	3.49	68.23	1.24	84.44	1.90	0.72	0.72
1.88	3.40	66.47	1.23	81.88	1.89	0.68	0.71
1.90	3.35	65.50	1.00	65.50	1.88	0.18	0.67
1.92	3.30	64.50	1.00	64.50	1.87	0.16	0.67
1.94	3.32	64.74	1.00	64.74	1.83	0.17	0.67
1.96	3.36	64.40	1.00	64.40	1.81	0.16	0.67
1.98	3.40	64.83	1.00	64.83	1.81	0.17	0.67
2.00	3.45	65.11	1.00	65.11	1.80	0.17	0.67
2.02	3.49	65.24	1.00	65.24	1.79	0.17	0.67
2.04	3.41	63.97	1.00	63.97	1.81	0.16	0.67
2.06	3.39	63.78	1.00	63.78	1.83	0.15	0.67
2.08	3.37	63.15	1.00	63.15	1.83	0.15	0.67
2.10	3.33	62.40	1.00	62.40	1.85	0.14	0.66
2.12	3.29	61.43	1.00	61.43	1.85	0.13	0.66
2.14	3.39	62.32	1.00	62.32	1.83	0.14	0.66
2.16	3.54	63.92	1.00	63.92	1.80	0.15	0.67
2.18	3.85	68.17	1.00	68.17	1.77	0.22	0.68
2.20	4.29	73.77	1.00	73.77	1.70	0.35	0.69
2.22	4.78	81.35	1.00	81.35	1.69	0.65	0.71
2.24	5.26	87.85	1.00	87.85	1.66	0.72	0.72
2.26	5.73	94.52	1.00	94.52	1.64	0.74	0.74
2.28	6.08	99.80	1.00	99.80	1.63	0.75	0.75
2.30	6.25	102.77	1.00	102.77	1.65	0.75	0.75
2.32	6.39	104.79	1.00	104.79	1.65	0.76	0.76
2.34	6.48	106.68	1.00	106.68	1.66	0.76	0.76
2.36	6.59	108.38	1.00	108.38	1.66	0.76	0.76
2.38	6.84	111.31	1.00	111.31	1.64	0.77	0.77
2.40	7.24	116.52	1.00	116.52	1.62	0.78	0.78
2.42	7.60	120.84	1.00	120.84	1.59	0.78	0.78
2.44	7.99	125.38	1.00	125.38	1.56	0.79	0.79
2.46	8.24	128.15	1.00	128.15	1.54	0.80	0.80
2.48	8.32	128.62	1.00	128.62	1.53	0.80	0.80
2.50	8.15	126.21	1.00	126.21	1.54	0.79	0.79
2.52	7.96	123.85	1.00	123.85	1.56	0.79	0.79
2.54	7.62	119.84	1.00	119.84	1.59	0.78	0.78
2.56	7.23	115.29	1.00	115.29	1.64	0.78	0.78
2.58	6.77	109.91	1.00	109.91	1.69	0.77	0.77
2.60	6.34	104.27	1.05	109.68	1.73	0.77	0.77
2.62	5.79	96.77	1.13	109.24	1.78	0.76	0.76
2.64	5.26	88.93	1.18	104.63	1.82	0.76	0.76
2.66	4.72	80.68	1.21	97.60	1.86	0.74	0.74
2.68	4.18	72.46	1.24	90.06	1.91	0.73	0.73
2.70	3.72	65.21	1.27	82.83	1.95	0.71	0.71
2.72	3.46	61.07	1.29	78.49	1.97	0.51	0.70
2.74	3.32	58.88	1.30	76.80	2.00	0.45	0.70
2.76	3.26	58.29	1.33	77.34	2.02	0.47	0.70
2.78	3.30	59.09	1.34	79.27	2.04	0.55	0.71
2.80	3.35	60.42	1.37	82.77	2.06	0.71	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	3.27	59.78	1.43	85.37	2.11	0.72	0.72
2.84	3.09	57.49	1.54	88.27	2.17	0.72	0.72
2.86	2.90	54.74	1.67	91.28	2.22	0.73	0.73
2.88	2.69	51.49	1.83	94.21	2.27	0.74	0.74
2.90	2.42	46.93	2.08	97.71	2.34	0.74	0.74
2.92	2.19	42.34	2.39	101.29	2.40	0.75	0.75
2.94	2.10	40.43	2.48	100.26	2.42	0.75	0.75
2.96	1.99	38.30	2.58	98.75	2.44	0.75	0.75
2.98	1.80	34.53	2.90	100.19	2.49	0.75	0.75
3.00	1.63	31.14	3.24	100.81	2.54	0.77	0.77
3.02	1.46	27.77	3.65	101.30	2.59	0.81	0.81
3.04	1.18	22.39	4.70	105.17	2.70	0.91	0.91
3.06	0.93	17.48	6.25	109.32	2.83	0.76	0.76
3.08	0.76	14.05	7.74	108.80	2.94	0.76	0.76
3.10	0.63	11.48	9.15	104.97	3.02	0.55	0.99
3.12	0.54	9.67	10.27	99.38	3.08	0.48	0.84
3.14	0.48	8.47	11.17	94.65	3.13	0.39	0.73
3.16	0.44	7.70	11.47	88.26	3.14	0.34	0.66
3.18	0.41	7.18	11.39	81.78	3.14	0.28	0.61
3.20	0.40	6.97	10.94	76.22	3.12	0.21	0.59
3.22	0.39	6.77	10.54	71.33	3.10	0.19	0.58
3.24	0.39	6.61	10.24	67.68	3.08	0.17	0.56
3.26	0.38	6.46	10.17	65.72	3.08	0.16	0.55
3.28	0.37	6.36	10.13	64.43	3.07	0.16	0.54
3.30	0.37	6.31	10.07	63.54	3.07	0.15	0.53
3.32	0.38	6.40	9.82	62.87	3.06	0.14	0.54
3.34	0.38	6.50	9.57	62.18	3.04	0.14	0.55
3.36	0.39	6.58	9.39	61.83	3.03	0.14	0.55
3.38	0.39	6.61	9.33	61.71	3.03	0.14	0.55
3.40	0.39	6.62	9.36	61.96	3.03	0.14	0.55
3.42	0.39	6.56	9.51	62.43	3.04	0.14	0.55
3.44	0.39	6.56	9.60	63.00	3.05	0.14	0.55
3.46	0.38	6.50	9.80	63.72	3.06	0.15	0.54
3.48	0.38	6.42	10.06	64.60	3.07	0.15	0.53
3.50	0.38	6.33	10.35	65.49	3.09	0.15	0.52
3.52	0.37	6.23	10.63	66.29	3.10	0.16	0.51
3.54	0.37	6.13	10.93	67.01	3.12	0.17	0.50
3.56	0.37	6.15	10.98	67.51	3.12	0.17	0.50
3.58	0.37	6.19	10.96	67.84	3.12	0.17	0.51
3.60	0.37	6.25	10.87	67.93	3.11	0.17	0.51
3.62	0.38	6.35	10.65	67.67	3.10	0.17	0.52
3.64	0.38	6.45	10.37	66.88	3.09	0.17	0.52
3.66	0.39	6.48	10.26	66.47	3.08	0.16	0.52
3.68	0.39	6.53	10.16	66.41	3.08	0.15	0.53
3.70	0.39	6.61	10.04	66.40	3.07	0.16	0.53
3.72	0.39	6.58	10.16	66.82	3.08	0.17	0.53
3.74	0.39	6.47	10.58	68.50	3.10	0.17	0.52
3.76	0.38	6.40	10.93	69.96	3.12	0.17	0.51

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.38	6.31	11.26	71.06	3.13	0.19	0.50
3.80	0.38	6.31	11.36	71.62	3.14	0.20	0.50
3.82	0.38	6.36	11.31	71.92	3.13	0.20	0.51
3.84	0.39	6.41	11.13	71.31	3.13	0.18	0.51
3.86	0.39	6.50	10.77	70.07	3.11	0.18	0.51
3.88	0.40	6.61	10.40	68.72	3.09	0.17	0.52
3.90	0.40	6.68	10.15	67.82	3.08	0.16	0.53
3.92	0.41	6.78	9.90	67.11	3.06	0.16	0.53
3.94	0.41	6.80	9.81	66.78	3.06	0.16	0.53
3.96	0.40	6.73	9.97	67.16	3.07	0.16	0.53
3.98	0.40	6.63	10.18	67.51	3.08	0.16	0.52
4.00	0.39	6.41	10.59	67.91	3.10	0.17	0.50
4.02	0.38	6.19	11.01	68.14	3.12	0.16	0.48
4.04	0.37	6.14	11.07	67.97	3.12	0.16	0.48
4.06	0.38	6.16	10.90	67.20	3.11	0.16	0.48
4.08	0.38	6.18	10.72	66.26	3.11	0.15	0.48
4.10	0.38	6.24	10.40	64.88	3.09	0.14	0.48
4.12	0.39	6.32	10.03	63.36	3.07	0.13	0.49
4.14	0.39	6.34	9.79	62.03	3.06	0.12	0.49
4.16	0.40	6.60	9.30	61.40	3.03	0.12	0.51
4.18	0.41	6.83	9.02	61.62	3.01	0.12	0.52
4.20	0.42	7.06	8.86	62.56	3.00	0.13	0.54
4.22	0.44	7.28	8.76	63.80	3.00	0.15	0.67
4.24	0.44	7.44	8.71	64.84	3.00	0.17	0.67
4.26	0.44	7.30	8.96	65.48	3.01	0.16	0.55
4.28	0.43	7.15	9.17	65.60	3.02	0.15	0.54
4.30	0.42	7.03	9.29	65.36	3.03	0.14	0.53
4.32	0.42	6.98	9.26	64.65	3.03	0.14	0.53
4.34	0.43	7.09	8.99	63.80	3.01	0.14	0.53
4.36	0.44	7.29	8.69	63.32	2.99	0.15	0.67
4.38	0.45	7.47	8.43	63.00	2.98	0.14	0.66
4.40	0.46	7.68	8.13	62.41	2.96	0.14	0.66
4.42	0.47	7.91	7.83	61.93	2.94	0.13	0.66
4.44	0.48	8.03	7.68	61.69	2.93	0.13	0.66
4.46	0.48	8.06	7.61	61.33	2.93	0.13	0.66
4.48	0.48	8.04	7.66	61.59	2.93	0.13	0.66
4.50	0.47	7.92	7.86	62.24	2.94	0.14	0.66
4.52	0.47	7.80	8.08	62.96	2.96	0.14	0.66
4.54	0.46	7.63	8.37	63.89	2.98	0.15	0.67
4.56	0.45	7.52	8.63	64.89	2.99	0.17	0.67
4.58	0.46	7.58	8.55	64.74	2.99	0.17	0.67
4.60	0.46	7.74	8.30	64.29	2.97	0.16	0.67
4.62	0.47	7.81	8.19	63.89	2.96	0.15	0.67
4.64	0.47	7.80	8.15	63.52	2.96	0.15	0.67
4.66	0.46	7.70	8.21	63.25	2.97	0.15	0.67
4.68	0.45	7.53	8.45	63.64	2.98	0.15	0.67
4.70	0.44	7.33	8.71	63.82	3.00	0.15	0.67
4.72	0.44	7.18	8.91	64.00	3.01	0.14	0.52

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.44	7.17	8.91	63.87	3.01	0.13	0.52
4.76	0.44	7.19	8.81	63.36	3.00	0.13	0.52
4.78	0.44	7.27	8.59	62.46	2.99	0.14	0.66
4.80	0.44	7.28	8.53	62.05	2.98	0.13	0.66
4.82	0.44	7.14	8.69	62.06	2.99	0.13	0.66
4.84	0.42	6.88	9.12	62.77	3.02	0.12	0.49
4.86	0.41	6.65	9.59	63.80	3.05	0.13	0.48
4.88	0.40	6.42	10.13	65.03	3.07	0.14	0.46
4.90	0.39	6.22	10.63	66.05	3.10	0.14	0.44
4.92	0.39	6.03	11.02	66.50	3.12	0.14	0.43
4.94	0.38	5.95	11.14	66.30	3.13	0.14	0.43
4.96	0.39	6.12	10.64	65.15	3.10	0.13	0.44
4.98	0.42	6.62	9.54	63.21	3.04	0.13	0.47
5.00	0.43	6.92	8.89	61.52	3.01	0.12	0.49
5.02	0.45	7.13	8.47	60.39	2.98	0.12	0.66
5.04	0.46	7.33	8.12	59.50	2.96	0.11	0.66
5.06	0.46	7.31	8.15	59.56	2.96	0.11	0.66
5.08	0.44	6.96	8.69	60.46	2.99	0.12	0.66
5.10	0.44	6.86	8.94	61.28	3.01	0.12	0.49
5.12	0.44	6.91	8.96	61.89	3.01	0.12	0.49
5.14	0.44	6.96	8.94	62.25	3.01	0.12	0.50
5.16	0.45	6.99	8.93	62.48	3.01	0.13	0.50
5.18	0.45	7.04	8.74	61.57	3.00	0.13	0.66
5.20	0.45	7.11	8.51	60.49	2.98	0.12	0.66
5.22	0.46	7.18	8.25	59.28	2.97	0.11	0.65
5.24	0.46	7.27	8.00	58.21	2.95	0.10	0.65
5.26	0.47	7.33	7.79	57.09	2.94	0.09	0.65
5.28	0.47	7.38	7.74	57.13	2.94	0.09	0.65
5.30	0.48	7.39	7.75	57.25	2.94	0.09	0.65
5.32	0.47	7.31	7.86	57.44	2.94	0.09	0.65
5.34	0.46	7.13	8.10	57.75	2.96	0.09	0.65
5.36	0.45	6.79	9.20	62.48	3.02	0.10	0.49
5.38	0.44	6.64	9.87	65.48	3.06	0.10	0.47
5.40	0.43	6.46	10.61	68.56	3.10	0.20	0.46
5.42	0.42	6.36	11.22	71.34	3.13	0.17	0.45
5.44	0.42	6.32	11.65	73.66	3.15	0.18	0.45
5.46	0.43	6.41	11.31	72.47	3.13	0.18	0.46
5.48	0.42	6.26	11.61	72.64	3.15	0.17	0.45
5.50	0.42	6.12	11.85	72.52	3.16	0.17	0.44
5.52	0.41	5.97	12.11	72.34	3.17	0.17	0.43
5.54	0.40	5.83	12.41	72.36	3.19	0.17	0.42
5.56	0.40	5.74	12.59	72.25	3.19	0.17	0.41
5.58	0.40	5.71	12.61	71.96	3.19	0.17	0.41
5.60	0.40	5.73	12.54	71.82	3.19	0.16	0.41
5.62	0.40	5.74	12.53	71.88	3.19	0.16	0.41
5.64	0.40	5.76	12.50	72.00	3.19	0.17	0.41
5.66	0.40	5.74	12.58	72.15	3.19	0.17	0.41
5.68	0.41	5.76	12.54	72.26	3.19	0.17	0.41

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.41	5.80	12.48	72.37	3.19	0.17	0.41
5.72	0.41	5.79	12.52	72.57	3.19	0.17	0.41
5.74	0.41	5.82	12.53	72.93	3.19	0.17	0.42
5.76	0.41	5.87	12.48	73.26	3.19	0.18	0.42
5.78	0.42	5.87	12.51	73.45	3.19	0.18	0.42
5.80	0.42	5.87	12.56	73.70	3.19	0.18	0.42
5.82	0.42	5.90	12.53	73.92	3.19	0.17	0.42
5.84	0.42	5.92	12.48	73.90	3.19	0.18	0.42
5.86	0.42	5.92	12.49	73.91	3.19	0.18	0.42
5.88	0.42	5.93	12.50	74.14	3.19	0.18	0.42
5.90	0.43	5.96	12.46	74.29	3.19	0.18	0.43
5.92	0.43	5.97	12.45	74.28	3.19	0.18	0.43
5.94	0.43	5.94	12.51	74.37	3.19	0.18	0.42
5.96	0.42	5.88	12.70	74.67	3.20	0.18	0.42
5.98	0.42	5.77	13.02	75.07	3.21	0.18	0.41
6.00	0.41	5.65	13.33	75.34	3.23	0.19	0.40
6.02	0.41	5.57	13.57	75.53	3.24	0.19	0.40
6.04	0.41	5.50	13.75	75.70	3.24	0.19	0.39
6.06	0.41	5.49	13.76	75.53	3.24	0.19	0.39
6.08	0.41	5.47	13.75	75.19	3.24	0.19	0.39
6.10	0.40	5.39	13.90	74.90	3.25	0.18	0.39
6.12	0.40	5.33	14.02	74.71	3.25	0.18	0.38
6.14	0.40	5.24	14.15	74.13	3.26	0.18	0.37
6.16	0.39	5.17	14.24	73.58	3.26	0.18	0.37
6.18	0.39	5.13	14.21	72.83	3.26	0.17	0.37
6.20	0.39	5.12	14.04	71.87	3.26	0.16	0.37
6.22	0.39	5.14	13.76	70.75	3.24	0.16	0.37
6.24	0.40	5.16	13.60	70.12	3.24	0.15	0.37
6.26	0.39	5.12	13.68	70.09	3.24	0.15	0.37
6.28	0.39	5.10	13.81	70.43	3.25	0.15	0.36
6.30	0.39	5.05	14.05	70.97	3.26	0.16	0.36
6.32	0.39	4.97	14.37	71.47	3.27	0.17	0.36
6.34	0.39	4.90	14.65	71.83	3.28	0.17	0.35
6.36	0.38	4.85	14.77	71.57	3.28	0.16	0.35
6.38	0.38	4.79	14.84	71.13	3.29	0.16	0.34
6.40	0.38	4.75	14.88	70.73	3.29	0.15	0.34
6.42	0.38	4.71	15.00	70.70	3.29	0.15	0.34
6.44	0.38	4.70	15.06	70.72	3.30	0.15	0.34
6.46	0.38	4.66	15.24	71.06	3.30	0.16	0.33
6.48	0.37	4.62	15.46	71.46	3.31	0.16	0.33
6.50	0.37	4.58	15.66	71.67	3.32	0.16	0.33
6.52	0.37	4.53	15.81	71.65	3.32	0.16	0.32
6.54	0.37	4.51	15.88	71.55	3.33	0.16	0.32
6.56	0.37	4.52	15.77	71.25	3.32	0.16	0.32
6.58	0.38	4.66	15.54	72.48	3.31	0.16	0.33
6.60	0.39	4.77	15.49	73.82	3.31	0.16	0.34
6.62	0.39	4.82	15.47	74.48	3.31	0.20	0.34
6.64	0.39	4.83	15.55	75.14	3.31	0.20	0.35

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	0.40	4.87	15.54	75.68	3.31	0.18	0.35
6.68	0.39	4.77	15.62	74.51	3.32	0.18	0.34
6.70	0.39	4.72	15.52	73.23	3.31	0.17	0.34
6.72	0.39	4.71	15.41	72.55	3.31	0.16	0.34
6.74	0.39	4.70	15.29	71.86	3.30	0.16	0.34
6.76	0.39	4.69	15.16	71.17	3.30	0.16	0.34
6.78	0.39	4.71	14.98	70.57	3.29	0.16	0.34
6.80	0.39	4.74	14.76	69.91	3.28	0.15	0.34
6.82	0.40	4.76	14.58	69.36	3.28	0.15	0.34
6.84	0.40	4.77	14.44	68.82	3.27	0.14	0.34
6.86	0.40	4.71	14.49	68.32	3.27	0.14	0.34
6.88	0.39	4.65	14.60	67.82	3.28	0.14	0.33
6.90	0.39	4.56	14.72	67.20	3.28	0.14	0.33
6.92	0.38	4.49	14.70	66.06	3.28	0.13	0.32
6.94	0.38	4.44	14.54	64.56	3.28	0.13	0.32
6.96	0.38	4.43	14.19	62.79	3.26	0.11	0.32
6.98	0.38	4.41	13.82	60.97	3.25	0.10	0.32
7.00	0.38	4.40	13.46	59.22	3.23	0.09	0.31
7.02	0.38	4.39	13.20	57.94	3.22	0.09	0.31
7.04	0.38	4.39	12.98	56.93	3.21	0.09	0.31
7.06	0.38	4.39	12.81	56.28	3.20	0.08	0.31
7.08	0.39	4.41	12.65	55.85	3.20	0.08	0.32
7.10	0.39	4.46	12.46	55.55	3.19	0.08	0.32
7.12	0.39	4.51	12.26	55.33	3.18	0.08	0.32
7.14	0.40	4.56	12.11	55.26	3.17	0.08	0.33
7.16	0.40	4.62	11.91	54.96	3.16	0.08	0.33
7.18	0.41	4.68	11.79	55.12	3.16	0.08	0.33
7.20	0.42	4.84	11.43	55.28	3.14	0.08	0.35
7.22	0.43	5.11	10.81	55.26	3.11	0.09	0.36
7.24	0.47	5.60	9.84	55.08	3.06	0.09	0.40
7.26	0.50	6.13	9.02	55.32	3.01	0.09	0.44
7.28	0.53	6.66	8.25	54.98	2.97	0.08	0.64
7.30	0.56	7.02	7.78	54.65	2.94	0.07	0.64
7.32	0.57	7.19	7.62	54.75	2.93	0.08	0.64
7.34	0.57	7.12	7.75	55.20	2.94	0.08	0.64
7.36	0.56	6.99	7.95	55.56	2.95	0.08	0.64
7.38	0.55	6.87	8.15	56.03	2.96	0.08	0.64
7.40	0.55	6.82	8.29	56.57	2.97	0.09	0.65
7.42	0.55	6.83	8.36	57.10	2.97	0.09	0.65
7.44	0.56	7.00	8.17	57.14	2.96	0.09	0.65
7.46	0.58	7.23	7.90	57.09	2.95	0.09	0.65
7.48	0.62	7.73	7.34	56.72	2.91	0.09	0.65
7.50	0.74	9.42	5.75	54.14	2.79	0.07	0.64
7.52	0.91	11.69	4.42	51.72	2.67	0.75	0.75
7.54	1.09	14.17	3.60	51.08	2.58	0.22	0.68
7.56	1.25	16.21	3.06	49.54	2.51	0.05	0.62
7.58	1.43	18.64	2.71	50.47	2.46	0.05	0.63

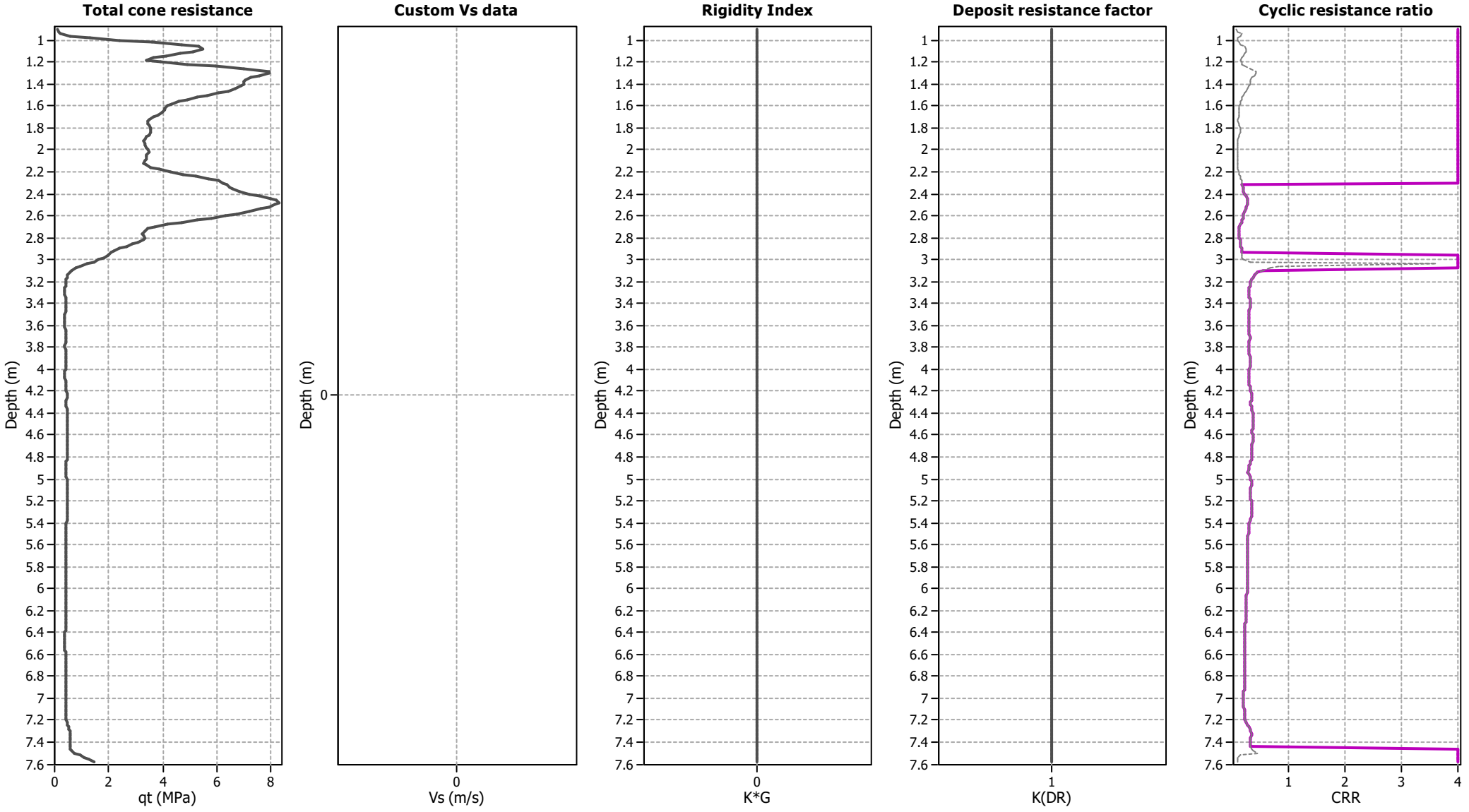
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

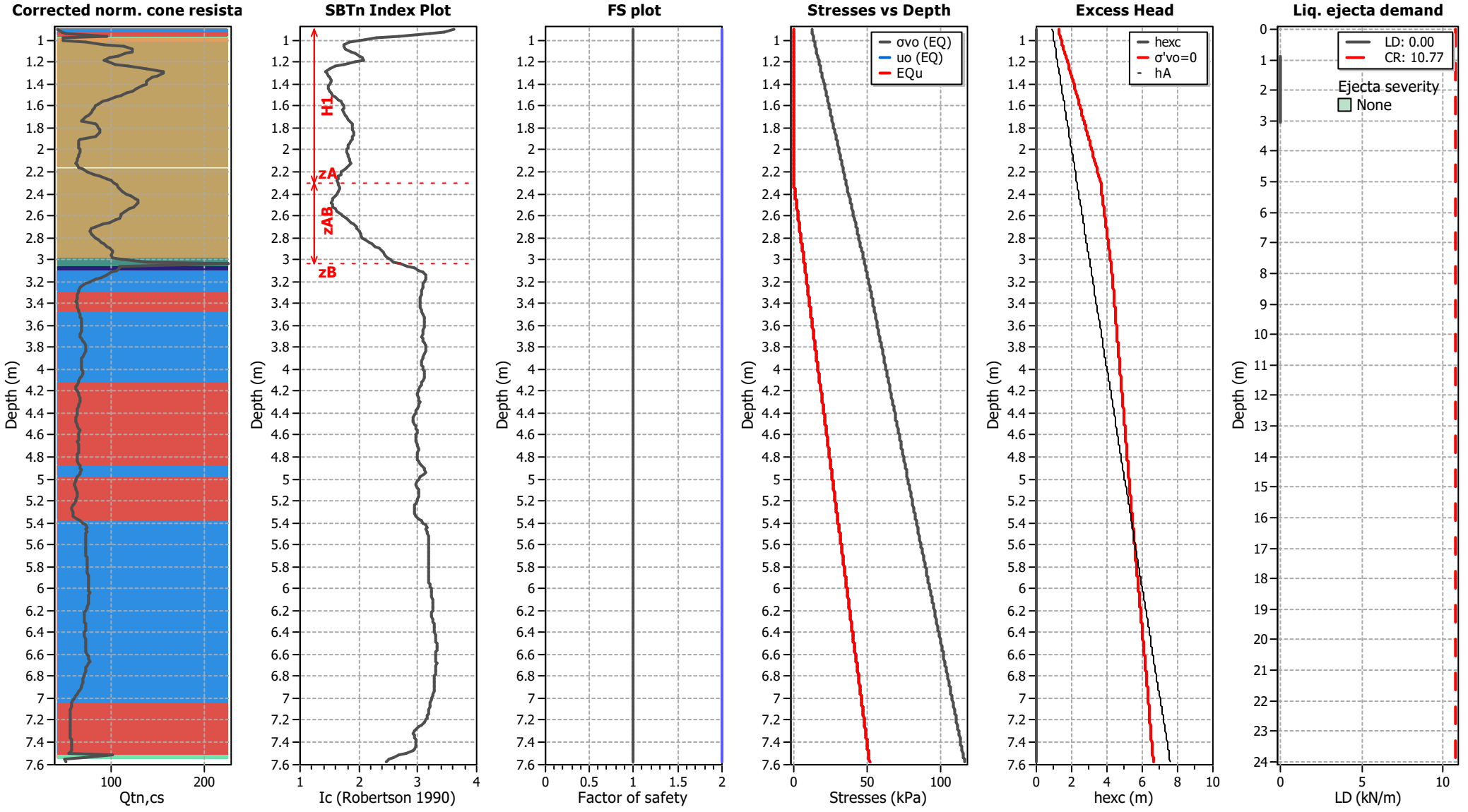
Aging Calculation Estimation



This software is licensed to: Chritina Matthews

CPT name: CWLP CPT-6CCR

Ejecta Severity Estimation



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LIQUEFACTION ANALYSIS REPORT

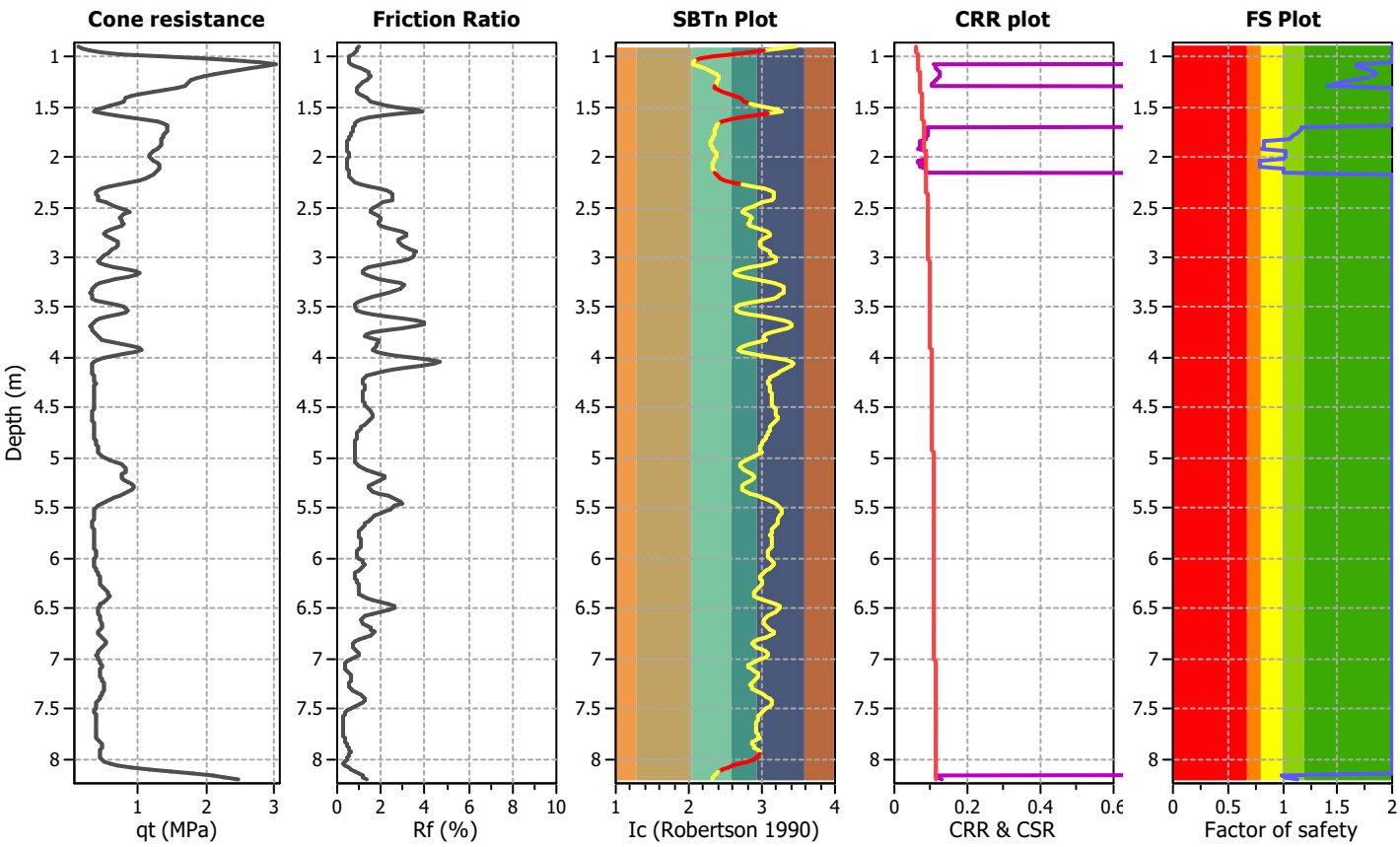
Project title : CWLP Liquefaction Analysis

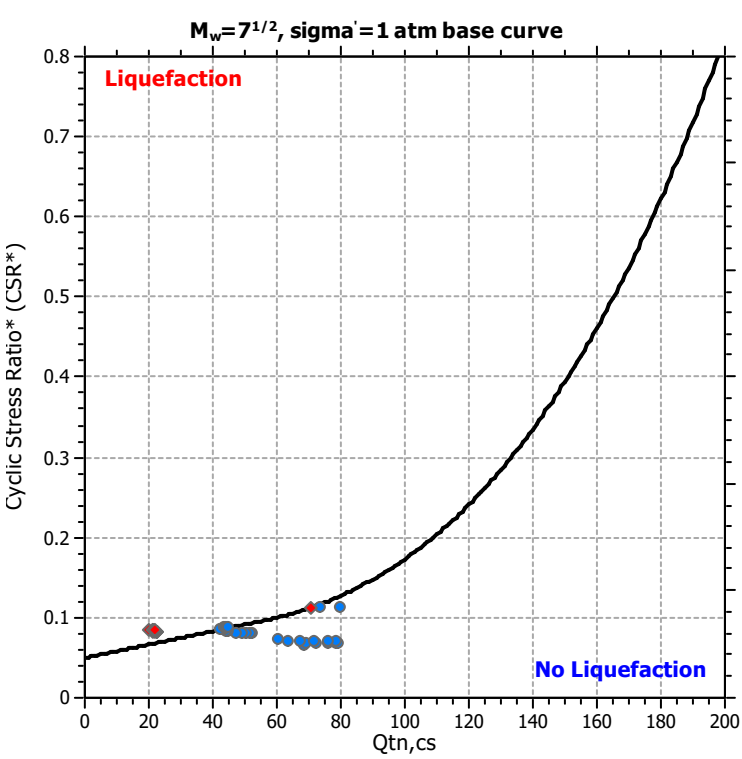
Location : East Lake Shore Drive, Springfield, Illinois

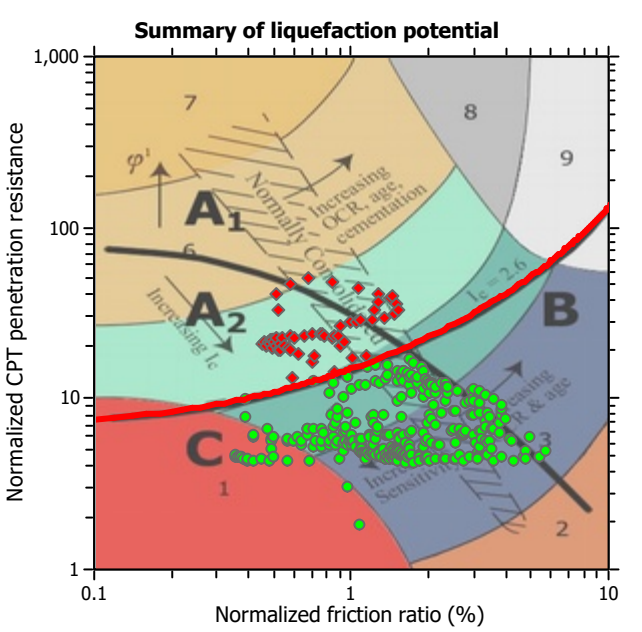
CPT file : CWLPCPT- 7CCR

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.64 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.64 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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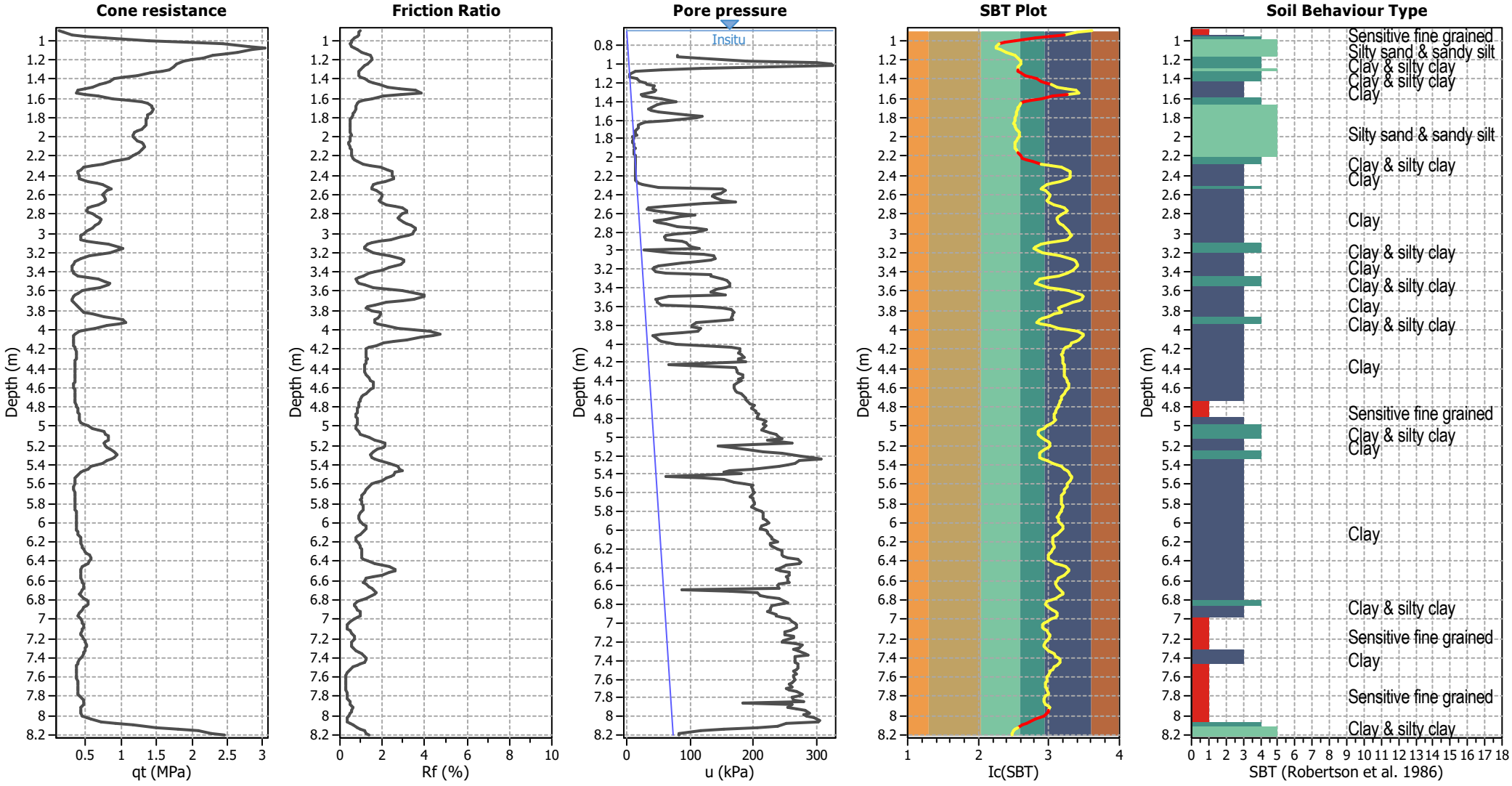
CPT name: CWLPCPT- 7CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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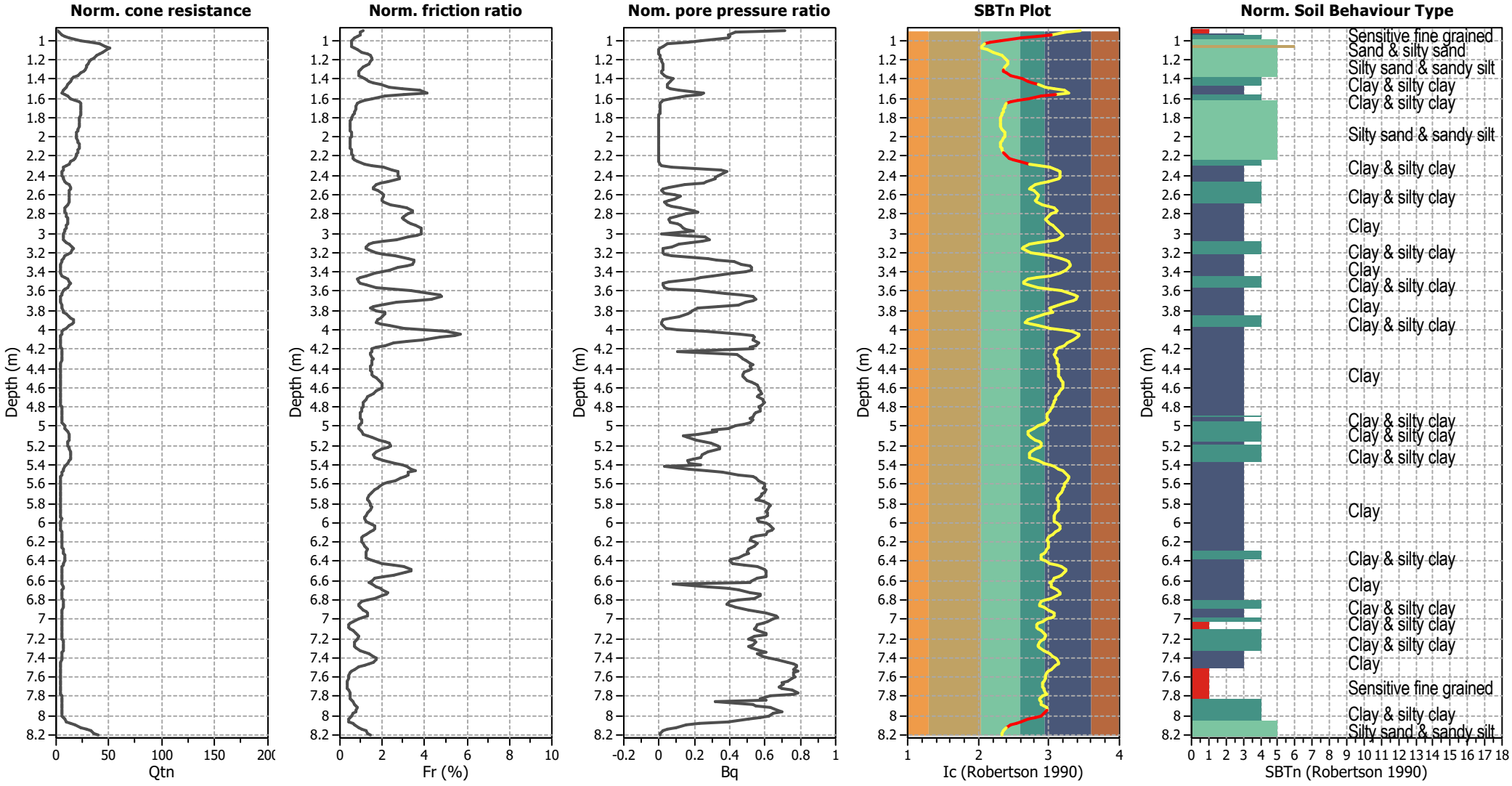
CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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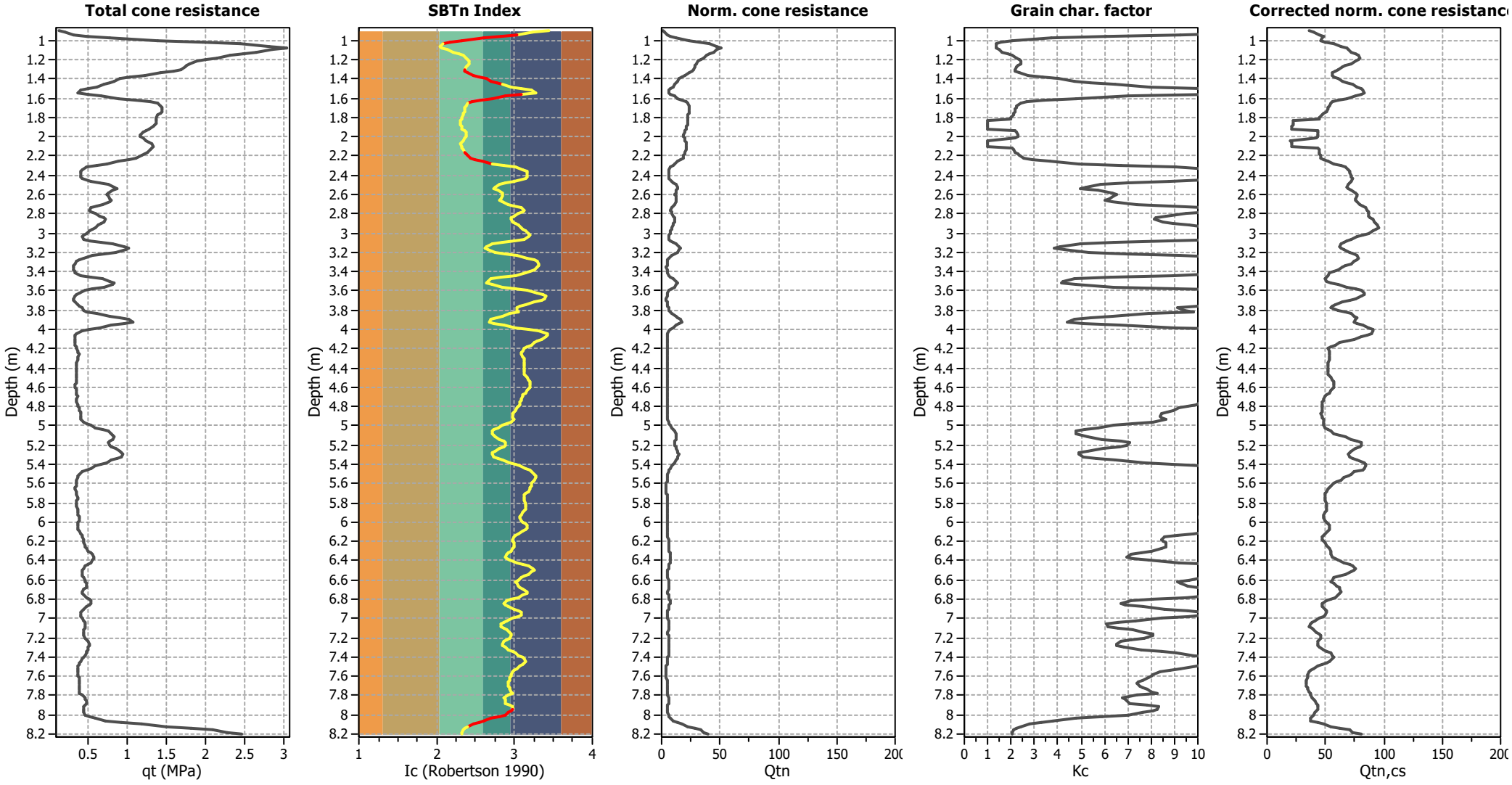
CPT name: CWLPCPT- 7CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

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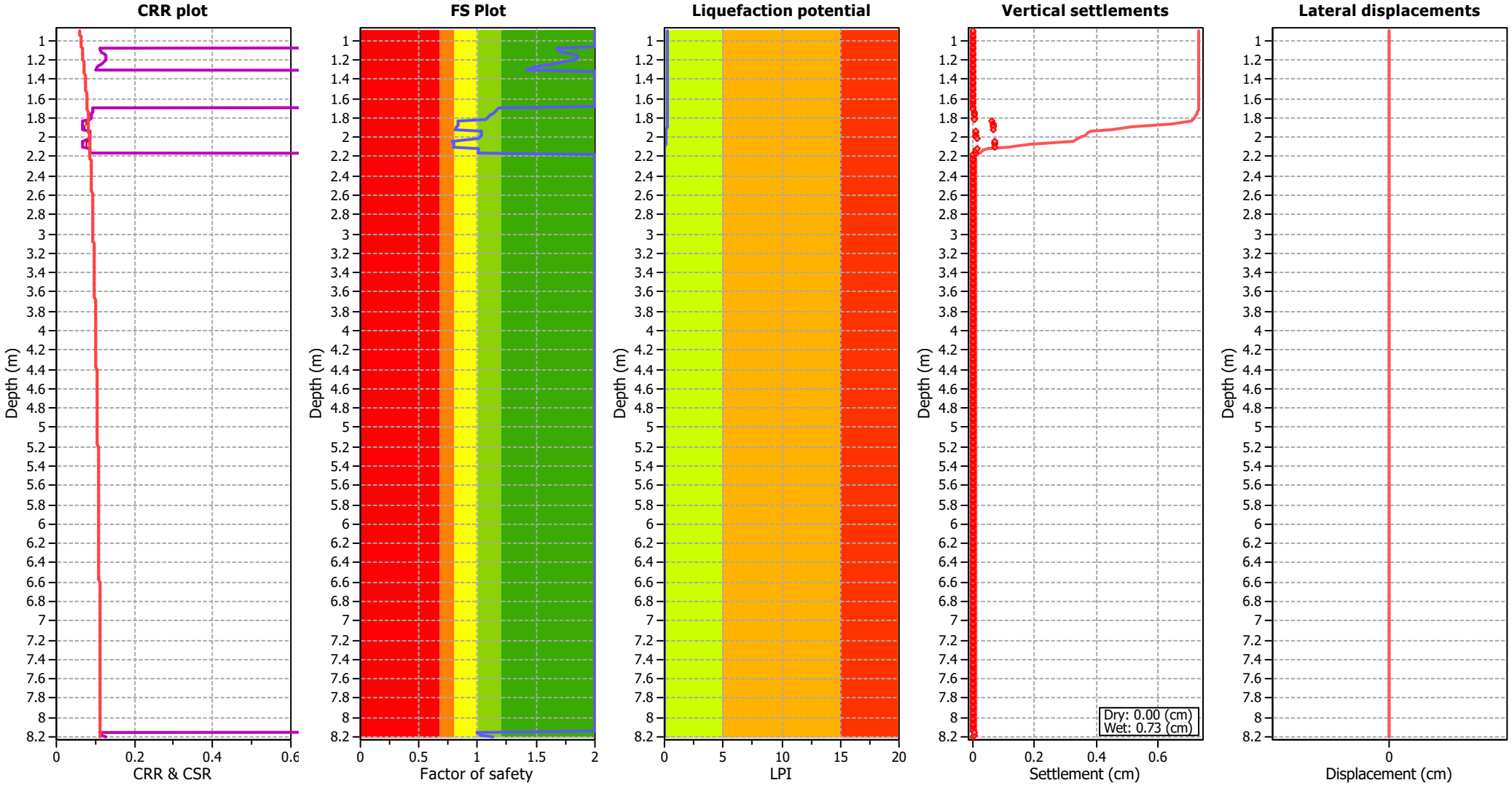
CPT name: CWLPCPT- 7CCR

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

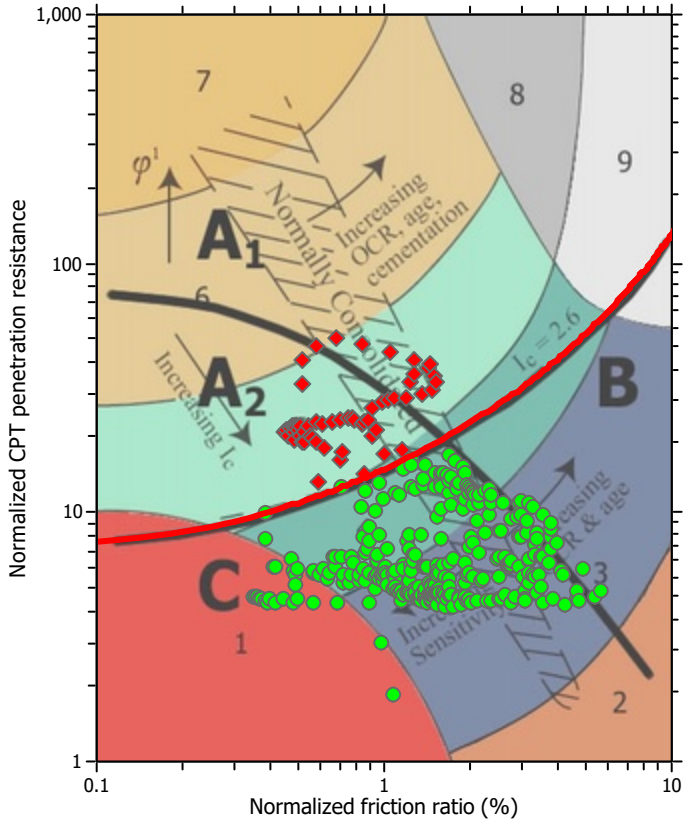
F.S. color scheme

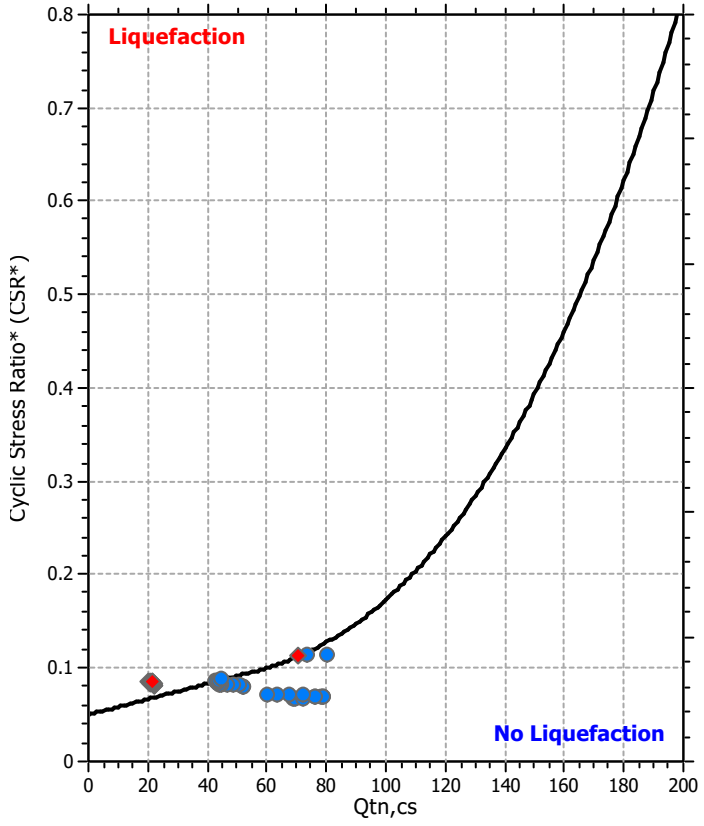
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

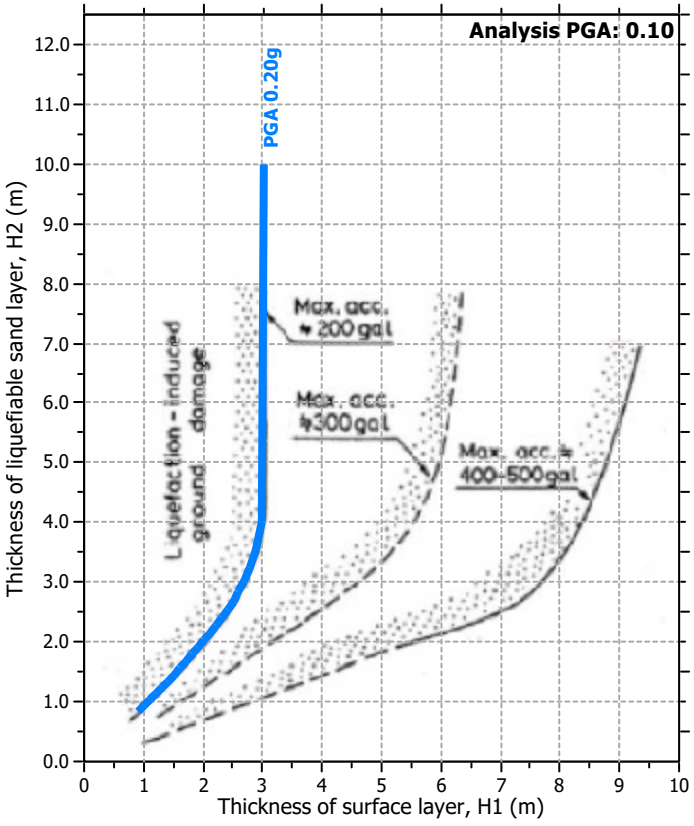
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



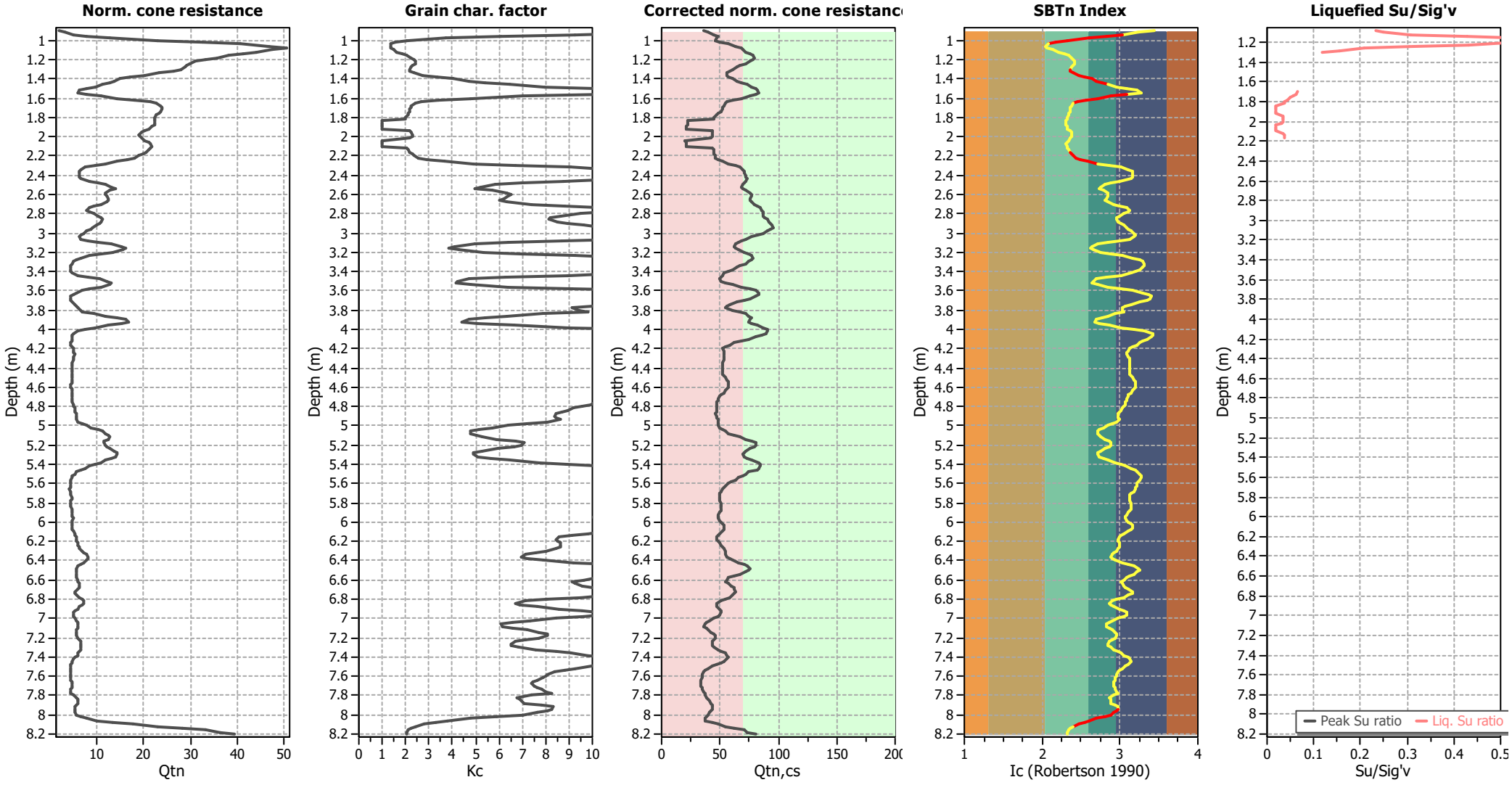




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

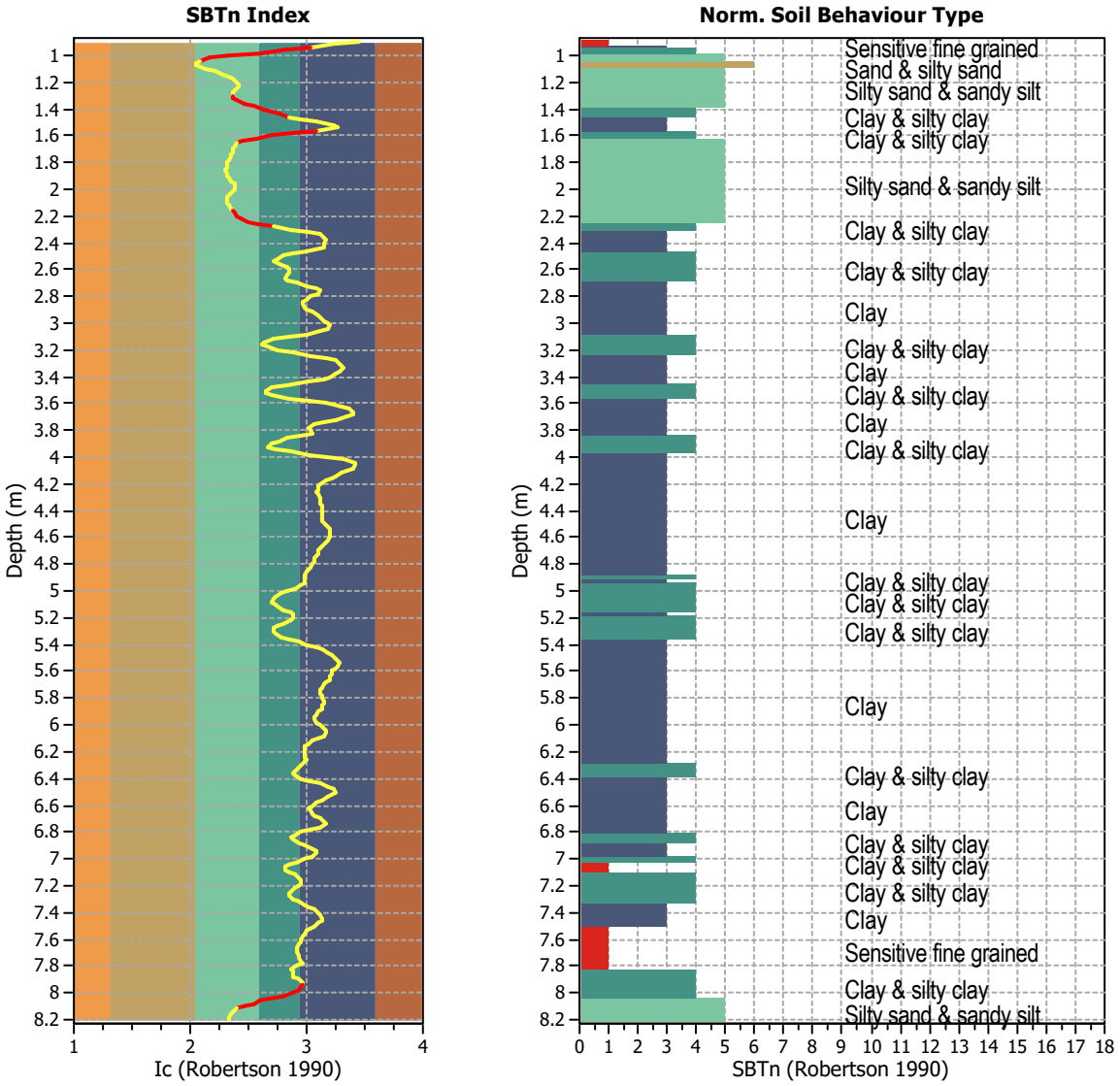
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	0.64 m	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.64 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	366
I_c maximum check value:	3.00	Total points excluded:	38
I_c change ratio value:	0.0100	Exclusion percentage:	10.38%
Minimum number of points in layer:	2	Number of layers detected:	5

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 0.96 (m)	4	Clay & silty clay
		End depth: 1.06 (m)	6	Sand & silty sand
Transition layer 2	9	Start depth: 1.32 (m)	5	Silty sand & sandy silt
		End depth: 1.48 (m)	3	Clay
Transition layer 3	6	Start depth: 1.58 (m)	4	Clay & silty clay
		End depth: 1.68 (m)	5	Silty sand & sandy silt
Transition layer 4	7	Start depth: 2.18 (m)	5	Silty sand & sandy silt
		End depth: 2.30 (m)	4	Clay & silty clay
Transition layer 5	10	Start depth: 7.96 (m)	4	Clay & silty clay
		End depth: 8.14 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.06	1.00	79.80	93.89	13.73
2	0.92	0.06	1.00	79.80	75.36	13.73
3	0.94	0.28	1.90	115.50	60.31	13.73
4	0.96	0.39	3.80	190.20	47.16	14.30
5	0.98	0.58	5.80	300.70	35.37	14.83
6	1.00	0.91	7.40	323.80	23.46	15.49
7	1.02	1.45	8.10	325.20	17.99	15.90
8	1.04	3.37	14.40	117.30	15.27	16.23
9	1.06	3.26	14.70	53.90	14.33	16.58
10	1.08	3.03	17.70	13.30	14.46	16.88
11	1.10	2.83	25.70	4.40	16.66	17.04
12	1.12	2.64	29.50	4.10	19.29	17.19
13	1.14	2.49	32.30	4.50	21.80	17.29
14	1.16	2.24	34.00	16.60	23.74	17.31
15	1.18	2.13	34.90	20.50	25.24	17.26
16	1.20	1.99	31.20	30.30	26.44	17.17
17	1.22	1.84	26.10	31.80	26.98	17.03
18	1.24	1.75	23.90	42.40	26.83	16.86
19	1.26	1.65	20.20	41.70	26.01	16.69
20	1.28	1.69	17.90	46.30	25.22	16.56
21	1.30	1.80	15.90	44.10	24.80	16.40
22	1.32	1.75	15.10	22.20	24.99	16.22
23	1.34	1.49	12.60	24.90	26.55	16.01
24	1.36	1.17	9.70	38.80	29.12	15.81
25	1.38	0.82	8.30	54.90	32.95	15.68
26	1.40	0.84	8.70	78.10	37.01	15.65
27	1.42	0.82	11.90	58.00	40.68	15.70
28	1.44	0.84	13.40	47.00	43.88	15.76
29	1.46	0.79	14.00	38.80	48.80	15.79
30	1.48	0.55	12.50	33.60	55.11	15.78
31	1.50	0.43	12.80	38.30	64.16	15.74
32	1.52	0.35	14.60	51.00	75.07	15.65
33	1.54	0.29	15.60	93.90	78.86	15.65
34	1.56	0.28	14.00	119.10	64.52	15.77
35	1.58	0.41	13.60	109.70	51.32	15.85
36	1.60	1.05	13.20	63.40	40.84	15.88
37	1.62	1.22	12.30	30.80	33.39	15.91
38	1.64	1.35	11.50	22.80	28.48	15.93
39	1.66	1.40	11.00	19.10	26.63	15.91
40	1.68	1.42	11.10	17.60	25.48	15.88
41	1.70	1.47	11.10	16.40	25.12	15.88
42	1.72	1.47	10.30	14.40	24.92	15.85
43	1.74	1.44	11.00	14.60	24.55	15.78
44	1.76	1.42	9.90	14.90	24.24	15.66
45	1.78	1.37	7.70	9.90	24.01	15.53
46	1.80	1.35	6.60	10.40	23.40	15.38
47	1.82	1.31	5.70	10.00	23.15	15.32
48	1.84	1.37	6.30	10.00	5.00	15.26

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.38	7.90	10.40	5.00	15.24
50	1.88	1.37	6.20	11.40	5.00	15.25
51	1.90	1.34	5.90	12.60	5.00	15.23
52	1.92	1.30	6.10	12.40	5.00	15.16
53	1.94	1.22	5.90	12.20	24.60	15.15
54	1.96	1.16	6.30	12.50	25.41	15.13
55	1.98	1.13	6.30	12.70	25.83	15.11
56	2.00	1.13	5.90	14.00	25.63	15.09
57	2.02	1.17	5.70	13.70	24.87	15.06
58	2.04	1.23	5.30	13.10	5.00	15.05
59	2.06	1.30	5.30	13.00	5.00	15.07
60	2.08	1.33	5.70	13.70	5.00	15.12
61	2.10	1.35	6.10	14.20	5.00	15.18
62	2.12	1.33	6.70	14.30	23.52	15.23
63	2.14	1.29	6.80	13.60	24.19	15.26
64	2.16	1.26	6.80	13.80	24.92	15.27
65	2.18	1.20	6.70	14.00	25.61	15.25
66	2.20	1.17	6.60	14.20	26.48	15.23
67	2.22	1.14	6.50	14.40	27.75	15.21
68	2.24	1.07	6.60	14.80	30.43	15.20
69	2.26	0.97	7.00	16.40	34.76	15.21
70	2.28	0.69	7.50	18.90	41.37	15.26
71	2.30	0.52	8.50	26.00	49.76	15.27
72	2.32	0.41	10.20	49.80	59.58	15.25
73	2.34	0.35	10.00	151.20	66.41	15.25
74	2.36	0.36	9.60	155.70	69.56	15.26
75	2.38	0.37	9.60	150.00	69.82	15.25
76	2.40	0.39	9.60	137.50	69.57	15.27
77	2.42	0.38	10.10	135.10	69.49	15.31
78	2.44	0.38	10.70	139.50	68.79	15.36
79	2.46	0.38	11.00	151.20	58.47	15.51
80	2.48	0.42	11.50	170.90	50.96	15.64
81	2.50	0.96	12.20	121.30	45.97	15.72
82	2.52	0.97	12.50	58.80	43.11	15.81
83	2.54	0.89	12.30	35.20	41.78	15.90
84	2.56	0.78	13.70	31.50	45.24	15.91
85	2.58	0.69	15.10	42.90	48.18	15.93
86	2.60	0.61	15.00	79.80	49.06	15.95
87	2.62	0.71	14.80	106.60	48.50	15.97
88	2.64	0.83	14.10	84.60	47.55	15.98
89	2.66	0.85	14.70	61.80	46.88	15.99
90	2.68	0.79	15.10	42.70	48.20	15.99
91	2.70	0.69	15.10	49.10	52.77	15.97
92	2.72	0.58	15.20	61.40	58.66	15.94
93	2.74	0.44	15.80	81.00	64.16	15.90
94	2.76	0.42	16.30	109.20	67.00	15.91
95	2.78	0.44	15.40	127.10	65.32	15.99
96	2.80	0.56	17.10	107.10	61.28	16.08

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.72	19.20	77.30	57.93	16.15
98	2.84	0.74	19.50	62.30	56.05	16.23
99	2.86	0.70	19.20	58.90	55.89	16.30
100	2.88	0.66	20.10	62.70	57.36	16.33
101	2.90	0.65	22.30	86.60	59.00	16.32
102	2.92	0.64	22.00	93.50	61.81	16.30
103	2.94	0.62	20.50	97.80	65.17	16.27
104	2.96	0.50	19.40	102.90	66.51	16.19
105	2.98	0.43	19.50	113.80	68.70	16.05
106	3.00	0.52	16.70	28.00	71.45	15.88
107	3.02	0.43	13.70	67.90	72.44	15.71
108	3.04	0.38	10.60	120.70	71.31	15.52
109	3.06	0.35	9.80	136.30	67.04	15.37
110	3.08	0.36	9.30	140.10	58.01	15.33
111	3.10	0.58	8.80	132.40	48.56	15.43
112	3.12	0.82	9.40	112.20	41.70	15.62
113	3.14	1.06	11.00	86.20	37.23	15.77
114	3.16	1.17	14.30	49.70	36.08	15.86
115	3.18	1.10	13.60	43.60	38.42	15.91
116	3.20	0.88	12.30	40.70	43.53	15.91
117	3.22	0.57	13.10	44.90	50.80	15.80
118	3.24	0.46	14.10	61.90	60.32	15.69
119	3.26	0.37	12.30	133.10	70.68	15.56
120	3.28	0.37	12.30	133.10	76.62	15.44
121	3.30	0.31	10.10	151.80	79.92	15.29
122	3.32	0.28	9.30	157.00	81.30	15.15
123	3.34	0.28	8.40	159.80	81.82	14.96
124	3.36	0.28	7.50	161.90	79.97	14.79
125	3.38	0.28	5.60	162.60	76.66	14.63
126	3.40	0.29	4.80	156.30	73.35	14.46
127	3.42	0.31	4.40	143.00	69.09	14.31
128	3.44	0.30	4.00	132.40	59.19	14.31
129	3.46	0.34	4.00	140.90	47.92	14.52
130	3.48	0.62	4.30	155.20	40.53	14.75
131	3.50	0.99	6.60	65.50	37.90	15.00
132	3.52	1.05	7.30	46.30	37.60	15.25
133	3.54	0.80	9.00	47.40	40.87	15.48
134	3.56	0.65	10.90	48.70	48.48	15.61
135	3.58	0.51	13.10	54.50	59.82	15.66
136	3.60	0.40	15.00	119.90	70.71	15.67
137	3.62	0.33	14.40	151.90	80.60	15.65
138	3.64	0.29	13.90	164.40	87.16	15.58
139	3.66	0.28	13.30	169.10	89.98	15.46
140	3.68	0.28	11.70	167.80	89.09	15.29
141	3.70	0.28	9.60	166.60	85.06	15.08
142	3.72	0.28	6.00	165.00	77.31	14.85
143	3.74	0.30	5.00	166.70	68.61	14.63
144	3.76	0.38	4.30	140.20	63.10	14.50

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.45	4.40	110.40	59.97	14.52
146	3.80	0.42	5.90	103.20	60.98	14.85
147	3.82	0.42	5.90	103.20	62.41	15.20
148	3.84	0.44	12.80	117.50	54.94	15.60
149	3.86	0.52	15.10	111.70	48.22	15.93
150	3.88	1.13	17.70	87.80	43.87	16.17
151	3.90	1.24	19.00	55.70	40.45	16.25
152	3.92	1.15	17.50	41.80	39.03	16.28
153	3.94	0.97	15.20	47.70	42.46	16.24
154	3.96	0.78	16.10	49.40	49.50	16.17
155	3.98	0.63	17.70	54.00	59.25	16.09
156	4.00	0.41	19.00	77.40	70.94	16.03
157	4.02	0.33	18.30	124.60	82.06	15.94
158	4.04	0.30	17.30	164.40	91.01	15.81
159	4.06	0.30	15.10	178.00	91.84	15.65
160	4.08	0.30	12.60	177.70	89.45	15.48
161	4.10	0.30	9.90	175.40	85.35	15.26
162	4.12	0.30	8.10	180.60	81.05	15.00
163	4.14	0.30	6.30	184.50	77.41	14.74
164	4.16	0.30	4.70	177.20	74.79	14.53
165	4.18	0.29	4.40	177.10	69.84	14.36
166	4.20	0.29	4.30	187.90	66.84	14.26
167	4.22	0.39	4.00	66.50	65.76	14.28
168	4.24	0.36	4.00	118.40	64.95	14.32
169	4.26	0.34	5.00	171.80	64.13	14.34
170	4.28	0.33	4.90	174.80	65.68	14.35
171	4.30	0.33	4.60	174.70	66.68	14.35
172	4.32	0.32	4.30	177.20	66.85	14.30
173	4.34	0.32	4.10	183.30	66.96	14.25
174	4.36	0.32	4.20	183.10	67.52	14.21
175	4.38	0.31	4.00	177.00	67.78	14.18
176	4.40	0.30	4.00	180.60	67.53	14.17
177	4.42	0.31	3.90	175.60	67.57	14.17
178	4.44	0.33	3.90	170.50	67.64	14.20
179	4.46	0.32	4.20	168.90	67.71	14.24
180	4.48	0.32	4.40	170.00	68.48	14.31
181	4.50	0.32	4.80	171.60	69.93	14.37
182	4.52	0.31	5.10	174.90	71.25	14.43
183	4.54	0.31	5.30	180.60	72.43	14.48
184	4.56	0.30	5.50	182.80	73.20	14.49
185	4.58	0.30	5.50	186.80	73.46	14.49
186	4.60	0.30	5.20	186.80	73.38	14.45
187	4.62	0.30	5.00	189.50	71.91	14.40
188	4.64	0.30	4.60	195.40	69.87	14.34
189	4.66	0.32	4.30	200.90	67.96	14.27
190	4.68	0.33	4.00	198.80	66.38	14.17
191	4.70	0.33	3.70	196.10	65.21	14.09
192	4.72	0.31	3.20	202.90	65.09	14.01

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.30	3.20	204.60	64.39	13.95
194	4.76	0.30	3.20	208.20	63.61	13.91
195	4.78	0.33	3.10	206.40	62.87	13.92
196	4.80	0.34	3.10	207.00	61.65	13.93
197	4.82	0.34	3.30	216.00	60.19	13.94
198	4.84	0.34	3.20	220.10	59.16	13.93
199	4.86	0.35	3.10	215.70	58.14	13.93
200	4.88	0.37	2.90	219.20	57.15	13.93
201	4.90	0.38	3.00	217.10	57.00	13.96
202	4.92	0.38	3.20	212.80	57.22	14.01
203	4.94	0.37	3.60	219.80	57.90	14.06
204	4.96	0.36	3.70	226.80	55.71	14.15
205	4.98	0.36	3.70	235.00	52.08	14.26
206	5.00	0.50	3.90	240.10	48.36	14.36
207	5.02	0.60	4.40	245.70	45.44	14.55
208	5.04	0.63	4.60	222.20	42.54	14.83
209	5.06	0.67	6.60	261.00	40.91	15.07
210	5.08	0.79	8.70	199.90	40.88	15.24
211	5.10	0.87	9.40	144.30	41.95	15.49
212	5.12	0.78	9.20	164.00	43.42	15.72
213	5.14	0.77	13.50	198.70	46.19	15.88
214	5.16	0.77	16.50	215.80	49.78	15.99
215	5.18	0.69	17.80	244.90	51.40	16.08
216	5.20	0.64	17.10	274.80	51.04	16.11
217	5.22	0.72	15.50	292.70	49.52	16.10
218	5.24	0.82	15.10	306.70	46.46	16.03
219	5.26	0.88	15.10	272.90	43.33	15.99
220	5.28	0.90	12.10	265.80	41.61	15.97
221	5.30	0.92	12.70	254.80	41.35	15.96
222	5.32	0.90	13.40	241.30	42.37	15.97
223	5.34	0.86	14.60	198.50	44.96	15.99
224	5.36	0.79	16.00	163.70	48.62	15.99
225	5.38	0.67	14.90	154.00	54.12	16.11
226	5.40	0.58	14.50	180.10	58.94	16.05
227	5.42	0.61	24.20	62.80	63.71	15.94
228	5.44	0.49	13.40	122.00	68.03	15.84
229	5.46	0.43	11.40	152.30	72.29	15.73
230	5.48	0.38	10.50	169.60	74.40	15.40
231	5.50	0.33	9.90	185.50	77.30	15.25
232	5.52	0.33	9.10	198.70	78.94	15.10
233	5.54	0.32	8.20	196.50	79.21	14.95
234	5.56	0.31	6.20	198.10	77.78	14.80
235	5.58	0.31	5.60	199.30	76.34	14.63
236	5.60	0.30	5.10	201.10	74.79	14.46
237	5.62	0.31	4.60	198.50	74.01	14.35
238	5.64	0.30	4.30	195.40	73.32	14.25
239	5.66	0.29	3.90	198.90	72.39	14.18
240	5.68	0.30	3.80	199.30	70.76	14.13

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.30	3.70	200.50	68.99	14.08
242	5.72	0.33	3.60	202.50	67.74	14.05
243	5.74	0.33	3.40	199.70	67.08	14.04
244	5.76	0.32	3.40	197.00	66.82	14.04
245	5.78	0.31	3.60	206.10	67.80	14.05
246	5.80	0.31	3.60	213.20	68.48	14.09
247	5.82	0.31	3.90	216.00	68.90	14.13
248	5.84	0.32	4.00	215.30	68.86	14.15
249	5.86	0.32	4.10	215.00	68.48	14.15
250	5.88	0.32	3.90	214.40	67.37	14.12
251	5.90	0.32	3.50	220.50	65.87	14.07
252	5.92	0.33	3.30	223.30	64.31	14.01
253	5.94	0.35	3.10	220.90	63.36	13.97
254	5.96	0.35	3.10	212.30	63.37	13.99
255	5.98	0.34	3.30	211.40	64.42	14.05
256	6.00	0.33	3.80	218.90	66.49	14.13
257	6.02	0.32	4.20	221.10	68.52	14.21
258	6.04	0.31	4.40	221.70	69.94	14.28
259	6.06	0.32	4.70	225.80	70.44	14.31
260	6.08	0.32	4.60	228.20	68.69	14.29
261	6.10	0.32	4.30	230.00	65.64	14.24
262	6.12	0.36	3.60	237.30	62.38	14.16
263	6.14	0.39	3.20	227.80	59.78	14.09
264	6.16	0.40	3.10	225.60	57.75	14.04
265	6.18	0.39	3.30	228.10	57.09	14.05
266	6.20	0.38	3.40	237.40	57.36	14.09
267	6.22	0.39	3.70	245.40	57.81	14.20
268	6.24	0.39	3.70	245.40	57.91	14.31
269	6.26	0.43	4.80	245.00	57.99	14.42
270	6.28	0.43	5.10	247.60	57.13	14.50
271	6.30	0.42	5.20	254.40	55.38	14.59
272	6.32	0.46	5.10	270.00	53.70	14.65
273	6.34	0.51	5.20	275.70	51.80	14.72
274	6.36	0.55	5.80	271.70	50.98	14.82
275	6.38	0.58	6.30	252.40	52.02	14.92
276	6.40	0.53	7.10	242.40	54.97	15.05
277	6.42	0.48	8.00	235.40	59.99	15.21
278	6.44	0.43	9.20	243.60	66.26	15.33
279	6.46	0.40	12.10	255.80	71.62	15.41
280	6.48	0.38	12.40	256.00	75.49	15.43
281	6.50	0.37	11.60	252.00	76.76	15.41
282	6.52	0.36	10.20	254.70	74.86	15.30
283	6.54	0.38	8.50	254.80	71.47	15.09
284	6.56	0.40	6.90	255.50	67.85	14.85
285	6.58	0.39	4.20	241.40	64.19	14.59
286	6.60	0.38	3.70	239.20	61.83	14.61
287	6.62	0.38	3.50	241.00	59.84	14.53
288	6.64	0.50	8.40	86.80	60.32	14.68

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	0.46	5.10	162.00	61.45	14.82
290	6.68	0.45	7.30	205.20	63.18	14.95
291	6.70	0.42	7.40	211.20	66.23	14.88
292	6.72	0.38	7.30	223.10	69.79	14.92
293	6.74	0.33	7.00	239.80	69.84	14.88
294	6.76	0.34	6.70	249.90	66.45	14.83
295	6.78	0.42	6.30	255.00	61.30	14.73
296	6.80	0.50	5.30	241.10	55.71	14.61
297	6.82	0.53	4.00	229.80	51.64	14.45
298	6.84	0.51	3.40	225.60	49.77	14.26
299	6.86	0.47	3.10	225.60	50.72	14.16
300	6.88	0.43	2.90	222.10	53.73	14.16
301	6.90	0.40	4.00	235.30	57.73	14.18
302	6.92	0.37	4.30	236.60	61.51	14.22
303	6.94	0.35	4.20	244.30	63.92	14.23
304	6.96	0.34	4.10	255.60	64.15	14.16
305	6.98	0.35	3.40	261.00	61.67	14.00
306	7.00	0.36	2.80	266.10	57.26	13.81
307	7.02	0.40	1.90	267.40	52.56	13.73
308	7.04	0.43	1.50	267.40	49.20	13.73
309	7.06	0.44	1.30	263.10	47.16	13.73
310	7.08	0.42	1.30	258.40	47.33	13.73
311	7.10	0.40	1.50	250.00	49.40	13.73
312	7.12	0.39	1.80	249.10	51.92	13.73
313	7.14	0.38	2.50	263.30	54.13	13.73
314	7.16	0.39	2.90	263.30	55.52	13.83
315	7.18	0.40	3.30	247.00	55.70	13.94
316	7.20	0.41	3.20	244.00	54.03	13.96
317	7.22	0.42	3.10	265.60	51.80	13.95
318	7.24	0.46	2.60	277.60	49.79	13.90
319	7.26	0.49	2.50	273.20	48.93	13.85
320	7.28	0.48	2.50	264.40	49.02	13.87
321	7.30	0.43	2.60	270.70	50.45	13.99
322	7.32	0.42	3.30	282.80	53.61	14.19
323	7.34	0.44	4.20	285.60	57.04	14.37
324	7.36	0.43	5.40	265.00	59.61	14.52
325	7.38	0.41	5.90	265.80	62.51	14.60
326	7.40	0.39	5.70	264.80	65.50	14.60
327	7.42	0.35	5.30	264.70	67.26	14.52
328	7.44	0.34	4.70	271.10	67.98	14.34
329	7.46	0.33	3.80	270.20	67.74	14.13
330	7.48	0.32	2.70	270.20	65.92	13.87
331	7.50	0.32	2.10	267.90	63.12	13.73
332	7.52	0.32	1.70	263.20	60.43	13.73
333	7.54	0.33	1.30	268.60	58.54	13.73
334	7.56	0.33	1.10	263.90	57.00	13.73
335	7.58	0.32	1.10	264.20	55.75	13.73
336	7.60	0.32	1.00	266.30	55.34	13.73

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	0.32	0.90	264.20	54.86	13.73
338	7.64	0.33	1.00	261.40	53.84	13.73
339	7.66	0.34	1.00	257.60	53.02	13.73
340	7.68	0.36	1.00	261.00	52.87	13.73
341	7.70	0.35	0.90	252.30	53.24	13.73
342	7.72	0.34	1.00	256.00	53.85	13.73
343	7.74	0.31	1.00	267.90	54.55	13.73
344	7.76	0.32	1.10	277.60	55.48	13.73
345	7.78	0.35	1.30	273.40	56.34	13.73
346	7.80	0.35	1.50	261.50	52.84	13.73
347	7.82	0.34	1.80	262.60	50.22	13.73
348	7.84	0.49	1.80	279.00	50.65	13.73
349	7.86	0.50	1.90	183.10	50.85	13.73
350	7.88	0.41	2.90	260.90	51.39	13.73
351	7.90	0.39	2.60	254.70	54.53	13.76
352	7.92	0.36	2.90	268.80	56.73	13.76
353	7.94	0.37	2.50	280.90	56.28	13.73
354	7.96	0.39	2.00	288.10	55.58	13.73
355	7.98	0.39	1.90	278.70	53.72	13.73
356	8.00	0.39	1.90	282.90	51.19	13.73
357	8.02	0.40	1.90	294.50	46.31	13.73
358	8.04	0.46	1.90	305.10	40.72	13.73
359	8.06	0.64	1.60	302.10	35.49	13.82
360	8.08	0.77	1.70	253.00	32.77	14.72
361	8.10	1.05	4.40	238.20	29.31	15.37
362	8.12	1.42	13.60	206.30	26.60	15.97
363	8.14	1.79	16.30	153.70	25.13	16.50
364	8.16	2.24	22.70	115.70	24.41	16.94
365	8.18	2.37	30.10	82.60	23.53	17.12
366	8.20	2.55	39.00	82.60	23.62	17.39

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	2.55	9.81	1.00	0.081	1.38	0.059	1.00	1.00	0.059	No
2	0.92	12.64	2.75	9.89	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
3	0.94	12.91	2.94	9.97	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
4	0.96	13.20	3.14	10.06	0.99	0.085	1.38	0.062	1.00	1.00	2.000	Yes
5	0.98	13.49	3.34	10.16	0.99	0.086	1.38	0.062	1.00	1.00	2.000	Yes
6	1.00	13.80	3.53	10.27	0.99	0.087	1.38	0.063	1.00	1.00	2.000	Yes
7	1.02	14.12	3.73	10.39	0.99	0.088	1.38	0.064	1.00	1.00	2.000	Yes
8	1.04	14.44	3.92	10.52	0.99	0.089	1.38	0.064	1.00	1.00	2.000	Yes
9	1.06	14.78	4.12	10.66	0.99	0.090	1.38	0.065	1.00	1.00	2.000	Yes
10	1.08	15.11	4.32	10.80	0.99	0.090	1.38	0.066	1.00	1.00	0.066	No
11	1.10	15.46	4.51	10.94	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
12	1.12	15.80	4.71	11.09	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
13	1.14	16.14	4.91	11.24	0.99	0.093	1.38	0.067	1.00	1.00	0.067	No
14	1.16	16.49	5.10	11.39	0.99	0.093	1.38	0.068	1.00	1.00	0.068	No
15	1.18	16.84	5.30	11.54	0.99	0.094	1.38	0.068	1.00	1.00	0.068	No
16	1.20	17.18	5.49	11.69	0.99	0.095	1.38	0.069	1.00	1.00	0.069	No
17	1.22	17.52	5.69	11.83	0.99	0.096	1.38	0.069	1.00	1.00	0.069	No
18	1.24	17.86	5.89	11.97	0.99	0.096	1.38	0.070	1.00	1.00	0.070	No
19	1.26	18.19	6.08	12.11	0.99	0.097	1.38	0.070	1.00	1.00	0.070	No
20	1.28	18.52	6.28	12.24	0.99	0.098	1.38	0.071	1.00	1.00	0.071	No
21	1.30	18.85	6.47	12.38	0.99	0.098	1.38	0.071	1.00	1.00	0.071	No
22	1.32	19.17	6.67	12.50	0.99	0.099	1.38	0.072	1.00	1.00	2.000	Yes
23	1.34	19.49	6.87	12.63	0.99	0.100	1.38	0.072	1.00	1.00	2.000	Yes
24	1.36	19.81	7.06	12.75	0.99	0.100	1.38	0.073	1.00	1.00	2.000	Yes
25	1.38	20.12	7.26	12.87	0.99	0.101	1.38	0.073	1.00	1.00	2.000	Yes
26	1.40	20.44	7.46	12.98	0.99	0.101	1.38	0.074	1.00	1.00	2.000	Yes
27	1.42	20.75	7.65	13.10	0.99	0.102	1.38	0.074	1.00	1.00	2.000	Yes
28	1.44	21.07	7.85	13.22	0.99	0.103	1.38	0.075	1.00	1.00	2.000	Yes
29	1.46	21.38	8.04	13.34	0.99	0.103	1.38	0.075	1.00	1.00	2.000	Yes
30	1.48	21.70	8.24	13.46	0.99	0.104	1.38	0.075	1.00	1.00	2.000	Yes
31	1.50	22.01	8.44	13.58	0.99	0.104	1.38	0.076	1.00	1.00	0.076	No
32	1.52	22.33	8.63	13.69	0.99	0.105	1.38	0.076	1.00	1.00	0.076	No
33	1.54	22.64	8.83	13.81	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
34	1.56	22.95	9.03	13.93	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
35	1.58	23.27	9.22	14.05	0.99	0.107	1.38	0.077	1.00	1.00	2.000	Yes
36	1.60	23.59	9.42	14.17	0.99	0.107	1.38	0.078	1.00	1.00	2.000	Yes
37	1.62	23.91	9.61	14.29	0.99	0.108	1.38	0.078	1.00	1.00	2.000	Yes
38	1.64	24.23	9.81	14.42	0.99	0.108	1.38	0.079	1.00	1.00	2.000	Yes
39	1.66	24.54	10.01	14.54	0.99	0.109	1.38	0.079	1.00	1.00	2.000	Yes
40	1.68	24.86	10.20	14.66	0.99	0.109	1.38	0.079	1.00	1.00	2.000	Yes
41	1.70	25.18	10.40	14.78	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
42	1.72	25.50	10.59	14.90	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
43	1.74	25.81	10.79	15.02	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
44	1.76	26.12	10.99	15.14	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
45	1.78	26.44	11.18	15.25	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
46	1.80	26.74	11.38	15.36	0.99	0.112	1.38	0.081	1.00	1.00	0.081	No
47	1.82	27.05	11.58	15.47	0.99	0.112	1.38	0.082	1.00	1.00	0.082	No
48	1.84	27.35	11.77	15.58	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	1.86	27.66	11.97	15.69	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No
50	1.88	27.96	12.16	15.80	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
51	1.90	28.27	12.36	15.91	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
52	1.92	28.57	12.56	16.02	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
53	1.94	28.88	12.75	16.12	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
54	1.96	29.18	12.95	16.23	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
55	1.98	29.48	13.15	16.33	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
56	2.00	29.78	13.34	16.44	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
57	2.02	30.08	13.54	16.55	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
58	2.04	30.38	13.73	16.65	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
59	2.06	30.69	13.93	16.76	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
60	2.08	30.99	14.13	16.86	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
61	2.10	31.29	14.32	16.97	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
62	2.12	31.60	14.52	17.08	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
63	2.14	31.90	14.72	17.19	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
64	2.16	32.21	14.91	17.30	0.99	0.119	1.38	0.087	1.00	1.00	0.087	No
65	2.18	32.51	15.11	17.40	0.99	0.120	1.38	0.087	1.00	1.00	2.000	Yes
66	2.20	32.82	15.30	17.51	0.99	0.120	1.38	0.087	1.00	1.00	2.000	Yes
67	2.22	33.12	15.50	17.62	0.99	0.120	1.38	0.087	1.00	1.00	2.000	Yes
68	2.24	33.42	15.70	17.73	0.98	0.121	1.38	0.088	1.00	1.00	2.000	Yes
69	2.26	33.73	15.89	17.84	0.98	0.121	1.38	0.088	1.00	1.00	2.000	Yes
70	2.28	34.03	16.09	17.95	0.98	0.121	1.38	0.088	1.00	1.00	2.000	Yes
71	2.30	34.34	16.28	18.05	0.98	0.122	1.38	0.088	1.00	1.00	2.000	Yes
72	2.32	34.64	16.48	18.16	0.98	0.122	1.38	0.089	1.00	1.00	0.089	No
73	2.34	34.95	16.68	18.27	0.98	0.122	1.38	0.089	1.00	1.00	0.089	No
74	2.36	35.25	16.87	18.38	0.98	0.123	1.38	0.089	1.00	1.00	0.089	No
75	2.38	35.56	17.07	18.49	0.98	0.123	1.38	0.089	1.00	1.00	0.089	No
76	2.40	35.87	17.27	18.60	0.98	0.123	1.38	0.090	1.00	1.00	0.090	No
77	2.42	36.17	17.46	18.71	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
78	2.44	36.48	17.66	18.82	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
79	2.46	36.79	17.85	18.93	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
80	2.48	37.10	18.05	19.05	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
81	2.50	37.42	18.25	19.17	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
82	2.52	37.73	18.44	19.29	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
83	2.54	38.05	18.64	19.41	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
84	2.56	38.37	18.84	19.53	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
85	2.58	38.69	19.03	19.66	0.98	0.126	1.38	0.091	1.00	1.00	0.091	No
86	2.60	39.01	19.23	19.78	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
87	2.62	39.33	19.42	19.90	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
88	2.64	39.65	19.62	20.03	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
89	2.66	39.96	19.82	20.15	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
90	2.68	40.28	20.01	20.27	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
91	2.70	40.60	20.21	20.40	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
92	2.72	40.92	20.40	20.52	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
93	2.74	41.24	20.60	20.64	0.98	0.127	1.38	0.093	1.00	1.00	0.093	No
94	2.76	41.56	20.80	20.76	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
95	2.78	41.88	20.99	20.89	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
96	2.80	42.20	21.19	21.01	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	2.82	42.52	21.39	21.14	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
98	2.84	42.85	21.58	21.27	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
99	2.86	43.17	21.78	21.40	0.98	0.129	1.38	0.093	1.00	1.00	0.093	No
100	2.88	43.50	21.97	21.53	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
101	2.90	43.83	22.17	21.66	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
102	2.92	44.15	22.37	21.79	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
103	2.94	44.48	22.56	21.92	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
104	2.96	44.80	22.76	22.04	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
105	2.98	45.12	22.96	22.17	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
106	3.00	45.44	23.15	22.29	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
107	3.02	45.76	23.35	22.41	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
108	3.04	46.07	23.54	22.52	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
109	3.06	46.37	23.74	22.63	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
110	3.08	46.68	23.94	22.74	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
111	3.10	46.99	24.13	22.86	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
112	3.12	47.30	24.33	22.97	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
113	3.14	47.62	24.53	23.09	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
114	3.16	47.93	24.72	23.21	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
115	3.18	48.25	24.92	23.33	0.98	0.131	1.38	0.096	1.00	1.00	0.096	No
116	3.20	48.57	25.11	23.46	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
117	3.22	48.89	25.31	23.58	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
118	3.24	49.20	25.51	23.69	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
119	3.26	49.51	25.70	23.81	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
120	3.28	49.82	25.90	23.92	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
121	3.30	50.13	26.09	24.03	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
122	3.32	50.43	26.29	24.14	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
123	3.34	50.73	26.49	24.24	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
124	3.36	51.02	26.68	24.34	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
125	3.38	51.32	26.88	24.44	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
126	3.40	51.61	27.08	24.53	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
127	3.42	51.89	27.27	24.62	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
128	3.44	52.18	27.47	24.71	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
129	3.46	52.47	27.66	24.80	0.98	0.134	1.38	0.098	1.00	1.00	0.098	No
130	3.48	52.76	27.86	24.90	0.98	0.134	1.38	0.098	1.00	1.00	0.098	No
131	3.50	53.06	28.06	25.01	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
132	3.52	53.37	28.25	25.12	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
133	3.54	53.68	28.45	25.23	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
134	3.56	53.99	28.65	25.35	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
135	3.58	54.30	28.84	25.46	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
136	3.60	54.62	29.04	25.58	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
137	3.62	54.93	29.23	25.70	0.98	0.135	1.38	0.098	1.00	1.00	0.098	No
138	3.64	55.24	29.43	25.81	0.98	0.136	1.38	0.099	1.00	1.00	0.099	No
139	3.66	55.55	29.63	25.92	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
140	3.68	55.86	29.82	26.03	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
141	3.70	56.16	30.02	26.14	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
142	3.72	56.46	30.21	26.24	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
143	3.74	56.75	30.41	26.34	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
144	3.76	57.04	30.61	26.43	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	57.33	30.80	26.53	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
146	3.80	57.63	31.00	26.63	0.97	0.137	1.38	0.100	1.00	1.00	0.100	No
147	3.82	57.93	31.20	26.73	0.97	0.137	1.38	0.100	1.00	1.00	0.100	No
148	3.84	58.24	31.39	26.85	0.97	0.137	1.38	0.100	1.00	1.00	0.100	No
149	3.86	58.56	31.59	26.97	0.97	0.137	1.38	0.100	1.00	1.00	0.100	No
150	3.88	58.88	31.78	27.10	0.97	0.137	1.38	0.100	1.00	1.00	0.100	No
151	3.90	59.21	31.98	27.23	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
152	3.92	59.53	32.18	27.36	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
153	3.94	59.86	32.37	27.49	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
154	3.96	60.18	32.57	27.61	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
155	3.98	60.50	32.77	27.74	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
156	4.00	60.82	32.96	27.86	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
157	4.02	61.14	33.16	27.99	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
158	4.04	61.46	33.35	28.11	0.97	0.138	1.38	0.100	1.00	1.00	0.100	No
159	4.06	61.77	33.55	28.22	0.97	0.138	1.38	0.101	1.00	1.00	0.101	No
160	4.08	62.08	33.75	28.34	0.97	0.138	1.38	0.101	1.00	1.00	0.101	No
161	4.10	62.39	33.94	28.44	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
162	4.12	62.69	34.14	28.55	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
163	4.14	62.98	34.34	28.65	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
164	4.16	63.27	34.53	28.74	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
165	4.18	63.56	34.73	28.83	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
166	4.20	63.85	34.92	28.92	0.97	0.139	1.38	0.101	1.00	1.00	0.101	No
167	4.22	64.13	35.12	29.01	0.97	0.140	1.38	0.101	1.00	1.00	0.101	No
168	4.24	64.42	35.32	29.10	0.97	0.140	1.38	0.102	1.00	1.00	0.102	No
169	4.26	64.70	35.51	29.19	0.97	0.140	1.38	0.102	1.00	1.00	0.102	No
170	4.28	64.99	35.71	29.28	0.97	0.140	1.38	0.102	1.00	1.00	0.102	No
171	4.30	65.28	35.90	29.37	0.97	0.140	1.38	0.102	1.00	1.00	0.102	No
172	4.32	65.56	36.10	29.46	0.97	0.140	1.38	0.102	1.00	1.00	0.102	No
173	4.34	65.85	36.30	29.55	0.97	0.141	1.38	0.102	1.00	1.00	0.102	No
174	4.36	66.13	36.49	29.64	0.97	0.141	1.38	0.102	1.00	1.00	0.102	No
175	4.38	66.42	36.69	29.73	0.97	0.141	1.38	0.102	1.00	1.00	0.102	No
176	4.40	66.70	36.89	29.81	0.97	0.141	1.38	0.102	1.00	1.00	0.102	No
177	4.42	66.98	37.08	29.90	0.97	0.141	1.38	0.103	1.00	1.00	0.103	No
178	4.44	67.27	37.28	29.99	0.97	0.141	1.38	0.103	1.00	1.00	0.103	No
179	4.46	67.55	37.47	30.08	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
180	4.48	67.84	37.67	30.17	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
181	4.50	68.13	37.87	30.26	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
182	4.52	68.41	38.06	30.35	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
183	4.54	68.70	38.26	30.45	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
184	4.56	68.99	38.46	30.54	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
185	4.58	69.28	38.65	30.63	0.97	0.142	1.38	0.103	1.00	1.00	0.103	No
186	4.60	69.57	38.85	30.73	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
187	4.62	69.86	39.04	30.82	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
188	4.64	70.15	39.24	30.91	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
189	4.66	70.43	39.44	31.00	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
190	4.68	70.72	39.63	31.08	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
191	4.70	71.00	39.83	31.17	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No
192	4.72	71.28	40.02	31.25	0.97	0.143	1.38	0.104	1.00	1.00	0.104	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	71.56	40.22	31.34	0.97	0.144	1.38	0.104	1.00	1.00	0.104	No
194	4.76	71.84	40.42	31.42	0.97	0.144	1.38	0.104	1.00	1.00	0.104	No
195	4.78	72.11	40.61	31.50	0.97	0.144	1.38	0.105	1.00	1.00	0.105	No
196	4.80	72.39	40.81	31.58	0.97	0.144	1.38	0.105	1.00	1.00	0.105	No
197	4.82	72.67	41.01	31.67	0.97	0.144	1.38	0.105	1.00	1.00	0.105	No
198	4.84	72.95	41.20	31.75	0.97	0.144	1.38	0.105	1.00	1.00	0.105	No
199	4.86	73.23	41.40	31.83	0.97	0.145	1.38	0.105	1.00	1.00	0.105	No
200	4.88	73.51	41.59	31.91	0.97	0.145	1.38	0.105	1.00	1.00	0.105	No
201	4.90	73.79	41.79	32.00	0.97	0.145	1.38	0.105	1.00	1.00	0.105	No
202	4.92	74.07	41.99	32.08	0.97	0.145	1.38	0.105	1.00	1.00	0.105	No
203	4.94	74.35	42.18	32.17	0.97	0.145	1.38	0.105	1.00	1.00	0.105	No
204	4.96	74.63	42.38	32.25	0.97	0.145	1.38	0.106	1.00	1.00	0.106	No
205	4.98	74.92	42.58	32.34	0.97	0.145	1.38	0.106	1.00	1.00	0.106	No
206	5.00	75.20	42.77	32.43	0.97	0.146	1.38	0.106	1.00	1.00	0.106	No
207	5.02	75.49	42.97	32.53	0.97	0.146	1.38	0.106	1.00	1.00	0.106	No
208	5.04	75.79	43.16	32.63	0.97	0.146	1.38	0.106	1.00	1.00	0.106	No
209	5.06	76.09	43.36	32.73	0.97	0.146	1.38	0.106	1.00	1.00	0.106	No
210	5.08	76.40	43.56	32.84	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
211	5.10	76.71	43.75	32.95	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
212	5.12	77.02	43.95	33.07	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
213	5.14	77.34	44.15	33.19	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
214	5.16	77.66	44.34	33.32	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
215	5.18	77.98	44.54	33.44	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
216	5.20	78.30	44.73	33.57	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
217	5.22	78.62	44.93	33.69	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
218	5.24	78.95	45.13	33.82	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
219	5.26	79.27	45.32	33.94	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
220	5.28	79.58	45.52	34.07	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
221	5.30	79.90	45.71	34.19	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
222	5.32	80.22	45.91	34.31	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
223	5.34	80.54	46.11	34.44	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
224	5.36	80.86	46.30	34.56	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
225	5.38	81.18	46.50	34.69	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
226	5.40	81.51	46.70	34.81	0.96	0.146	1.38	0.106	1.00	1.00	0.106	No
227	5.42	81.82	46.89	34.93	0.96	0.147	1.38	0.106	1.00	1.00	0.106	No
228	5.44	82.14	47.09	35.05	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
229	5.46	82.46	47.28	35.17	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
230	5.48	82.76	47.48	35.28	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
231	5.50	83.07	47.68	35.39	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
232	5.52	83.37	47.87	35.50	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
233	5.54	83.67	48.07	35.60	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
234	5.56	83.97	48.27	35.70	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
235	5.58	84.26	48.46	35.80	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
236	5.60	84.55	48.66	35.89	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
237	5.62	84.83	48.85	35.98	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
238	5.64	85.12	49.05	36.07	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
239	5.66	85.40	49.25	36.16	0.96	0.147	1.38	0.107	1.00	1.00	0.107	No
240	5.68	85.69	49.44	36.24	0.96	0.148	1.38	0.107	1.00	1.00	0.107	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	85.97	49.64	36.33	0.96	0.148	1.38	0.107	1.00	1.00	0.107	No
242	5.72	86.25	49.83	36.41	0.96	0.148	1.38	0.107	1.00	1.00	0.107	No
243	5.74	86.53	50.03	36.50	0.96	0.148	1.38	0.107	1.00	1.00	0.107	No
244	5.76	86.81	50.23	36.58	0.96	0.148	1.38	0.108	1.00	1.00	0.108	No
245	5.78	87.09	50.42	36.67	0.96	0.148	1.38	0.108	1.00	1.00	0.108	No
246	5.80	87.37	50.62	36.75	0.96	0.148	1.38	0.108	1.00	1.00	0.108	No
247	5.82	87.66	50.82	36.84	0.96	0.148	1.38	0.108	1.00	1.00	0.108	No
248	5.84	87.94	51.01	36.93	0.96	0.148	1.38	0.108	1.00	1.00	0.108	No
249	5.86	88.22	51.21	37.01	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
250	5.88	88.50	51.40	37.10	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
251	5.90	88.79	51.60	37.19	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
252	5.92	89.07	51.80	37.27	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
253	5.94	89.35	51.99	37.35	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
254	5.96	89.63	52.19	37.44	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
255	5.98	89.91	52.39	37.52	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
256	6.00	90.19	52.58	37.61	0.96	0.149	1.38	0.108	1.00	1.00	0.108	No
257	6.02	90.47	52.78	37.70	0.96	0.149	1.38	0.109	1.00	1.00	0.109	No
258	6.04	90.76	52.97	37.78	0.96	0.149	1.38	0.109	1.00	1.00	0.109	No
259	6.06	91.04	53.17	37.87	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
260	6.08	91.33	53.37	37.96	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
261	6.10	91.62	53.56	38.05	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
262	6.12	91.90	53.76	38.14	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
263	6.14	92.18	53.96	38.23	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
264	6.16	92.46	54.15	38.31	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
265	6.18	92.74	54.35	38.39	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
266	6.20	93.02	54.54	38.48	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
267	6.22	93.31	54.74	38.57	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
268	6.24	93.59	54.94	38.66	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
269	6.26	93.88	55.13	38.75	0.96	0.150	1.38	0.109	1.00	1.00	0.109	No
270	6.28	94.17	55.33	38.84	0.96	0.151	1.38	0.109	1.00	1.00	0.109	No
271	6.30	94.46	55.52	38.94	0.96	0.151	1.38	0.109	1.00	1.00	0.109	No
272	6.32	94.76	55.72	39.04	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
273	6.34	95.05	55.92	39.13	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
274	6.36	95.35	56.11	39.23	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
275	6.38	95.65	56.31	39.34	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
276	6.40	95.95	56.51	39.44	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
277	6.42	96.25	56.70	39.55	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
278	6.44	96.56	56.90	39.66	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
279	6.46	96.87	57.09	39.77	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
280	6.48	97.17	57.29	39.88	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
281	6.50	97.48	57.49	40.00	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
282	6.52	97.79	57.68	40.11	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
283	6.54	98.09	57.88	40.21	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
284	6.56	98.39	58.08	40.31	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
285	6.58	98.68	58.27	40.41	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
286	6.60	98.97	58.47	40.50	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
287	6.62	99.26	58.66	40.60	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
288	6.64	99.56	58.86	40.70	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	99.85	59.06	40.80	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
290	6.68	100.15	59.25	40.90	0.95	0.151	1.38	0.110	1.00	1.00	0.110	No
291	6.70	100.45	59.45	41.00	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
292	6.72	100.75	59.64	41.10	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
293	6.74	101.04	59.84	41.20	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
294	6.76	101.34	60.04	41.30	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
295	6.78	101.64	60.23	41.40	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
296	6.80	101.93	60.43	41.50	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
297	6.82	102.22	60.63	41.59	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
298	6.84	102.50	60.82	41.68	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
299	6.86	102.79	61.02	41.77	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
300	6.88	103.07	61.21	41.85	0.95	0.152	1.38	0.110	1.00	1.00	0.110	No
301	6.90	103.35	61.41	41.94	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
302	6.92	103.64	61.61	42.03	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
303	6.94	103.92	61.80	42.12	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
304	6.96	104.20	62.00	42.21	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
305	6.98	104.48	62.20	42.29	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
306	7.00	104.76	62.39	42.37	0.95	0.152	1.38	0.111	1.00	1.00	0.111	No
307	7.02	105.04	62.59	42.45	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
308	7.04	105.31	62.78	42.53	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
309	7.06	105.59	62.98	42.60	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
310	7.08	105.86	63.18	42.68	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
311	7.10	106.13	63.37	42.76	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
312	7.12	106.41	63.57	42.84	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
313	7.14	106.68	63.77	42.92	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
314	7.16	106.96	63.96	43.00	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
315	7.18	107.24	64.16	43.08	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
316	7.20	107.52	64.35	43.16	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
317	7.22	107.80	64.55	43.25	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
318	7.24	108.08	64.75	43.33	0.95	0.153	1.38	0.111	1.00	1.00	0.111	No
319	7.26	108.35	64.94	43.41	0.95	0.153	1.38	0.112	1.00	1.00	0.112	No
320	7.28	108.63	65.14	43.49	0.95	0.154	1.38	0.112	1.00	1.00	0.112	No
321	7.30	108.91	65.33	43.57	0.95	0.154	1.38	0.112	1.00	1.00	0.112	No
322	7.32	109.19	65.53	43.66	0.95	0.154	1.38	0.112	1.00	1.00	0.112	No
323	7.34	109.48	65.73	43.75	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
324	7.36	109.77	65.92	43.85	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
325	7.38	110.06	66.12	43.94	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
326	7.40	110.36	66.32	44.04	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
327	7.42	110.65	66.51	44.13	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
328	7.44	110.93	66.71	44.22	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
329	7.46	111.22	66.90	44.31	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
330	7.48	111.49	67.10	44.39	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
331	7.50	111.77	67.30	44.47	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
332	7.52	112.04	67.49	44.55	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
333	7.54	112.32	67.69	44.63	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
334	7.56	112.59	67.89	44.71	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
335	7.58	112.87	68.08	44.78	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
336	7.60	113.14	68.28	44.86	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	7.62	113.42	68.47	44.94	0.94	0.154	1.38	0.112	1.00	1.00	0.112	No
338	7.64	113.69	68.67	45.02	0.94	0.155	1.38	0.112	1.00	1.00	0.112	No
339	7.66	113.96	68.87	45.10	0.94	0.155	1.38	0.112	1.00	1.00	0.112	No
340	7.68	114.24	69.06	45.18	0.94	0.155	1.38	0.112	1.00	1.00	0.112	No
341	7.70	114.51	69.26	45.26	0.94	0.155	1.38	0.112	1.00	1.00	0.112	No
342	7.72	114.79	69.45	45.33	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
343	7.74	115.06	69.65	45.41	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
344	7.76	115.34	69.85	45.49	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
345	7.78	115.61	70.04	45.57	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
346	7.80	115.89	70.24	45.65	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
347	7.82	116.16	70.44	45.73	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
348	7.84	116.44	70.63	45.80	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
349	7.86	116.71	70.83	45.88	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
350	7.88	116.99	71.02	45.96	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
351	7.90	117.26	71.22	46.04	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
352	7.92	117.54	71.42	46.12	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
353	7.94	117.81	71.61	46.20	0.94	0.155	1.38	0.113	1.00	1.00	0.113	No
354	7.96	118.09	71.81	46.28	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
355	7.98	118.36	72.01	46.36	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
356	8.00	118.64	72.20	46.43	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
357	8.02	118.91	72.40	46.51	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
358	8.04	119.18	72.59	46.59	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
359	8.06	119.46	72.79	46.67	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
360	8.08	119.76	72.99	46.77	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
361	8.10	120.06	73.18	46.88	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
362	8.12	120.38	73.38	47.00	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
363	8.14	120.71	73.58	47.14	0.94	0.156	1.38	0.113	1.00	1.00	2.000	Yes
364	8.16	121.05	73.77	47.28	0.94	0.156	1.38	0.113	1.00	1.00	0.113	No
365	8.18	121.39	73.97	47.43	0.93	0.156	1.38	0.113	1.00	1.00	0.113	No
366	8.20	121.74	74.16	47.58	0.93	0.155	1.38	0.113	1.00	1.00	0.113	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.12	3.45	1.09	1.00	1.82	19.50	35.55	3.600	No	Yes	2.00
2	0.92	0.19	3.23	0.98	1.00	2.99	13.43	40.12	3.600	No	Yes	2.00
3	0.94	0.30	3.03	0.93	1.00	4.86	9.25	44.95	3.600	No	Yes	2.00
4	0.96	0.48	2.82	0.85	0.85	7.85	6.11	47.95	4.000	Yes	Yes	2.00
5	0.98	0.77	2.60	0.72	0.79	12.65	3.76	47.52	4.000	Yes	Yes	2.00
6	1.00	1.39	2.33	0.58	0.71	23.01	2.02	46.55	4.000	Yes	No	2.00
7	1.02	1.95	2.17	0.52	0.66	32.55	1.54	50.25	4.000	Yes	No	2.00
8	1.04	2.43	2.08	0.52	0.63	40.59	1.39	56.55	4.000	Yes	No	2.00
9	1.06	2.81	2.05	0.58	0.62	46.85	1.35	63.45	4.000	Yes	No	2.00
10	1.08	3.03	2.05	0.68	0.62	50.62	1.36	68.83	0.110	No	No	1.68
11	1.10	2.85	2.13	0.84	0.65	47.61	1.46	69.67	0.111	No	No	1.68
12	1.12	2.65	2.21	1.06	0.67	44.17	1.64	72.27	0.115	No	No	1.72
13	1.14	2.47	2.28	1.28	0.69	41.16	1.85	76.28	0.121	No	No	1.80
14	1.16	2.30	2.33	1.42	0.71	38.32	2.05	78.72	0.125	No	No	1.85
15	1.18	2.14	2.37	1.49	0.72	35.64	2.23	79.41	0.127	No	No	1.85
16	1.20	1.99	2.40	1.52	0.73	33.17	2.38	78.86	0.126	No	No	1.82
17	1.22	1.88	2.41	1.47	0.73	31.18	2.45	76.34	0.121	No	No	1.75
18	1.24	1.79	2.41	1.35	0.73	29.72	2.43	72.15	0.115	No	No	1.64
19	1.26	1.75	2.39	1.20	0.73	29.09	2.32	67.56	0.109	No	No	1.54
20	1.28	1.73	2.37	1.08	0.72	28.78	2.23	64.05	0.104	No	No	1.47
21	1.30	1.68	2.36	0.98	0.72	27.90	2.17	60.67	0.101	No	No	1.41
22	1.32	1.59	2.36	0.91	0.72	26.30	2.20	57.79	4.000	Yes	No	2.00
23	1.34	1.41	2.40	0.88	0.73	23.38	2.39	55.90	4.000	Yes	No	2.00
24	1.36	1.22	2.46	0.91	0.75	20.17	2.74	55.35	4.000	Yes	No	2.00
25	1.38	1.04	2.55	1.01	0.77	17.08	3.34	57.07	4.000	Yes	No	2.00
26	1.40	0.91	2.63	1.17	0.80	14.91	4.05	60.37	4.000	Yes	Yes	2.00
27	1.42	0.83	2.70	1.39	0.82	13.61	4.75	64.68	4.000	Yes	Yes	2.00
28	1.44	0.78	2.76	1.60	0.84	12.67	5.40	68.47	4.000	Yes	Yes	2.00
29	1.46	0.69	2.85	1.92	0.86	11.27	6.47	72.93	4.000	Yes	Yes	2.00
30	1.48	0.60	2.95	2.34	0.89	9.67	7.95	76.85	4.000	Yes	Yes	2.00
31	1.50	0.49	3.08	2.97	1.00	7.85	10.26	80.54	3.600	No	Yes	2.00
32	1.52	0.39	3.23	3.78	1.00	6.17	13.34	82.38	3.600	No	Yes	2.00
33	1.54	0.37	3.27	4.12	1.00	5.75	14.50	83.31	3.600	No	Yes	2.00
34	1.56	0.49	3.09	3.03	1.00	7.85	10.36	81.31	3.600	No	Yes	2.00
35	1.58	0.67	2.89	2.14	0.87	10.77	7.05	75.90	4.000	Yes	Yes	2.00
36	1.60	0.87	2.71	1.52	0.82	14.26	4.78	68.19	4.000	Yes	Yes	2.00
37	1.62	1.10	2.56	1.15	0.78	17.97	3.41	61.35	4.000	Yes	No	2.00
38	1.64	1.29	2.45	0.93	0.74	21.30	2.65	56.51	4.000	Yes	No	2.00
39	1.66	1.38	2.41	0.84	0.73	22.66	2.40	54.44	4.000	Yes	No	2.00
40	1.68	1.43	2.38	0.79	0.72	23.49	2.26	53.02	4.000	Yes	No	2.00
41	1.70	1.44	2.37	0.77	0.72	23.79	2.21	52.63	0.094	No	No	1.18
42	1.72	1.45	2.36	0.75	0.72	23.83	2.19	52.15	0.093	No	No	1.17
43	1.74	1.44	2.35	0.71	0.71	23.68	2.15	50.79	0.092	No	No	1.15
44	1.76	1.41	2.35	0.66	0.71	23.25	2.11	49.06	0.091	No	No	1.13
45	1.78	1.38	2.34	0.60	0.71	22.69	2.08	47.29	0.089	No	No	1.10
46	1.80	1.36	2.32	0.54	0.71	22.45	2.02	45.27	0.088	No	No	1.08
47	1.82	1.36	2.32	0.51	0.70	22.31	1.99	44.40	0.087	No	No	1.07
48	1.84	1.36	2.31	0.49	0.70	22.29	1.00	22.29	0.069	No	No	0.84

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	1.35	2.31	0.48	0.70	22.26	1.00	22.26	0.069	No	No	0.83
50	1.88	1.35	2.31	0.49	0.70	22.23	1.00	22.23	0.069	No	No	0.83
51	1.90	1.32	2.32	0.49	0.70	21.72	1.00	21.72	0.068	No	No	0.82
52	1.92	1.28	2.33	0.49	0.71	20.99	1.00	20.99	0.067	No	No	0.81
53	1.94	1.23	2.35	0.51	0.71	20.17	2.15	43.41	0.086	No	No	1.03
54	1.96	1.19	2.38	0.53	0.72	19.46	2.25	43.75	0.086	No	No	1.03
55	1.98	1.16	2.39	0.53	0.72	19.03	2.30	43.77	0.086	No	No	1.03
56	2.00	1.17	2.38	0.52	0.72	19.08	2.28	43.41	0.086	No	No	1.02
57	2.02	1.19	2.36	0.49	0.72	19.53	2.18	42.65	0.086	No	No	1.01
58	2.04	1.24	2.34	0.46	0.71	20.22	1.00	20.22	0.067	No	No	0.79
59	2.06	1.28	2.32	0.45	0.70	20.96	1.00	20.96	0.067	No	No	0.79
60	2.08	1.31	2.31	0.45	0.70	21.47	1.00	21.47	0.068	No	No	0.79
61	2.10	1.32	2.31	0.47	0.70	21.66	1.00	21.66	0.068	No	No	0.79
62	2.12	1.31	2.33	0.50	0.71	21.52	2.03	43.68	0.086	No	No	1.00
63	2.14	1.29	2.34	0.53	0.71	21.07	2.10	44.32	0.087	No	No	1.01
64	2.16	1.25	2.36	0.55	0.72	20.48	2.19	44.84	0.087	No	No	1.01
65	2.18	1.21	2.38	0.57	0.72	19.83	2.27	45.08	4.000	Yes	No	2.00
66	2.20	1.17	2.40	0.58	0.73	19.07	2.38	45.43	4.000	Yes	No	2.00
67	2.22	1.11	2.43	0.62	0.74	18.11	2.55	46.21	4.000	Yes	No	2.00
68	2.24	1.01	2.49	0.70	0.76	16.39	2.94	48.18	4.000	Yes	No	2.00
69	2.26	0.88	2.59	0.85	0.78	14.20	3.65	51.81	4.000	Yes	No	2.00
70	2.28	0.74	2.72	1.13	0.82	11.77	4.89	57.52	4.000	Yes	Yes	2.00
71	2.30	0.60	2.86	1.53	0.87	9.45	6.69	63.18	4.000	Yes	Yes	2.00
72	2.32	0.48	3.02	2.06	1.00	7.46	9.06	67.63	3.600	No	Yes	2.00
73	2.34	0.42	3.11	2.49	1.00	6.45	10.87	70.13	3.600	No	Yes	2.00
74	2.36	0.40	3.16	2.71	1.00	6.06	11.74	71.20	3.600	No	Yes	2.00
75	2.38	0.39	3.16	2.72	1.00	6.02	11.82	71.18	3.600	No	Yes	2.00
76	2.40	0.40	3.16	2.73	1.00	6.09	11.75	71.54	3.600	No	Yes	2.00
77	2.42	0.40	3.15	2.78	1.00	6.17	11.72	72.29	3.600	No	Yes	2.00
78	2.44	0.41	3.14	2.80	1.00	6.35	11.53	73.21	3.600	No	Yes	2.00
79	2.46	0.53	3.00	2.26	1.00	8.25	8.78	72.40	3.600	No	Yes	2.00
80	2.48	0.64	2.88	1.91	0.87	10.18	6.96	70.92	3.600	No	Yes	2.00
81	2.50	0.74	2.80	1.69	0.85	11.84	5.85	69.23	3.600	No	Yes	2.00
82	2.52	0.82	2.75	1.59	0.83	13.11	5.24	68.71	3.600	No	Yes	2.00
83	2.54	0.87	2.72	1.58	0.83	13.94	4.97	69.31	3.600	No	Yes	2.00
84	2.56	0.80	2.79	1.80	0.84	12.77	5.69	72.66	3.600	No	Yes	2.00
85	2.58	0.75	2.84	2.00	0.86	11.88	6.33	75.27	3.600	No	Yes	2.00
86	2.60	0.74	2.85	2.08	0.86	11.71	6.53	76.47	3.600	No	Yes	2.00
87	2.62	0.75	2.84	2.07	0.86	11.96	6.41	76.59	3.600	No	Yes	2.00
88	2.64	0.77	2.83	2.01	0.86	12.28	6.19	76.06	3.600	No	Yes	2.00
89	2.66	0.79	2.82	1.98	0.85	12.53	6.05	75.72	3.600	No	Yes	2.00
90	2.68	0.76	2.84	2.06	0.86	12.09	6.34	76.63	3.600	No	Yes	2.00
91	2.70	0.68	2.91	2.36	0.88	10.77	7.39	79.59	3.600	No	Yes	2.00
92	2.72	0.60	3.00	2.78	1.00	9.35	8.83	82.54	3.600	No	Yes	2.00
93	2.74	0.53	3.08	3.18	1.00	8.21	10.26	84.25	3.600	No	Yes	2.00
94	2.76	0.51	3.12	3.44	1.00	7.78	11.03	85.77	3.600	No	Yes	2.00
95	2.78	0.53	3.10	3.41	1.00	8.24	10.57	87.11	3.600	No	Yes	2.00
96	2.80	0.59	3.04	3.19	1.00	9.22	9.50	87.55	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.65	2.99	2.99	1.00	10.13	8.64	87.57	3.600	No	Yes	2.00
98	2.84	0.69	2.96	2.94	1.00	10.84	8.18	88.65	3.600	No	Yes	2.00
99	2.86	0.71	2.96	3.03	1.00	11.13	8.14	90.54	3.600	No	Yes	2.00
100	2.88	0.69	2.98	3.19	1.00	10.84	8.50	92.21	3.600	No	Yes	2.00
101	2.90	0.67	3.01	3.34	1.00	10.46	8.91	93.23	3.600	No	Yes	2.00
102	2.92	0.63	3.05	3.58	1.00	9.78	9.64	94.30	3.600	No	Yes	2.00
103	2.94	0.58	3.10	3.85	1.00	9.03	10.53	95.07	3.600	No	Yes	2.00
104	2.96	0.55	3.11	3.85	1.00	8.56	10.89	93.24	3.600	No	Yes	2.00
105	2.98	0.51	3.14	3.84	1.00	7.86	11.50	90.37	3.600	No	Yes	2.00
106	3.00	0.47	3.18	3.80	1.00	7.05	12.28	86.64	3.600	No	Yes	2.00
107	3.02	0.44	3.19	3.60	1.00	6.56	12.57	82.42	3.600	No	Yes	2.00
108	3.04	0.42	3.18	3.19	1.00	6.31	12.24	77.30	3.600	No	Yes	2.00
109	3.06	0.44	3.12	2.67	1.00	6.57	11.04	72.57	3.600	No	Yes	2.00
110	3.08	0.52	2.99	2.04	1.00	7.89	8.66	68.37	3.600	No	Yes	2.00
111	3.10	0.65	2.84	1.59	0.86	10.17	6.42	65.29	3.600	No	Yes	2.00
112	3.12	0.81	2.72	1.38	0.82	12.88	4.96	63.81	3.600	No	Yes	2.00
113	3.14	0.96	2.64	1.25	0.80	15.31	4.09	62.61	3.600	No	Yes	2.00
114	3.16	1.02	2.61	1.25	0.79	16.26	3.88	63.12	3.600	No	Yes	2.00
115	3.18	0.96	2.66	1.40	0.81	15.38	4.31	66.32	3.600	No	Yes	2.00
116	3.20	0.84	2.76	1.70	0.83	13.34	5.33	71.11	3.600	No	Yes	2.00
117	3.22	0.69	2.88	2.05	0.87	10.72	6.93	74.23	3.600	No	Yes	2.00
118	3.24	0.55	3.03	2.58	1.00	8.33	9.25	77.07	3.600	No	Yes	2.00
119	3.26	0.44	3.17	3.21	1.00	6.48	12.06	78.11	3.600	No	Yes	2.00
120	3.28	0.38	3.25	3.50	1.00	5.57	13.81	76.88	3.600	No	Yes	2.00
121	3.30	0.35	3.29	3.52	1.00	5.00	14.83	74.10	3.600	No	Yes	2.00
122	3.32	0.33	3.30	3.41	1.00	4.68	15.26	71.48	3.600	No	Yes	2.00
123	3.34	0.31	3.31	3.14	1.00	4.38	15.42	67.48	3.600	No	Yes	2.00
124	3.36	0.31	3.29	2.77	1.00	4.31	14.84	63.99	3.600	No	Yes	2.00
125	3.38	0.31	3.25	2.35	1.00	4.37	13.82	60.46	3.600	No	Yes	2.00
126	3.40	0.32	3.20	1.99	1.00	4.44	12.84	57.04	3.600	No	Yes	2.00
127	3.42	0.33	3.15	1.64	1.00	4.65	11.61	54.02	3.600	No	Yes	2.00
128	3.44	0.40	3.01	1.25	1.00	5.79	8.96	51.86	3.600	No	Yes	2.00
129	3.46	0.53	2.83	0.97	0.86	8.07	6.28	50.62	3.600	No	Yes	2.00
130	3.48	0.68	2.70	0.84	0.82	10.52	4.72	49.65	3.600	No	Yes	2.00
131	3.50	0.78	2.65	0.86	0.80	12.14	4.21	51.17	3.600	No	Yes	2.00
132	3.52	0.83	2.65	0.98	0.80	13.11	4.16	54.52	3.600	No	Yes	2.00
133	3.54	0.81	2.71	1.24	0.82	12.66	4.79	60.65	3.600	No	Yes	2.00
134	3.56	0.69	2.84	1.73	0.86	10.72	6.40	68.61	3.600	No	Yes	2.00
135	3.58	0.55	3.02	2.51	1.00	8.34	9.12	76.12	3.600	No	Yes	2.00
136	3.60	0.45	3.17	3.38	1.00	6.69	12.07	80.75	3.600	No	Yes	2.00
137	3.62	0.38	3.29	4.24	1.00	5.52	15.04	83.03	3.600	No	Yes	2.00
138	3.64	0.34	3.37	4.75	1.00	4.82	17.17	82.77	3.600	No	Yes	2.00
139	3.66	0.32	3.40	4.77	1.00	4.42	18.13	80.19	3.600	No	Yes	2.00
140	3.68	0.31	3.39	4.31	1.00	4.25	17.82	75.71	3.600	No	Yes	2.00
141	3.70	0.31	3.35	3.58	1.00	4.28	16.47	70.48	3.600	No	Yes	2.00
142	3.72	0.33	3.25	2.67	1.00	4.60	14.02	64.51	3.600	No	Yes	2.00
143	3.74	0.36	3.14	1.92	1.00	5.13	11.48	58.86	3.600	No	Yes	2.00
144	3.76	0.39	3.07	1.54	1.00	5.57	9.98	55.55	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.42	3.02	1.42	1.00	6.00	9.16	55.01	3.600	No	Yes	2.00
146	3.80	0.44	3.04	1.74	1.00	6.42	9.42	60.52	3.600	No	Yes	2.00
147	3.82	0.47	3.06	2.15	1.00	6.87	9.80	67.29	3.600	No	Yes	2.00
148	3.84	0.60	2.95	2.11	0.89	9.13	7.91	72.22	3.600	No	Yes	2.00
149	3.86	0.76	2.84	2.00	0.86	11.85	6.34	75.13	3.600	No	Yes	2.00
150	3.88	0.91	2.76	1.93	0.84	14.26	5.40	77.00	3.600	No	Yes	2.00
151	3.90	1.01	2.70	1.77	0.82	16.01	4.70	75.31	3.600	No	Yes	2.00
152	3.92	1.06	2.67	1.71	0.81	16.82	4.43	74.50	3.600	No	Yes	2.00
153	3.94	0.96	2.74	1.90	0.83	15.11	5.11	77.22	3.600	No	Yes	2.00
154	3.96	0.80	2.86	2.33	0.87	12.34	6.63	81.78	3.600	No	Yes	2.00
155	3.98	0.63	3.01	3.01	1.00	9.62	8.98	86.40	3.600	No	Yes	2.00
156	4.00	0.50	3.17	3.99	1.00	7.43	12.14	90.22	3.600	No	Yes	2.00
157	4.02	0.41	3.31	4.98	1.00	5.88	15.50	91.22	3.600	No	Yes	2.00
158	4.04	0.35	3.41	5.70	1.00	4.84	18.48	89.54	3.600	No	Yes	2.00
159	4.06	0.33	3.42	5.40	1.00	4.55	18.78	85.36	3.600	No	Yes	2.00
160	4.08	0.33	3.40	4.73	1.00	4.47	17.95	80.22	3.600	No	Yes	2.00
161	4.10	0.33	3.35	3.90	1.00	4.48	16.57	74.18	3.600	No	Yes	2.00
162	4.12	0.33	3.30	3.12	1.00	4.47	15.18	67.88	3.600	No	Yes	2.00
163	4.14	0.33	3.26	2.52	1.00	4.44	14.05	62.38	3.600	No	Yes	2.00
164	4.16	0.33	3.22	2.12	1.00	4.39	13.26	58.26	3.600	No	Yes	2.00
165	4.18	0.34	3.16	1.72	1.00	4.63	11.82	54.79	3.600	No	Yes	2.00
166	4.20	0.35	3.12	1.50	1.00	4.80	10.99	52.69	3.600	No	Yes	2.00
167	4.22	0.36	3.10	1.47	1.00	4.94	10.69	52.84	3.600	No	Yes	2.00
168	4.24	0.37	3.09	1.47	1.00	5.08	10.47	53.16	3.600	No	Yes	2.00
169	4.26	0.37	3.08	1.45	1.00	5.20	10.25	53.30	3.600	No	Yes	2.00
170	4.28	0.37	3.10	1.52	1.00	5.03	10.67	53.71	3.600	No	Yes	2.00
171	4.30	0.36	3.12	1.56	1.00	4.92	10.94	53.89	3.600	No	Yes	2.00
172	4.32	0.35	3.12	1.53	1.00	4.85	10.99	53.26	3.600	No	Yes	2.00
173	4.34	0.35	3.12	1.49	1.00	4.77	11.02	52.54	3.600	No	Yes	2.00
174	4.36	0.34	3.13	1.48	1.00	4.66	11.17	52.09	3.600	No	Yes	2.00
175	4.38	0.34	3.13	1.47	1.00	4.60	11.25	51.77	3.600	No	Yes	2.00
176	4.40	0.34	3.13	1.45	1.00	4.61	11.18	51.58	3.600	No	Yes	2.00
177	4.42	0.34	3.13	1.46	1.00	4.61	11.19	51.58	3.600	No	Yes	2.00
178	4.44	0.34	3.13	1.48	1.00	4.63	11.21	51.93	3.600	No	Yes	2.00
179	4.46	0.35	3.13	1.52	1.00	4.69	11.23	52.60	3.600	No	Yes	2.00
180	4.48	0.35	3.14	1.60	1.00	4.69	11.44	53.64	3.600	No	Yes	2.00
181	4.50	0.34	3.16	1.72	1.00	4.63	11.85	54.88	3.600	No	Yes	2.00
182	4.52	0.34	3.18	1.84	1.00	4.58	12.23	55.99	3.600	No	Yes	2.00
183	4.54	0.34	3.19	1.94	1.00	4.53	12.57	56.91	3.600	No	Yes	2.00
184	4.56	0.34	3.20	1.99	1.00	4.48	12.79	57.26	3.600	No	Yes	2.00
185	4.58	0.33	3.21	2.00	1.00	4.45	12.87	57.20	3.600	No	Yes	2.00
186	4.60	0.33	3.20	1.96	1.00	4.41	12.85	56.66	3.600	No	Yes	2.00
187	4.62	0.34	3.19	1.84	1.00	4.48	12.42	55.64	3.600	No	Yes	2.00
188	4.64	0.34	3.16	1.69	1.00	4.59	11.83	54.32	3.600	No	Yes	2.00
189	4.66	0.35	3.13	1.55	1.00	4.69	11.30	52.95	3.600	No	Yes	2.00
190	4.68	0.35	3.11	1.41	1.00	4.72	10.86	51.31	3.600	No	Yes	2.00
191	4.70	0.35	3.10	1.30	1.00	4.74	10.54	50.00	3.600	No	Yes	2.00
192	4.72	0.35	3.09	1.24	1.00	4.66	10.51	49.01	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.35	3.08	1.18	1.00	4.66	10.32	48.12	3.600	No	Yes	2.00
194	4.76	0.35	3.07	1.13	1.00	4.70	10.11	47.50	3.600	No	Yes	2.00
195	4.78	0.36	3.06	1.11	1.00	4.79	9.92	47.52	3.600	No	Yes	2.00
196	4.80	0.37	3.05	1.08	1.00	4.94	9.60	47.40	3.600	No	Yes	2.00
197	4.82	0.38	3.03	1.04	1.00	5.11	9.22	47.14	3.600	No	Yes	2.00
198	4.84	0.38	3.01	1.00	1.00	5.23	8.96	46.83	3.600	No	Yes	2.00
199	4.86	0.39	2.99	0.97	1.00	5.36	8.70	46.61	3.600	No	Yes	2.00
200	4.88	0.40	2.98	0.94	1.00	5.49	8.45	46.38	3.600	No	Yes	2.00
201	4.90	0.40	2.98	0.95	1.00	5.55	8.41	46.72	3.600	No	Yes	2.00
202	4.92	0.41	2.98	0.99	1.00	5.59	8.47	47.30	3.600	No	Yes	2.00
203	4.94	0.41	2.99	1.04	1.00	5.57	8.64	48.10	3.600	No	Yes	2.00
204	4.96	0.43	2.96	1.01	1.00	5.99	8.09	48.52	3.600	No	Yes	2.00
205	4.98	0.48	2.90	0.96	0.88	6.75	7.23	48.77	3.600	No	Yes	2.00
206	5.00	0.53	2.84	0.89	0.86	7.63	6.37	48.59	3.600	No	Yes	2.00
207	5.02	0.59	2.79	0.90	0.85	8.67	5.73	49.73	3.600	No	Yes	2.00
208	5.04	0.68	2.74	0.94	0.83	10.10	5.13	51.76	3.600	No	Yes	2.00
209	5.06	0.75	2.71	1.00	0.82	11.28	4.80	54.11	3.600	No	Yes	2.00
210	5.08	0.78	2.71	1.09	0.82	11.81	4.79	56.60	3.600	No	Yes	2.00
211	5.10	0.81	2.73	1.29	0.83	12.29	5.01	61.51	3.600	No	Yes	2.00
212	5.12	0.83	2.75	1.53	0.83	12.59	5.31	66.82	3.600	No	Yes	2.00
213	5.14	0.81	2.80	1.82	0.85	12.27	5.89	72.30	3.600	No	Yes	2.00
214	5.16	0.77	2.86	2.15	0.87	11.57	6.69	77.42	3.600	No	Yes	2.00
215	5.18	0.76	2.89	2.36	0.88	11.43	7.07	80.78	3.600	No	Yes	2.00
216	5.20	0.77	2.88	2.36	0.87	11.64	6.98	81.24	3.600	No	Yes	2.00
217	5.22	0.80	2.86	2.25	0.87	12.04	6.63	79.89	3.600	No	Yes	2.00
218	5.24	0.84	2.81	1.97	0.85	12.75	5.95	75.91	3.600	No	Yes	2.00
219	5.26	0.89	2.75	1.73	0.83	13.65	5.29	72.21	3.600	No	Yes	2.00
220	5.28	0.93	2.72	1.61	0.82	14.22	4.94	70.23	3.600	No	Yes	2.00
221	5.30	0.93	2.72	1.59	0.82	14.30	4.89	69.85	3.600	No	Yes	2.00
222	5.32	0.91	2.74	1.66	0.83	13.93	5.09	70.90	3.600	No	Yes	2.00
223	5.34	0.86	2.78	1.84	0.84	13.09	5.63	73.69	3.600	No	Yes	2.00
224	5.36	0.79	2.84	2.07	0.86	11.90	6.43	76.53	3.600	No	Yes	2.00
225	5.38	0.73	2.93	2.61	0.89	10.84	7.71	83.56	3.600	No	Yes	2.00
226	5.40	0.65	3.01	2.92	1.00	9.54	8.90	84.95	3.600	No	Yes	2.00
227	5.42	0.58	3.08	3.16	1.00	8.32	10.14	84.40	3.600	No	Yes	2.00
228	5.44	0.52	3.13	3.37	1.00	7.37	11.32	83.40	3.600	No	Yes	2.00
229	5.46	0.47	3.19	3.56	1.00	6.54	12.53	81.98	3.600	No	Yes	2.00
230	5.48	0.42	3.22	3.21	1.00	5.68	13.14	74.66	3.600	No	Yes	2.00
231	5.50	0.39	3.25	3.20	1.00	5.14	14.02	72.07	3.600	No	Yes	2.00
232	5.52	0.37	3.27	3.09	1.00	4.76	14.52	69.16	3.600	No	Yes	2.00
233	5.54	0.35	3.28	2.89	1.00	4.53	14.60	66.16	3.600	No	Yes	2.00
234	5.56	0.35	3.26	2.58	1.00	4.44	14.16	62.94	3.600	No	Yes	2.00
235	5.58	0.34	3.24	2.29	1.00	4.35	13.73	59.73	3.600	No	Yes	2.00
236	5.60	0.34	3.22	2.02	1.00	4.28	13.26	56.75	3.600	No	Yes	2.00
237	5.62	0.34	3.21	1.87	1.00	4.21	13.03	54.90	3.600	No	Yes	2.00
238	5.64	0.33	3.20	1.75	1.00	4.16	12.83	53.39	3.600	No	Yes	2.00
239	5.66	0.33	3.19	1.64	1.00	4.15	12.56	52.15	3.600	No	Yes	2.00
240	5.68	0.34	3.17	1.53	1.00	4.24	12.09	51.19	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.34	3.15	1.42	1.00	4.34	11.58	50.29	3.600	No	Yes	2.00
242	5.72	0.35	3.13	1.36	1.00	4.43	11.23	49.76	3.600	No	Yes	2.00
243	5.74	0.35	3.12	1.33	1.00	4.48	11.05	49.53	3.600	No	Yes	2.00
244	5.76	0.36	3.12	1.31	1.00	4.50	10.98	49.42	3.600	No	Yes	2.00
245	5.78	0.35	3.13	1.36	1.00	4.42	11.25	49.76	3.600	No	Yes	2.00
246	5.80	0.35	3.14	1.41	1.00	4.40	11.44	50.35	3.600	No	Yes	2.00
247	5.82	0.35	3.15	1.46	1.00	4.41	11.56	50.99	3.600	No	Yes	2.00
248	5.84	0.35	3.15	1.47	1.00	4.44	11.55	51.25	3.600	No	Yes	2.00
249	5.86	0.35	3.14	1.46	1.00	4.47	11.44	51.14	3.600	No	Yes	2.00
250	5.88	0.36	3.13	1.39	1.00	4.54	11.13	50.53	3.600	No	Yes	2.00
251	5.90	0.36	3.11	1.30	1.00	4.63	10.72	49.61	3.600	No	Yes	2.00
252	5.92	0.37	3.08	1.20	1.00	4.72	10.30	48.58	3.600	No	Yes	2.00
253	5.94	0.37	3.07	1.15	1.00	4.77	10.05	47.94	3.600	No	Yes	2.00
254	5.96	0.38	3.07	1.16	1.00	4.80	10.05	48.22	3.600	No	Yes	2.00
255	5.98	0.37	3.09	1.23	1.00	4.76	10.33	49.13	3.600	No	Yes	2.00
256	6.00	0.37	3.11	1.36	1.00	4.63	10.89	50.46	3.600	No	Yes	2.00
257	6.02	0.36	3.14	1.51	1.00	4.54	11.45	51.99	3.600	No	Yes	2.00
258	6.04	0.36	3.16	1.62	1.00	4.49	11.85	53.18	3.600	No	Yes	2.00
259	6.06	0.36	3.17	1.67	1.00	4.47	11.99	53.63	3.600	No	Yes	2.00
260	6.08	0.37	3.14	1.57	1.00	4.61	11.50	53.01	3.600	No	Yes	2.00
261	6.10	0.38	3.10	1.41	1.00	4.86	10.66	51.75	3.600	No	Yes	2.00
262	6.12	0.40	3.06	1.23	1.00	5.12	9.79	50.06	3.600	No	Yes	2.00
263	6.14	0.41	3.02	1.10	1.00	5.33	9.11	48.62	3.600	No	Yes	2.00
264	6.16	0.42	2.99	1.01	1.00	5.53	8.60	47.55	3.600	No	Yes	2.00
265	6.18	0.43	2.98	0.99	1.00	5.64	8.43	47.54	3.600	No	Yes	2.00
266	6.20	0.43	2.98	1.02	1.00	5.65	8.50	48.02	3.600	No	Yes	2.00
267	6.22	0.44	2.99	1.10	1.00	5.75	8.61	49.53	3.600	No	Yes	2.00
268	6.24	0.45	2.99	1.18	1.00	5.91	8.64	51.02	3.600	No	Yes	2.00
269	6.26	0.45	2.99	1.25	1.00	6.06	8.66	52.44	3.600	No	Yes	2.00
270	6.28	0.47	2.98	1.27	1.00	6.32	8.45	53.34	3.600	No	Yes	2.00
271	6.30	0.50	2.95	1.26	1.00	6.75	8.01	54.07	3.600	No	Yes	2.00
272	6.32	0.52	2.93	1.24	0.89	7.15	7.61	54.38	3.600	No	Yes	2.00
273	6.34	0.55	2.90	1.21	0.88	7.64	7.16	54.69	3.600	No	Yes	2.00
274	6.36	0.57	2.88	1.24	0.87	7.99	6.97	55.69	3.600	No	Yes	2.00
275	6.38	0.57	2.90	1.36	0.88	8.02	7.21	57.82	3.600	No	Yes	2.00
276	6.40	0.56	2.95	1.58	0.89	7.72	7.91	61.09	3.600	No	Yes	2.00
277	6.42	0.53	3.02	1.99	1.00	7.20	9.17	65.99	3.600	No	Yes	2.00
278	6.44	0.49	3.11	2.51	1.00	6.52	10.83	70.60	3.600	No	Yes	2.00
279	6.46	0.45	3.18	2.99	1.00	5.99	12.33	73.81	3.600	No	Yes	2.00
280	6.48	0.43	3.23	3.33	1.00	5.60	13.47	75.41	3.600	No	Yes	2.00
281	6.50	0.42	3.25	3.39	1.00	5.42	13.85	75.15	3.600	No	Yes	2.00
282	6.52	0.42	3.22	3.06	1.00	5.43	13.28	72.14	3.600	No	Yes	2.00
283	6.54	0.42	3.18	2.55	1.00	5.46	12.29	67.04	3.600	No	Yes	2.00
284	6.56	0.42	3.13	2.05	1.00	5.47	11.27	61.66	3.600	No	Yes	2.00
285	6.58	0.43	3.08	1.63	1.00	5.51	10.27	56.57	3.600	No	Yes	2.00
286	6.60	0.45	3.05	1.54	1.00	5.82	9.64	56.17	3.600	No	Yes	2.00
287	6.62	0.46	3.02	1.40	1.00	5.98	9.13	54.55	3.600	No	Yes	2.00
288	6.64	0.47	3.03	1.53	1.00	6.15	9.25	56.85	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	0.47	3.04	1.70	1.00	6.24	9.54	59.56	3.600	No	Yes	2.00
290	6.68	0.47	3.07	1.91	1.00	6.23	10.00	62.30	3.600	No	Yes	2.00
291	6.70	0.44	3.11	2.00	1.00	5.72	10.82	61.85	3.600	No	Yes	2.00
292	6.72	0.42	3.16	2.23	1.00	5.36	11.81	63.31	3.600	No	Yes	2.00
293	6.74	0.42	3.16	2.20	1.00	5.30	11.82	62.66	3.600	No	Yes	2.00
294	6.76	0.43	3.11	1.95	1.00	5.60	10.88	60.89	3.600	No	Yes	2.00
295	6.78	0.46	3.04	1.61	1.00	6.09	9.50	57.91	3.600	No	Yes	2.00
296	6.80	0.50	2.96	1.28	1.00	6.72	8.09	54.35	3.600	No	Yes	2.00
297	6.82	0.53	2.89	1.04	0.88	7.13	7.12	50.81	3.600	No	Yes	2.00
298	6.84	0.53	2.86	0.88	0.87	7.14	6.69	47.75	3.600	No	Yes	2.00
299	6.86	0.51	2.88	0.86	0.87	6.79	6.91	46.93	3.600	No	Yes	2.00
300	6.88	0.48	2.93	0.95	0.89	6.28	7.61	47.82	3.600	No	Yes	2.00
301	6.90	0.44	2.99	1.08	1.00	5.72	8.59	49.19	3.600	No	Yes	2.00
302	6.92	0.42	3.04	1.24	1.00	5.29	9.56	50.55	3.600	No	Yes	2.00
303	6.94	0.40	3.08	1.34	1.00	5.03	10.20	51.25	3.600	No	Yes	2.00
304	6.96	0.40	3.08	1.29	1.00	4.90	10.26	50.25	3.600	No	Yes	2.00
305	6.98	0.40	3.05	1.10	1.00	4.98	9.60	47.86	3.600	No	Yes	2.00
306	7.00	0.42	2.98	0.87	1.00	5.28	8.48	44.79	3.600	No	Yes	2.00
307	7.02	0.44	2.91	0.65	0.88	5.63	7.34	41.31	3.600	No	Yes	2.00
308	7.04	0.46	2.85	0.50	0.86	5.87	6.56	38.51	3.600	No	Yes	2.00
309	7.06	0.46	2.82	0.42	0.85	6.01	6.11	36.68	3.600	No	Yes	2.00
310	7.08	0.46	2.82	0.42	0.85	5.96	6.14	36.59	3.600	No	Yes	2.00
311	7.10	0.45	2.86	0.49	0.87	5.77	6.61	38.09	3.600	No	Yes	2.00
312	7.12	0.44	2.90	0.60	0.88	5.60	7.19	40.26	3.600	No	Yes	2.00
313	7.14	0.44	2.93	0.73	0.89	5.53	7.71	42.67	3.600	No	Yes	2.00
314	7.16	0.44	2.96	0.83	1.00	5.54	8.05	44.55	3.600	No	Yes	2.00
315	7.18	0.44	2.96	0.89	1.00	5.66	8.09	45.80	3.600	No	Yes	2.00
316	7.20	0.46	2.93	0.85	0.89	5.93	7.69	45.62	3.600	No	Yes	2.00
317	7.22	0.48	2.90	0.79	0.88	6.26	7.16	44.85	3.600	No	Yes	2.00
318	7.24	0.50	2.86	0.71	0.87	6.53	6.70	43.71	3.600	No	Yes	2.00
319	7.26	0.50	2.85	0.68	0.86	6.61	6.50	42.98	3.600	No	Yes	2.00
320	7.28	0.50	2.85	0.68	0.86	6.62	6.52	43.18	3.600	No	Yes	2.00
321	7.30	0.50	2.88	0.77	0.87	6.56	6.85	44.92	3.600	No	Yes	2.00
322	7.32	0.49	2.93	0.95	0.89	6.33	7.59	48.05	3.600	No	Yes	2.00
323	7.34	0.47	2.98	1.18	1.00	6.10	8.42	51.42	3.600	No	Yes	2.00
324	7.36	0.47	3.02	1.38	1.00	5.98	9.07	54.22	3.600	No	Yes	2.00
325	7.38	0.45	3.06	1.56	1.00	5.71	9.82	56.13	3.600	No	Yes	2.00
326	7.40	0.43	3.10	1.69	1.00	5.36	10.62	56.88	3.600	No	Yes	2.00
327	7.42	0.41	3.12	1.69	1.00	5.03	11.10	55.88	3.600	No	Yes	2.00
328	7.44	0.39	3.13	1.58	1.00	4.73	11.30	53.44	3.600	No	Yes	2.00
329	7.46	0.38	3.13	1.39	1.00	4.48	11.24	50.38	3.600	No	Yes	2.00
330	7.48	0.37	3.11	1.15	1.00	4.37	10.73	46.91	3.600	No	Yes	2.00
331	7.50	0.37	3.07	0.90	1.00	4.33	9.98	43.21	3.600	No	Yes	2.00
332	7.52	0.37	3.03	0.69	1.00	4.30	9.28	39.91	3.600	No	Yes	2.00
333	7.54	0.37	3.00	0.57	1.00	4.29	8.80	37.75	3.600	No	Yes	2.00
334	7.56	0.37	2.98	0.48	1.00	4.30	8.41	36.14	3.600	No	Yes	2.00
335	7.58	0.37	2.96	0.42	1.00	4.31	8.10	34.90	3.600	No	Yes	2.00
336	7.60	0.37	2.95	0.40	1.00	4.30	8.00	34.43	3.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	0.37	2.95	0.39	0.89	4.34	7.89	34.25	3.600	No	Yes	2.00
338	7.64	0.38	2.93	0.37	0.89	4.45	7.64	34.03	3.600	No	Yes	2.00
339	7.66	0.38	2.92	0.35	0.88	4.54	7.45	33.81	3.600	No	Yes	2.00
340	7.68	0.39	2.91	0.36	0.88	4.58	7.41	33.95	3.600	No	Yes	2.00
341	7.70	0.38	2.92	0.36	0.88	4.53	7.50	33.98	3.600	No	Yes	2.00
342	7.72	0.38	2.93	0.38	0.89	4.47	7.64	34.18	3.600	No	Yes	2.00
343	7.74	0.38	2.94	0.40	0.89	4.44	7.81	34.67	3.600	No	Yes	2.00
344	7.76	0.38	2.95	0.45	1.00	4.43	8.04	35.61	3.600	No	Yes	2.00
345	7.78	0.38	2.97	0.50	1.00	4.46	8.25	36.78	3.600	No	Yes	2.00
346	7.80	0.42	2.91	0.50	0.88	5.06	7.40	37.49	3.600	No	Yes	2.00
347	7.82	0.45	2.87	0.50	0.87	5.61	6.79	38.10	3.600	No	Yes	2.00
348	7.84	0.46	2.88	0.57	0.87	5.80	6.89	39.95	3.600	No	Yes	2.00
349	7.86	0.47	2.88	0.62	0.87	5.93	6.94	41.13	3.600	No	Yes	2.00
350	7.88	0.47	2.89	0.68	0.88	5.99	7.06	42.33	3.600	No	Yes	2.00
351	7.90	0.45	2.94	0.77	0.89	5.58	7.81	43.53	3.600	No	Yes	2.00
352	7.92	0.43	2.97	0.82	1.00	5.26	8.35	43.94	3.600	No	Yes	2.00
353	7.94	0.43	2.97	0.77	1.00	5.21	8.23	42.87	3.600	No	Yes	2.00
354	7.96	0.43	2.96	0.72	1.00	5.22	8.06	42.05	4.000	Yes	Yes	2.00
355	7.98	0.44	2.93	0.64	0.89	5.35	7.61	40.73	4.000	Yes	Yes	2.00
356	8.00	0.46	2.89	0.57	0.87	5.66	7.02	39.71	4.000	Yes	Yes	2.00
357	8.02	0.51	2.81	0.48	0.85	6.49	5.92	38.40	4.000	Yes	Yes	2.00
358	8.04	0.58	2.70	0.39	0.82	7.75	4.76	36.89	4.000	Yes	Yes	2.00
359	8.06	0.71	2.60	0.39	0.79	9.92	3.78	37.46	4.000	Yes	Yes	2.00
360	8.08	0.91	2.55	0.59	0.77	13.29	3.31	44.01	4.000	Yes	No	2.00
361	8.10	1.17	2.47	0.71	0.75	17.66	2.77	48.96	4.000	Yes	No	2.00
362	8.12	1.49	2.40	0.86	0.73	22.93	2.40	54.99	4.000	Yes	No	2.00
363	8.14	1.80	2.37	1.04	0.72	28.18	2.21	62.40	4.000	Yes	No	2.00
364	8.16	2.10	2.35	1.23	0.71	33.12	2.13	70.51	0.113	No	No	1.00
365	8.18	2.28	2.33	1.28	0.71	36.21	2.03	73.55	0.117	No	No	1.03
366	8.20	2.47	2.33	1.45	0.71	39.31	2.04	80.21	0.128	No	No	1.13

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	1.68	0.00	0.00	0.02	0.00
1.10	1.68	0.00	0.00	0.02	0.00	1.12	1.72	0.00	0.00	0.02	0.00
1.14	1.80	0.00	0.00	0.02	0.00	1.16	1.85	0.00	0.00	0.02	0.00
1.18	1.85	0.00	0.00	0.02	0.00	1.20	1.82	0.00	0.00	0.02	0.00
1.22	1.75	0.00	0.00	0.02	0.00	1.24	1.64	0.00	0.00	0.02	0.00
1.26	1.54	0.00	0.00	0.02	0.00	1.28	1.47	0.00	0.00	0.02	0.00
1.30	1.41	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	1.18	0.00	0.00	0.02	0.00	1.72	1.17	0.00	0.00	0.02	0.00
1.74	1.15	0.00	0.00	0.02	0.00	1.76	1.13	0.00	0.00	0.02	0.00
1.78	1.10	0.00	0.00	0.02	0.00	1.80	1.08	0.00	0.00	0.02	0.00
1.82	1.07	0.00	0.00	0.02	0.00	1.84	0.84	0.00	0.00	0.02	0.03
1.86	0.83	0.00	0.00	0.02	0.03	1.88	0.83	0.00	0.00	0.02	0.03
1.90	0.82	0.00	0.00	0.02	0.03	1.92	0.81	0.00	0.00	0.02	0.03
1.94	1.03	0.00	0.00	0.02	0.00	1.96	1.03	0.00	0.00	0.02	0.00
1.98	1.03	0.00	0.00	0.02	0.00	2.00	1.02	0.00	0.00	0.02	0.00
2.02	1.01	0.00	0.00	0.02	0.00	2.04	0.79	0.21	1.50	0.02	0.04
2.06	0.79	0.21	1.55	0.02	0.04	2.08	0.79	0.21	1.57	0.02	0.04
2.10	0.79	0.21	1.56	0.02	0.04	2.12	1.00	0.00	0.00	0.02	0.00
2.14	1.01	0.00	0.00	0.02	0.00	2.16	1.01	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	1.00	0.00	0.00	0.02	0.00
8.18	1.03	0.00	0.00	0.02	0.00	8.20	1.13	0.00	0.00	0.02	0.00

Overall liquefaction potential: 0.31

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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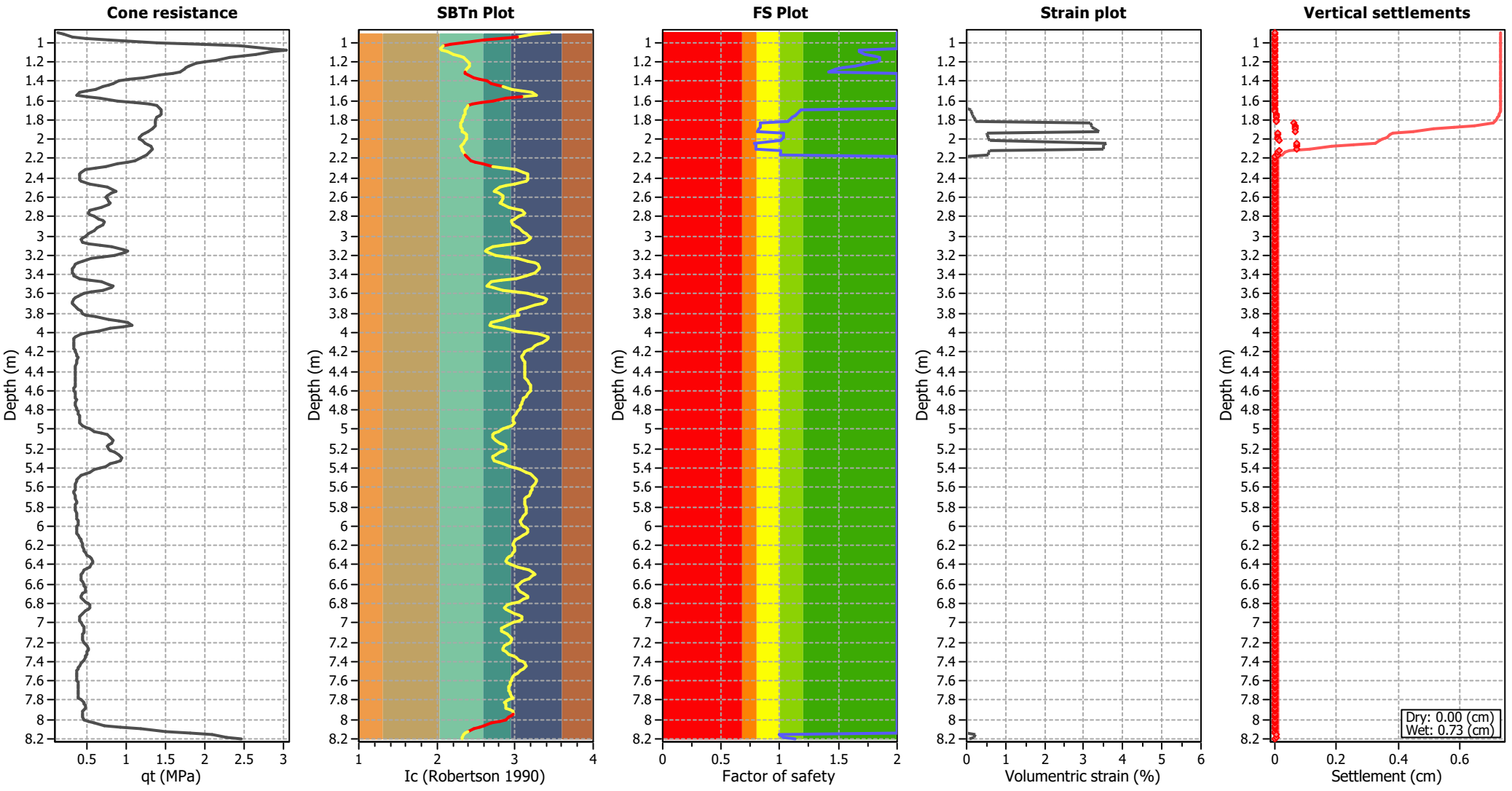
CPT name: CWLPCPT- 7CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
0.90	35.55	2.00	0.00	0.95	0.00	0.92	40.12	2.00	0.00	0.95	0.00
0.94	44.95	2.00	0.00	0.95	0.00	0.96	47.95	2.00	0.00	0.95	0.00
0.98	47.52	2.00	0.00	0.95	0.00	1.00	46.55	2.00	0.00	0.94	0.00
1.02	50.25	2.00	0.00	0.94	0.00	1.04	56.55	2.00	0.00	0.94	0.00
1.06	63.45	2.00	0.00	0.94	0.00	1.08	68.83	1.68	0.00	0.94	0.00
1.10	69.67	1.68	0.00	0.94	0.00	1.12	72.27	1.72	0.00	0.94	0.00
1.14	76.28	1.80	0.00	0.94	0.00	1.16	78.72	1.85	0.00	0.94	0.00
1.18	79.41	1.85	0.00	0.93	0.00	1.20	78.86	1.82	0.00	0.93	0.00
1.22	76.34	1.75	0.00	0.93	0.00	1.24	72.15	1.64	0.00	0.93	0.00
1.26	67.56	1.54	0.00	0.93	0.00	1.28	64.05	1.47	0.00	0.93	0.00
1.30	60.67	1.41	0.00	0.93	0.00	1.32	57.79	2.00	0.00	0.93	0.00
1.34	55.90	2.00	0.00	0.93	0.00	1.36	55.35	2.00	0.00	0.92	0.00
1.38	57.07	2.00	0.00	0.92	0.00	1.40	60.37	2.00	0.00	0.92	0.00
1.42	64.68	2.00	0.00	0.92	0.00	1.44	68.47	2.00	0.00	0.92	0.00
1.46	72.93	2.00	0.00	0.92	0.00	1.48	76.85	2.00	0.00	0.92	0.00
1.50	80.54	2.00	0.00	0.92	0.00	1.52	82.38	2.00	0.00	0.92	0.00
1.54	83.31	2.00	0.00	0.91	0.00	1.56	81.31	2.00	0.00	0.91	0.00
1.58	75.90	2.00	0.00	0.91	0.00	1.60	68.19	2.00	0.00	0.91	0.00
1.62	61.35	2.00	0.00	0.91	0.00	1.64	56.51	2.00	0.00	0.91	0.00
1.66	54.44	2.00	0.00	0.91	0.00	1.68	53.02	2.00	0.00	0.91	0.00
1.70	52.63	1.18	0.10	0.91	0.00	1.72	52.15	1.17	0.10	0.90	0.00
1.74	50.79	1.15	0.15	0.90	0.00	1.76	49.06	1.13	0.17	0.90	0.00
1.78	47.29	1.10	0.19	0.90	0.00	1.80	45.27	1.08	0.22	0.90	0.00
1.82	44.40	1.07	0.23	0.90	0.00	1.84	22.29	0.84	3.17	0.90	0.06
1.86	22.26	0.83	3.20	0.90	0.06	1.88	22.23	0.83	3.22	0.90	0.06
1.90	21.72	0.82	3.29	0.89	0.07	1.92	20.99	0.81	3.37	0.89	0.07
1.94	43.41	1.03	0.54	0.89	0.01	1.96	43.75	1.03	0.54	0.89	0.01
1.98	43.77	1.03	0.54	0.89	0.01	2.00	43.41	1.02	0.56	0.89	0.01
2.02	42.65	1.01	0.59	0.89	0.01	2.04	20.22	0.79	3.56	0.89	0.07
2.06	20.96	0.79	3.52	0.89	0.07	2.08	21.47	0.79	3.49	0.88	0.07
2.10	21.66	0.79	3.50	0.88	0.07	2.12	43.68	1.00	0.59	0.88	0.01
2.14	44.32	1.01	0.58	0.88	0.01	2.16	44.84	1.01	0.57	0.88	0.01
2.18	45.08	2.00	0.00	0.88	0.00	2.20	45.43	2.00	0.00	0.88	0.00
2.22	46.21	2.00	0.00	0.88	0.00	2.24	48.18	2.00	0.00	0.88	0.00
2.26	51.81	2.00	0.00	0.87	0.00	2.28	57.52	2.00	0.00	0.87	0.00
2.30	63.18	2.00	0.00	0.87	0.00	2.32	67.63	2.00	0.00	0.87	0.00
2.34	70.13	2.00	0.00	0.87	0.00	2.36	71.20	2.00	0.00	0.87	0.00
2.38	71.18	2.00	0.00	0.87	0.00	2.40	71.54	2.00	0.00	0.87	0.00
2.42	72.29	2.00	0.00	0.87	0.00	2.44	73.21	2.00	0.00	0.86	0.00
2.46	72.40	2.00	0.00	0.86	0.00	2.48	70.92	2.00	0.00	0.86	0.00
2.50	69.23	2.00	0.00	0.86	0.00	2.52	68.71	2.00	0.00	0.86	0.00
2.54	69.31	2.00	0.00	0.86	0.00	2.56	72.66	2.00	0.00	0.86	0.00
2.58	75.27	2.00	0.00	0.86	0.00	2.60	76.47	2.00	0.00	0.86	0.00
2.62	76.59	2.00	0.00	0.85	0.00	2.64	76.06	2.00	0.00	0.85	0.00
2.66	75.72	2.00	0.00	0.85	0.00	2.68	76.63	2.00	0.00	0.85	0.00
2.70	79.59	2.00	0.00	0.85	0.00	2.72	82.54	2.00	0.00	0.85	0.00
2.74	84.25	2.00	0.00	0.85	0.00	2.76	85.77	2.00	0.00	0.85	0.00
2.78	87.11	2.00	0.00	0.85	0.00	2.80	87.55	2.00	0.00	0.84	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.82	87.57	2.00	0.00	0.84	0.00	2.84	88.65	2.00	0.00	0.84	0.00
2.86	90.54	2.00	0.00	0.84	0.00	2.88	92.21	2.00	0.00	0.84	0.00
2.90	93.23	2.00	0.00	0.84	0.00	2.92	94.30	2.00	0.00	0.84	0.00
2.94	95.07	2.00	0.00	0.84	0.00	2.96	93.24	2.00	0.00	0.84	0.00
2.98	90.37	2.00	0.00	0.83	0.00	3.00	86.64	2.00	0.00	0.83	0.00
3.02	82.42	2.00	0.00	0.83	0.00	3.04	77.30	2.00	0.00	0.83	0.00
3.06	72.57	2.00	0.00	0.83	0.00	3.08	68.37	2.00	0.00	0.83	0.00
3.10	65.29	2.00	0.00	0.83	0.00	3.12	63.81	2.00	0.00	0.83	0.00
3.14	62.61	2.00	0.00	0.83	0.00	3.16	63.12	2.00	0.00	0.82	0.00
3.18	66.32	2.00	0.00	0.82	0.00	3.20	71.11	2.00	0.00	0.82	0.00
3.22	74.23	2.00	0.00	0.82	0.00	3.24	77.07	2.00	0.00	0.82	0.00
3.26	78.11	2.00	0.00	0.82	0.00	3.28	76.88	2.00	0.00	0.82	0.00
3.30	74.10	2.00	0.00	0.82	0.00	3.32	71.48	2.00	0.00	0.82	0.00
3.34	67.48	2.00	0.00	0.81	0.00	3.36	63.99	2.00	0.00	0.81	0.00
3.38	60.46	2.00	0.00	0.81	0.00	3.40	57.04	2.00	0.00	0.81	0.00
3.42	54.02	2.00	0.00	0.81	0.00	3.44	51.86	2.00	0.00	0.81	0.00
3.46	50.62	2.00	0.00	0.81	0.00	3.48	49.65	2.00	0.00	0.81	0.00
3.50	51.17	2.00	0.00	0.81	0.00	3.52	54.52	2.00	0.00	0.80	0.00
3.54	60.65	2.00	0.00	0.80	0.00	3.56	68.61	2.00	0.00	0.80	0.00
3.58	76.12	2.00	0.00	0.80	0.00	3.60	80.75	2.00	0.00	0.80	0.00
3.62	83.03	2.00	0.00	0.80	0.00	3.64	82.77	2.00	0.00	0.80	0.00
3.66	80.19	2.00	0.00	0.80	0.00	3.68	75.71	2.00	0.00	0.80	0.00
3.70	70.48	2.00	0.00	0.79	0.00	3.72	64.51	2.00	0.00	0.79	0.00
3.74	58.86	2.00	0.00	0.79	0.00	3.76	55.55	2.00	0.00	0.79	0.00
3.78	55.01	2.00	0.00	0.79	0.00	3.80	60.52	2.00	0.00	0.79	0.00
3.82	67.29	2.00	0.00	0.79	0.00	3.84	72.22	2.00	0.00	0.79	0.00
3.86	75.13	2.00	0.00	0.79	0.00	3.88	77.00	2.00	0.00	0.78	0.00
3.90	75.31	2.00	0.00	0.78	0.00	3.92	74.50	2.00	0.00	0.78	0.00
3.94	77.22	2.00	0.00	0.78	0.00	3.96	81.78	2.00	0.00	0.78	0.00
3.98	86.40	2.00	0.00	0.78	0.00	4.00	90.22	2.00	0.00	0.78	0.00
4.02	91.22	2.00	0.00	0.78	0.00	4.04	89.54	2.00	0.00	0.78	0.00
4.06	85.36	2.00	0.00	0.77	0.00	4.08	80.22	2.00	0.00	0.77	0.00
4.10	74.18	2.00	0.00	0.77	0.00	4.12	67.88	2.00	0.00	0.77	0.00
4.14	62.38	2.00	0.00	0.77	0.00	4.16	58.26	2.00	0.00	0.77	0.00
4.18	54.79	2.00	0.00	0.77	0.00	4.20	52.69	2.00	0.00	0.77	0.00
4.22	52.84	2.00	0.00	0.77	0.00	4.24	53.16	2.00	0.00	0.76	0.00
4.26	53.30	2.00	0.00	0.76	0.00	4.28	53.71	2.00	0.00	0.76	0.00
4.30	53.89	2.00	0.00	0.76	0.00	4.32	53.26	2.00	0.00	0.76	0.00
4.34	52.54	2.00	0.00	0.76	0.00	4.36	52.09	2.00	0.00	0.76	0.00
4.38	51.77	2.00	0.00	0.76	0.00	4.40	51.58	2.00	0.00	0.76	0.00
4.42	51.58	2.00	0.00	0.75	0.00	4.44	51.93	2.00	0.00	0.75	0.00
4.46	52.60	2.00	0.00	0.75	0.00	4.48	53.64	2.00	0.00	0.75	0.00
4.50	54.88	2.00	0.00	0.75	0.00	4.52	55.99	2.00	0.00	0.75	0.00
4.54	56.91	2.00	0.00	0.75	0.00	4.56	57.26	2.00	0.00	0.75	0.00
4.58	57.20	2.00	0.00	0.75	0.00	4.60	56.66	2.00	0.00	0.74	0.00
4.62	55.64	2.00	0.00	0.74	0.00	4.64	54.32	2.00	0.00	0.74	0.00
4.66	52.95	2.00	0.00	0.74	0.00	4.68	51.31	2.00	0.00	0.74	0.00
4.70	50.00	2.00	0.00	0.74	0.00	4.72	49.01	2.00	0.00	0.74	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.74	48.12	2.00	0.00	0.74	0.00	4.76	47.50	2.00	0.00	0.74	0.00
4.78	47.52	2.00	0.00	0.73	0.00	4.80	47.40	2.00	0.00	0.73	0.00
4.82	47.14	2.00	0.00	0.73	0.00	4.84	46.83	2.00	0.00	0.73	0.00
4.86	46.61	2.00	0.00	0.73	0.00	4.88	46.38	2.00	0.00	0.73	0.00
4.90	46.72	2.00	0.00	0.73	0.00	4.92	47.30	2.00	0.00	0.73	0.00
4.94	48.10	2.00	0.00	0.73	0.00	4.96	48.52	2.00	0.00	0.72	0.00
4.98	48.77	2.00	0.00	0.72	0.00	5.00	48.59	2.00	0.00	0.72	0.00
5.02	49.73	2.00	0.00	0.72	0.00	5.04	51.76	2.00	0.00	0.72	0.00
5.06	54.11	2.00	0.00	0.72	0.00	5.08	56.60	2.00	0.00	0.72	0.00
5.10	61.51	2.00	0.00	0.72	0.00	5.12	66.82	2.00	0.00	0.72	0.00
5.14	72.30	2.00	0.00	0.71	0.00	5.16	77.42	2.00	0.00	0.71	0.00
5.18	80.78	2.00	0.00	0.71	0.00	5.20	81.24	2.00	0.00	0.71	0.00
5.22	79.89	2.00	0.00	0.71	0.00	5.24	75.91	2.00	0.00	0.71	0.00
5.26	72.21	2.00	0.00	0.71	0.00	5.28	70.23	2.00	0.00	0.71	0.00
5.30	69.85	2.00	0.00	0.71	0.00	5.32	70.90	2.00	0.00	0.70	0.00
5.34	73.69	2.00	0.00	0.70	0.00	5.36	76.53	2.00	0.00	0.70	0.00
5.38	83.56	2.00	0.00	0.70	0.00	5.40	84.95	2.00	0.00	0.70	0.00
5.42	84.40	2.00	0.00	0.70	0.00	5.44	83.40	2.00	0.00	0.70	0.00
5.46	81.98	2.00	0.00	0.70	0.00	5.48	74.66	2.00	0.00	0.70	0.00
5.50	72.07	2.00	0.00	0.69	0.00	5.52	69.16	2.00	0.00	0.69	0.00
5.54	66.16	2.00	0.00	0.69	0.00	5.56	62.94	2.00	0.00	0.69	0.00
5.58	59.73	2.00	0.00	0.69	0.00	5.60	56.75	2.00	0.00	0.69	0.00
5.62	54.90	2.00	0.00	0.69	0.00	5.64	53.39	2.00	0.00	0.69	0.00
5.66	52.15	2.00	0.00	0.69	0.00	5.68	51.19	2.00	0.00	0.68	0.00
5.70	50.29	2.00	0.00	0.68	0.00	5.72	49.76	2.00	0.00	0.68	0.00
5.74	49.53	2.00	0.00	0.68	0.00	5.76	49.42	2.00	0.00	0.68	0.00
5.78	49.76	2.00	0.00	0.68	0.00	5.80	50.35	2.00	0.00	0.68	0.00
5.82	50.99	2.00	0.00	0.68	0.00	5.84	51.25	2.00	0.00	0.68	0.00
5.86	51.14	2.00	0.00	0.67	0.00	5.88	50.53	2.00	0.00	0.67	0.00
5.90	49.61	2.00	0.00	0.67	0.00	5.92	48.58	2.00	0.00	0.67	0.00
5.94	47.94	2.00	0.00	0.67	0.00	5.96	48.22	2.00	0.00	0.67	0.00
5.98	49.13	2.00	0.00	0.67	0.00	6.00	50.46	2.00	0.00	0.67	0.00
6.02	51.99	2.00	0.00	0.67	0.00	6.04	53.18	2.00	0.00	0.66	0.00
6.06	53.63	2.00	0.00	0.66	0.00	6.08	53.01	2.00	0.00	0.66	0.00
6.10	51.75	2.00	0.00	0.66	0.00	6.12	50.06	2.00	0.00	0.66	0.00
6.14	48.62	2.00	0.00	0.66	0.00	6.16	47.55	2.00	0.00	0.66	0.00
6.18	47.54	2.00	0.00	0.66	0.00	6.20	48.02	2.00	0.00	0.66	0.00
6.22	49.53	2.00	0.00	0.65	0.00	6.24	51.02	2.00	0.00	0.65	0.00
6.26	52.44	2.00	0.00	0.65	0.00	6.28	53.34	2.00	0.00	0.65	0.00
6.30	54.07	2.00	0.00	0.65	0.00	6.32	54.38	2.00	0.00	0.65	0.00
6.34	54.69	2.00	0.00	0.65	0.00	6.36	55.69	2.00	0.00	0.65	0.00
6.38	57.82	2.00	0.00	0.65	0.00	6.40	61.09	2.00	0.00	0.64	0.00
6.42	65.99	2.00	0.00	0.64	0.00	6.44	70.60	2.00	0.00	0.64	0.00
6.46	73.81	2.00	0.00	0.64	0.00	6.48	75.41	2.00	0.00	0.64	0.00
6.50	75.15	2.00	0.00	0.64	0.00	6.52	72.14	2.00	0.00	0.64	0.00
6.54	67.04	2.00	0.00	0.64	0.00	6.56	61.66	2.00	0.00	0.64	0.00
6.58	56.57	2.00	0.00	0.63	0.00	6.60	56.17	2.00	0.00	0.63	0.00
6.62	54.55	2.00	0.00	0.63	0.00	6.64	56.85	2.00	0.00	0.63	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.66	59.56	2.00	0.00	0.63	0.00	6.68	62.30	2.00	0.00	0.63	0.00
6.70	61.85	2.00	0.00	0.63	0.00	6.72	63.31	2.00	0.00	0.63	0.00
6.74	62.66	2.00	0.00	0.63	0.00	6.76	60.89	2.00	0.00	0.62	0.00
6.78	57.91	2.00	0.00	0.62	0.00	6.80	54.35	2.00	0.00	0.62	0.00
6.82	50.81	2.00	0.00	0.62	0.00	6.84	47.75	2.00	0.00	0.62	0.00
6.86	46.93	2.00	0.00	0.62	0.00	6.88	47.82	2.00	0.00	0.62	0.00
6.90	49.19	2.00	0.00	0.62	0.00	6.92	50.55	2.00	0.00	0.62	0.00
6.94	51.25	2.00	0.00	0.61	0.00	6.96	50.25	2.00	0.00	0.61	0.00
6.98	47.86	2.00	0.00	0.61	0.00	7.00	44.79	2.00	0.00	0.61	0.00
7.02	41.31	2.00	0.00	0.61	0.00	7.04	38.51	2.00	0.00	0.61	0.00
7.06	36.68	2.00	0.00	0.61	0.00	7.08	36.59	2.00	0.00	0.61	0.00
7.10	38.09	2.00	0.00	0.61	0.00	7.12	40.26	2.00	0.00	0.60	0.00
7.14	42.67	2.00	0.00	0.60	0.00	7.16	44.55	2.00	0.00	0.60	0.00
7.18	45.80	2.00	0.00	0.60	0.00	7.20	45.62	2.00	0.00	0.60	0.00
7.22	44.85	2.00	0.00	0.60	0.00	7.24	43.71	2.00	0.00	0.60	0.00
7.26	42.98	2.00	0.00	0.60	0.00	7.28	43.18	2.00	0.00	0.60	0.00
7.30	44.92	2.00	0.00	0.59	0.00	7.32	48.05	2.00	0.00	0.59	0.00
7.34	51.42	2.00	0.00	0.59	0.00	7.36	54.22	2.00	0.00	0.59	0.00
7.38	56.13	2.00	0.00	0.59	0.00	7.40	56.88	2.00	0.00	0.59	0.00
7.42	55.88	2.00	0.00	0.59	0.00	7.44	53.44	2.00	0.00	0.59	0.00
7.46	50.38	2.00	0.00	0.59	0.00	7.48	46.91	2.00	0.00	0.58	0.00
7.50	43.21	2.00	0.00	0.58	0.00	7.52	39.91	2.00	0.00	0.58	0.00
7.54	37.75	2.00	0.00	0.58	0.00	7.56	36.14	2.00	0.00	0.58	0.00
7.58	34.90	2.00	0.00	0.58	0.00	7.60	34.43	2.00	0.00	0.58	0.00
7.62	34.25	2.00	0.00	0.58	0.00	7.64	34.03	2.00	0.00	0.58	0.00
7.66	33.81	2.00	0.00	0.57	0.00	7.68	33.95	2.00	0.00	0.57	0.00
7.70	33.98	2.00	0.00	0.57	0.00	7.72	34.18	2.00	0.00	0.57	0.00
7.74	34.67	2.00	0.00	0.57	0.00	7.76	35.61	2.00	0.00	0.57	0.00
7.78	36.78	2.00	0.00	0.57	0.00	7.80	37.49	2.00	0.00	0.57	0.00
7.82	38.10	2.00	0.00	0.57	0.00	7.84	39.95	2.00	0.00	0.56	0.00
7.86	41.13	2.00	0.00	0.56	0.00	7.88	42.33	2.00	0.00	0.56	0.00
7.90	43.53	2.00	0.00	0.56	0.00	7.92	43.94	2.00	0.00	0.56	0.00
7.94	42.87	2.00	0.00	0.56	0.00	7.96	42.05	2.00	0.00	0.56	0.00
7.98	40.73	2.00	0.00	0.56	0.00	8.00	39.71	2.00	0.00	0.56	0.00
8.02	38.40	2.00	0.00	0.55	0.00	8.04	36.89	2.00	0.00	0.55	0.00
8.06	37.46	2.00	0.00	0.55	0.00	8.08	44.01	2.00	0.00	0.55	0.00
8.10	48.96	2.00	0.00	0.55	0.00	8.12	54.99	2.00	0.00	0.55	0.00
8.14	62.40	2.00	0.00	0.55	0.00	8.16	70.51	1.00	0.24	0.55	0.00
8.18	73.55	1.03	0.20	0.55	0.00	8.20	80.21	1.13	0.07	0.54	0.00

Total estimated settlement: 0.73

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.12	1.82	19.50	35.55	3.45	0.10	0.79
0.92	0.19	2.99	13.43	40.12	3.23	0.10	1.29
0.94	0.30	4.86	9.25	44.95	3.03	0.19	2.08
0.96	0.48	7.85	6.11	47.95	2.82	0.05	0.62
0.98	0.77	12.65	3.76	47.52	2.60	0.04	0.62
1.00	1.39	23.01	2.02	46.55	2.33	0.04	0.62
1.02	1.95	32.55	1.54	50.25	2.17	0.05	0.63
1.04	2.43	40.59	1.39	56.55	2.08	0.09	0.65
1.06	2.81	46.85	1.35	63.45	2.05	0.15	0.67
1.08	3.03	50.62	1.36	68.83	2.05	0.23	0.68
1.10	2.85	47.61	1.46	69.67	2.13	0.25	0.68
1.12	2.65	44.17	1.64	72.27	2.21	0.31	0.69
1.14	2.47	41.16	1.85	76.28	2.28	0.43	0.70
1.16	2.30	38.32	2.05	78.72	2.33	0.52	0.70
1.18	2.14	35.64	2.23	79.41	2.37	0.56	0.71
1.20	1.99	33.17	2.38	78.86	2.40	0.53	0.70
1.22	1.88	31.18	2.45	76.34	2.41	0.43	0.70
1.24	1.79	29.72	2.43	72.15	2.41	0.30	0.69
1.26	1.75	29.09	2.32	67.56	2.39	0.21	0.68
1.28	1.73	28.78	2.23	64.05	2.37	0.16	0.67
1.30	1.68	27.90	2.17	60.67	2.36	0.12	0.66
1.32	1.59	26.30	2.20	57.79	2.36	0.09	0.65
1.34	1.41	23.38	2.39	55.90	2.40	0.08	0.64
1.36	1.22	20.17	2.74	55.35	2.46	0.08	0.64
1.38	1.04	17.08	3.34	57.07	2.55	0.09	0.65
1.40	0.91	14.91	4.05	60.37	2.63	0.12	0.66
1.42	0.83	13.61	4.75	64.68	2.70	0.16	0.67
1.44	0.78	12.67	5.40	68.47	2.76	0.22	0.68
1.46	0.69	11.27	6.47	72.93	2.85	0.32	0.69
1.48	0.60	9.67	7.95	76.85	2.95	0.45	0.70
1.50	0.49	7.85	10.26	80.54	3.08	0.94	2.46
1.52	0.39	6.17	13.34	82.38	3.23	1.07	1.92
1.54	0.37	5.75	14.50	83.31	3.27	1.13	1.77
1.56	0.49	7.85	10.36	81.31	3.09	1.01	2.40
1.58	0.67	10.77	7.05	75.90	2.89	0.42	0.70
1.60	0.87	14.26	4.78	68.19	2.71	0.22	0.68
1.62	1.10	17.97	3.41	61.35	2.56	0.13	0.66
1.64	1.29	21.30	2.65	56.51	2.45	0.09	0.65
1.66	1.38	22.66	2.40	54.44	2.41	0.07	0.64
1.68	1.43	23.49	2.26	53.02	2.38	0.07	0.64
1.70	1.44	23.79	2.21	52.63	2.37	0.06	0.63
1.72	1.45	23.83	2.19	52.15	2.36	0.06	0.63
1.74	1.44	23.68	2.15	50.79	2.35	0.06	0.63
1.76	1.41	23.25	2.11	49.06	2.35	0.05	0.62
1.78	1.38	22.69	2.08	47.29	2.34	0.04	0.62
1.80	1.36	22.45	2.02	45.27	2.32	0.04	0.62
1.82	1.36	22.31	1.99	44.40	2.32	0.04	0.62
1.84	1.36	22.29	1.00	22.29	2.31	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.35	22.26	1.00	22.26	2.31	0.02	0.62
1.88	1.35	22.23	1.00	22.23	2.31	0.02	0.62
1.90	1.32	21.72	1.00	21.72	2.32	0.02	0.62
1.92	1.28	20.99	1.00	20.99	2.33	0.02	0.62
1.94	1.23	20.17	2.15	43.41	2.35	0.03	0.62
1.96	1.19	19.46	2.25	43.75	2.38	0.03	0.62
1.98	1.16	19.03	2.30	43.77	2.39	0.03	0.62
2.00	1.17	19.08	2.28	43.41	2.38	0.03	0.62
2.02	1.19	19.53	2.18	42.65	2.36	0.03	0.62
2.04	1.24	20.22	1.00	20.22	2.34	0.02	0.62
2.06	1.28	20.96	1.00	20.96	2.32	0.02	0.62
2.08	1.31	21.47	1.00	21.47	2.31	0.02	0.62
2.10	1.32	21.66	1.00	21.66	2.31	0.02	0.62
2.12	1.31	21.52	2.03	43.68	2.33	0.03	0.62
2.14	1.29	21.07	2.10	44.32	2.34	0.04	0.62
2.16	1.25	20.48	2.19	44.84	2.36	0.04	0.62
2.18	1.21	19.83	2.27	45.08	2.38	0.04	0.62
2.20	1.17	19.07	2.38	45.43	2.40	0.04	0.62
2.22	1.11	18.11	2.55	46.21	2.43	0.04	0.62
2.24	1.01	16.39	2.94	48.18	2.49	0.05	0.62
2.26	0.88	14.20	3.65	51.81	2.59	0.06	0.63
2.28	0.74	11.77	4.89	57.52	2.72	0.09	0.65
2.30	0.60	9.45	6.69	63.18	2.86	0.15	0.67
2.32	0.48	7.46	9.06	67.63	3.02	0.56	1.75
2.34	0.42	6.45	10.87	70.13	3.11	0.55	1.50
2.36	0.40	6.06	11.74	71.20	3.16	0.52	1.40
2.38	0.39	6.02	11.82	71.18	3.16	0.52	1.39
2.40	0.40	6.09	11.75	71.54	3.16	0.52	1.39
2.42	0.40	6.17	11.72	72.29	3.15	0.54	1.40
2.44	0.41	6.35	11.53	73.21	3.14	0.57	1.44
2.46	0.53	8.25	8.78	72.40	3.00	0.31	0.69
2.48	0.64	10.18	6.96	70.92	2.88	0.27	0.69
2.50	0.74	11.84	5.85	69.23	2.80	0.24	0.68
2.52	0.82	13.11	5.24	68.71	2.75	0.23	0.68
2.54	0.87	13.94	4.97	69.31	2.72	0.24	0.68
2.56	0.80	12.77	5.69	72.66	2.79	0.32	0.69
2.58	0.75	11.88	6.33	75.27	2.84	0.39	0.70
2.60	0.74	11.71	6.53	76.47	2.85	0.44	0.70
2.62	0.75	11.96	6.41	76.59	2.84	0.44	0.70
2.64	0.77	12.28	6.19	76.06	2.83	0.42	0.70
2.66	0.79	12.53	6.05	75.72	2.82	0.41	0.70
2.68	0.76	12.09	6.34	76.63	2.84	0.44	0.70
2.70	0.68	10.77	7.39	79.59	2.91	0.56	0.71
2.72	0.60	9.35	8.83	82.54	3.00	0.74	1.94
2.74	0.53	8.21	10.26	84.25	3.08	0.77	1.69
2.76	0.51	7.78	11.03	85.77	3.12	0.79	1.59
2.78	0.53	8.24	10.57	87.11	3.10	0.74	1.68
2.80	0.59	9.22	9.50	87.55	3.04	0.81	1.87

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.65	10.13	8.64	87.57	2.99	0.72	0.72
2.84	0.69	10.84	8.18	88.65	2.96	0.73	0.73
2.86	0.71	11.13	8.14	90.54	2.96	0.73	0.73
2.88	0.69	10.84	8.50	92.21	2.98	0.73	0.73
2.90	0.67	10.46	8.91	93.23	3.01	1.03	2.06
2.92	0.63	9.78	9.64	94.30	3.05	1.01	1.91
2.94	0.58	9.03	10.53	95.07	3.10	0.94	1.75
2.96	0.55	8.56	10.89	93.24	3.11	0.88	1.65
2.98	0.51	7.86	11.50	90.37	3.14	0.88	1.51
3.00	0.47	7.05	12.28	86.64	3.18	0.75	1.35
3.02	0.44	6.56	12.57	82.42	3.19	0.61	1.25
3.04	0.42	6.31	12.24	77.30	3.18	0.47	1.19
3.06	0.44	6.57	11.04	72.57	3.12	0.43	1.24
3.08	0.52	7.89	8.66	68.37	2.99	0.22	0.68
3.10	0.65	10.17	6.42	65.29	2.84	0.17	0.67
3.12	0.81	12.88	4.96	63.81	2.72	0.15	0.67
3.14	0.96	15.31	4.09	62.61	2.64	0.14	0.66
3.16	1.02	16.26	3.88	63.12	2.61	0.15	0.67
3.18	0.96	15.38	4.31	66.32	2.66	0.19	0.67
3.20	0.84	13.34	5.33	71.11	2.76	0.28	0.69
3.22	0.69	10.72	6.93	74.23	2.88	0.36	0.69
3.24	0.55	8.33	9.25	77.07	3.03	0.60	1.50
3.26	0.44	6.48	12.06	78.11	3.17	0.52	1.16
3.28	0.38	5.57	13.81	76.88	3.25	0.51	0.99
3.30	0.35	5.00	14.83	74.10	3.29	0.42	0.89
3.32	0.33	4.68	15.26	71.48	3.30	0.39	0.83
3.34	0.31	4.38	15.42	67.48	3.31	0.35	0.77
3.36	0.31	4.31	14.84	63.99	3.29	0.31	0.75
3.38	0.31	4.37	13.82	60.46	3.25	0.23	0.76
3.40	0.32	4.44	12.84	57.04	3.20	0.20	0.77
3.42	0.33	4.65	11.61	54.02	3.15	0.18	0.80
3.44	0.40	5.79	8.96	51.86	3.01	0.16	1.00
3.46	0.53	8.07	6.28	50.62	2.83	0.06	0.63
3.48	0.68	10.52	4.72	49.65	2.70	0.05	0.62
3.50	0.78	12.14	4.21	51.17	2.65	0.06	0.63
3.52	0.83	13.11	4.16	54.52	2.65	0.07	0.64
3.54	0.81	12.66	4.79	60.65	2.71	0.12	0.66
3.56	0.69	10.72	6.40	68.61	2.84	0.23	0.68
3.58	0.55	8.34	9.12	76.12	3.02	0.51	1.40
3.60	0.45	6.69	12.07	80.75	3.17	0.59	1.11
3.62	0.38	5.52	15.04	83.03	3.29	0.56	0.91
3.64	0.34	4.82	17.17	82.77	3.37	0.54	0.80
3.66	0.32	4.42	18.13	80.19	3.40	0.51	0.73
3.68	0.31	4.25	17.82	75.71	3.39	0.45	0.69
3.70	0.31	4.28	16.47	70.48	3.35	0.37	0.70
3.72	0.33	4.60	14.02	64.51	3.25	0.23	0.75
3.74	0.36	5.13	11.48	58.86	3.14	0.19	0.83
3.76	0.39	5.57	9.98	55.55	3.07	0.16	0.90

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.42	6.00	9.16	55.01	3.02	0.17	0.96
3.80	0.44	6.42	9.42	60.52	3.04	0.22	1.03
3.82	0.47	6.87	9.80	67.29	3.06	0.22	1.09
3.84	0.60	9.13	7.91	72.22	2.95	0.31	0.69
3.86	0.76	11.85	6.34	75.13	2.84	0.39	0.70
3.88	0.91	14.26	5.40	77.00	2.76	0.45	0.70
3.90	1.01	16.01	4.70	75.31	2.70	0.40	0.70
3.92	1.06	16.82	4.43	74.50	2.67	0.37	0.69
3.94	0.96	15.11	5.11	77.22	2.74	0.46	0.70
3.96	0.80	12.34	6.63	81.78	2.86	0.68	0.71
3.98	0.63	9.62	8.98	86.40	3.01	0.64	1.48
4.00	0.50	7.43	12.14	90.22	3.17	0.68	1.14
4.02	0.41	5.88	15.50	91.22	3.31	0.65	0.90
4.04	0.35	4.84	18.48	89.54	3.41	0.62	0.73
4.06	0.33	4.55	18.78	85.36	3.42	0.54	0.69
4.08	0.33	4.47	17.95	80.22	3.40	0.44	0.67
4.10	0.33	4.48	16.57	74.18	3.35	0.35	0.67
4.12	0.33	4.47	15.18	67.88	3.30	0.28	0.67
4.14	0.33	4.44	14.05	62.38	3.26	0.22	0.66
4.16	0.33	4.39	13.26	58.26	3.22	0.16	0.65
4.18	0.34	4.63	11.82	54.79	3.16	0.15	0.68
4.20	0.35	4.80	10.99	52.69	3.12	0.15	0.71
4.22	0.36	4.94	10.69	52.84	3.10	0.14	0.73
4.24	0.37	5.08	10.47	53.16	3.09	0.14	0.74
4.26	0.37	5.20	10.25	53.30	3.08	0.17	0.76
4.28	0.37	5.03	10.67	53.71	3.10	0.17	0.73
4.30	0.36	4.92	10.94	53.89	3.12	0.16	0.71
4.32	0.35	4.85	10.99	53.26	3.12	0.15	0.70
4.34	0.35	4.77	11.02	52.54	3.12	0.14	0.69
4.36	0.34	4.66	11.17	52.09	3.13	0.14	0.67
4.38	0.34	4.60	11.25	51.77	3.13	0.13	0.66
4.40	0.34	4.61	11.18	51.58	3.13	0.13	0.66
4.42	0.34	4.61	11.19	51.58	3.13	0.13	0.66
4.44	0.34	4.63	11.21	51.93	3.13	0.13	0.66
4.46	0.35	4.69	11.23	52.60	3.13	0.14	0.66
4.48	0.35	4.69	11.44	53.64	3.14	0.15	0.66
4.50	0.34	4.63	11.85	54.88	3.16	0.16	0.65
4.52	0.34	4.58	12.23	55.99	3.18	0.17	0.64
4.54	0.34	4.53	12.57	56.91	3.19	0.17	0.63
4.56	0.34	4.48	12.79	57.26	3.20	0.18	0.62
4.58	0.33	4.45	12.87	57.20	3.21	0.18	0.62
4.60	0.33	4.41	12.85	56.66	3.20	0.17	0.61
4.62	0.34	4.48	12.42	55.64	3.19	0.16	0.62
4.64	0.34	4.59	11.83	54.32	3.16	0.15	0.63
4.66	0.35	4.69	11.30	52.95	3.13	0.14	0.64
4.68	0.35	4.72	10.86	51.31	3.11	0.13	0.65
4.70	0.35	4.74	10.54	50.00	3.10	0.12	0.65
4.72	0.35	4.66	10.51	49.01	3.09	0.10	0.64

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.35	4.66	10.32	48.12	3.08	0.10	0.63
4.76	0.35	4.70	10.11	47.50	3.07	0.10	0.64
4.78	0.36	4.79	9.92	47.52	3.06	0.10	0.65
4.80	0.37	4.94	9.60	47.40	3.05	0.10	0.67
4.82	0.38	5.11	9.22	47.14	3.03	0.10	0.69
4.84	0.38	5.23	8.96	46.83	3.01	0.10	0.70
4.86	0.39	5.36	8.70	46.61	2.99	0.04	0.62
4.88	0.40	5.49	8.45	46.38	2.98	0.04	0.62
4.90	0.40	5.55	8.41	46.72	2.98	0.04	0.62
4.92	0.41	5.59	8.47	47.30	2.98	0.04	0.62
4.94	0.41	5.57	8.64	48.10	2.99	0.05	0.62
4.96	0.43	5.99	8.09	48.52	2.96	0.05	0.62
4.98	0.48	6.75	7.23	48.77	2.90	0.05	0.62
5.00	0.53	7.63	6.37	48.59	2.84	0.05	0.62
5.02	0.59	8.67	5.73	49.73	2.79	0.05	0.62
5.04	0.68	10.10	5.13	51.76	2.74	0.06	0.63
5.06	0.75	11.28	4.80	54.11	2.71	0.07	0.64
5.08	0.78	11.81	4.79	56.60	2.71	0.09	0.65
5.10	0.81	12.29	5.01	61.51	2.73	0.13	0.66
5.12	0.83	12.59	5.31	66.82	2.75	0.20	0.68
5.14	0.81	12.27	5.89	72.30	2.80	0.31	0.69
5.16	0.77	11.57	6.69	77.42	2.86	0.47	0.70
5.18	0.76	11.43	7.07	80.78	2.89	0.62	0.71
5.20	0.77	11.64	6.98	81.24	2.88	0.65	0.71
5.22	0.80	12.04	6.63	79.89	2.86	0.58	0.71
5.24	0.84	12.75	5.95	75.91	2.81	0.42	0.70
5.26	0.89	13.65	5.29	72.21	2.75	0.31	0.69
5.28	0.93	14.22	4.94	70.23	2.72	0.26	0.68
5.30	0.93	14.30	4.89	69.85	2.72	0.25	0.68
5.32	0.91	13.93	5.09	70.90	2.74	0.27	0.69
5.34	0.86	13.09	5.63	73.69	2.78	0.35	0.69
5.36	0.79	11.90	6.43	76.53	2.84	0.44	0.70
5.38	0.73	10.84	7.71	83.56	2.93	0.71	0.71
5.40	0.65	9.54	8.90	84.95	3.01	0.42	1.17
5.42	0.58	8.32	10.14	84.40	3.08	0.69	1.01
5.44	0.52	7.37	11.32	83.40	3.13	0.38	0.90
5.46	0.47	6.54	12.53	81.98	3.19	0.32	0.79
5.48	0.42	5.68	13.14	74.66	3.22	0.30	0.69
5.50	0.39	5.14	14.02	72.07	3.25	0.28	0.62
5.52	0.37	4.76	14.52	69.16	3.27	0.26	0.57
5.54	0.35	4.53	14.60	66.16	3.28	0.23	0.54
5.56	0.35	4.44	14.16	62.94	3.26	0.17	0.53
5.58	0.34	4.35	13.73	59.73	3.24	0.16	0.52
5.60	0.34	4.28	13.26	56.75	3.22	0.14	0.51
5.62	0.34	4.21	13.03	54.90	3.21	0.13	0.50
5.64	0.33	4.16	12.83	53.39	3.20	0.12	0.49
5.66	0.33	4.15	12.56	52.15	3.19	0.11	0.49
5.68	0.34	4.24	12.09	51.19	3.17	0.10	0.50

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.34	4.34	11.58	50.29	3.15	0.10	0.51
5.72	0.35	4.43	11.23	49.76	3.13	0.10	0.52
5.74	0.35	4.48	11.05	49.53	3.12	0.09	0.52
5.76	0.36	4.50	10.98	49.42	3.12	0.09	0.52
5.78	0.35	4.42	11.25	49.76	3.13	0.10	0.51
5.80	0.35	4.40	11.44	50.35	3.14	0.10	0.51
5.82	0.35	4.41	11.56	50.99	3.15	0.11	0.51
5.84	0.35	4.44	11.55	51.25	3.15	0.11	0.51
5.86	0.35	4.47	11.44	51.14	3.14	0.11	0.51
5.88	0.36	4.54	11.13	50.53	3.13	0.11	0.52
5.90	0.36	4.63	10.72	49.61	3.11	0.09	0.53
5.92	0.37	4.72	10.30	48.58	3.08	0.09	0.54
5.94	0.37	4.77	10.05	47.94	3.07	0.08	0.54
5.96	0.38	4.80	10.05	48.22	3.07	0.08	0.55
5.98	0.37	4.76	10.33	49.13	3.09	0.09	0.54
6.00	0.37	4.63	10.89	50.46	3.11	0.10	0.52
6.02	0.36	4.54	11.45	51.99	3.14	0.11	0.51
6.04	0.36	4.49	11.85	53.18	3.16	0.12	0.51
6.06	0.36	4.47	11.99	53.63	3.17	0.12	0.50
6.08	0.37	4.61	11.50	53.01	3.14	0.12	0.52
6.10	0.38	4.86	10.66	51.75	3.10	0.11	0.54
6.12	0.40	5.12	9.79	50.06	3.06	0.09	0.57
6.14	0.41	5.33	9.11	48.62	3.02	0.08	0.59
6.16	0.42	5.53	8.60	47.55	2.99	0.04	0.62
6.18	0.43	5.64	8.43	47.54	2.98	0.04	0.62
6.20	0.43	5.65	8.50	48.02	2.98	0.05	0.62
6.22	0.44	5.75	8.61	49.53	2.99	0.05	0.62
6.24	0.45	5.91	8.64	51.02	2.99	0.06	0.63
6.26	0.45	6.06	8.66	52.44	2.99	0.06	0.63
6.28	0.47	6.32	8.45	53.34	2.98	0.07	0.64
6.30	0.50	6.75	8.01	54.07	2.95	0.07	0.64
6.32	0.52	7.15	7.61	54.38	2.93	0.07	0.64
6.34	0.55	7.64	7.16	54.69	2.90	0.07	0.64
6.36	0.57	7.99	6.97	55.69	2.88	0.08	0.64
6.38	0.57	8.02	7.21	57.82	2.90	0.10	0.65
6.40	0.56	7.72	7.91	61.09	2.95	0.12	0.66
6.42	0.53	7.20	9.17	65.99	3.02	0.20	0.77
6.44	0.49	6.52	10.83	70.60	3.11	0.23	0.70
6.46	0.45	5.99	12.33	73.81	3.18	0.30	0.64
6.48	0.43	5.60	13.47	75.41	3.23	0.31	0.60
6.50	0.42	5.42	13.85	75.15	3.25	0.29	0.58
6.52	0.42	5.43	13.28	72.14	3.22	0.25	0.58
6.54	0.42	5.46	12.29	67.04	3.18	0.21	0.58
6.56	0.42	5.47	11.27	61.66	3.13	0.17	0.58
6.58	0.43	5.51	10.27	56.57	3.08	0.10	0.58
6.60	0.45	5.82	9.64	56.17	3.05	0.09	0.61
6.62	0.46	5.98	9.13	54.55	3.02	0.09	0.63
6.64	0.47	6.15	9.25	56.85	3.03	0.21	0.64

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	0.47	6.24	9.54	59.56	3.04	0.13	0.65
6.68	0.47	6.23	10.00	62.30	3.07	0.18	0.65
6.70	0.44	5.72	10.82	61.85	3.11	0.18	0.59
6.72	0.42	5.36	11.81	63.31	3.16	0.18	0.56
6.74	0.42	5.30	11.82	62.66	3.16	0.17	0.55
6.76	0.43	5.60	10.88	60.89	3.11	0.16	0.58
6.78	0.46	6.09	9.50	57.91	3.04	0.15	0.63
6.80	0.50	6.72	8.09	54.35	2.96	0.07	0.64
6.82	0.53	7.13	7.12	50.81	2.89	0.06	0.63
6.84	0.53	7.14	6.69	47.75	2.86	0.04	0.62
6.86	0.51	6.79	6.91	46.93	2.88	0.04	0.62
6.88	0.48	6.28	7.61	47.82	2.93	0.05	0.62
6.90	0.44	5.72	8.59	49.19	2.99	0.05	0.62
6.92	0.42	5.29	9.56	50.55	3.04	0.10	0.54
6.94	0.40	5.03	10.20	51.25	3.08	0.10	0.51
6.96	0.40	4.90	10.26	50.25	3.08	0.10	0.49
6.98	0.40	4.98	9.60	47.86	3.05	0.08	0.50
7.00	0.42	5.28	8.48	44.79	2.98	0.04	0.62
7.02	0.44	5.63	7.34	41.31	2.91	0.03	0.62
7.04	0.46	5.87	6.56	38.51	2.85	0.03	0.62
7.06	0.46	6.01	6.11	36.68	2.82	0.02	0.62
7.08	0.46	5.96	6.14	36.59	2.82	0.02	0.62
7.10	0.45	5.77	6.61	38.09	2.86	0.03	0.62
7.12	0.44	5.60	7.19	40.26	2.90	0.03	0.62
7.14	0.44	5.53	7.71	42.67	2.93	0.03	0.62
7.16	0.44	5.54	8.05	44.55	2.96	0.04	0.62
7.18	0.44	5.66	8.09	45.80	2.96	0.04	0.62
7.20	0.46	5.93	7.69	45.62	2.93	0.04	0.62
7.22	0.48	6.26	7.16	44.85	2.90	0.04	0.62
7.24	0.50	6.53	6.70	43.71	2.86	0.03	0.62
7.26	0.50	6.61	6.50	42.98	2.85	0.03	0.62
7.28	0.50	6.62	6.52	43.18	2.85	0.03	0.62
7.30	0.50	6.56	6.85	44.92	2.88	0.04	0.62
7.32	0.49	6.33	7.59	48.05	2.93	0.05	0.62
7.34	0.47	6.10	8.42	51.42	2.98	0.06	0.63
7.36	0.47	5.98	9.07	54.22	3.02	0.12	0.58
7.38	0.45	5.71	9.82	56.13	3.06	0.13	0.55
7.40	0.43	5.36	10.62	56.88	3.10	0.13	0.52
7.42	0.41	5.03	11.10	55.88	3.12	0.12	0.49
7.44	0.39	4.73	11.30	53.44	3.13	0.11	0.46
7.46	0.38	4.48	11.24	50.38	3.13	0.09	0.43
7.48	0.37	4.37	10.73	46.91	3.11	0.06	0.42
7.50	0.37	4.33	9.98	43.21	3.07	0.05	0.41
7.52	0.37	4.30	9.28	39.91	3.03	0.04	0.41
7.54	0.37	4.29	8.80	37.75	3.00	0.03	0.41
7.56	0.37	4.30	8.41	36.14	2.98	0.02	0.62
7.58	0.37	4.31	8.10	34.90	2.96	0.02	0.62
7.60	0.37	4.30	8.00	34.43	2.95	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	0.37	4.34	7.89	34.25	2.95	0.02	0.62
7.64	0.38	4.45	7.64	34.03	2.93	0.02	0.62
7.66	0.38	4.54	7.45	33.81	2.92	0.02	0.62
7.68	0.39	4.58	7.41	33.95	2.91	0.02	0.62
7.70	0.38	4.53	7.50	33.98	2.92	0.02	0.62
7.72	0.38	4.47	7.64	34.18	2.93	0.02	0.62
7.74	0.38	4.44	7.81	34.67	2.94	0.02	0.62
7.76	0.38	4.43	8.04	35.61	2.95	0.02	0.62
7.78	0.38	4.46	8.25	36.78	2.97	0.02	0.62
7.80	0.42	5.06	7.40	37.49	2.91	0.02	0.62
7.82	0.45	5.61	6.79	38.10	2.87	0.03	0.62
7.84	0.46	5.80	6.89	39.95	2.88	0.03	0.62
7.86	0.47	5.93	6.94	41.13	2.88	0.03	0.62
7.88	0.47	5.99	7.06	42.33	2.89	0.03	0.62
7.90	0.45	5.58	7.81	43.53	2.94	0.03	0.62
7.92	0.43	5.26	8.35	43.94	2.97	0.03	0.62
7.94	0.43	5.21	8.23	42.87	2.97	0.03	0.62
7.96	0.43	5.22	8.06	42.05	2.96	0.03	0.62
7.98	0.44	5.35	7.61	40.73	2.93	0.03	0.62
8.00	0.46	5.66	7.02	39.71	2.89	0.03	0.62
8.02	0.51	6.49	5.92	38.40	2.81	0.03	0.62
8.04	0.58	7.75	4.76	36.89	2.70	0.02	0.62
8.06	0.71	9.92	3.78	37.46	2.60	0.02	0.62
8.08	0.91	13.29	3.31	44.01	2.55	0.04	0.62
8.10	1.17	17.66	2.77	48.96	2.47	0.05	0.62
8.12	1.49	22.93	2.40	54.99	2.40	0.08	0.64
8.14	1.80	28.18	2.21	62.40	2.37	0.14	0.66
8.16	2.10	33.12	2.13	70.51	2.35	0.27	0.68
8.18	2.28	36.21	2.03	73.55	2.33	0.34	0.69
8.20	2.47	39.31	2.04	80.21	2.33	0.59	0.71

Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

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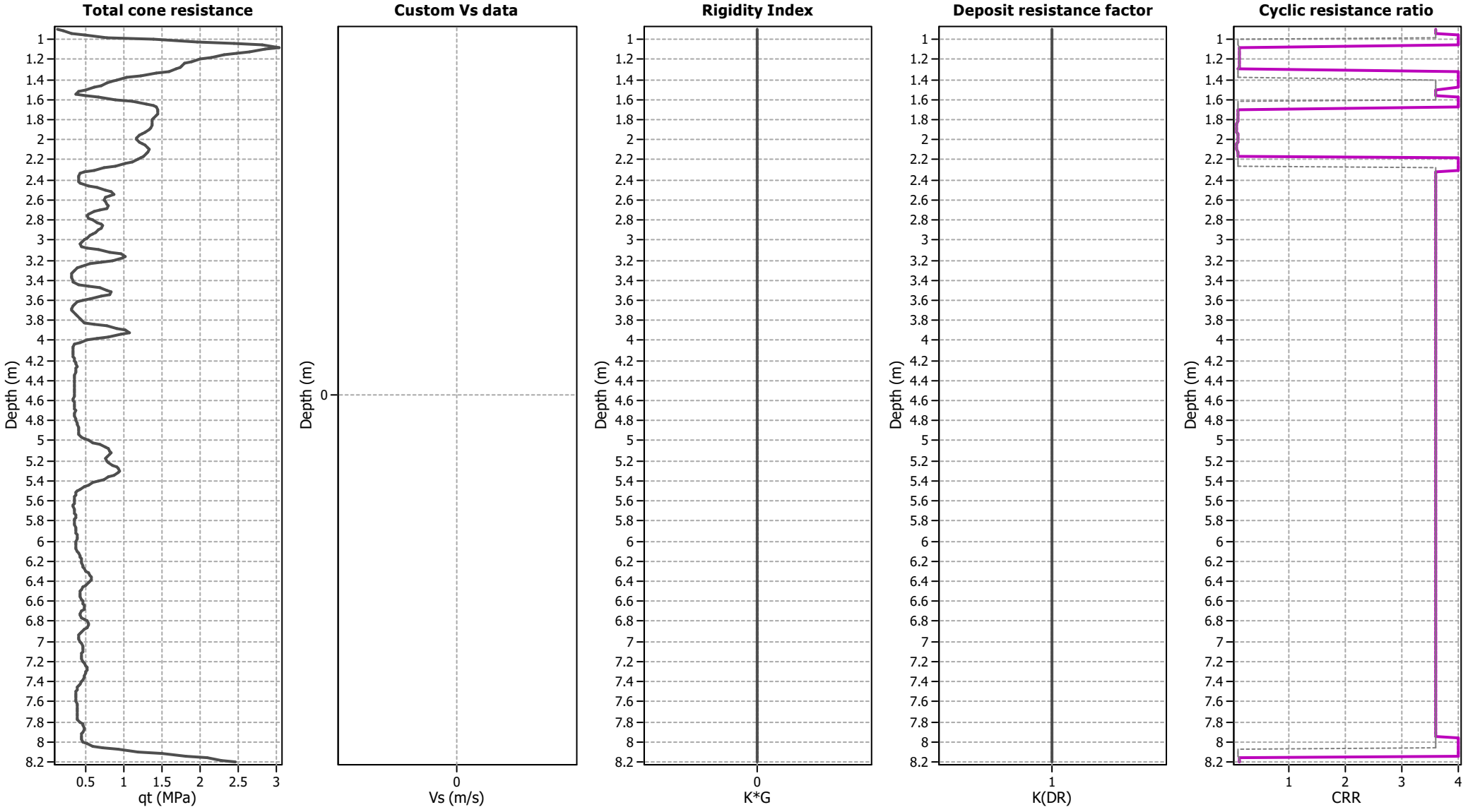
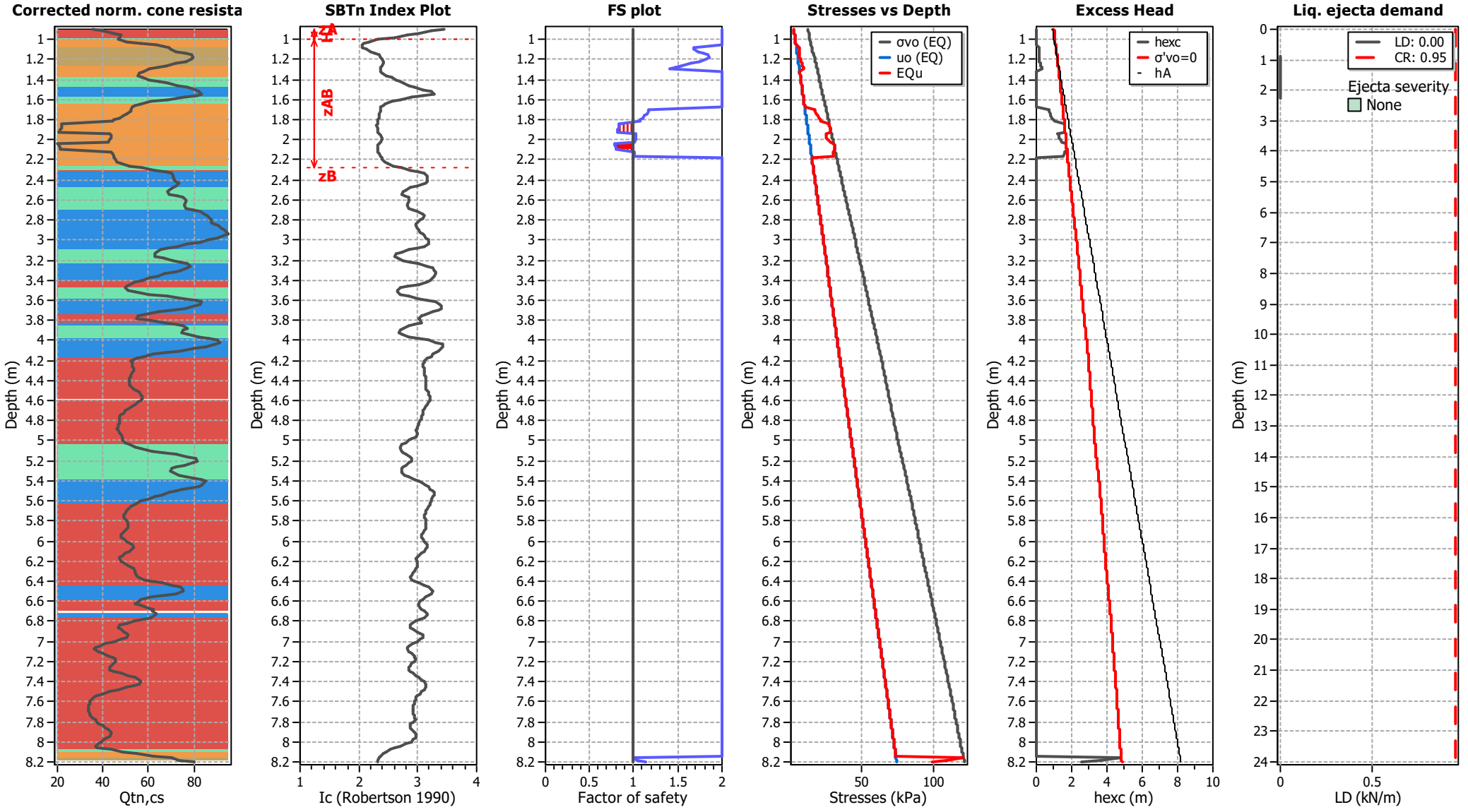
CPT name: CWLPCPT- 7CCR

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

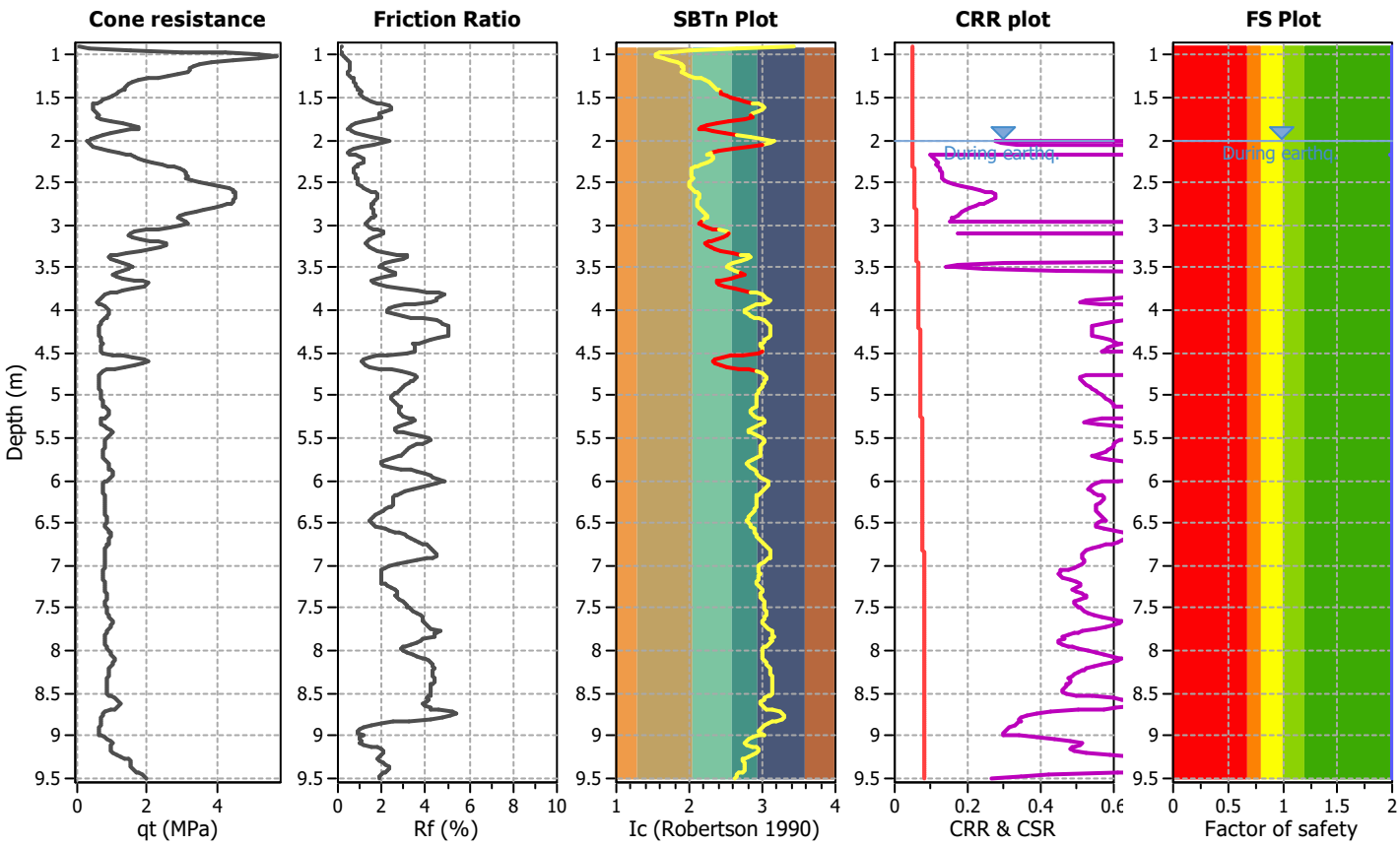
Project title : CWLP Liquefaction Analysis

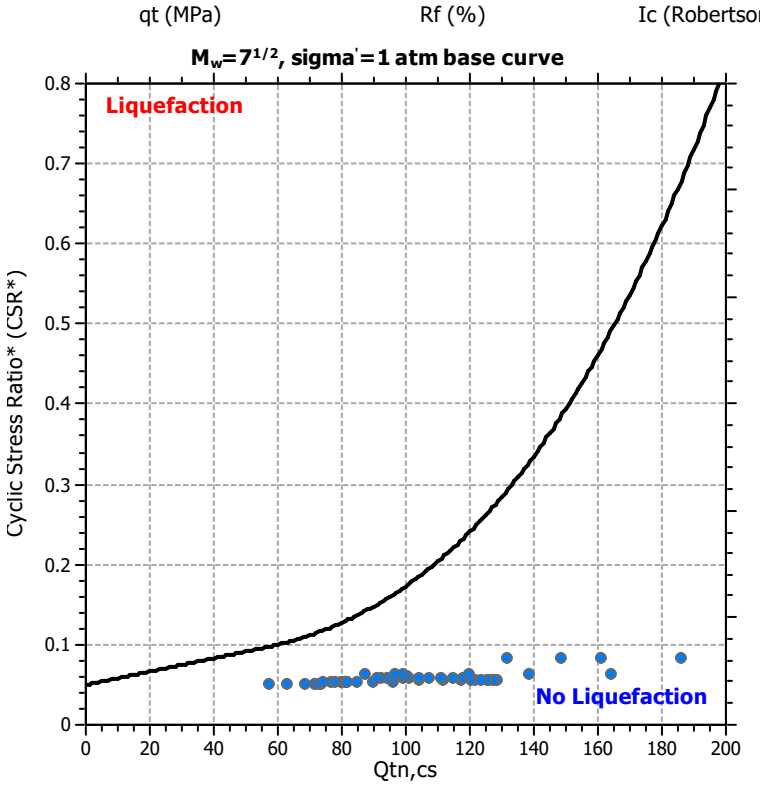
Location : East Lake Shore Drive, Springfield, Illinois

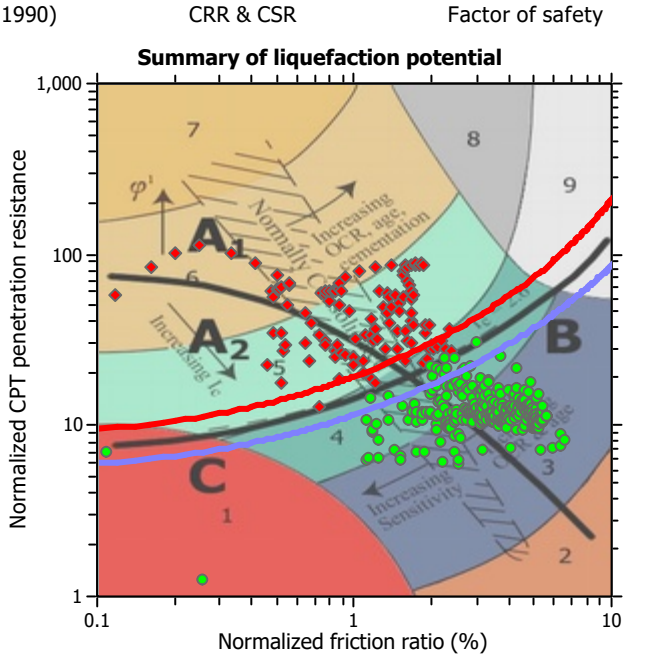
CPT file : CWLP CPT- 10CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	2.00 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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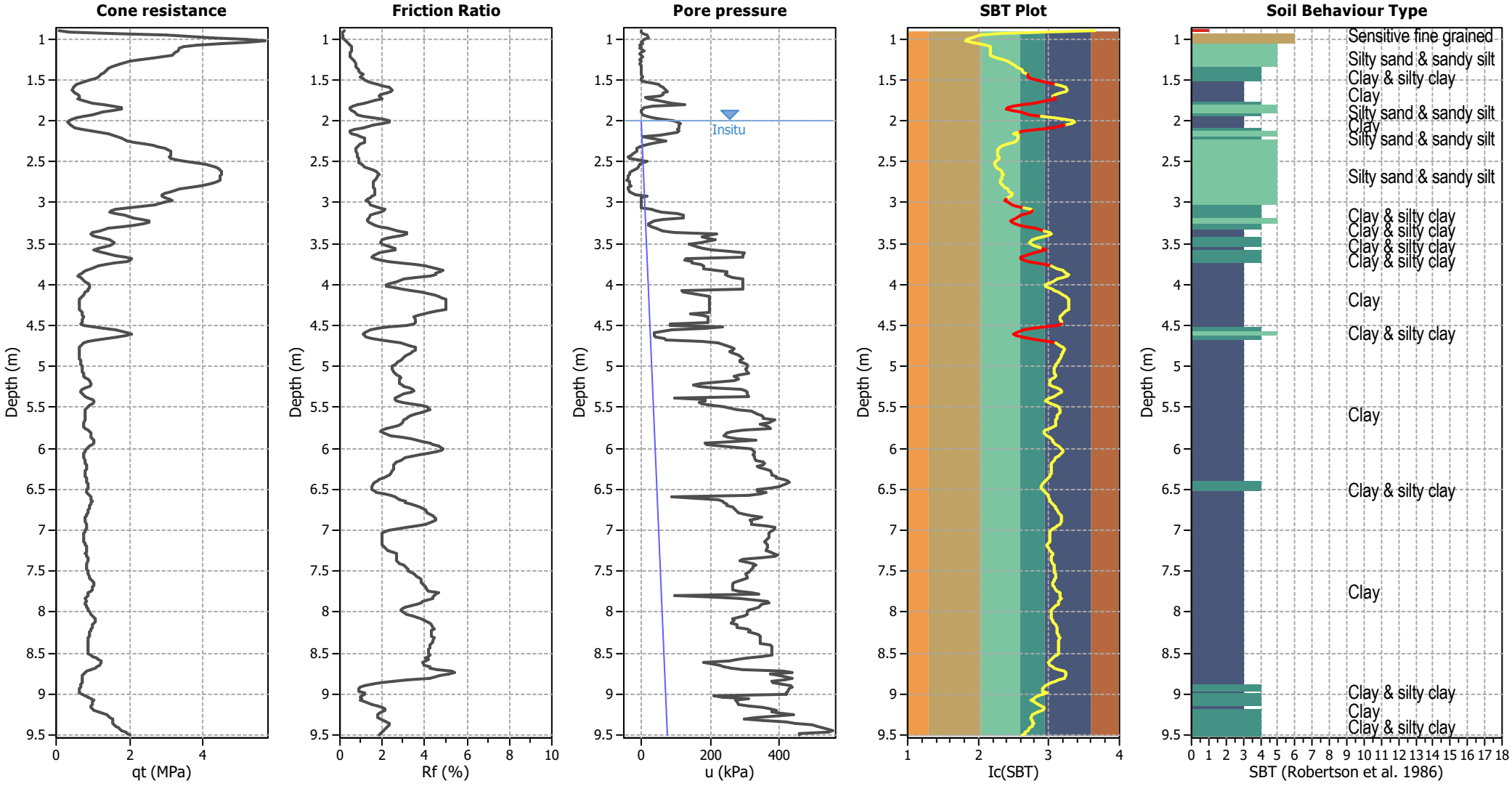
CPT name: CWLP CPT- 10CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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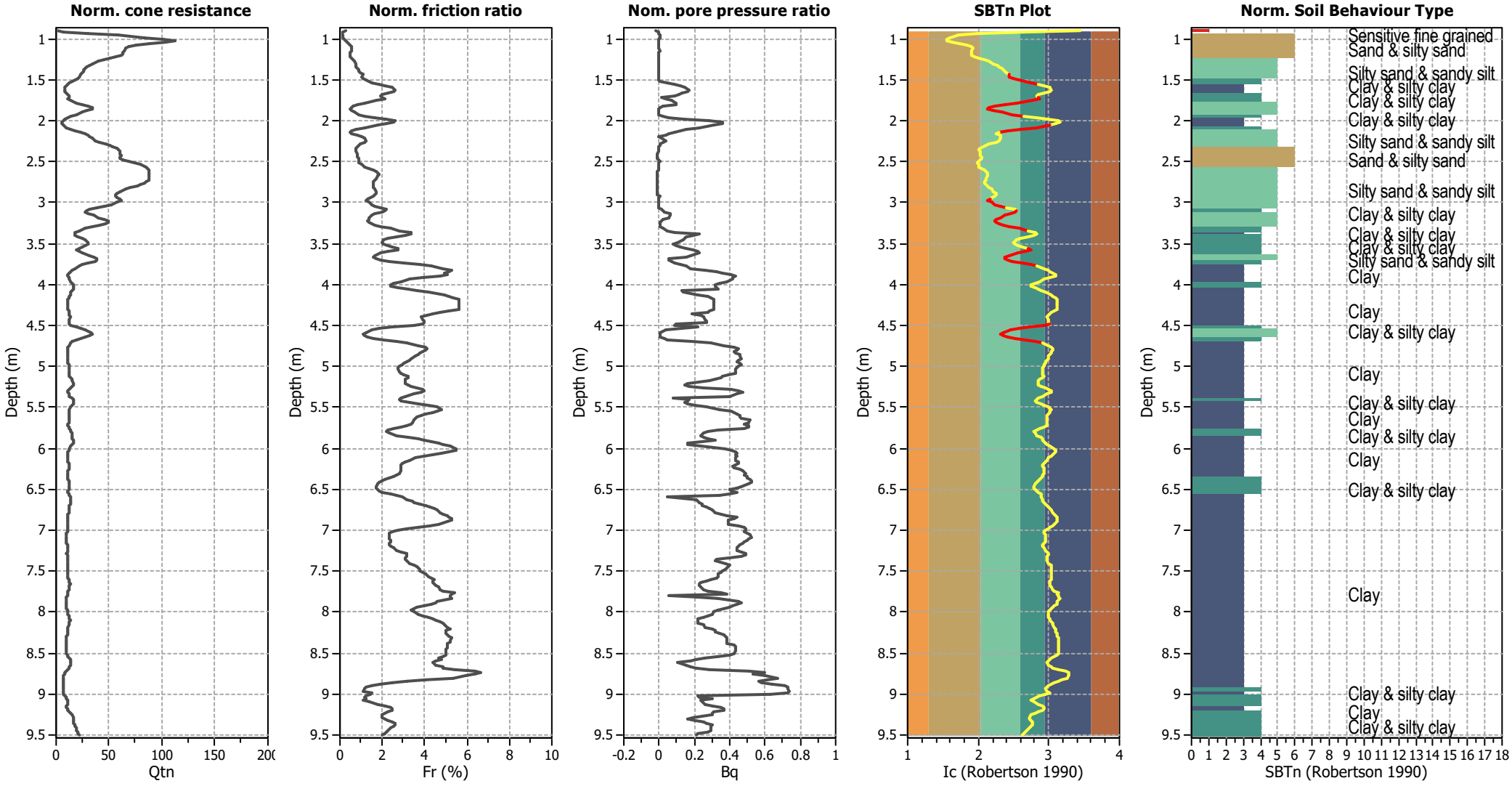
CPT name: CWLP CPT- 10CCR

CPT basic interpretation plots (normalized)



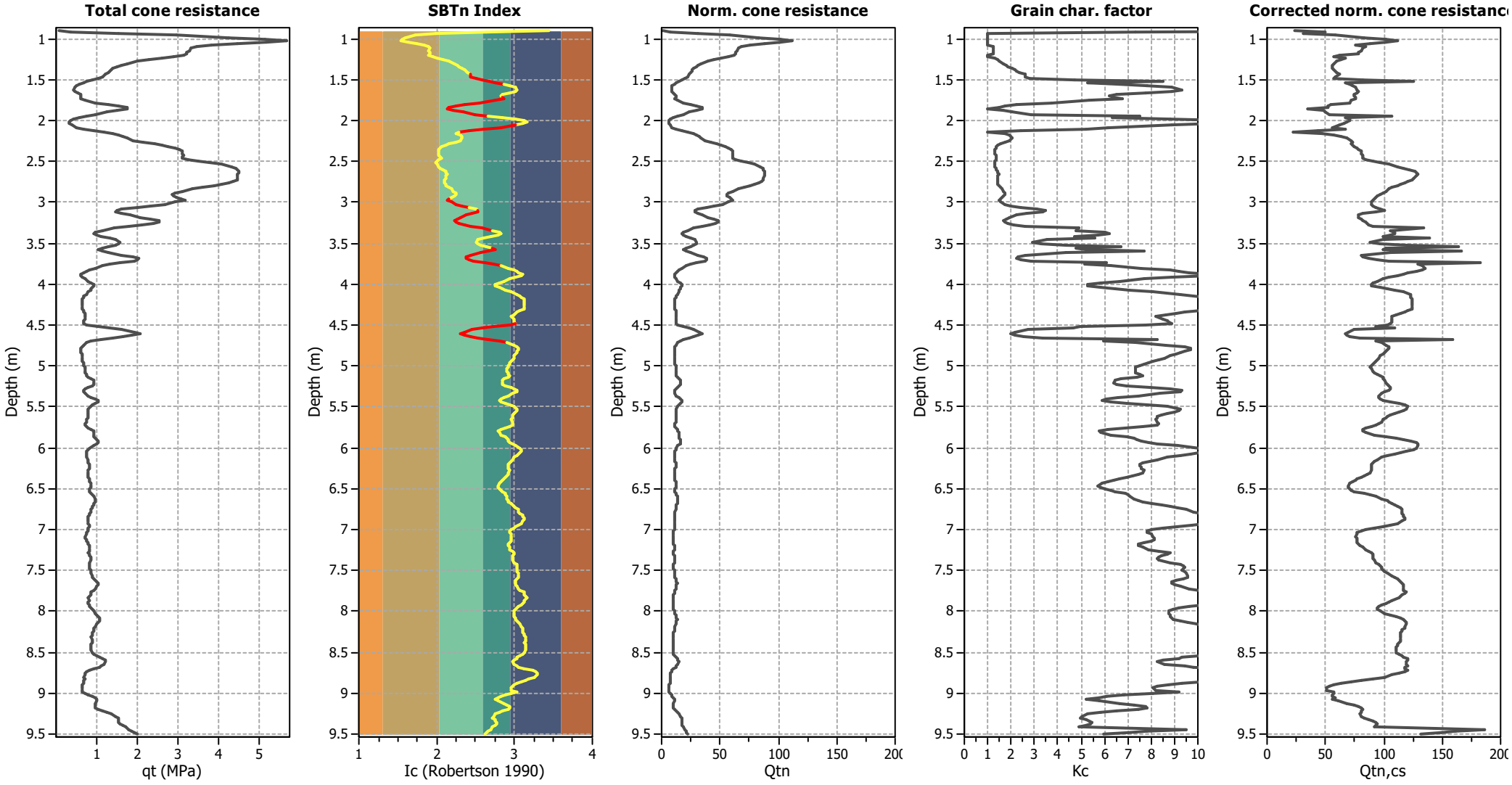
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

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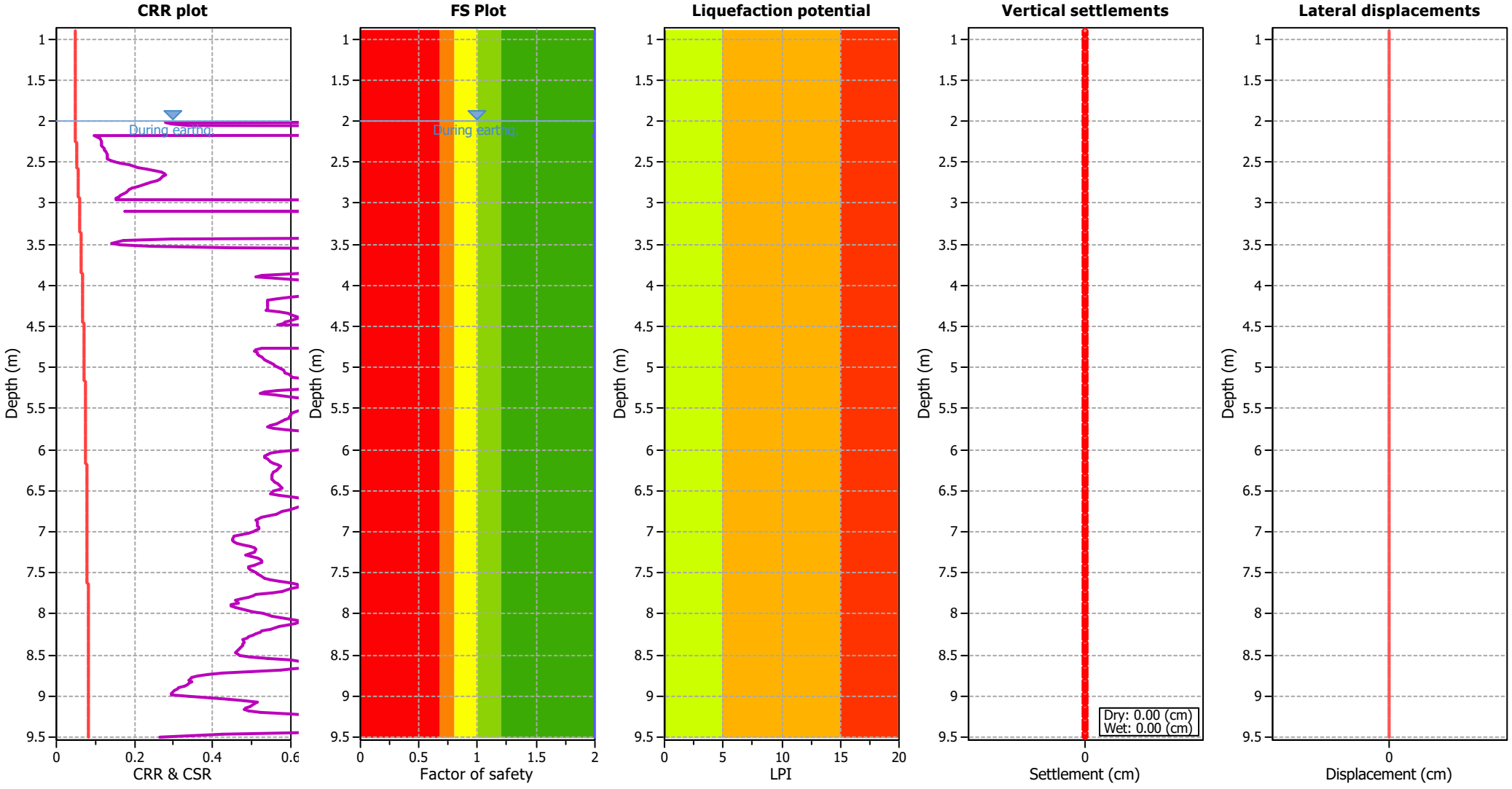
CPT name: CWLP CPT- 10CCR

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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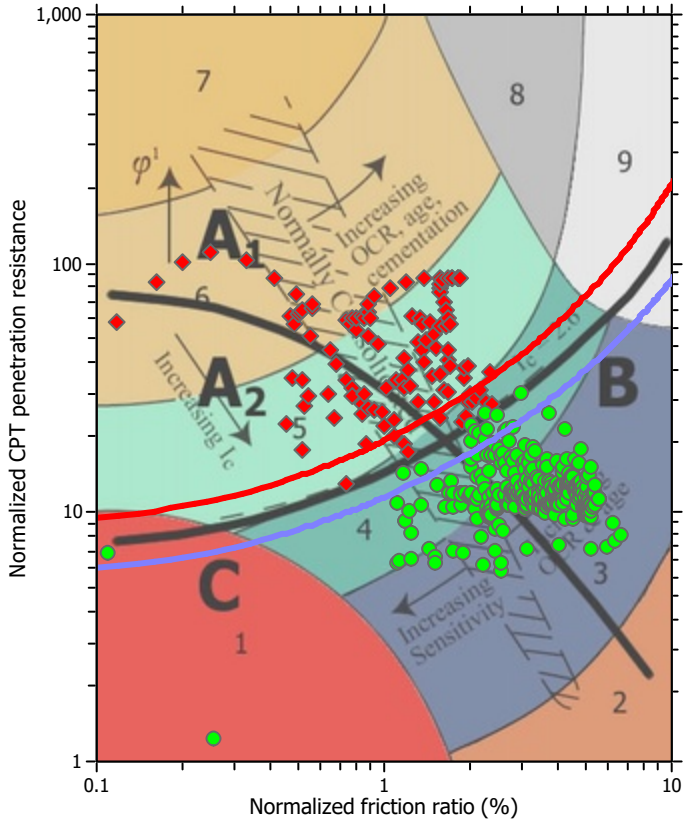
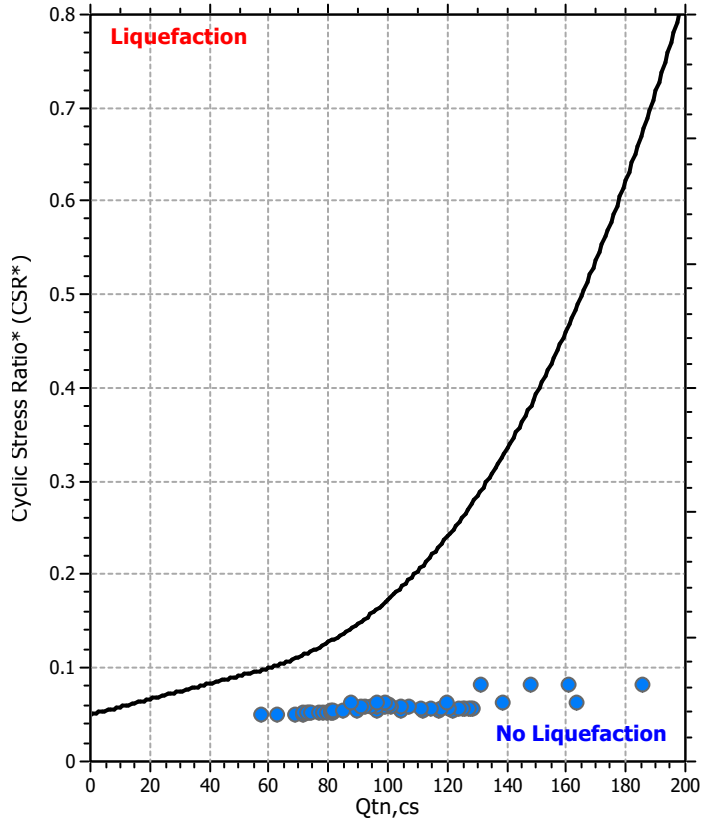
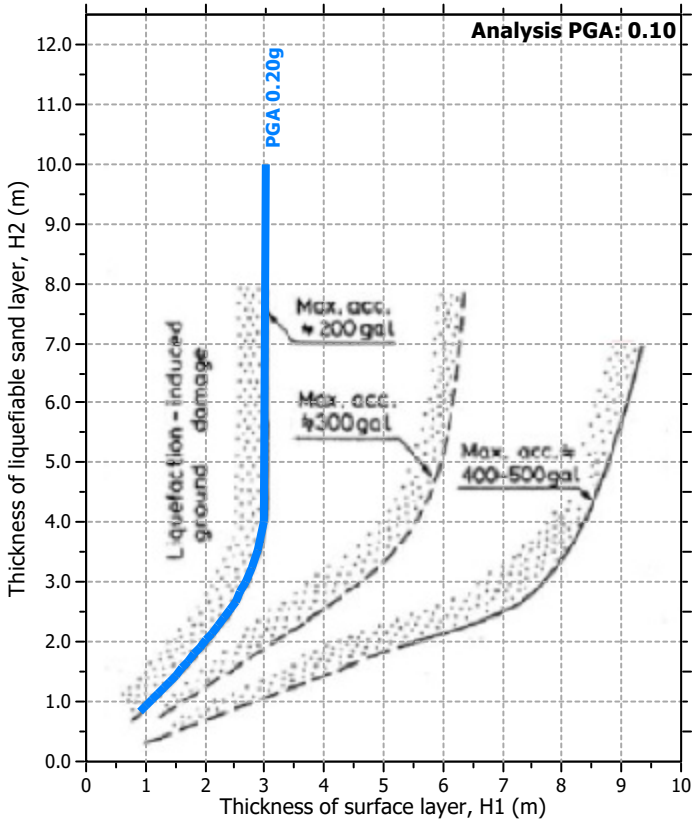
Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

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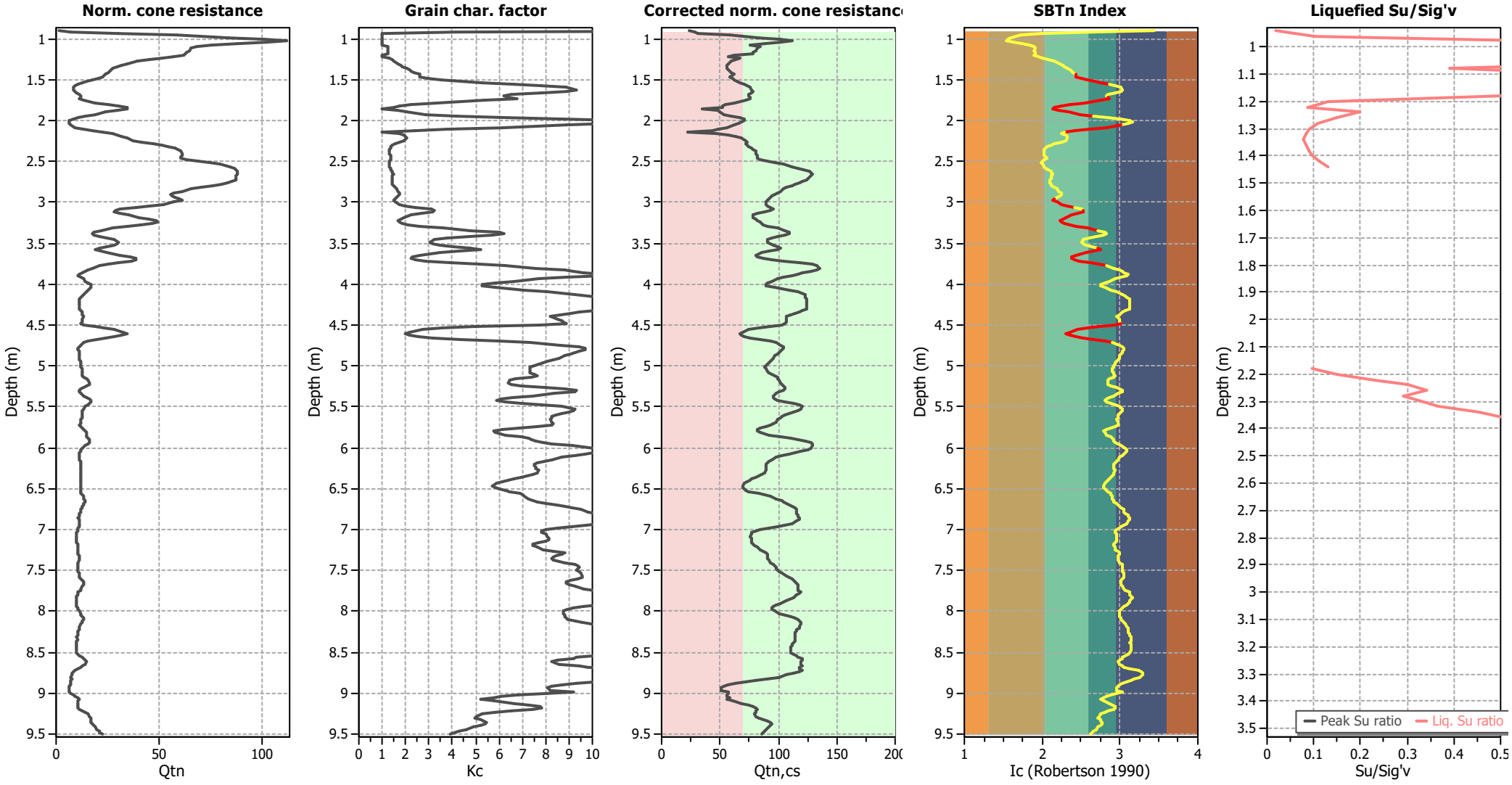
CPT name: CWLP CPT- 10CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

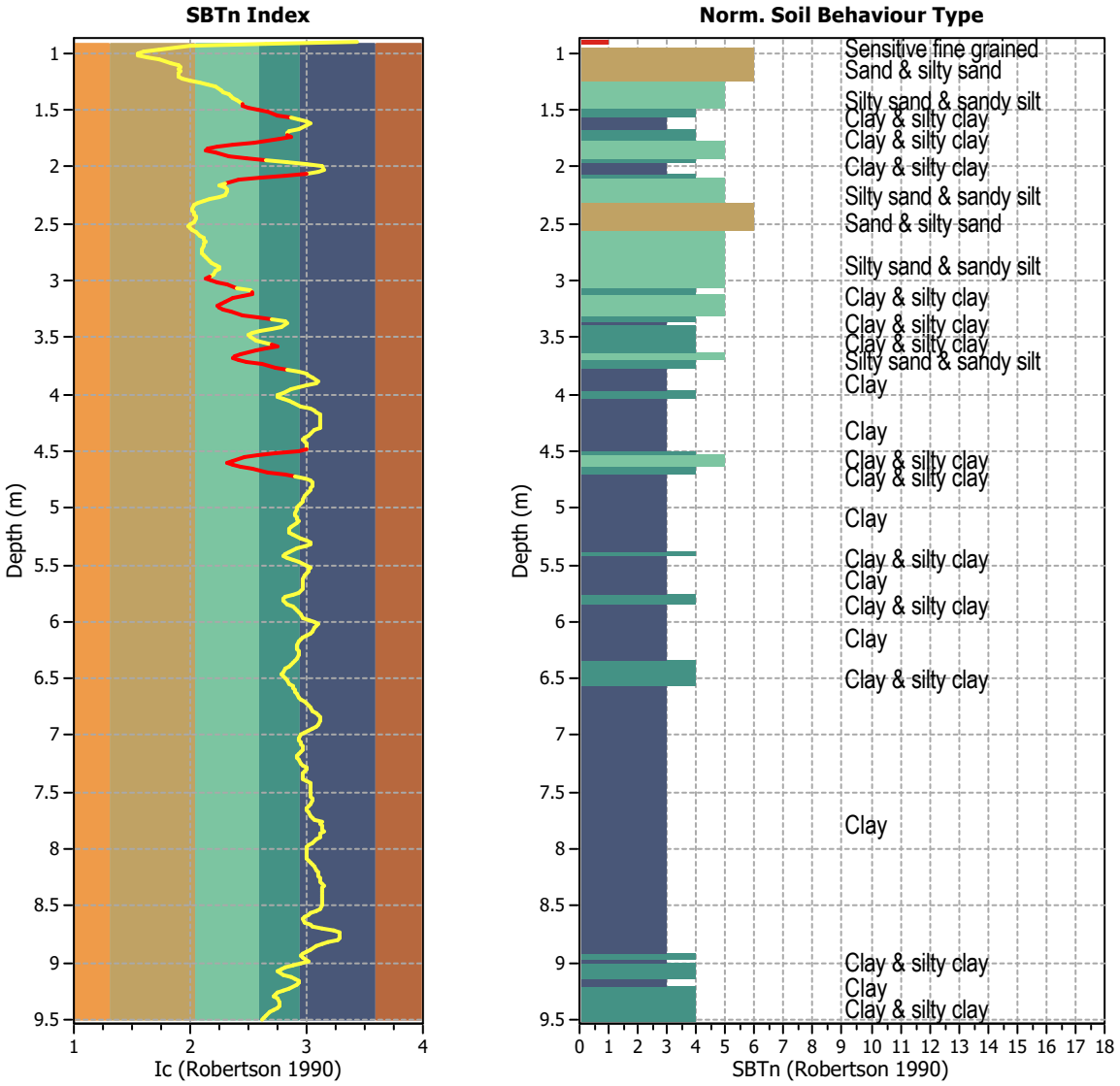
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	2.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.00 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	2

General statistics	
Total points in CPT file:	431
Total points excluded:	69
Exclusion percentage:	16.01%
Number of layers detected:	11

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	7	Start depth: 1.46 (m)	5	Silty sand & sandy silt
		End depth: 1.58 (m)	3	Clay
Transition layer 2	6	Start depth: 1.74 (m)	4	Clay & silty clay
		End depth: 1.84 (m)	5	Silty sand & sandy silt
Transition layer 3	6	Start depth: 1.86 (m)	5	Silty sand & sandy silt
		End depth: 1.96 (m)	4	Clay & silty clay
Transition layer 4	5	Start depth: 2.08 (m)	4	Clay & silty clay
		End depth: 2.16 (m)	5	Silty sand & sandy silt
Transition layer 5	6	Start depth: 2.98 (m)	5	Silty sand & sandy silt
		End depth: 3.08 (m)	4	Clay & silty clay
Transition layer 6	6	Start depth: 3.12 (m)	4	Clay & silty clay
		End depth: 3.22 (m)	5	Silty sand & sandy silt
Transition layer 7	7	Start depth: 3.24 (m)	5	Silty sand & sandy silt
		End depth: 3.36 (m)	4	Clay & silty clay
Transition layer 8	5	Start depth: 3.58 (m)	4	Clay & silty clay
		End depth: 3.66 (m)	5	Silty sand & sandy silt
Transition layer 9	7	Start depth: 3.68 (m)	5	Silty sand & sandy silt
		End depth: 3.80 (m)	3	Clay
Transition layer 10	6	Start depth: 4.50 (m)	3	Clay
		End depth: 4.60 (m)	5	Silty sand & sandy silt
Transition layer 11	8	Start depth: 4.60 (m)	5	Silty sand & sandy silt
		End depth: 4.74 (m)	3	Clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.03	0.20	-1.10	93.05	13.73
2	0.92	0.03	0.20	-1.10	37.71	13.73
3	0.94	0.27	0.00	1.20	5.00	13.73
4	0.96	1.45	1.30	14.60	5.00	14.84
5	0.98	6.00	5.00	18.80	4.45	15.76
6	1.00	7.17	10.90	6.80	3.62	16.30
7	1.02	6.38	17.10	3.90	3.54	16.70
8	1.04	4.81	17.30	-1.40	4.98	16.89
9	1.06	4.07	20.00	0.70	5.00	16.92
10	1.08	3.57	20.50	-4.70	5.00	16.89
11	1.10	3.56	17.80	-1.60	10.42	16.88
12	1.12	3.11	19.20	-5.10	10.75	16.81
13	1.14	3.09	20.00	8.00	10.48	16.71
14	1.16	3.40	15.50	-0.10	10.61	16.65
15	1.18	3.37	12.90	-3.70	10.58	16.62
16	1.20	3.15	14.20	-0.40	5.00	16.52
17	1.22	3.02	17.30	2.20	5.00	16.43
18	1.24	2.78	13.90	-3.20	13.13	16.41
19	1.26	2.13	11.40	-5.90	15.47	16.41
20	1.28	1.95	14.30	-1.30	17.38	16.26
21	1.30	1.66	17.50	-6.70	19.73	16.13
22	1.32	1.57	11.20	-3.10	21.20	16.06
23	1.34	1.42	9.20	-0.40	22.18	15.95
24	1.36	1.44	9.40	-2.50	23.71	15.94
25	1.38	1.41	10.20	-0.70	24.67	15.95
26	1.40	1.20	18.30	0.50	25.23	15.97
27	1.42	1.32	12.10	-2.90	26.31	16.01
28	1.44	1.32	10.60	-3.10	28.20	16.01
29	1.46	1.26	12.30	1.00	28.22	15.83
30	1.48	0.98	11.40	-0.40	30.74	15.78
31	1.50	0.91	10.10	-1.60	34.32	15.68
32	1.52	0.77	11.30	1.40	38.93	15.55
33	1.54	0.63	8.60	29.40	43.31	15.47
34	1.56	0.53	9.30	48.60	49.46	15.43
35	1.58	0.47	10.30	55.30	54.56	15.37
36	1.60	0.39	10.90	62.50	58.84	15.41
37	1.62	0.40	10.90	70.70	60.53	15.44
38	1.64	0.43	11.70	73.40	58.78	15.49
39	1.66	0.47	11.20	63.80	54.33	15.54
40	1.68	0.58	11.80	62.80	49.13	15.61
41	1.70	0.67	11.60	53.20	47.73	15.63
42	1.72	0.80	11.60	10.30	48.35	15.67
43	1.74	0.56	11.90	20.50	50.21	15.65
44	1.76	0.47	13.20	46.60	43.70	15.68
45	1.78	0.43	11.70	89.40	32.64	15.76
46	1.80	1.21	10.10	124.40	25.14	15.81
47	1.82	2.20	9.10	34.00	20.35	15.78
48	1.84	2.09	9.10	6.30	17.33	15.74

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.79	8.80	1.70	5.00	15.66
50	1.88	1.51	8.20	0.10	19.55	15.55
51	1.90	1.25	6.90	-0.10	23.89	15.49
52	1.92	0.95	7.30	0.90	29.94	15.41
53	1.94	0.74	9.80	15.20	37.91	15.33
54	1.96	0.45	9.20	30.30	48.19	15.26
55	1.98	0.35	9.10	57.10	58.70	15.17
56	2.00	0.30	8.40	90.80	67.70	15.00
57	2.02	0.28	7.40	105.30	69.66	14.88
58	2.04	0.29	6.80	112.50	65.84	14.79
59	2.06	0.32	6.10	110.50	58.78	14.72
60	2.08	0.42	5.60	107.30	47.24	14.68
61	2.10	0.52	5.10	104.70	35.05	14.66
62	2.12	0.83	3.90	109.60	26.78	14.74
63	2.14	1.27	3.50	102.30	5.00	14.96
64	2.16	1.54	5.40	78.50	20.56	15.39
65	2.18	1.65	8.40	55.50	22.74	16.09
66	2.20	1.66	14.90	2.30	23.19	16.39
67	2.22	1.52	32.00	23.50	23.44	16.65
68	2.24	1.81	20.60	68.40	22.68	16.83
69	2.26	2.13	24.00	46.70	20.84	16.97
70	2.28	2.44	22.50	22.40	17.67	16.92
71	2.30	2.81	24.10	7.50	16.09	16.95
72	2.32	2.89	22.00	-6.30	14.89	16.93
73	2.34	2.87	20.60	-16.00	13.96	16.97
74	2.36	2.87	20.60	-16.00	13.40	16.98
75	2.38	3.28	24.10	-12.80	13.46	17.06
76	2.40	3.30	23.80	-28.20	13.69	17.12
77	2.42	3.23	29.40	-29.40	13.88	17.17
78	2.44	2.94	26.00	-41.30	14.14	17.17
79	2.46	2.95	25.80	-36.90	14.44	17.22
80	2.48	3.10	25.20	-7.90	13.86	17.29
81	2.50	3.30	29.70	17.30	13.11	17.41
82	2.52	4.00	34.70	2.60	12.65	17.58
83	2.54	4.25	38.00	-7.40	12.96	17.84
84	2.56	4.37	45.40	-11.20	13.39	18.08
85	2.58	4.49	65.20	-15.00	14.33	18.28
86	2.60	4.55	73.80	-23.40	15.33	18.44
87	2.62	4.48	80.90	-30.80	16.16	18.57
88	2.64	4.49	83.30	-35.80	16.55	18.62
89	2.66	4.49	83.30	-35.80	16.74	18.63
90	2.68	4.53	82.90	-40.00	16.52	18.60
91	2.70	4.47	78.80	-39.20	16.18	18.55
92	2.72	4.47	71.10	-43.70	15.79	18.50
93	2.74	4.45	67.50	-36.20	15.66	18.42
94	2.76	4.45	65.80	-34.40	15.77	18.36
95	2.78	4.05	61.80	-35.90	16.11	18.30
96	2.80	3.89	64.00	-32.50	16.63	18.23

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	3.66	56.90	-39.10	17.65	18.14
98	2.84	3.47	53.10	-41.50	18.70	18.06
99	2.86	3.02	50.50	-35.30	19.68	17.96
100	2.88	2.81	49.70	-27.00	20.54	17.89
101	2.90	2.70	48.60	-19.10	20.57	17.81
102	2.92	2.72	44.70	13.70	19.84	17.76
103	2.94	3.07	39.40	-2.70	18.83	17.71
104	2.96	3.20	39.40	-2.70	17.76	17.68
105	2.98	3.20	39.40	-2.70	16.99	17.66
106	3.00	3.20	39.40	-2.70	18.45	17.63
107	3.02	3.20	39.40	-2.70	20.40	17.59
108	3.04	1.91	39.40	-2.70	23.21	17.51
109	3.06	1.91	39.40	-2.70	26.72	17.40
110	3.08	1.50	34.50	26.80	31.41	17.24
111	3.10	1.44	30.90	40.40	32.14	17.09
112	3.12	1.36	26.90	56.90	31.87	16.96
113	3.14	1.35	22.70	104.20	28.65	16.91
114	3.16	1.64	24.50	121.10	25.26	16.98
115	3.18	2.14	24.50	121.10	22.81	17.10
116	3.20	2.63	33.20	63.40	21.17	17.25
117	3.22	2.61	35.20	37.70	19.89	17.34
118	3.24	2.59	36.50	28.50	20.49	17.43
119	3.26	2.65	32.10	21.20	21.94	17.42
120	3.28	2.18	37.10	20.90	24.52	17.34
121	3.30	1.88	34.90	27.80	28.25	17.23
122	3.32	1.26	30.80	39.50	34.65	17.14
123	3.34	0.99	29.60	61.60	40.88	17.02
124	3.36	0.82	31.10	95.10	46.67	16.93
125	3.38	0.81	31.40	216.50	47.76	16.88
126	3.40	0.94	31.40	195.10	45.47	16.86
127	3.42	1.04	26.60	174.70	40.62	16.88
128	3.44	1.20	25.30	191.70	35.61	16.94
129	3.46	1.45	26.70	212.30	32.27	17.00
130	3.48	1.76	32.10	173.70	30.98	17.08
131	3.50	1.76	33.40	139.00	31.74	17.11
132	3.52	1.52	33.00	150.10	33.69	17.11
133	3.54	1.12	30.80	164.30	36.99	17.04
134	3.56	1.01	29.30	182.10	40.77	16.92
135	3.58	0.95	28.00	206.30	42.91	16.77
136	3.60	0.90	24.90	255.60	38.13	16.75
137	3.62	0.97	20.20	298.50	33.69	16.74
138	3.64	1.73	23.10	294.80	28.12	16.90
139	3.66	1.73	23.10	294.80	25.71	17.09
140	3.68	2.59	36.00	130.50	25.29	17.30
141	3.70	2.19	40.40	124.90	27.00	17.44
142	3.72	1.85	45.00	145.50	29.81	17.57
143	3.74	1.55	45.00	145.50	36.26	17.57
144	3.76	1.29	50.20	172.50	42.67	17.54

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.90	48.90	180.40	47.79	17.45
146	3.80	0.90	48.90	180.40	53.70	17.32
147	3.82	0.90	38.40	216.00	58.64	17.16
148	3.84	0.64	33.20	247.70	60.11	17.01
149	3.86	0.60	31.50	247.80	61.74	16.81
150	3.88	0.58	28.30	244.10	65.35	16.64
151	3.90	0.55	25.00	251.00	64.78	16.52
152	3.92	0.51	22.50	264.90	58.92	16.45
153	3.94	0.55	20.30	292.50	53.98	16.40
154	3.96	0.87	20.30	292.50	49.70	16.38
155	3.98	0.87	20.30	292.50	45.92	16.39
156	4.00	0.87	20.30	292.50	43.30	16.42
157	4.02	0.87	20.30	292.50	43.32	16.42
158	4.04	0.87	20.30	292.50	45.92	16.57
159	4.06	0.87	20.30	292.50	48.71	16.68
160	4.08	0.82	35.00	118.30	51.39	16.77
161	4.10	0.77	33.80	122.80	55.64	16.84
162	4.12	0.75	31.80	169.80	60.27	16.89
163	4.14	0.61	32.20	197.60	62.56	16.85
164	4.16	0.61	32.20	197.60	64.54	16.82
165	4.18	0.61	32.20	197.60	66.70	16.81
166	4.20	0.61	32.20	197.60	66.73	16.81
167	4.22	0.61	32.20	197.60	66.75	16.81
168	4.24	0.61	32.20	197.60	66.78	16.81
169	4.26	0.61	32.20	197.60	66.81	16.81
170	4.28	0.61	32.20	197.60	66.83	16.81
171	4.30	0.61	32.20	197.60	66.86	16.81
172	4.32	0.61	32.20	197.60	63.59	16.79
173	4.34	0.61	32.20	197.60	61.15	16.75
174	4.36	0.79	26.10	141.10	59.50	16.70
175	4.38	0.73	25.70	176.00	57.86	16.64
176	4.40	0.66	24.90	191.50	56.21	16.58
177	4.42	0.66	24.90	191.50	57.46	16.56
178	4.44	0.66	24.90	191.50	58.22	16.53
179	4.46	0.66	24.90	191.50	58.27	16.51
180	4.48	0.66	23.40	81.60	58.75	16.48
181	4.50	0.66	23.40	81.60	54.38	16.50
182	4.52	0.59	21.60	236.20	41.92	16.62
183	4.54	1.00	23.90	186.40	34.28	16.71
184	4.56	2.09	24.40	86.80	28.86	16.77
185	4.58	2.15	22.70	37.80	24.81	16.83
186	4.60	2.15	21.50	35.80	22.97	16.82
187	4.62	2.15	21.50	35.80	24.77	16.75
188	4.64	1.76	20.20	39.50	27.55	16.66
189	4.66	1.15	20.40	64.70	31.90	16.59
190	4.68	1.00	19.80	70.90	38.69	16.51
191	4.70	0.81	20.80	175.00	46.56	16.45
192	4.72	0.67	22.50	224.30	52.41	16.42

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.60	22.50	247.50	57.87	16.40
194	4.76	0.54	22.40	261.40	61.07	16.39
195	4.78	0.56	22.40	269.10	62.06	16.37
196	4.80	0.59	22.00	264.00	61.95	16.35
197	4.82	0.59	21.60	257.60	61.06	16.33
198	4.84	0.58	20.80	266.50	60.43	16.30
199	4.86	0.57	20.10	278.20	59.69	16.27
200	4.88	0.57	19.50	285.10	58.67	16.25
201	4.90	0.60	19.20	292.60	57.63	16.22
202	4.92	0.63	19.10	286.10	56.72	16.20
203	4.94	0.62	18.20	287.90	55.73	16.18
204	4.96	0.61	17.80	300.20	54.90	16.16
205	4.98	0.62	17.60	309.00	54.16	16.14
206	5.00	0.64	17.20	306.10	53.35	16.13
207	5.02	0.66	17.00	305.40	52.64	16.13
208	5.04	0.67	16.90	303.30	52.41	16.15
209	5.06	0.67	17.60	308.50	52.49	16.19
210	5.08	0.66	18.90	311.30	52.63	16.25
211	5.10	0.69	20.10	287.70	53.21	16.31
212	5.12	0.72	20.90	269.50	53.84	16.38
213	5.14	0.70	22.00	275.60	52.86	16.49
214	5.16	0.70	23.30	281.00	49.87	16.62
215	5.18	0.88	27.40	271.10	48.77	16.69
216	5.20	1.16	29.50	171.20	48.50	16.73
217	5.22	0.96	26.50	151.80	49.10	16.76
218	5.24	0.81	25.20	167.50	50.84	16.72
219	5.26	0.70	27.50	208.10	55.20	16.62
220	5.28	0.64	24.80	291.60	58.67	16.55
221	5.30	0.61	23.60	301.20	60.53	16.49
222	5.32	0.61	22.30	306.70	60.40	16.41
223	5.34	0.60	20.70	308.80	56.97	16.40
224	5.36	0.62	20.20	309.50	52.98	16.44
225	5.38	0.89	21.60	94.50	49.40	16.53
226	5.40	0.99	23.80	182.60	47.07	16.67
227	5.42	1.09	27.60	184.90	46.08	16.82
228	5.44	1.08	31.10	168.30	47.93	16.93
229	5.46	1.00	34.40	177.90	50.83	17.01
230	5.48	0.82	36.20	204.20	54.57	17.03
231	5.50	0.76	36.20	239.70	58.02	17.01
232	5.52	0.73	35.80	279.00	60.26	16.95
233	5.54	0.72	31.60	321.70	60.03	16.89
234	5.56	0.73	29.20	330.20	59.29	16.81
235	5.58	0.74	27.50	338.20	58.13	16.73
236	5.60	0.71	26.80	350.40	57.12	16.66
237	5.62	0.71	25.30	352.70	56.44	16.61
238	5.64	0.72	23.80	354.00	56.41	16.56
239	5.66	0.72	22.80	386.30	56.11	16.51
240	5.68	0.69	23.00	370.10	56.37	16.45

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.69	22.00	346.40	56.72	16.39
242	5.72	0.63	20.40	360.10	56.26	16.32
243	5.74	0.63	18.60	369.00	53.87	16.25
244	5.76	0.68	16.80	374.60	50.66	16.20
245	5.78	0.82	15.80	297.60	47.27	16.20
246	5.80	0.94	16.50	264.40	45.77	16.27
247	5.82	0.99	18.20	249.80	45.99	16.39
248	5.84	0.91	22.00	240.80	47.98	16.56
249	5.86	0.85	26.00	250.70	50.98	16.77
250	5.88	0.82	31.10	277.70	52.33	16.98
251	5.90	0.89	39.60	330.80	52.66	17.13
252	5.92	1.14	43.20	266.40	53.65	17.25
253	5.94	1.12	43.00	184.90	54.94	17.33
254	5.96	0.94	44.80	187.40	56.39	17.32
255	5.98	0.82	45.20	231.60	59.83	17.26
256	6.00	0.75	40.90	320.50	63.31	17.18
257	6.02	0.73	37.70	323.70	64.98	17.08
258	6.04	0.72	34.70	329.20	64.66	16.96
259	6.06	0.68	31.40	329.30	63.51	16.85
260	6.08	0.69	28.50	325.90	62.08	16.74
261	6.10	0.70	25.60	327.40	60.41	16.62
262	6.12	0.70	22.60	327.70	58.19	16.52
263	6.14	0.71	21.10	333.00	56.50	16.45
264	6.16	0.73	20.30	352.40	55.12	16.41
265	6.18	0.74	20.80	356.80	53.95	16.39
266	6.20	0.76	20.90	352.80	53.26	16.38
267	6.22	0.79	20.70	336.30	53.32	16.38
268	6.24	0.76	19.70	343.50	53.47	16.37
269	6.26	0.73	20.00	364.10	53.69	16.37
270	6.28	0.72	20.40	374.40	54.01	16.34
271	6.30	0.73	20.40	380.50	53.74	16.31
272	6.32	0.73	19.10	379.80	52.99	16.27
273	6.34	0.75	16.90	390.40	52.10	16.21
274	6.36	0.75	16.40	392.30	51.05	16.13
275	6.38	0.73	15.40	411.80	49.62	16.05
276	6.40	0.74	14.40	425.00	48.46	16.00
277	6.42	0.78	13.70	430.30	47.27	15.94
278	6.44	0.80	13.00	421.50	46.30	15.89
279	6.46	0.80	12.30	398.30	45.44	15.87
280	6.48	0.79	12.60	373.10	45.82	15.84
281	6.50	0.82	12.40	338.70	46.79	15.86
282	6.52	0.74	12.80	338.40	47.86	15.92
283	6.54	0.73	14.10	361.40	48.86	15.98
284	6.56	0.77	15.90	346.20	50.77	16.26
285	6.58	0.79	16.90	312.10	51.24	16.45
286	6.60	0.99	30.80	85.70	51.59	16.62
287	6.62	0.95	27.70	222.00	52.26	16.76
288	6.64	0.94	29.20	234.30	53.07	16.88

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	0.91	30.00	238.70	53.75	16.88
290	6.68	0.89	31.10	246.70	55.50	16.93
291	6.70	0.89	31.10	246.70	57.22	16.97
292	6.72	0.85	35.30	264.10	58.54	17.01
293	6.74	0.84	36.40	269.90	59.76	17.03
294	6.76	0.85	36.10	275.10	61.26	17.04
295	6.78	0.81	34.60	283.80	62.46	17.02
296	6.80	0.78	34.00	296.90	63.84	17.01
297	6.82	0.74	35.00	318.20	65.27	17.00
298	6.84	0.72	35.90	349.90	66.11	17.01
299	6.86	0.73	36.70	337.60	66.73	17.02
300	6.88	0.77	36.70	316.80	66.68	17.03
301	6.90	0.75	35.90	320.80	65.93	16.99
302	6.92	0.75	35.90	320.80	64.30	16.91
303	6.94	0.73	29.90	362.80	62.29	16.80
304	6.96	0.75	24.30	388.60	59.76	16.65
305	6.98	0.77	21.40	387.80	57.45	16.45
306	7.00	0.77	18.10	383.40	55.45	16.27
307	7.02	0.70	15.60	373.40	54.56	16.13
308	7.04	0.68	14.10	371.40	54.60	16.01
309	7.06	0.67	13.80	369.60	55.37	15.95
310	7.08	0.66	14.20	371.40	55.58	15.94
311	7.10	0.65	14.70	365.40	55.82	15.95
312	7.12	0.68	15.10	362.10	55.79	15.97
313	7.14	0.69	15.00	358.20	55.35	16.00
314	7.16	0.70	14.90	363.40	54.21	16.04
315	7.18	0.73	15.80	366.70	53.11	16.08
316	7.20	0.78	16.20	364.60	53.11	16.14
317	7.22	0.82	17.20	365.70	53.83	16.22
318	7.24	0.76	18.90	362.70	54.99	16.29
319	7.26	0.72	20.40	374.70	56.72	16.35
320	7.28	0.71	21.50	382.10	58.51	16.41
321	7.30	0.71	22.00	395.30	58.02	16.46
322	7.32	0.75	22.70	388.00	57.11	16.50
323	7.34	0.86	23.10	347.30	56.68	16.51
324	7.36	0.86	23.00	296.20	56.40	16.53
325	7.38	0.79	22.40	287.40	56.73	16.54
326	7.40	0.76	22.70	322.30	58.51	16.56
327	7.42	0.75	24.20	333.80	60.26	16.59
328	7.44	0.75	25.90	326.00	60.85	16.63
329	7.46	0.76	27.20	322.10	61.02	16.66
330	7.48	0.79	26.80	319.10	60.78	16.70
331	7.50	0.80	26.10	317.60	60.59	16.73
332	7.52	0.82	27.30	311.80	60.98	16.78
333	7.54	0.82	29.50	301.20	61.32	16.85
334	7.56	0.79	32.40	307.50	61.50	16.93
335	7.58	0.85	34.70	308.50	61.46	17.01
336	7.60	0.89	36.00	296.00	60.89	17.10

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	0.94	37.50	283.30	59.63	17.16
338	7.64	0.99	40.70	267.70	58.86	17.21
339	7.66	1.01	40.70	262.80	58.82	17.24
340	7.68	1.01	40.80	262.90	59.36	17.26
341	7.70	0.96	40.70	263.10	60.43	17.25
342	7.72	0.92	40.40	266.80	61.86	17.22
343	7.74	0.88	40.40	279.90	63.37	17.18
344	7.76	0.84	38.10	317.90	67.46	17.20
345	7.78	0.82	36.40	342.80	67.27	17.16
346	7.80	0.70	48.20	96.70	67.61	17.10
347	7.82	0.89	33.40	205.00	68.53	17.05
348	7.84	0.79	32.00	285.10	69.56	17.01
349	7.86	0.72	32.20	365.20	66.57	16.88
350	7.88	0.70	31.50	369.10	67.25	16.82
351	7.90	0.72	29.10	351.00	66.23	16.76
352	7.92	0.75	26.40	344.40	64.05	16.70
353	7.94	0.79	24.50	340.90	61.78	16.66
354	7.96	0.81	23.80	329.70	60.13	16.65
355	7.98	0.83	25.20	310.90	59.04	16.66
356	8.00	0.84	26.90	306.30	58.30	16.77
357	8.02	0.87	26.90	306.30	58.32	16.90
358	8.04	0.99	34.30	297.70	58.51	17.03
359	8.06	1.00	38.90	282.80	58.59	17.16
360	8.08	1.01	41.80	267.00	58.76	17.28
361	8.10	1.04	44.70	267.20	59.14	17.33
362	8.12	1.05	44.90	265.60	60.27	17.35
363	8.14	1.05	42.90	259.90	61.60	17.34
364	8.16	0.93	43.90	276.90	62.97	17.32
365	8.18	0.87	41.70	278.80	64.38	17.28
366	8.20	0.88	42.10	305.80	65.78	17.25
367	8.22	0.88	40.90	315.90	65.33	17.21
368	8.24	0.88	39.50	311.00	65.84	17.19
369	8.26	0.90	36.20	327.40	66.33	17.17
370	8.28	0.80	39.00	341.60	67.04	17.15
371	8.30	0.81	39.30	344.10	67.42	17.14
372	8.32	0.81	40.00	343.70	68.60	17.15
373	8.34	0.84	38.20	346.70	68.18	17.15
374	8.36	0.83	38.20	346.70	68.10	17.14
375	8.38	0.83	38.20	346.70	67.77	17.12
376	8.40	0.81	38.00	375.10	68.02	17.11
377	8.42	0.81	36.50	378.60	68.20	17.09
378	8.44	0.81	36.50	378.60	68.38	17.08
379	8.46	0.80	36.30	377.40	68.36	17.07
380	8.48	0.80	36.30	377.40	68.51	17.06
381	8.50	0.80	36.30	377.40	67.81	17.09
382	8.52	0.80	36.30	377.40	66.40	17.18
383	8.54	0.90	40.00	349.70	63.76	17.28
384	8.56	1.03	46.60	308.30	60.59	17.39

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	1.18	49.20	276.40	60.11	17.47
386	8.60	1.29	49.90	255.70	57.48	17.53
387	8.62	1.03	50.90	178.70	56.50	17.53
388	8.64	1.32	46.40	225.30	57.71	17.50
389	8.66	1.16	44.80	241.50	61.06	17.46
390	8.68	1.01	46.60	260.30	62.48	17.40
391	8.70	0.85	47.50	296.00	67.81	17.31
392	8.72	0.75	41.00	413.90	75.35	17.26
393	8.74	0.70	37.90	438.90	79.11	17.17
394	8.76	0.54	44.80	375.30	80.12	17.03
395	8.78	0.67	36.70	402.00	79.87	16.90
396	8.80	0.64	26.90	438.60	77.82	16.74
397	8.82	0.63	21.50	416.10	71.79	16.46
398	8.84	0.67	17.10	377.20	67.95	16.14
399	8.86	0.61	12.70	383.70	63.94	15.83
400	8.88	0.60	9.30	409.30	60.49	15.51
401	8.90	0.61	6.40	432.90	58.31	15.19
402	8.92	0.58	5.40	436.70	56.45	14.95
403	8.94	0.56	5.20	431.60	55.64	14.81
404	8.96	0.55	5.50	425.80	56.11	14.76
405	8.98	0.56	5.70	423.00	60.08	15.12
406	9.00	0.56	5.50	422.10	55.61	15.26
407	9.02	0.62	15.20	210.50	50.46	15.31
408	9.04	0.97	8.40	234.70	47.20	15.43
409	9.06	1.01	5.70	309.70	45.51	15.61
410	9.08	1.01	8.80	272.90	42.99	15.60
411	9.10	0.95	11.40	277.20	45.62	15.81
412	9.12	0.91	14.00	283.90	49.48	16.06
413	9.14	0.88	18.00	311.30	52.37	16.23
414	9.16	0.88	20.70	352.40	54.25	16.36
415	9.18	0.90	20.70	374.30	54.52	16.46
416	9.20	0.92	21.80	392.80	53.04	16.54
417	9.22	1.00	21.60	378.80	49.03	16.62
418	9.24	1.12	23.50	403.80	46.01	16.71
419	9.26	1.47	25.20	441.20	43.34	16.79
420	9.28	1.47	25.90	331.60	41.98	16.91
421	9.30	1.50	26.30	300.60	41.70	17.03
422	9.32	1.48	31.90	353.10	42.92	17.12
423	9.34	1.44	36.60	422.00	43.66	17.20
424	9.36	1.43	37.00	446.00	44.26	17.27
425	9.38	1.49	37.10	496.30	43.99	17.31
426	9.40	1.52	36.90	512.10	42.91	17.34
427	9.42	1.60	37.00	524.90	41.34	17.35
428	9.44	1.69	38.00	556.60	39.85	17.37
429	9.46	1.79	36.80	542.80	38.25	17.39
430	9.48	1.88	36.80	459.70	37.37	17.40
431	9.50	1.99	37.60	459.70	36.11	17.42

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.91	0.00	12.91	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.21	0.00	13.21	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	13.52	0.00	13.52	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	13.85	0.00	13.85	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	14.18	0.00	14.18	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	14.52	0.00	14.52	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	14.86	0.00	14.86	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.20	0.00	15.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.53	0.00	15.53	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	15.87	0.00	15.87	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	16.20	0.00	16.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	16.54	0.00	16.54	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	16.87	0.00	16.87	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	17.20	0.00	17.20	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.53	0.00	17.53	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	17.86	0.00	17.86	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	18.18	0.00	18.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	18.51	0.00	18.51	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	18.83	0.00	18.83	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	19.15	0.00	19.15	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	19.47	0.00	19.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	19.79	0.00	19.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	20.11	0.00	20.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	20.43	0.00	20.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	20.75	0.00	20.75	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	21.07	0.00	21.07	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	21.39	0.00	21.39	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
30	1.48	21.70	0.00	21.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
31	1.50	22.02	0.00	22.02	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
32	1.52	22.33	0.00	22.33	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
33	1.54	22.64	0.00	22.64	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
34	1.56	22.95	0.00	22.95	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
35	1.58	23.25	0.00	23.25	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
36	1.60	23.56	0.00	23.56	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	23.87	0.00	23.87	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	24.18	0.00	24.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	24.49	0.00	24.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	24.80	0.00	24.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	25.12	0.00	25.12	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	25.43	0.00	25.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	25.74	0.00	25.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
44	1.76	26.06	0.00	26.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
45	1.78	26.37	0.00	26.37	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
46	1.80	26.69	0.00	26.69	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
47	1.82	27.00	0.00	27.00	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
48	1.84	27.32	0.00	27.32	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	27.63	0.00	27.63	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
50	1.88	27.94	0.00	27.94	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
51	1.90	28.25	0.00	28.25	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
52	1.92	28.56	0.00	28.56	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
53	1.94	28.87	0.00	28.87	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
54	1.96	29.17	0.00	29.17	0.99	0.064	1.38	0.047	1.00	1.00	2.000	Yes
55	1.98	29.47	0.00	29.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	29.77	0.00	29.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	30.07	0.20	29.88	0.99	0.065	1.38	0.047	1.00	1.00	0.047	No
58	2.04	30.37	0.39	29.98	0.99	0.065	1.38	0.047	1.00	1.00	0.047	No
59	2.06	30.66	0.59	30.07	0.99	0.065	1.38	0.048	1.00	1.00	0.048	No
60	2.08	30.96	0.78	30.17	0.99	0.066	1.38	0.048	1.00	1.00	2.000	Yes
61	2.10	31.25	0.98	30.27	0.99	0.066	1.38	0.048	1.00	1.00	2.000	Yes
62	2.12	31.54	1.18	30.37	0.99	0.067	1.38	0.048	1.00	1.00	2.000	Yes
63	2.14	31.84	1.37	30.47	0.99	0.067	1.38	0.049	1.00	1.00	2.000	Yes
64	2.16	32.15	1.57	30.58	0.99	0.067	1.38	0.049	1.00	1.00	2.000	Yes
65	2.18	32.47	1.77	30.71	0.99	0.068	1.38	0.049	1.00	1.00	0.049	No
66	2.20	32.80	1.96	30.84	0.99	0.068	1.38	0.050	1.00	1.00	0.050	No
67	2.22	33.13	2.16	30.98	0.99	0.068	1.38	0.050	1.00	1.00	0.050	No
68	2.24	33.47	2.35	31.12	0.98	0.069	1.38	0.050	1.00	1.00	0.050	No
69	2.26	33.81	2.55	31.26	0.98	0.069	1.38	0.050	1.00	1.00	0.050	No
70	2.28	34.15	2.75	31.40	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
71	2.30	34.49	2.94	31.54	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
72	2.32	34.83	3.14	31.69	0.98	0.070	1.38	0.051	1.00	1.00	0.051	No
73	2.34	35.16	3.34	31.83	0.98	0.071	1.38	0.051	1.00	1.00	0.051	No
74	2.36	35.50	3.53	31.97	0.98	0.071	1.38	0.052	1.00	1.00	0.052	No
75	2.38	35.85	3.73	32.12	0.98	0.071	1.38	0.052	1.00	1.00	0.052	No
76	2.40	36.19	3.92	32.26	0.98	0.072	1.38	0.052	1.00	1.00	0.052	No
77	2.42	36.53	4.12	32.41	0.98	0.072	1.38	0.052	1.00	1.00	0.052	No
78	2.44	36.87	4.32	32.56	0.98	0.072	1.38	0.053	1.00	1.00	0.053	No
79	2.46	37.22	4.51	32.71	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
80	2.48	37.56	4.71	32.86	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
81	2.50	37.91	4.91	33.01	0.98	0.073	1.38	0.053	1.00	1.00	0.053	No
82	2.52	38.26	5.10	33.16	0.98	0.074	1.38	0.054	1.00	1.00	0.054	No
83	2.54	38.62	5.30	33.32	0.98	0.074	1.38	0.054	1.00	1.00	0.054	No
84	2.56	38.98	5.49	33.49	0.98	0.074	1.38	0.054	1.00	1.00	0.054	No
85	2.58	39.35	5.69	33.66	0.98	0.075	1.38	0.054	1.00	1.00	0.054	No
86	2.60	39.72	5.89	33.83	0.98	0.075	1.38	0.054	1.00	1.00	0.054	No
87	2.62	40.09	6.08	34.01	0.98	0.075	1.38	0.055	1.00	1.00	0.055	No
88	2.64	40.46	6.28	34.18	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
89	2.66	40.83	6.47	34.36	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
90	2.68	41.21	6.67	34.54	0.98	0.076	1.38	0.055	1.00	1.00	0.055	No
91	2.70	41.58	6.87	34.71	0.98	0.076	1.38	0.056	1.00	1.00	0.056	No
92	2.72	41.95	7.06	34.88	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
93	2.74	42.32	7.26	35.06	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
94	2.76	42.68	7.46	35.23	0.98	0.077	1.38	0.056	1.00	1.00	0.056	No
95	2.78	43.05	7.65	35.40	0.98	0.078	1.38	0.056	1.00	1.00	0.056	No
96	2.80	43.41	7.85	35.57	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	43.78	8.04	35.73	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No
98	2.84	44.14	8.24	35.90	0.98	0.078	1.38	0.057	1.00	1.00	0.057	No
99	2.86	44.50	8.44	36.06	0.98	0.079	1.38	0.057	1.00	1.00	0.057	No
100	2.88	44.85	8.63	36.22	0.98	0.079	1.38	0.057	1.00	1.00	0.057	No
101	2.90	45.21	8.83	36.38	0.98	0.079	1.38	0.058	1.00	1.00	0.058	No
102	2.92	45.57	9.03	36.54	0.98	0.079	1.38	0.058	1.00	1.00	0.058	No
103	2.94	45.92	9.22	36.70	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
104	2.96	46.27	9.42	36.86	0.98	0.080	1.38	0.058	1.00	1.00	0.058	No
105	2.98	46.63	9.61	37.01	0.98	0.080	1.38	0.058	1.00	1.00	2.000	Yes
106	3.00	46.98	9.81	37.17	0.98	0.080	1.38	0.058	1.00	1.00	2.000	Yes
107	3.02	47.33	10.01	37.32	0.98	0.081	1.38	0.059	1.00	1.00	2.000	Yes
108	3.04	47.68	10.20	37.48	0.98	0.081	1.38	0.059	1.00	1.00	2.000	Yes
109	3.06	48.03	10.40	37.63	0.98	0.081	1.38	0.059	1.00	1.00	2.000	Yes
110	3.08	48.37	10.59	37.78	0.98	0.081	1.38	0.059	1.00	1.00	2.000	Yes
111	3.10	48.72	10.79	37.92	0.98	0.082	1.38	0.059	1.00	1.00	0.059	No
112	3.12	49.05	10.99	38.07	0.98	0.082	1.38	0.060	1.00	1.00	2.000	Yes
113	3.14	49.39	11.18	38.21	0.98	0.082	1.38	0.060	1.00	1.00	2.000	Yes
114	3.16	49.73	11.38	38.35	0.98	0.082	1.38	0.060	1.00	1.00	2.000	Yes
115	3.18	50.07	11.58	38.50	0.98	0.083	1.38	0.060	1.00	1.00	2.000	Yes
116	3.20	50.42	11.77	38.65	0.98	0.083	1.38	0.060	1.00	1.00	2.000	Yes
117	3.22	50.77	11.97	38.80	0.98	0.083	1.38	0.060	1.00	1.00	2.000	Yes
118	3.24	51.12	12.16	38.95	0.98	0.083	1.38	0.061	1.00	1.00	2.000	Yes
119	3.26	51.46	12.36	39.10	0.98	0.084	1.38	0.061	1.00	1.00	2.000	Yes
120	3.28	51.81	12.56	39.25	0.98	0.084	1.38	0.061	1.00	1.00	2.000	Yes
121	3.30	52.16	12.75	39.40	0.98	0.084	1.38	0.061	1.00	1.00	2.000	Yes
122	3.32	52.50	12.95	39.55	0.98	0.084	1.38	0.061	1.00	1.00	2.000	Yes
123	3.34	52.84	13.15	39.69	0.98	0.085	1.38	0.061	1.00	1.00	2.000	Yes
124	3.36	53.18	13.34	39.84	0.98	0.085	1.38	0.062	1.00	1.00	2.000	Yes
125	3.38	53.51	13.54	39.98	0.98	0.085	1.38	0.062	1.00	1.00	0.062	No
126	3.40	53.85	13.73	40.12	0.98	0.085	1.38	0.062	1.00	1.00	0.062	No
127	3.42	54.19	13.93	40.26	0.98	0.085	1.38	0.062	1.00	1.00	0.062	No
128	3.44	54.53	14.13	40.40	0.98	0.086	1.38	0.062	1.00	1.00	0.062	No
129	3.46	54.87	14.32	40.55	0.98	0.086	1.38	0.062	1.00	1.00	0.062	No
130	3.48	55.21	14.52	40.69	0.98	0.086	1.38	0.063	1.00	1.00	0.063	No
131	3.50	55.55	14.72	40.84	0.98	0.086	1.38	0.063	1.00	1.00	0.063	No
132	3.52	55.89	14.91	40.98	0.98	0.087	1.38	0.063	1.00	1.00	0.063	No
133	3.54	56.23	15.11	41.13	0.98	0.087	1.38	0.063	1.00	1.00	0.063	No
134	3.56	56.57	15.30	41.27	0.98	0.087	1.38	0.063	1.00	1.00	0.063	No
135	3.58	56.91	15.50	41.41	0.98	0.087	1.38	0.063	1.00	1.00	2.000	Yes
136	3.60	57.24	15.70	41.55	0.98	0.087	1.38	0.063	1.00	1.00	2.000	Yes
137	3.62	57.58	15.89	41.69	0.98	0.088	1.38	0.064	1.00	1.00	2.000	Yes
138	3.64	57.92	16.09	41.83	0.98	0.088	1.38	0.064	1.00	1.00	2.000	Yes
139	3.66	58.26	16.28	41.97	0.97	0.088	1.38	0.064	1.00	1.00	2.000	Yes
140	3.68	58.60	16.48	42.12	0.97	0.088	1.38	0.064	1.00	1.00	2.000	Yes
141	3.70	58.95	16.68	42.28	0.97	0.088	1.38	0.064	1.00	1.00	2.000	Yes
142	3.72	59.30	16.87	42.43	0.97	0.089	1.38	0.064	1.00	1.00	2.000	Yes
143	3.74	59.66	17.07	42.59	0.97	0.089	1.38	0.064	1.00	1.00	2.000	Yes
144	3.76	60.01	17.27	42.74	0.97	0.089	1.38	0.065	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	60.36	17.46	42.89	0.97	0.089	1.38	0.065	1.00	1.00	2.000	Yes
146	3.80	60.70	17.66	43.04	0.97	0.089	1.38	0.065	1.00	1.00	2.000	Yes
147	3.82	61.05	17.85	43.19	0.97	0.089	1.38	0.065	1.00	1.00	0.065	No
148	3.84	61.39	18.05	43.33	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
149	3.86	61.72	18.25	43.47	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
150	3.88	62.05	18.44	43.61	0.97	0.090	1.38	0.065	1.00	1.00	0.065	No
151	3.90	62.38	18.64	43.75	0.97	0.090	1.38	0.066	1.00	1.00	0.066	No
152	3.92	62.71	18.84	43.88	0.97	0.090	1.38	0.066	1.00	1.00	0.066	No
153	3.94	63.04	19.03	44.01	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
154	3.96	63.37	19.23	44.14	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
155	3.98	63.70	19.42	44.27	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
156	4.00	64.03	19.62	44.41	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
157	4.02	64.35	19.82	44.54	0.97	0.091	1.38	0.066	1.00	1.00	0.066	No
158	4.04	64.69	20.01	44.67	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
159	4.06	65.02	20.21	44.81	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
160	4.08	65.35	20.40	44.95	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
161	4.10	65.69	20.60	45.09	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
162	4.12	66.03	20.80	45.23	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
163	4.14	66.37	20.99	45.37	0.97	0.092	1.38	0.067	1.00	1.00	0.067	No
164	4.16	66.70	21.19	45.51	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No
165	4.18	67.04	21.39	45.65	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No
166	4.20	67.37	21.58	45.79	0.97	0.093	1.38	0.067	1.00	1.00	0.067	No
167	4.22	67.71	21.78	45.93	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
168	4.24	68.05	21.97	46.07	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
169	4.26	68.38	22.17	46.21	0.97	0.093	1.38	0.068	1.00	1.00	0.068	No
170	4.28	68.72	22.37	46.35	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
171	4.30	69.06	22.56	46.49	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
172	4.32	69.39	22.76	46.63	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
173	4.34	69.73	22.96	46.77	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
174	4.36	70.06	23.15	46.91	0.97	0.094	1.38	0.068	1.00	1.00	0.068	No
175	4.38	70.39	23.35	47.05	0.97	0.094	1.38	0.069	1.00	1.00	0.069	No
176	4.40	70.73	23.54	47.18	0.97	0.094	1.38	0.069	1.00	1.00	0.069	No
177	4.42	71.06	23.74	47.32	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
178	4.44	71.39	23.94	47.45	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
179	4.46	71.72	24.13	47.58	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
180	4.48	72.05	24.33	47.72	0.97	0.095	1.38	0.069	1.00	1.00	0.069	No
181	4.50	72.38	24.53	47.85	0.97	0.095	1.38	0.069	1.00	1.00	2.000	Yes
182	4.52	72.71	24.72	47.99	0.97	0.095	1.38	0.069	1.00	1.00	2.000	Yes
183	4.54	73.04	24.92	48.13	0.97	0.096	1.38	0.069	1.00	1.00	2.000	Yes
184	4.56	73.38	25.11	48.27	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
185	4.58	73.72	25.31	48.41	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
186	4.60	74.05	25.51	48.55	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
187	4.62	74.39	25.70	48.68	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
188	4.64	74.72	25.90	48.82	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
189	4.66	75.05	26.09	48.96	0.97	0.096	1.38	0.070	1.00	1.00	2.000	Yes
190	4.68	75.38	26.29	49.09	0.97	0.097	1.38	0.070	1.00	1.00	2.000	Yes
191	4.70	75.71	26.49	49.22	0.97	0.097	1.38	0.070	1.00	1.00	2.000	Yes
192	4.72	76.04	26.68	49.36	0.97	0.097	1.38	0.070	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	76.37	26.88	49.49	0.97	0.097	1.38	0.071	1.00	1.00	2.000	Yes
194	4.76	76.70	27.08	49.62	0.97	0.097	1.38	0.071	1.00	1.00	0.071	No
195	4.78	77.02	27.27	49.75	0.97	0.097	1.38	0.071	1.00	1.00	0.071	No
196	4.80	77.35	27.47	49.88	0.97	0.097	1.38	0.071	1.00	1.00	0.071	No
197	4.82	77.68	27.66	50.01	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
198	4.84	78.00	27.86	50.14	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
199	4.86	78.33	28.06	50.27	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
200	4.88	78.65	28.25	50.40	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
201	4.90	78.98	28.45	50.53	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
202	4.92	79.30	28.65	50.66	0.97	0.098	1.38	0.071	1.00	1.00	0.071	No
203	4.94	79.62	28.84	50.78	0.97	0.098	1.38	0.072	1.00	1.00	0.072	No
204	4.96	79.95	29.04	50.91	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
205	4.98	80.27	29.23	51.04	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
206	5.00	80.59	29.43	51.16	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
207	5.02	80.92	29.63	51.29	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
208	5.04	81.24	29.82	51.42	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
209	5.06	81.56	30.02	51.54	0.97	0.099	1.38	0.072	1.00	1.00	0.072	No
210	5.08	81.89	30.21	51.67	0.96	0.099	1.38	0.072	1.00	1.00	0.072	No
211	5.10	82.21	30.41	51.80	0.96	0.100	1.38	0.072	1.00	1.00	0.072	No
212	5.12	82.54	30.61	51.93	0.96	0.100	1.38	0.072	1.00	1.00	0.072	No
213	5.14	82.87	30.80	52.07	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
214	5.16	83.20	31.00	52.20	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
215	5.18	83.54	31.20	52.34	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
216	5.20	83.87	31.39	52.48	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
217	5.22	84.21	31.59	52.62	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
218	5.24	84.54	31.78	52.76	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
219	5.26	84.87	31.98	52.89	0.96	0.100	1.38	0.073	1.00	1.00	0.073	No
220	5.28	85.20	32.18	53.03	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
221	5.30	85.53	32.37	53.16	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
222	5.32	85.86	32.57	53.29	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
223	5.34	86.19	32.77	53.43	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
224	5.36	86.52	32.96	53.56	0.96	0.101	1.38	0.073	1.00	1.00	0.073	No
225	5.38	86.85	33.16	53.69	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
226	5.40	87.18	33.35	53.83	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
227	5.42	87.52	33.55	53.97	0.96	0.101	1.38	0.074	1.00	1.00	0.074	No
228	5.44	87.86	33.75	54.11	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
229	5.46	88.20	33.94	54.26	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
230	5.48	88.54	34.14	54.40	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
231	5.50	88.88	34.34	54.54	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
232	5.52	89.22	34.53	54.69	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
233	5.54	89.56	34.73	54.83	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
234	5.56	89.89	34.92	54.97	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
235	5.58	90.23	35.12	55.11	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
236	5.60	90.56	35.32	55.24	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
237	5.62	90.89	35.51	55.38	0.96	0.102	1.38	0.074	1.00	1.00	0.074	No
238	5.64	91.22	35.71	55.52	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
239	5.66	91.55	35.90	55.65	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
240	5.68	91.88	36.10	55.78	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
241	5.70	92.21	36.30	55.91	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
242	5.72	92.54	36.49	56.04	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
243	5.74	92.86	36.69	56.17	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
244	5.76	93.19	36.89	56.30	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
245	5.78	93.51	37.08	56.43	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
246	5.80	93.84	37.28	56.56	0.96	0.103	1.38	0.075	1.00	1.00	0.075	No
247	5.82	94.16	37.47	56.69	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
248	5.84	94.50	37.67	56.82	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
249	5.86	94.83	37.87	56.96	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
250	5.88	95.17	38.06	57.11	0.96	0.104	1.38	0.075	1.00	1.00	0.075	No
251	5.90	95.51	38.26	57.25	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
252	5.92	95.86	38.46	57.40	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
253	5.94	96.20	38.65	57.55	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
254	5.96	96.55	38.85	57.70	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
255	5.98	96.90	39.04	57.85	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
256	6.00	97.24	39.24	58.00	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
257	6.02	97.58	39.44	58.14	0.96	0.104	1.38	0.076	1.00	1.00	0.076	No
258	6.04	97.92	39.63	58.29	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
259	6.06	98.26	39.83	58.43	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
260	6.08	98.59	40.02	58.57	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
261	6.10	98.92	40.22	58.70	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
262	6.12	99.26	40.42	58.84	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
263	6.14	99.58	40.61	58.97	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
264	6.16	99.91	40.81	59.10	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
265	6.18	100.24	41.01	59.23	0.96	0.105	1.38	0.076	1.00	1.00	0.076	No
266	6.20	100.57	41.20	59.37	0.96	0.105	1.38	0.077	1.00	1.00	0.077	No
267	6.22	100.90	41.40	59.50	0.96	0.105	1.38	0.077	1.00	1.00	0.077	No
268	6.24	101.22	41.59	59.63	0.96	0.105	1.38	0.077	1.00	1.00	0.077	No
269	6.26	101.55	41.79	59.76	0.96	0.106	1.38	0.077	1.00	1.00	0.077	No
270	6.28	101.88	41.99	59.89	0.96	0.106	1.38	0.077	1.00	1.00	0.077	No
271	6.30	102.20	42.18	60.02	0.96	0.106	1.38	0.077	1.00	1.00	0.077	No
272	6.32	102.53	42.38	60.15	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
273	6.34	102.85	42.58	60.28	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
274	6.36	103.18	42.77	60.40	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
275	6.38	103.50	42.97	60.53	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
276	6.40	103.82	43.16	60.65	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
277	6.42	104.14	43.36	60.77	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
278	6.44	104.45	43.56	60.90	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
279	6.46	104.77	43.75	61.02	0.95	0.106	1.38	0.077	1.00	1.00	0.077	No
280	6.48	105.09	43.95	61.14	0.95	0.107	1.38	0.077	1.00	1.00	0.077	No
281	6.50	105.40	44.15	61.26	0.95	0.107	1.38	0.077	1.00	1.00	0.077	No
282	6.52	105.72	44.34	61.38	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
283	6.54	106.04	44.54	61.50	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
284	6.56	106.37	44.73	61.63	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
285	6.58	106.70	44.93	61.77	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
286	6.60	107.03	45.13	61.90	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
287	6.62	107.36	45.32	62.04	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
288	6.64	107.70	45.52	62.18	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	6.66	108.04	45.71	62.32	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
290	6.68	108.38	45.91	62.47	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
291	6.70	108.72	46.11	62.61	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
292	6.72	109.06	46.30	62.75	0.95	0.107	1.38	0.078	1.00	1.00	0.078	No
293	6.74	109.40	46.50	62.90	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
294	6.76	109.74	46.70	63.04	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
295	6.78	110.08	46.89	63.19	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
296	6.80	110.42	47.09	63.33	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
297	6.82	110.76	47.28	63.47	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
298	6.84	111.10	47.48	63.62	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
299	6.86	111.44	47.68	63.76	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
300	6.88	111.78	47.87	63.91	0.95	0.108	1.38	0.078	1.00	1.00	0.078	No
301	6.90	112.12	48.07	64.05	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
302	6.92	112.46	48.27	64.19	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
303	6.94	112.79	48.46	64.33	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
304	6.96	113.13	48.66	64.47	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
305	6.98	113.46	48.85	64.60	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
306	7.00	113.78	49.05	64.73	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
307	7.02	114.10	49.25	64.86	0.95	0.108	1.38	0.079	1.00	1.00	0.079	No
308	7.04	114.42	49.44	64.98	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
309	7.06	114.74	49.64	65.11	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
310	7.08	115.06	49.83	65.23	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
311	7.10	115.38	50.03	65.35	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
312	7.12	115.70	50.23	65.47	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
313	7.14	116.02	50.42	65.60	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
314	7.16	116.34	50.62	65.72	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
315	7.18	116.66	50.82	65.85	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
316	7.20	116.99	51.01	65.97	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
317	7.22	117.31	51.21	66.10	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
318	7.24	117.64	51.40	66.23	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
319	7.26	117.96	51.60	66.36	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
320	7.28	118.29	51.80	66.49	0.95	0.109	1.38	0.079	1.00	1.00	0.079	No
321	7.30	118.62	51.99	66.63	0.95	0.109	1.38	0.080	1.00	1.00	0.080	No
322	7.32	118.95	52.19	66.76	0.95	0.109	1.38	0.080	1.00	1.00	0.080	No
323	7.34	119.28	52.39	66.90	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
324	7.36	119.61	52.58	67.03	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
325	7.38	119.94	52.78	67.16	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
326	7.40	120.27	52.97	67.30	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
327	7.42	120.61	53.17	67.44	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
328	7.44	120.94	53.37	67.57	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
329	7.46	121.27	53.56	67.71	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
330	7.48	121.61	53.76	67.85	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
331	7.50	121.94	53.96	67.98	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
332	7.52	122.28	54.15	68.12	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
333	7.54	122.61	54.35	68.26	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
334	7.56	122.95	54.54	68.41	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
335	7.58	123.29	54.74	68.55	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
336	7.60	123.63	54.94	68.70	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
337	7.62	123.98	55.13	68.84	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
338	7.64	124.32	55.33	68.99	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
339	7.66	124.67	55.52	69.14	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
340	7.68	125.01	55.72	69.29	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
341	7.70	125.36	55.92	69.44	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
342	7.72	125.70	56.11	69.59	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
343	7.74	126.04	56.31	69.73	0.94	0.110	1.38	0.080	1.00	1.00	0.080	No
344	7.76	126.39	56.51	69.88	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
345	7.78	126.73	56.70	70.03	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
346	7.80	127.07	56.90	70.17	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
347	7.82	127.41	57.09	70.32	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
348	7.84	127.75	57.29	70.46	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
349	7.86	128.09	57.49	70.60	0.94	0.111	1.38	0.080	1.00	1.00	0.080	No
350	7.88	128.43	57.68	70.74	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
351	7.90	128.76	57.88	70.88	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
352	7.92	129.10	58.08	71.02	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
353	7.94	129.43	58.27	71.16	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
354	7.96	129.76	58.47	71.30	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
355	7.98	130.10	58.66	71.43	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
356	8.00	130.43	58.86	71.57	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
357	8.02	130.77	59.06	71.71	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
358	8.04	131.11	59.25	71.86	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
359	8.06	131.45	59.45	72.01	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
360	8.08	131.80	59.64	72.15	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
361	8.10	132.15	59.84	72.30	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
362	8.12	132.49	60.04	72.46	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
363	8.14	132.84	60.23	72.61	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
364	8.16	133.19	60.43	72.76	0.94	0.111	1.38	0.081	1.00	1.00	0.081	No
365	8.18	133.53	60.63	72.91	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
366	8.20	133.88	60.82	73.06	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
367	8.22	134.22	61.02	73.20	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
368	8.24	134.56	61.21	73.35	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
369	8.26	134.91	61.41	73.50	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
370	8.28	135.25	61.61	73.64	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
371	8.30	135.59	61.80	73.79	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
372	8.32	135.94	62.00	73.94	0.93	0.111	1.38	0.081	1.00	1.00	0.081	No
373	8.34	136.28	62.20	74.08	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
374	8.36	136.62	62.39	74.23	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
375	8.38	136.97	62.59	74.38	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
376	8.40	137.31	62.78	74.52	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
377	8.42	137.65	62.98	74.67	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
378	8.44	137.99	63.18	74.81	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
379	8.46	138.33	63.37	74.96	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
380	8.48	138.67	63.57	75.10	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
381	8.50	139.02	63.77	75.25	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
382	8.52	139.36	63.96	75.40	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
383	8.54	139.70	64.16	75.55	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
384	8.56	140.05	64.35	75.70	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	8.58	140.40	64.55	75.85	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
386	8.60	140.75	64.75	76.01	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
387	8.62	141.10	64.94	76.16	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
388	8.64	141.45	65.14	76.31	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
389	8.66	141.80	65.33	76.47	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
390	8.68	142.15	65.53	76.62	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
391	8.70	142.50	65.73	76.77	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
392	8.72	142.84	65.92	76.92	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
393	8.74	143.18	66.12	77.07	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
394	8.76	143.53	66.32	77.21	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
395	8.78	143.86	66.51	77.35	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
396	8.80	144.20	66.71	77.49	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
397	8.82	144.53	66.90	77.62	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
398	8.84	144.85	67.10	77.75	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
399	8.86	145.17	67.30	77.87	0.93	0.112	1.38	0.081	1.00	1.00	0.081	No
400	8.88	145.48	67.49	77.98	0.92	0.112	1.38	0.081	1.00	1.00	0.081	No
401	8.90	145.78	67.69	78.09	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
402	8.92	146.08	67.89	78.19	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
403	8.94	146.38	68.08	78.29	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
404	8.96	146.67	68.28	78.39	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
405	8.98	146.97	68.47	78.50	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
406	9.00	147.28	68.67	78.61	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
407	9.02	147.59	68.87	78.72	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
408	9.04	147.89	69.06	78.83	0.92	0.112	1.38	0.082	1.00	1.00	0.082	No
409	9.06	148.21	69.26	78.95	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
410	9.08	148.52	69.45	79.06	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
411	9.10	148.83	69.65	79.18	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
412	9.12	149.16	69.85	79.31	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
413	9.14	149.48	70.04	79.44	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
414	9.16	149.81	70.24	79.57	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
415	9.18	150.14	70.44	79.70	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
416	9.20	150.47	70.63	79.83	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
417	9.22	150.80	70.83	79.97	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
418	9.24	151.13	71.02	80.11	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
419	9.26	151.47	71.22	80.25	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
420	9.28	151.81	71.42	80.39	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
421	9.30	152.15	71.61	80.54	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
422	9.32	152.49	71.81	80.68	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
423	9.34	152.83	72.01	80.83	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
424	9.36	153.18	72.20	80.98	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
425	9.38	153.53	72.40	81.13	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
426	9.40	153.87	72.59	81.28	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
427	9.42	154.22	72.79	81.43	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
428	9.44	154.57	72.99	81.58	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
429	9.46	154.92	73.18	81.73	0.92	0.113	1.38	0.082	1.00	1.00	0.082	No
430	9.48	155.26	73.38	81.88	0.91	0.113	1.38	0.082	1.00	1.00	0.082	No
431	9.50	155.61	73.58	82.04	0.91	0.113	1.38	0.082	1.00	1.00	0.082	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.07	3.44	0.26	1.00	1.23	19.20	23.67	4.000	No	Yes	2.00
2	0.92	0.36	2.65	0.11	0.86	6.85	7.31	50.09	4.000	No	No	2.00
3	0.94	1.56	1.99	0.09	0.62	30.45	1.00	30.45	4.000	No	No	2.00
4	0.96	2.98	1.73	0.12	0.51	58.65	1.00	58.65	4.000	No	No	2.00
5	0.98	4.26	1.61	0.16	0.47	83.73	1.00	83.73	4.000	No	No	2.00
6	1.00	5.16	1.55	0.20	0.45	101.63	1.00	101.63	4.000	No	No	2.00
7	1.02	5.69	1.55	0.25	0.45	111.98	1.00	111.98	4.000	No	No	2.00
8	1.04	5.20	1.64	0.33	0.48	102.36	1.00	102.36	4.000	No	No	2.00
9	1.06	4.48	1.74	0.42	0.52	88.09	1.00	88.09	4.000	No	No	2.00
10	1.08	3.82	1.84	0.50	0.56	75.18	1.00	75.18	4.000	No	No	2.00
11	1.10	3.48	1.90	0.56	0.58	68.40	1.24	84.66	4.000	No	No	2.00
12	1.12	3.35	1.91	0.56	0.59	65.72	1.25	81.92	4.000	No	No	2.00
13	1.14	3.30	1.90	0.52	0.58	64.91	1.24	80.44	4.000	No	No	2.00
14	1.16	3.22	1.91	0.51	0.59	63.30	1.24	78.68	4.000	No	No	2.00
15	1.18	3.20	1.91	0.50	0.59	62.91	1.24	78.15	4.000	No	No	2.00
16	1.20	3.14	1.90	0.47	0.58	61.68	1.00	61.68	4.000	No	No	2.00
17	1.22	2.89	1.94	0.49	0.60	56.66	1.00	56.66	4.000	No	No	2.00
18	1.24	2.60	2.01	0.55	0.62	51.05	1.31	67.02	4.000	No	No	2.00
19	1.26	2.31	2.09	0.65	0.65	45.16	1.40	63.35	4.000	No	No	2.00
20	1.28	2.02	2.15	0.68	0.68	39.44	1.50	59.35	4.000	No	No	2.00
21	1.30	1.75	2.22	0.74	0.71	34.08	1.67	56.94	4.000	No	No	2.00
22	1.32	1.61	2.26	0.77	0.72	31.38	1.80	56.39	4.000	No	No	2.00
23	1.34	1.50	2.29	0.78	0.73	29.25	1.89	55.29	4.000	No	No	2.00
24	1.36	1.41	2.33	0.84	0.75	27.43	2.05	56.25	4.000	No	No	2.00
25	1.38	1.36	2.36	0.88	0.76	26.45	2.16	57.12	4.000	No	No	2.00
26	1.40	1.34	2.37	0.92	0.76	26.04	2.23	57.98	4.000	No	No	2.00
27	1.42	1.30	2.40	0.99	0.77	25.32	2.36	59.78	4.000	No	No	2.00
28	1.44	1.22	2.44	1.08	0.79	23.62	2.61	61.75	4.000	No	No	2.00
29	1.46	1.16	2.44	0.99	0.79	22.46	2.62	58.75	4.000	Yes	No	2.00
30	1.48	1.05	2.50	1.09	0.81	20.26	2.83	57.26	4.000	Yes	No	2.00
31	1.50	0.91	2.58	1.21	0.84	17.55	4.71	82.60	4.000	Yes	No	2.00
32	1.52	0.77	2.67	1.36	0.88	14.71	8.49	124.89	4.000	Yes	No	2.00
33	1.54	0.67	2.75	1.54	0.91	12.72	5.29	67.21	4.000	Yes	Yes	2.00
34	1.56	0.57	2.86	1.86	0.95	10.71	6.62	70.90	4.000	Yes	Yes	2.00
35	1.58	0.50	2.94	2.12	0.98	9.31	7.81	72.76	4.000	Yes	Yes	2.00
36	1.60	0.46	3.01	2.45	1.00	8.55	8.87	75.88	4.000	No	Yes	2.00
37	1.62	0.45	3.03	2.61	1.00	8.32	9.30	77.40	4.000	No	Yes	2.00
38	1.64	0.47	3.00	2.54	1.00	8.77	8.86	77.72	4.000	No	Yes	2.00
39	1.66	0.52	2.94	2.29	0.98	9.87	7.76	76.55	4.000	No	Yes	2.00
40	1.68	0.60	2.85	2.01	0.95	11.40	6.55	74.60	4.000	No	Yes	2.00
41	1.70	0.63	2.83	1.93	0.94	11.87	6.23	73.97	4.000	No	Yes	2.00
42	1.72	0.62	2.84	2.01	0.94	11.82	6.37	75.28	4.000	No	Yes	2.00
43	1.74	0.59	2.87	2.11	0.96	11.22	6.79	76.18	4.000	Yes	Yes	2.00
44	1.76	0.70	2.76	1.73	0.91	13.38	5.37	71.79	4.000	Yes	Yes	2.00
45	1.78	0.99	2.54	1.17	0.83	18.92	3.73	70.61	4.000	Yes	No	2.00
46	1.80	1.29	2.37	0.84	0.77	24.95	2.22	55.26	4.000	Yes	No	2.00
47	1.82	1.55	2.24	0.64	0.72	30.14	1.72	51.89	4.000	Yes	No	2.00
48	1.84	1.77	2.15	0.52	0.68	34.35	1.50	51.58	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	1.77	2.13	0.48	0.68	34.43	1.00	34.43	4.000	Yes	No	2.00
50	1.88	1.52	2.22	0.54	0.71	29.43	1.66	48.75	4.000	Yes	No	2.00
51	1.90	1.25	2.34	0.67	0.75	24.08	2.07	49.86	4.000	Yes	No	2.00
52	1.92	0.98	2.48	0.87	0.81	18.79	2.87	53.86	4.000	Yes	No	2.00
53	1.94	0.75	2.65	1.17	0.87	14.24	7.50	106.74	4.000	Yes	No	2.00
54	1.96	0.56	2.84	1.64	0.95	10.53	6.33	66.69	4.000	Yes	Yes	2.00
55	1.98	0.43	3.00	2.17	1.00	7.98	8.84	70.51	4.000	No	Yes	2.00
56	2.00	0.35	3.13	2.57	1.00	6.28	11.22	70.45	4.000	No	Yes	2.00
57	2.02	0.33	3.16	2.56	1.00	5.83	11.77	68.65	0.278	No	Yes	2.00
58	2.04	0.34	3.10	2.21	1.00	6.13	10.71	65.70	0.293	No	Yes	2.00
59	2.06	0.39	3.00	1.75	1.00	7.01	8.86	62.06	0.334	No	Yes	2.00
60	2.08	0.50	2.82	1.18	0.94	9.17	6.12	56.17	4.000	Yes	Yes	2.00
61	2.10	0.69	2.59	0.73	0.85	13.01	5.19	67.61	4.000	Yes	No	2.00
62	2.12	0.93	2.41	0.52	0.78	17.81	2.42	43.12	4.000	Yes	No	2.00
63	2.14	1.18	2.29	0.46	0.74	22.60	1.00	22.60	4.000	Yes	No	2.00
64	2.16	1.40	2.25	0.53	0.72	27.02	1.74	47.00	4.000	Yes	No	2.00
65	2.18	1.54	2.31	0.85	0.74	29.67	1.95	57.76	0.098	No	No	1.99
66	2.20	1.64	2.32	1.01	0.75	31.77	1.99	63.34	0.104	No	No	2.00
67	2.22	1.76	2.32	1.16	0.75	34.05	2.02	68.82	0.110	No	No	2.00
68	2.24	1.91	2.30	1.21	0.74	37.14	1.94	72.08	0.115	No	No	2.00
69	2.26	2.15	2.25	1.17	0.72	41.70	1.76	73.56	0.117	No	No	2.00
70	2.28	2.42	2.16	0.95	0.69	47.06	1.52	71.68	0.114	No	No	2.00
71	2.30	2.63	2.11	0.87	0.67	51.18	1.43	73.33	0.117	No	No	2.00
72	2.32	2.77	2.07	0.80	0.65	54.06	1.38	74.45	0.118	No	No	2.00
73	2.34	2.94	2.04	0.77	0.64	57.38	1.34	76.94	0.122	No	No	2.00
74	2.36	3.04	2.02	0.74	0.63	59.27	1.32	78.33	0.125	No	No	2.00
75	2.38	3.11	2.02	0.77	0.63	60.59	1.32	80.18	0.128	No	No	2.00
76	2.40	3.12	2.03	0.80	0.64	60.84	1.33	80.99	0.129	No	No	2.00
77	2.42	3.13	2.03	0.83	0.64	61.16	1.34	81.82	0.131	No	No	2.00
78	2.44	3.10	2.04	0.85	0.64	60.42	1.35	81.41	0.130	No	No	2.00
79	2.46	3.10	2.05	0.89	0.65	60.46	1.36	82.16	0.132	No	No	2.00
80	2.48	3.26	2.03	0.88	0.64	63.54	1.34	84.96	0.137	No	No	2.00
81	2.50	3.52	2.01	0.88	0.63	68.74	1.31	90.19	0.148	No	No	2.00
82	2.52	3.81	1.99	0.92	0.62	74.36	1.30	96.53	0.164	No	No	2.00
83	2.54	4.08	2.00	1.05	0.63	79.83	1.31	104.39	0.186	No	No	2.00
84	2.56	4.33	2.02	1.20	0.63	84.71	1.32	111.90	0.210	No	No	2.00
85	2.58	4.42	2.05	1.38	0.65	86.56	1.35	117.25	0.230	No	No	2.00
86	2.60	4.47	2.08	1.57	0.66	87.47	1.40	122.12	0.249	No	No	2.00
87	2.62	4.49	2.11	1.74	0.67	87.89	1.44	126.26	0.267	No	No	2.00
88	2.64	4.50	2.12	1.81	0.68	88.03	1.46	128.26	0.276	No	No	2.00
89	2.66	4.48	2.13	1.84	0.68	87.69	1.47	128.68	0.278	No	No	2.00
90	2.68	4.48	2.12	1.80	0.68	87.64	1.46	127.56	0.273	No	No	2.00
91	2.70	4.47	2.11	1.73	0.67	87.47	1.44	125.75	0.265	No	No	2.00
92	2.72	4.47	2.10	1.65	0.67	87.34	1.42	123.83	0.257	No	No	2.00
93	2.74	4.37	2.10	1.59	0.67	85.45	1.41	120.64	0.243	No	No	2.00
94	2.76	4.26	2.10	1.57	0.67	83.18	1.42	117.87	0.232	No	No	2.00
95	2.78	4.10	2.11	1.56	0.67	79.99	1.43	114.70	0.220	No	No	2.00
96	2.80	3.90	2.13	1.56	0.68	76.13	1.46	111.26	0.208	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	3.61	2.16	1.60	0.69	70.48	1.52	107.25	0.195	No	No	2.00
98	2.84	3.37	2.19	1.65	0.70	65.56	1.59	104.39	0.186	No	No	2.00
99	2.86	3.13	2.22	1.68	0.71	60.85	1.67	101.43	0.177	No	No	2.00
100	2.88	2.94	2.25	1.70	0.72	57.16	1.74	99.35	0.171	No	No	2.00
101	2.90	2.86	2.25	1.65	0.72	55.59	1.74	96.80	0.164	No	No	2.00
102	2.92	2.90	2.22	1.56	0.72	56.30	1.68	94.54	0.159	No	No	2.00
103	2.94	2.98	2.20	1.44	0.70	57.86	1.60	92.69	0.154	No	No	2.00
104	2.96	3.08	2.16	1.33	0.69	59.85	1.53	91.48	0.151	No	No	2.00
105	2.98	3.17	2.14	1.26	0.68	61.40	1.48	90.97	4.000	Yes	No	2.00
106	3.00	2.94	2.18	1.36	0.70	57.12	1.58	89.97	4.000	Yes	No	2.00
107	3.02	2.68	2.24	1.50	0.72	52.00	1.73	89.74	4.000	Yes	No	2.00
108	3.04	2.34	2.32	1.67	0.75	45.30	2.00	90.42	4.000	Yes	No	2.00
109	3.06	1.99	2.41	1.89	0.79	38.37	2.41	92.59	4.000	Yes	No	2.00
110	3.08	1.62	2.52	2.17	0.83	31.12	3.12	97.21	4.000	Yes	No	2.00
111	3.10	1.52	2.53	2.10	0.83	28.99	3.47	100.62	0.175	No	No	2.00
112	3.12	1.47	2.53	1.97	0.83	28.02	3.34	93.50	4.000	Yes	No	2.00
113	3.14	1.60	2.45	1.67	0.80	30.59	2.68	81.91	4.000	Yes	No	2.00
114	3.16	1.84	2.37	1.47	0.77	35.30	2.23	78.69	4.000	Yes	No	2.00
115	3.18	2.09	2.31	1.38	0.75	40.22	1.95	78.59	4.000	Yes	No	2.00
116	3.20	2.33	2.26	1.35	0.73	45.05	1.79	80.85	4.000	Yes	No	2.00
117	3.22	2.53	2.23	1.30	0.72	48.75	1.68	82.08	4.000	Yes	No	2.00
118	3.24	2.54	2.24	1.40	0.72	49.02	1.73	85.00	4.000	Yes	No	2.00
119	3.26	2.39	2.28	1.51	0.74	46.07	1.87	86.02	4.000	Yes	No	2.00
120	3.28	2.12	2.35	1.66	0.77	40.73	2.14	87.26	4.000	Yes	No	2.00
121	3.30	1.80	2.44	1.89	0.80	34.43	2.62	90.21	4.000	Yes	No	2.00
122	3.32	1.43	2.59	2.37	0.85	27.23	4.93	134.11	4.000	Yes	No	2.00
123	3.34	1.16	2.71	2.84	0.90	21.93	4.79	105.05	4.000	Yes	Yes	2.00
124	3.36	0.98	2.81	3.33	0.94	18.32	6.00	109.90	4.000	Yes	Yes	2.00
125	3.38	0.94	2.83	3.38	0.95	17.55	6.24	109.52	0.837	No	Yes	2.00
126	3.40	0.99	2.79	3.11	0.93	18.49	5.74	106.11	0.882	No	Yes	2.00
127	3.42	1.12	2.70	2.65	0.90	21.07	4.74	99.85	1.005	No	Yes	2.00
128	3.44	1.31	2.61	2.26	0.86	24.80	5.59	138.71	0.295	No	No	2.00
129	3.46	1.47	2.54	2.03	0.84	28.00	3.54	99.08	0.170	No	No	2.00
130	3.48	1.57	2.51	1.99	0.83	29.89	2.93	87.63	0.143	No	No	2.00
131	3.50	1.55	2.52	2.08	0.83	29.54	3.28	96.76	0.164	No	No	2.00
132	3.52	1.46	2.57	2.25	0.85	27.77	4.32	119.99	0.241	No	No	2.00
133	3.54	1.30	2.63	2.48	0.87	24.57	6.68	164.08	0.442	No	No	2.00
134	3.56	1.13	2.71	2.71	0.90	21.27	4.77	101.41	1.014	No	Yes	2.00
135	3.58	1.03	2.75	2.74	0.92	19.16	5.20	99.64	4.000	Yes	Yes	2.00
136	3.60	1.15	2.66	2.29	0.88	21.65	7.70	166.71	4.000	Yes	No	2.00
137	3.62	1.30	2.57	1.92	0.85	24.58	4.32	106.20	4.000	Yes	No	2.00
138	3.64	1.63	2.44	1.62	0.80	31.00	2.60	80.70	4.000	Yes	No	2.00
139	3.66	1.88	2.38	1.57	0.78	35.73	2.29	81.65	4.000	Yes	No	2.00
140	3.68	2.05	2.37	1.68	0.77	38.83	2.23	86.76	4.000	Yes	No	2.00
141	3.70	2.01	2.41	1.94	0.79	38.44	2.45	94.20	4.000	Yes	No	2.00
142	3.72	1.92	2.48	2.33	0.82	36.68	2.85	104.39	4.000	Yes	No	2.00
143	3.74	1.58	2.62	3.01	0.87	30.06	6.08	182.81	4.000	Yes	No	2.00
144	3.76	1.33	2.74	3.76	0.92	25.01	5.15	128.90	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	1.14	2.83	4.28	0.95	21.33	6.25	133.21	4.000	Yes	Yes	2.00
146	3.80	0.96	2.93	4.87	0.99	17.79	7.61	135.35	4.000	Yes	Yes	2.00
147	3.82	0.83	3.00	5.25	1.00	15.10	8.82	133.22	0.720	No	Yes	2.00
148	3.84	0.76	3.02	5.13	1.00	13.88	9.20	127.60	0.662	No	Yes	2.00
149	3.86	0.70	3.05	4.93	1.00	12.52	9.62	120.46	0.597	No	Yes	2.00
150	3.88	0.62	3.10	5.05	1.00	10.99	10.58	116.24	0.524	No	Yes	2.00
151	3.90	0.60	3.09	4.72	1.00	10.67	10.43	111.23	0.509	No	Yes	2.00
152	3.92	0.66	3.01	3.91	1.00	11.77	8.89	104.66	0.561	No	Yes	2.00
153	3.94	0.72	2.93	3.31	0.99	12.92	7.67	99.13	0.616	No	Yes	2.00
154	3.96	0.78	2.86	2.88	0.96	14.19	6.68	94.75	0.677	No	Yes	2.00
155	3.98	0.86	2.80	2.56	0.94	15.63	5.84	91.25	0.746	No	Yes	2.00
156	4.00	0.92	2.75	2.37	0.92	16.87	5.28	89.14	0.805	No	Yes	2.00
157	4.02	0.92	2.75	2.38	0.92	16.87	5.29	89.15	0.805	No	Yes	2.00
158	4.04	0.90	2.80	2.77	0.94	16.55	5.84	96.59	0.789	No	Yes	2.00
159	4.06	0.88	2.85	3.19	0.96	16.05	6.45	103.50	0.765	No	Yes	2.00
160	4.08	0.85	2.89	3.60	0.97	15.49	7.06	109.40	0.739	No	Yes	2.00
161	4.10	0.79	2.96	4.20	1.00	14.38	8.08	116.18	0.686	No	Yes	2.00
162	4.12	0.74	3.03	4.91	1.00	13.28	9.24	122.68	0.633	No	Yes	2.00
163	4.14	0.70	3.06	5.13	1.00	12.49	9.84	122.80	0.596	No	Yes	2.00
164	4.16	0.67	3.09	5.34	1.00	11.88	10.36	123.06	0.567	No	Yes	2.00
165	4.18	0.64	3.12	5.61	1.00	11.33	10.95	123.99	0.540	No	Yes	2.00
166	4.20	0.64	3.12	5.62	1.00	11.32	10.96	124.00	0.540	No	Yes	2.00
167	4.22	0.64	3.12	5.62	1.00	11.31	10.96	124.01	0.540	No	Yes	2.00
168	4.24	0.64	3.12	5.62	1.00	11.31	10.97	124.02	0.539	No	Yes	2.00
169	4.26	0.64	3.12	5.63	1.00	11.30	10.98	124.03	0.539	No	Yes	2.00
170	4.28	0.64	3.12	5.63	1.00	11.29	10.98	124.04	0.539	No	Yes	2.00
171	4.30	0.64	3.12	5.63	1.00	11.29	10.99	124.05	0.538	No	Yes	2.00
172	4.32	0.67	3.07	5.12	1.00	11.94	10.11	120.72	0.570	No	Yes	2.00
173	4.34	0.70	3.04	4.72	1.00	12.40	9.47	117.41	0.592	No	Yes	2.00
174	4.36	0.71	3.02	4.41	1.00	12.62	9.04	114.08	0.602	No	Yes	2.00
175	4.38	0.72	2.99	4.12	1.00	12.83	8.63	110.66	0.612	No	Yes	2.00
176	4.40	0.73	2.97	3.83	1.00	13.04	8.22	107.15	0.622	No	Yes	2.00
177	4.42	0.71	2.98	3.93	1.00	12.59	8.53	107.35	0.600	No	Yes	2.00
178	4.44	0.69	3.00	3.96	1.00	12.26	8.72	106.85	0.585	No	Yes	2.00
179	4.46	0.69	3.00	3.94	1.00	12.18	8.73	106.31	0.581	No	Yes	2.00
180	4.48	0.67	3.00	3.92	1.00	11.89	8.85	105.28	0.567	No	Yes	2.00
181	4.50	0.74	2.94	3.50	0.99	13.22	7.77	102.71	4.000	Yes	Yes	2.00
182	4.52	1.02	2.73	2.45	0.91	18.57	5.00	92.81	4.000	Yes	Yes	2.00
183	4.54	1.32	2.58	1.86	0.86	23.26	4.68	108.92	4.000	Yes	No	2.00
184	4.56	1.61	2.46	1.48	0.81	27.72	2.71	75.04	4.000	Yes	No	2.00
185	4.58	1.92	2.36	1.24	0.77	32.23	2.18	70.14	4.000	Yes	No	2.00
186	4.60	2.06	2.31	1.11	0.75	34.23	1.97	67.47	4.000	Yes	No	2.00
187	4.62	1.88	2.36	1.18	0.77	31.34	2.17	68.05	4.000	Yes	No	2.00
188	4.64	1.65	2.43	1.31	0.80	27.84	2.52	70.28	4.000	Yes	No	2.00
189	4.66	1.39	2.53	1.57	0.84	23.79	3.35	79.74	4.000	Yes	No	2.00
190	4.68	1.10	2.67	2.03	0.89	19.24	8.26	158.85	4.000	Yes	No	2.00
191	4.70	0.87	2.81	2.66	0.94	15.56	5.98	92.98	4.000	Yes	Yes	2.00
192	4.72	0.76	2.91	3.17	0.98	13.43	7.30	98.08	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.67	2.99	3.70	1.00	11.81	8.63	101.92	4.000	Yes	Yes	2.00
194	4.76	0.63	3.04	4.02	1.00	10.98	9.45	103.74	0.524	No	Yes	2.00
195	4.78	0.62	3.05	4.09	1.00	10.69	9.70	103.75	0.510	No	Yes	2.00
196	4.80	0.62	3.05	4.05	1.00	10.65	9.68	103.03	0.508	No	Yes	2.00
197	4.82	0.62	3.04	3.92	1.00	10.78	9.44	101.77	0.514	No	Yes	2.00
198	4.84	0.63	3.03	3.80	1.00	10.81	9.28	100.35	0.516	No	Yes	2.00
199	4.86	0.63	3.02	3.67	1.00	10.88	9.09	98.90	0.519	No	Yes	2.00
200	4.88	0.64	3.00	3.53	1.00	11.04	8.83	97.46	0.526	No	Yes	2.00
201	4.90	0.65	2.99	3.39	1.00	11.19	8.57	95.94	0.534	No	Yes	2.00
202	4.92	0.65	2.97	3.27	1.00	11.34	8.34	94.57	0.541	No	Yes	2.00
203	4.94	0.66	2.96	3.14	1.00	11.51	8.10	93.23	0.549	No	Yes	2.00
204	4.96	0.67	2.95	3.03	1.00	11.63	7.90	91.83	0.555	No	Yes	2.00
205	4.98	0.68	2.93	2.92	0.99	11.71	7.72	90.37	0.558	No	Yes	2.00
206	5.00	0.69	2.92	2.83	0.99	11.86	7.52	89.23	0.566	No	Yes	2.00
207	5.02	0.71	2.91	2.76	0.98	12.04	7.36	88.59	0.574	No	Yes	2.00
208	5.04	0.71	2.91	2.77	0.98	12.17	7.30	88.90	0.581	No	Yes	2.00
209	5.06	0.72	2.91	2.82	0.98	12.30	7.32	90.06	0.587	No	Yes	2.00
210	5.08	0.73	2.91	2.90	0.98	12.46	7.35	91.65	0.594	No	Yes	2.00
211	5.10	0.74	2.92	3.04	0.99	12.55	7.49	93.99	0.598	No	Yes	2.00
212	5.12	0.74	2.93	3.19	0.99	12.63	7.64	96.53	0.603	No	Yes	2.00
213	5.14	0.78	2.91	3.24	0.99	13.36	7.41	98.96	0.637	No	Yes	2.00
214	5.16	0.88	2.87	3.11	0.97	14.87	6.71	99.82	0.709	No	Yes	2.00
215	5.18	0.92	2.85	3.08	0.96	15.57	6.46	100.64	0.743	No	Yes	2.00
216	5.20	0.94	2.84	3.09	0.96	15.82	6.40	101.35	0.755	No	Yes	2.00
217	5.22	0.93	2.85	3.20	0.96	15.78	6.54	103.17	0.753	No	Yes	2.00
218	5.24	0.89	2.88	3.33	0.97	14.96	6.94	103.75	0.714	No	Yes	2.00
219	5.26	0.78	2.95	3.66	1.00	13.18	7.97	105.04	0.629	No	Yes	2.00
220	5.28	0.72	3.00	3.91	1.00	11.91	8.83	105.12	0.568	No	Yes	2.00
221	5.30	0.68	3.03	4.00	1.00	11.19	9.31	104.13	0.534	No	Yes	2.00
222	5.32	0.67	3.03	3.84	1.00	10.91	9.27	101.18	0.521	No	Yes	2.00
223	5.34	0.71	2.98	3.47	1.00	11.71	8.41	98.40	0.558	No	Yes	2.00
224	5.36	0.78	2.92	3.12	0.99	12.91	7.44	96.03	0.616	No	Yes	2.00
225	5.38	0.88	2.86	2.88	0.97	14.39	6.61	95.11	0.687	No	Yes	2.00
226	5.40	0.97	2.82	2.82	0.95	15.85	6.09	96.51	0.756	No	Yes	2.00
227	5.42	1.04	2.80	2.91	0.94	17.03	5.87	99.97	0.812	No	Yes	2.00
228	5.44	1.03	2.83	3.25	0.96	16.92	6.28	106.19	0.807	No	Yes	2.00
229	5.46	0.98	2.88	3.70	0.97	16.24	6.94	112.63	0.775	No	Yes	2.00
230	5.48	0.91	2.94	4.21	1.00	15.13	7.82	118.28	0.722	No	Yes	2.00
231	5.50	0.85	2.99	4.60	1.00	13.90	8.67	120.45	0.663	No	Yes	2.00
232	5.52	0.80	3.03	4.76	1.00	12.97	9.24	119.83	0.619	No	Yes	2.00
233	5.54	0.79	3.02	4.59	1.00	12.73	9.18	116.80	0.607	No	Yes	2.00
234	5.56	0.78	3.01	4.36	1.00	12.60	8.99	113.26	0.601	No	Yes	2.00
235	5.58	0.78	2.99	4.06	1.00	12.54	8.69	109.07	0.598	No	Yes	2.00
236	5.60	0.78	2.98	3.83	1.00	12.53	8.44	105.80	0.598	No	Yes	2.00
237	5.62	0.78	2.97	3.66	1.00	12.47	8.27	103.13	0.595	No	Yes	2.00
238	5.64	0.77	2.97	3.57	1.00	12.27	8.27	101.42	0.585	No	Yes	2.00
239	5.66	0.77	2.96	3.46	1.00	12.14	8.19	99.45	0.579	No	Yes	2.00
240	5.68	0.75	2.97	3.39	1.00	11.83	8.26	97.69	0.564	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.73	2.97	3.33	1.00	11.49	8.34	95.81	0.548	No	Yes	2.00
242	5.72	0.73	2.97	3.18	1.00	11.33	8.23	93.24	0.540	No	Yes	2.00
243	5.74	0.75	2.93	2.85	0.99	11.65	7.65	89.10	0.556	No	Yes	2.00
244	5.76	0.80	2.88	2.51	0.97	12.31	6.89	84.83	0.587	No	Yes	2.00
245	5.78	0.86	2.82	2.23	0.95	13.30	6.13	81.52	0.634	No	Yes	2.00
246	5.80	0.92	2.80	2.17	0.94	14.05	5.80	81.57	0.670	No	Yes	2.00
247	5.82	0.94	2.80	2.32	0.95	14.52	5.85	84.97	0.693	No	Yes	2.00
248	5.84	0.94	2.83	2.68	0.96	14.60	6.29	91.80	0.696	No	Yes	2.00
249	5.86	0.94	2.88	3.25	0.98	14.60	6.97	101.73	0.696	No	Yes	2.00
250	5.88	0.97	2.91	3.71	0.99	15.16	7.28	110.46	0.723	No	Yes	2.00
251	5.90	1.01	2.91	4.00	0.99	15.86	7.36	116.74	0.756	No	Yes	2.00
252	5.92	1.03	2.93	4.33	0.99	16.15	7.60	122.71	0.771	No	Yes	2.00
253	5.94	1.02	2.95	4.65	1.00	16.13	7.91	127.53	0.769	No	Yes	2.00
254	5.96	1.00	2.97	4.83	1.00	15.58	8.26	128.69	0.743	No	Yes	2.00
255	5.98	0.91	3.02	5.17	1.00	14.14	9.13	129.06	0.675	No	Yes	2.00
256	6.00	0.84	3.07	5.48	1.00	12.78	10.03	128.25	0.610	No	Yes	2.00
257	6.02	0.79	3.09	5.48	1.00	11.92	10.48	124.89	0.568	No	Yes	2.00
258	6.04	0.77	3.09	5.16	1.00	11.51	10.39	119.60	0.549	No	Yes	2.00
259	6.06	0.76	3.07	4.77	1.00	11.33	10.09	114.26	0.540	No	Yes	2.00
260	6.08	0.75	3.05	4.35	1.00	11.20	9.71	108.70	0.534	No	Yes	2.00
261	6.10	0.75	3.03	3.95	1.00	11.14	9.27	103.36	0.532	No	Yes	2.00
262	6.12	0.76	3.00	3.55	1.00	11.31	8.71	98.49	0.539	No	Yes	2.00
263	6.14	0.77	2.97	3.27	1.00	11.45	8.29	94.91	0.546	No	Yes	2.00
264	6.16	0.79	2.95	3.07	1.00	11.63	7.95	92.50	0.555	No	Yes	2.00
265	6.18	0.81	2.93	2.94	1.00	11.88	7.67	91.06	0.567	No	Yes	2.00
266	6.20	0.82	2.92	2.86	0.99	12.00	7.50	90.04	0.572	No	Yes	2.00
267	6.22	0.82	2.92	2.86	0.99	11.96	7.52	89.89	0.570	No	Yes	2.00
268	6.24	0.81	2.92	2.86	0.99	11.88	7.55	89.76	0.567	No	Yes	2.00
269	6.26	0.81	2.93	2.86	0.99	11.79	7.61	89.63	0.562	No	Yes	2.00
270	6.28	0.80	2.93	2.86	1.00	11.61	7.68	89.17	0.554	No	Yes	2.00
271	6.30	0.80	2.93	2.79	0.99	11.54	7.62	87.89	0.550	No	Yes	2.00
272	6.32	0.80	2.92	2.67	0.99	11.57	7.44	86.04	0.552	No	Yes	2.00
273	6.34	0.80	2.90	2.51	0.99	11.56	7.23	83.55	0.551	No	Yes	2.00
274	6.36	0.81	2.88	2.34	0.98	11.53	6.99	80.54	0.550	No	Yes	2.00
275	6.38	0.82	2.86	2.15	0.97	11.64	6.66	77.49	0.555	No	Yes	2.00
276	6.40	0.83	2.84	2.01	0.96	11.75	6.39	75.16	0.561	No	Yes	2.00
277	6.42	0.84	2.82	1.87	0.96	11.86	6.13	72.72	0.566	No	Yes	2.00
278	6.44	0.85	2.81	1.76	0.95	11.98	5.92	70.91	0.571	No	Yes	2.00
279	6.46	0.87	2.79	1.68	0.94	12.12	5.73	69.48	0.578	No	Yes	2.00
280	6.48	0.85	2.80	1.69	0.95	11.92	5.82	69.31	0.568	No	Yes	2.00
281	6.50	0.84	2.81	1.75	0.95	11.67	6.03	70.32	0.557	No	Yes	2.00
282	6.52	0.83	2.83	1.87	0.96	11.57	6.26	72.41	0.552	No	Yes	2.00
283	6.54	0.83	2.85	2.00	0.97	11.52	6.48	74.70	0.550	No	Yes	2.00
284	6.56	0.85	2.88	2.43	0.98	11.98	6.92	82.87	0.571	No	Yes	2.00
285	6.58	0.89	2.89	2.69	0.98	12.58	7.03	88.40	0.600	No	Yes	2.00
286	6.60	0.93	2.89	2.93	0.98	13.16	7.11	93.61	0.628	No	Yes	2.00
287	6.62	0.95	2.90	3.18	0.99	13.55	7.27	98.47	0.646	No	Yes	2.00
288	6.64	0.97	2.92	3.44	0.99	13.85	7.46	103.26	0.660	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	6.66	0.96	2.93	3.51	1.00	13.62	7.62	103.75	0.650	No	Yes	2.00
290	6.68	0.94	2.95	3.77	1.00	13.30	8.04	106.99	0.635	No	Yes	2.00
291	6.70	0.92	2.98	4.03	1.00	12.98	8.47	109.91	0.619	No	Yes	2.00
292	6.72	0.91	3.00	4.25	1.00	12.76	8.80	112.24	0.609	No	Yes	2.00
293	6.74	0.89	3.02	4.42	1.00	12.49	9.11	113.72	0.596	No	Yes	2.00
294	6.76	0.87	3.04	4.62	1.00	12.12	9.49	115.11	0.578	No	Yes	2.00
295	6.78	0.85	3.06	4.74	1.00	11.77	9.81	115.41	0.561	No	Yes	2.00
296	6.80	0.83	3.08	4.88	1.00	11.37	10.17	115.68	0.542	No	Yes	2.00
297	6.82	0.81	3.10	5.04	1.00	11.01	10.56	116.26	0.525	No	Yes	2.00
298	6.84	0.80	3.11	5.17	1.00	10.85	10.79	117.04	0.518	No	Yes	2.00
299	6.86	0.80	3.12	5.26	1.00	10.74	10.96	117.68	0.512	No	Yes	2.00
300	6.88	0.80	3.12	5.26	1.00	10.76	10.94	117.81	0.513	No	Yes	2.00
301	6.90	0.80	3.11	5.07	1.00	10.77	10.74	115.70	0.514	No	Yes	2.00
302	6.92	0.81	3.08	4.69	1.00	10.82	10.30	111.37	0.516	No	Yes	2.00
303	6.94	0.81	3.06	4.22	1.00	10.85	9.76	105.89	0.517	No	Yes	2.00
304	6.96	0.82	3.02	3.69	1.00	10.89	9.11	99.20	0.520	No	Yes	2.00
305	6.98	0.81	2.98	3.16	1.00	10.72	8.52	91.40	0.511	No	Yes	2.00
306	7.00	0.80	2.95	2.73	1.00	10.57	8.03	84.89	0.504	No	Yes	2.00
307	7.02	0.78	2.94	2.48	1.00	10.30	7.81	80.51	0.491	No	Yes	2.00
308	7.04	0.76	2.94	2.35	1.00	9.92	7.82	77.64	0.473	No	Yes	2.00
309	7.06	0.74	2.95	2.33	1.00	9.55	8.01	76.49	0.455	No	Yes	2.00
310	7.08	0.73	2.96	2.33	1.00	9.46	8.06	76.31	0.451	No	Yes	2.00
311	7.10	0.73	2.96	2.36	1.00	9.45	8.12	76.71	0.451	No	Yes	2.00
312	7.12	0.74	2.96	2.38	1.00	9.50	8.11	77.09	0.453	No	Yes	2.00
313	7.14	0.75	2.95	2.38	1.00	9.68	8.01	77.52	0.462	No	Yes	2.00
314	7.16	0.78	2.94	2.33	1.00	10.04	7.73	77.62	0.479	No	Yes	2.00
315	7.18	0.80	2.92	2.30	0.99	10.42	7.47	77.85	0.497	No	Yes	2.00
316	7.20	0.82	2.92	2.36	0.99	10.62	7.47	79.27	0.506	No	Yes	2.00
317	7.22	0.82	2.93	2.50	1.00	10.69	7.64	81.64	0.510	No	Yes	2.00
318	7.24	0.82	2.95	2.68	1.00	10.63	7.92	84.16	0.507	No	Yes	2.00
319	7.26	0.81	2.97	2.89	1.00	10.41	8.34	86.88	0.497	No	Yes	2.00
320	7.28	0.79	3.00	3.12	1.00	10.17	8.79	89.42	0.485	No	Yes	2.00
321	7.30	0.82	2.99	3.15	1.00	10.45	8.67	90.61	0.499	No	Yes	2.00
322	7.32	0.84	2.98	3.12	1.00	10.79	8.44	91.04	0.515	No	Yes	2.00
323	7.34	0.85	2.97	3.10	1.00	10.93	8.33	91.09	0.521	No	Yes	2.00
324	7.36	0.86	2.97	3.08	1.00	11.03	8.26	91.12	0.526	No	Yes	2.00
325	7.38	0.86	2.97	3.13	1.00	10.99	8.35	91.69	0.524	No	Yes	2.00
326	7.40	0.83	3.00	3.31	1.00	10.61	8.79	93.25	0.506	No	Yes	2.00
327	7.42	0.82	3.03	3.52	1.00	10.31	9.24	95.21	0.492	No	Yes	2.00
328	7.44	0.82	3.03	3.64	1.00	10.31	9.39	96.76	0.492	No	Yes	2.00
329	7.46	0.82	3.04	3.71	1.00	10.37	9.43	97.82	0.495	No	Yes	2.00
330	7.48	0.84	3.03	3.73	1.00	10.53	9.37	98.63	0.502	No	Yes	2.00
331	7.50	0.85	3.03	3.77	1.00	10.68	9.32	99.59	0.510	No	Yes	2.00
332	7.52	0.85	3.04	3.88	1.00	10.75	9.42	101.24	0.513	No	Yes	2.00
333	7.54	0.87	3.04	4.03	1.00	10.90	9.51	103.64	0.520	No	Yes	2.00
334	7.56	0.89	3.04	4.19	1.00	11.14	9.56	106.51	0.532	No	Yes	2.00
335	7.58	0.91	3.04	4.33	1.00	11.45	9.55	109.29	0.546	No	Yes	2.00
336	7.60	0.94	3.04	4.43	1.00	11.92	9.40	112.03	0.569	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	7.62	0.99	3.02	4.40	1.00	12.52	9.07	113.58	0.597	No	Yes	2.00
338	7.64	1.02	3.01	4.39	1.00	12.92	8.88	114.70	0.616	No	Yes	2.00
339	7.66	1.03	3.01	4.44	1.00	13.05	8.87	115.77	0.623	No	Yes	2.00
340	7.68	1.02	3.01	4.53	1.00	12.95	9.01	116.67	0.618	No	Yes	2.00
341	7.70	1.00	3.03	4.64	1.00	12.61	9.28	116.99	0.601	No	Yes	2.00
342	7.72	0.97	3.05	4.76	1.00	12.11	9.65	116.84	0.577	No	Yes	2.00
343	7.74	0.93	3.07	4.86	1.00	11.56	10.05	116.20	0.552	No	Yes	2.00
344	7.76	0.87	3.13	5.44	1.00	10.71	11.16	119.49	0.511	No	Yes	2.00
345	7.78	0.87	3.12	5.31	1.00	10.58	11.11	117.48	0.505	No	Yes	2.00
346	7.80	0.85	3.13	5.21	1.00	10.29	11.20	115.23	0.491	No	Yes	2.00
347	7.82	0.83	3.14	5.22	1.00	9.93	11.45	113.79	0.474	No	Yes	2.00
348	7.84	0.80	3.16	5.25	1.00	9.59	11.74	112.61	0.457	No	Yes	2.00
349	7.86	0.82	3.11	4.60	1.00	9.74	10.91	106.27	0.465	No	Yes	2.00
350	7.88	0.79	3.12	4.55	1.00	9.40	11.10	104.32	0.448	No	Yes	2.00
351	7.90	0.80	3.11	4.31	1.00	9.40	10.82	101.71	0.448	No	Yes	2.00
352	7.92	0.81	3.08	3.96	1.00	9.62	10.23	98.44	0.459	No	Yes	2.00
353	7.94	0.84	3.05	3.65	1.00	9.94	9.63	95.69	0.474	No	Yes	2.00
354	7.96	0.86	3.02	3.47	1.00	10.25	9.20	94.36	0.489	No	Yes	2.00
355	7.98	0.88	3.01	3.38	1.00	10.54	8.92	94.03	0.503	No	Yes	2.00
356	8.00	0.92	3.00	3.47	1.00	11.06	8.74	96.62	0.527	No	Yes	2.00
357	8.02	0.96	3.00	3.68	1.00	11.54	8.74	100.90	0.551	No	Yes	2.00
358	8.04	0.99	3.00	3.92	1.00	12.00	8.79	105.48	0.572	No	Yes	2.00
359	8.06	1.03	3.00	4.15	1.00	12.50	8.81	110.11	0.596	No	Yes	2.00
360	8.08	1.07	3.00	4.38	1.00	12.95	8.85	114.63	0.618	No	Yes	2.00
361	8.10	1.08	3.01	4.52	1.00	13.05	8.95	116.82	0.623	No	Yes	2.00
362	8.12	1.06	3.03	4.70	1.00	12.82	9.24	118.46	0.612	No	Yes	2.00
363	8.14	1.03	3.05	4.84	1.00	12.41	9.58	118.93	0.592	No	Yes	2.00
364	8.16	1.00	3.06	4.96	1.00	11.95	9.94	118.77	0.570	No	Yes	2.00
365	8.18	0.97	3.08	5.06	1.00	11.46	10.32	118.23	0.547	No	Yes	2.00
366	8.20	0.94	3.10	5.17	1.00	11.01	10.70	117.78	0.525	No	Yes	2.00
367	8.22	0.93	3.10	5.01	1.00	10.93	10.57	115.57	0.521	No	Yes	2.00
368	8.24	0.92	3.11	5.02	1.00	10.73	10.71	114.95	0.512	No	Yes	2.00
369	8.26	0.91	3.11	5.03	1.00	10.54	10.85	114.29	0.503	No	Yes	2.00
370	8.28	0.90	3.12	5.09	1.00	10.34	11.04	114.18	0.493	No	Yes	2.00
371	8.30	0.89	3.13	5.11	1.00	10.21	11.15	113.86	0.487	No	Yes	2.00
372	8.32	0.87	3.14	5.27	1.00	9.99	11.47	114.62	0.476	No	Yes	2.00
373	8.34	0.88	3.14	5.21	1.00	10.05	11.36	114.20	0.480	No	Yes	2.00
374	8.36	0.88	3.14	5.17	1.00	10.03	11.33	113.73	0.479	No	Yes	2.00
375	8.38	0.88	3.13	5.08	1.00	10.02	11.24	112.63	0.478	No	Yes	2.00
376	8.40	0.88	3.13	5.07	1.00	9.91	11.31	112.16	0.473	No	Yes	2.00
377	8.42	0.87	3.14	5.06	1.00	9.82	11.36	111.62	0.469	No	Yes	2.00
378	8.44	0.87	3.14	5.04	1.00	9.73	11.41	111.07	0.464	No	Yes	2.00
379	8.46	0.86	3.14	5.01	1.00	9.69	11.41	110.53	0.462	No	Yes	2.00
380	8.48	0.86	3.14	5.02	1.00	9.64	11.45	110.42	0.460	No	Yes	2.00
381	8.50	0.88	3.13	4.99	1.00	9.87	11.25	111.05	0.471	No	Yes	2.00
382	8.52	0.92	3.11	4.98	1.00	10.42	10.86	113.19	0.497	No	Yes	2.00
383	8.54	1.00	3.08	4.85	1.00	11.37	10.15	115.39	0.542	No	Yes	2.00
384	8.56	1.09	3.03	4.66	1.00	12.58	9.32	117.23	0.600	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	8.58	1.13	3.02	4.77	1.00	13.08	9.20	120.25	0.624	No	Yes	2.00
386	8.60	1.21	2.98	4.54	1.00	14.09	8.53	120.21	0.672	No	Yes	2.00
387	8.62	1.24	2.97	4.41	1.00	14.37	8.29	119.14	0.686	No	Yes	2.00
388	8.64	1.20	2.99	4.51	1.00	13.87	8.59	119.14	0.662	No	Yes	2.00
389	8.66	1.12	3.04	4.85	1.00	12.73	9.44	120.18	0.607	No	Yes	2.00
390	8.68	1.07	3.06	4.90	1.00	12.07	9.81	118.42	0.576	No	Yes	2.00
391	8.70	0.95	3.13	5.40	1.00	10.50	11.25	118.22	0.501	No	Yes	2.00
392	8.72	0.83	3.23	6.34	1.00	8.94	13.43	120.01	0.426	No	Yes	2.00
393	8.74	0.77	3.28	6.66	1.00	8.11	14.57	118.12	0.387	No	Yes	2.00
394	8.76	0.73	3.29	6.40	1.00	7.58	14.89	112.86	0.362	No	Yes	2.00
395	8.78	0.71	3.29	5.98	1.00	7.26	14.81	107.45	0.346	No	Yes	2.00
396	8.80	0.70	3.26	5.32	1.00	7.14	14.17	101.16	0.340	No	Yes	2.00
397	8.82	0.71	3.18	4.06	1.00	7.29	12.38	90.29	0.348	No	Yes	2.00
398	8.84	0.70	3.13	3.17	1.00	7.10	11.29	80.18	0.339	No	Yes	2.00
399	8.86	0.69	3.08	2.45	1.00	7.01	10.20	71.53	0.334	No	Yes	2.00
400	8.88	0.68	3.03	1.90	1.00	6.87	9.30	63.89	0.328	No	Yes	2.00
401	8.90	0.66	3.00	1.51	1.00	6.60	8.74	57.69	0.315	No	Yes	2.00
402	8.92	0.65	2.97	1.26	1.00	6.46	8.28	53.45	0.308	No	Yes	2.00
403	8.94	0.64	2.96	1.14	1.00	6.34	8.08	51.21	0.302	No	Yes	2.00
404	8.96	0.63	2.96	1.12	1.00	6.19	8.19	50.75	0.295	No	Yes	2.00
405	8.98	0.63	3.02	1.53	1.00	6.19	9.19	56.93	0.295	No	Yes	2.00
406	9.00	0.71	2.96	1.44	1.00	7.14	8.07	57.62	0.341	No	Yes	2.00
407	9.02	0.80	2.88	1.25	0.98	8.21	6.85	56.19	0.391	No	Yes	2.00
408	9.04	0.88	2.82	1.19	0.96	9.21	6.12	56.34	0.439	No	Yes	2.00
409	9.06	0.96	2.79	1.23	0.95	10.10	5.75	58.05	0.482	No	Yes	2.00
410	9.08	1.02	2.75	1.11	0.94	10.79	5.22	56.29	0.515	No	Yes	2.00
411	9.10	1.00	2.79	1.36	0.95	10.63	5.77	61.34	0.507	No	Yes	2.00
412	9.12	0.98	2.86	1.76	0.98	10.37	6.62	68.69	0.495	No	Yes	2.00
413	9.14	0.96	2.91	2.10	1.00	10.16	7.29	74.10	0.485	No	Yes	2.00
414	9.16	0.95	2.94	2.37	1.00	10.11	7.74	78.28	0.482	No	Yes	2.00
415	9.18	0.97	2.94	2.49	1.00	10.34	7.81	80.75	0.493	No	Yes	2.00
416	9.20	1.03	2.92	2.47	1.00	10.97	7.45	81.74	0.523	No	Yes	2.00
417	9.22	1.15	2.85	2.27	0.98	12.38	6.52	80.79	0.591	No	Yes	2.00
418	9.24	1.26	2.80	2.13	0.96	13.70	5.86	80.21	0.653	No	Yes	2.00
419	9.26	1.37	2.75	2.01	0.94	15.00	5.29	79.36	0.715	No	Yes	2.00
420	9.28	1.47	2.73	2.02	0.93	16.12	5.01	80.78	0.769	No	Yes	2.00
421	9.30	1.53	2.72	2.11	0.93	16.88	4.95	83.61	0.805	No	Yes	2.00
422	9.32	1.53	2.75	2.29	0.94	16.79	5.20	87.38	0.801	No	Yes	2.00
423	9.34	1.54	2.76	2.44	0.94	16.90	5.36	90.52	0.806	No	Yes	2.00
424	9.36	1.55	2.77	2.57	0.95	17.03	5.48	93.34	0.812	No	Yes	2.00
425	9.38	1.58	2.76	2.59	0.94	17.35	5.43	94.14	0.828	No	Yes	2.00
426	9.40	1.63	2.75	2.52	0.94	17.94	5.20	93.35	0.856	No	Yes	2.00
427	9.42	1.71	2.72	2.39	0.93	18.78	4.88	91.67	0.896	No	Yes	2.00
428	9.44	1.78	2.69	2.28	0.91	19.62	9.48	186.02	0.611	No	No	2.00
429	9.46	1.88	2.66	2.16	0.90	20.63	7.82	161.30	0.423	No	No	2.00
430	9.48	1.93	2.64	2.10	0.90	21.19	7.01	148.57	0.347	No	No	2.00
431	9.50	2.01	2.62	2.01	0.89	22.08	5.97	131.83	0.264	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	1.99	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	2.00	0.00	0.00	0.02	0.00	8.08	2.00	0.00	0.00	0.02	0.00
8.10	2.00	0.00	0.00	0.02	0.00	8.12	2.00	0.00	0.00	0.02	0.00
8.14	2.00	0.00	0.00	0.02	0.00	8.16	2.00	0.00	0.00	0.02	0.00
8.18	2.00	0.00	0.00	0.02	0.00	8.20	2.00	0.00	0.00	0.02	0.00
8.22	2.00	0.00	0.00	0.02	0.00	8.24	2.00	0.00	0.00	0.02	0.00
8.26	2.00	0.00	0.00	0.02	0.00	8.28	2.00	0.00	0.00	0.02	0.00
8.30	2.00	0.00	0.00	0.02	0.00	8.32	2.00	0.00	0.00	0.02	0.00
8.34	2.00	0.00	0.00	0.02	0.00	8.36	2.00	0.00	0.00	0.02	0.00
8.38	2.00	0.00	0.00	0.02	0.00	8.40	2.00	0.00	0.00	0.02	0.00
8.42	2.00	0.00	0.00	0.02	0.00	8.44	2.00	0.00	0.00	0.02	0.00
8.46	2.00	0.00	0.00	0.02	0.00	8.48	2.00	0.00	0.00	0.02	0.00
8.50	2.00	0.00	0.00	0.02	0.00	8.52	2.00	0.00	0.00	0.02	0.00
8.54	2.00	0.00	0.00	0.02	0.00	8.56	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.58	2.00	0.00	0.00	0.02	0.00	8.60	2.00	0.00	0.00	0.02	0.00
8.62	2.00	0.00	0.00	0.02	0.00	8.64	2.00	0.00	0.00	0.02	0.00
8.66	2.00	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	2.00	0.00	0.00	0.02	0.00	8.76	2.00	0.00	0.00	0.02	0.00
8.78	2.00	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	2.00	0.00	0.00	0.02	0.00
8.90	2.00	0.00	0.00	0.02	0.00	8.92	2.00	0.00	0.00	0.02	0.00
8.94	2.00	0.00	0.00	0.02	0.00	8.96	2.00	0.00	0.00	0.02	0.00
8.98	2.00	0.00	0.00	0.02	0.00	9.00	2.00	0.00	0.00	0.02	0.00
9.02	2.00	0.00	0.00	0.02	0.00	9.04	2.00	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	2.00	0.00	0.00	0.02	0.00
9.34	2.00	0.00	0.00	0.02	0.00	9.36	2.00	0.00	0.00	0.02	0.00
9.38	2.00	0.00	0.00	0.02	0.00	9.40	2.00	0.00	0.00	0.02	0.00
9.42	2.00	0.00	0.00	0.02	0.00	9.44	2.00	0.00	0.00	0.02	0.00
9.46	2.00	0.00	0.00	0.02	0.00	9.48	2.00	0.00	0.00	0.02	0.00
9.50	2.00	0.00	0.00	0.02	0.00						

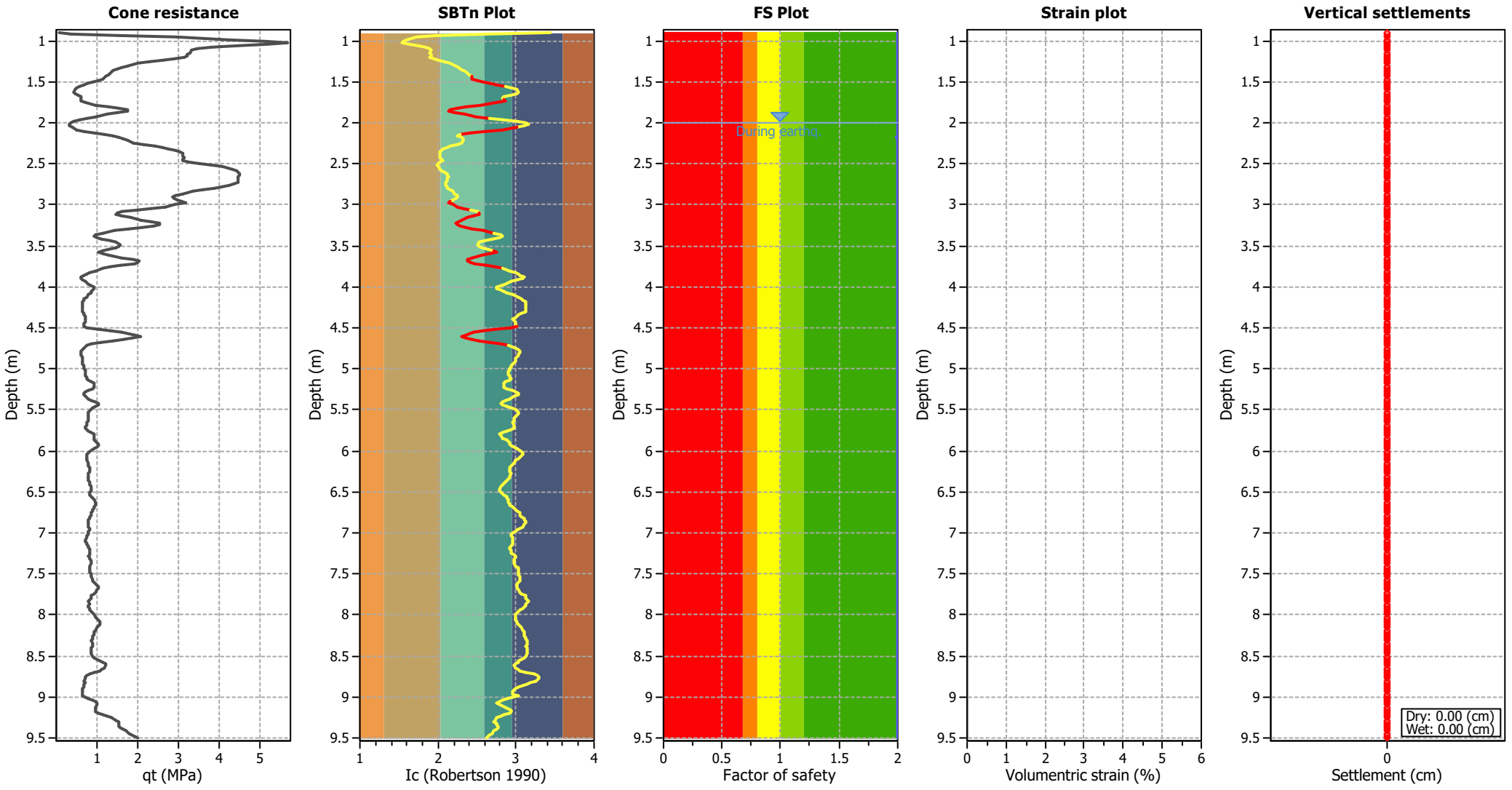
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.00	70.45	2.00	0.00	0.89	0.00	2.02	68.65	2.00	0.00	0.89	0.00
2.04	65.70	2.00	0.00	0.89	0.00	2.06	62.06	2.00	0.00	0.89	0.00
2.08	56.17	2.00	0.00	0.88	0.00	2.10	67.61	2.00	0.00	0.88	0.00
2.12	43.12	2.00	0.00	0.88	0.00	2.14	22.60	2.00	0.00	0.88	0.00
2.16	47.00	2.00	0.00	0.88	0.00	2.18	57.76	1.99	0.00	0.88	0.00
2.20	63.34	2.00	0.00	0.88	0.00	2.22	68.82	2.00	0.00	0.88	0.00
2.24	72.08	2.00	0.00	0.88	0.00	2.26	73.56	2.00	0.00	0.87	0.00
2.28	71.68	2.00	0.00	0.87	0.00	2.30	73.33	2.00	0.00	0.87	0.00
2.32	74.45	2.00	0.00	0.87	0.00	2.34	76.94	2.00	0.00	0.87	0.00
2.36	78.33	2.00	0.00	0.87	0.00	2.38	80.18	2.00	0.00	0.87	0.00
2.40	80.99	2.00	0.00	0.87	0.00	2.42	81.82	2.00	0.00	0.87	0.00
2.44	81.41	2.00	0.00	0.86	0.00	2.46	82.16	2.00	0.00	0.86	0.00
2.48	84.96	2.00	0.00	0.86	0.00	2.50	90.19	2.00	0.00	0.86	0.00
2.52	96.53	2.00	0.00	0.86	0.00	2.54	104.39	2.00	0.00	0.86	0.00
2.56	111.90	2.00	0.00	0.86	0.00	2.58	117.25	2.00	0.00	0.86	0.00
2.60	122.12	2.00	0.00	0.86	0.00	2.62	126.26	2.00	0.00	0.85	0.00
2.64	128.26	2.00	0.00	0.85	0.00	2.66	128.68	2.00	0.00	0.85	0.00
2.68	127.56	2.00	0.00	0.85	0.00	2.70	125.75	2.00	0.00	0.85	0.00
2.72	123.83	2.00	0.00	0.85	0.00	2.74	120.64	2.00	0.00	0.85	0.00
2.76	117.87	2.00	0.00	0.85	0.00	2.78	114.70	2.00	0.00	0.85	0.00
2.80	111.26	2.00	0.00	0.84	0.00	2.82	107.25	2.00	0.00	0.84	0.00
2.84	104.39	2.00	0.00	0.84	0.00	2.86	101.43	2.00	0.00	0.84	0.00
2.88	99.35	2.00	0.00	0.84	0.00	2.90	96.80	2.00	0.00	0.84	0.00
2.92	94.54	2.00	0.00	0.84	0.00	2.94	92.69	2.00	0.00	0.84	0.00
2.96	91.48	2.00	0.00	0.84	0.00	2.98	90.97	2.00	0.00	0.83	0.00
3.00	89.97	2.00	0.00	0.83	0.00	3.02	89.74	2.00	0.00	0.83	0.00
3.04	90.42	2.00	0.00	0.83	0.00	3.06	92.59	2.00	0.00	0.83	0.00
3.08	97.21	2.00	0.00	0.83	0.00	3.10	100.62	2.00	0.00	0.83	0.00
3.12	93.50	2.00	0.00	0.83	0.00	3.14	81.91	2.00	0.00	0.83	0.00
3.16	78.69	2.00	0.00	0.82	0.00	3.18	78.59	2.00	0.00	0.82	0.00
3.20	80.85	2.00	0.00	0.82	0.00	3.22	82.08	2.00	0.00	0.82	0.00
3.24	85.00	2.00	0.00	0.82	0.00	3.26	86.02	2.00	0.00	0.82	0.00
3.28	87.26	2.00	0.00	0.82	0.00	3.30	90.21	2.00	0.00	0.82	0.00
3.32	134.11	2.00	0.00	0.82	0.00	3.34	105.05	2.00	0.00	0.81	0.00
3.36	109.90	2.00	0.00	0.81	0.00	3.38	109.52	2.00	0.00	0.81	0.00
3.40	106.11	2.00	0.00	0.81	0.00	3.42	99.85	2.00	0.00	0.81	0.00
3.44	138.71	2.00	0.00	0.81	0.00	3.46	99.08	2.00	0.00	0.81	0.00
3.48	87.63	2.00	0.00	0.81	0.00	3.50	96.76	2.00	0.00	0.81	0.00
3.52	119.99	2.00	0.00	0.80	0.00	3.54	164.08	2.00	0.00	0.80	0.00
3.56	101.41	2.00	0.00	0.80	0.00	3.58	99.64	2.00	0.00	0.80	0.00
3.60	166.71	2.00	0.00	0.80	0.00	3.62	106.20	2.00	0.00	0.80	0.00
3.64	80.70	2.00	0.00	0.80	0.00	3.66	81.65	2.00	0.00	0.80	0.00
3.68	86.76	2.00	0.00	0.80	0.00	3.70	94.20	2.00	0.00	0.79	0.00
3.72	104.39	2.00	0.00	0.79	0.00	3.74	182.81	2.00	0.00	0.79	0.00
3.76	128.90	2.00	0.00	0.79	0.00	3.78	133.21	2.00	0.00	0.79	0.00
3.80	135.35	2.00	0.00	0.79	0.00	3.82	133.22	2.00	0.00	0.79	0.00
3.84	127.60	2.00	0.00	0.79	0.00	3.86	120.46	2.00	0.00	0.79	0.00
3.88	116.24	2.00	0.00	0.78	0.00	3.90	111.23	2.00	0.00	0.78	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
3.92	104.66	2.00	0.00	0.78	0.00	3.94	99.13	2.00	0.00	0.78	0.00
3.96	94.75	2.00	0.00	0.78	0.00	3.98	91.25	2.00	0.00	0.78	0.00
4.00	89.14	2.00	0.00	0.78	0.00	4.02	89.15	2.00	0.00	0.78	0.00
4.04	96.59	2.00	0.00	0.78	0.00	4.06	103.50	2.00	0.00	0.77	0.00
4.08	109.40	2.00	0.00	0.77	0.00	4.10	116.18	2.00	0.00	0.77	0.00
4.12	122.68	2.00	0.00	0.77	0.00	4.14	122.80	2.00	0.00	0.77	0.00
4.16	123.06	2.00	0.00	0.77	0.00	4.18	123.99	2.00	0.00	0.77	0.00
4.20	124.00	2.00	0.00	0.77	0.00	4.22	124.01	2.00	0.00	0.77	0.00
4.24	124.02	2.00	0.00	0.76	0.00	4.26	124.03	2.00	0.00	0.76	0.00
4.28	124.04	2.00	0.00	0.76	0.00	4.30	124.05	2.00	0.00	0.76	0.00
4.32	120.72	2.00	0.00	0.76	0.00	4.34	117.41	2.00	0.00	0.76	0.00
4.36	114.08	2.00	0.00	0.76	0.00	4.38	110.66	2.00	0.00	0.76	0.00
4.40	107.15	2.00	0.00	0.76	0.00	4.42	107.35	2.00	0.00	0.75	0.00
4.44	106.85	2.00	0.00	0.75	0.00	4.46	106.31	2.00	0.00	0.75	0.00
4.48	105.28	2.00	0.00	0.75	0.00	4.50	102.71	2.00	0.00	0.75	0.00
4.52	92.81	2.00	0.00	0.75	0.00	4.54	108.92	2.00	0.00	0.75	0.00
4.56	75.04	2.00	0.00	0.75	0.00	4.58	70.14	2.00	0.00	0.75	0.00
4.60	67.47	2.00	0.00	0.74	0.00	4.62	68.05	2.00	0.00	0.74	0.00
4.64	70.28	2.00	0.00	0.74	0.00	4.66	79.74	2.00	0.00	0.74	0.00
4.68	158.85	2.00	0.00	0.74	0.00	4.70	92.98	2.00	0.00	0.74	0.00
4.72	98.08	2.00	0.00	0.74	0.00	4.74	101.92	2.00	0.00	0.74	0.00
4.76	103.74	2.00	0.00	0.74	0.00	4.78	103.75	2.00	0.00	0.73	0.00
4.80	103.03	2.00	0.00	0.73	0.00	4.82	101.77	2.00	0.00	0.73	0.00
4.84	100.35	2.00	0.00	0.73	0.00	4.86	98.90	2.00	0.00	0.73	0.00
4.88	97.46	2.00	0.00	0.73	0.00	4.90	95.94	2.00	0.00	0.73	0.00
4.92	94.57	2.00	0.00	0.73	0.00	4.94	93.23	2.00	0.00	0.73	0.00
4.96	91.83	2.00	0.00	0.72	0.00	4.98	90.37	2.00	0.00	0.72	0.00
5.00	89.23	2.00	0.00	0.72	0.00	5.02	88.59	2.00	0.00	0.72	0.00
5.04	88.90	2.00	0.00	0.72	0.00	5.06	90.06	2.00	0.00	0.72	0.00
5.08	91.65	2.00	0.00	0.72	0.00	5.10	93.99	2.00	0.00	0.72	0.00
5.12	96.53	2.00	0.00	0.72	0.00	5.14	98.96	2.00	0.00	0.71	0.00
5.16	99.82	2.00	0.00	0.71	0.00	5.18	100.64	2.00	0.00	0.71	0.00
5.20	101.35	2.00	0.00	0.71	0.00	5.22	103.17	2.00	0.00	0.71	0.00
5.24	103.75	2.00	0.00	0.71	0.00	5.26	105.04	2.00	0.00	0.71	0.00
5.28	105.12	2.00	0.00	0.71	0.00	5.30	104.13	2.00	0.00	0.71	0.00
5.32	101.18	2.00	0.00	0.70	0.00	5.34	98.40	2.00	0.00	0.70	0.00
5.36	96.03	2.00	0.00	0.70	0.00	5.38	95.11	2.00	0.00	0.70	0.00
5.40	96.51	2.00	0.00	0.70	0.00	5.42	99.97	2.00	0.00	0.70	0.00
5.44	106.19	2.00	0.00	0.70	0.00	5.46	112.63	2.00	0.00	0.70	0.00
5.48	118.28	2.00	0.00	0.70	0.00	5.50	120.45	2.00	0.00	0.69	0.00
5.52	119.83	2.00	0.00	0.69	0.00	5.54	116.80	2.00	0.00	0.69	0.00
5.56	113.26	2.00	0.00	0.69	0.00	5.58	109.07	2.00	0.00	0.69	0.00
5.60	105.80	2.00	0.00	0.69	0.00	5.62	103.13	2.00	0.00	0.69	0.00
5.64	101.42	2.00	0.00	0.69	0.00	5.66	99.45	2.00	0.00	0.69	0.00
5.68	97.69	2.00	0.00	0.68	0.00	5.70	95.81	2.00	0.00	0.68	0.00
5.72	93.24	2.00	0.00	0.68	0.00	5.74	89.10	2.00	0.00	0.68	0.00
5.76	84.83	2.00	0.00	0.68	0.00	5.78	81.52	2.00	0.00	0.68	0.00
5.80	81.57	2.00	0.00	0.68	0.00	5.82	84.97	2.00	0.00	0.68	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.84	91.80	2.00	0.00	0.68	0.00	5.86	101.73	2.00	0.00	0.67	0.00
5.88	110.46	2.00	0.00	0.67	0.00	5.90	116.74	2.00	0.00	0.67	0.00
5.92	122.71	2.00	0.00	0.67	0.00	5.94	127.53	2.00	0.00	0.67	0.00
5.96	128.69	2.00	0.00	0.67	0.00	5.98	129.06	2.00	0.00	0.67	0.00
6.00	128.25	2.00	0.00	0.67	0.00	6.02	124.89	2.00	0.00	0.67	0.00
6.04	119.60	2.00	0.00	0.66	0.00	6.06	114.26	2.00	0.00	0.66	0.00
6.08	108.70	2.00	0.00	0.66	0.00	6.10	103.36	2.00	0.00	0.66	0.00
6.12	98.49	2.00	0.00	0.66	0.00	6.14	94.91	2.00	0.00	0.66	0.00
6.16	92.50	2.00	0.00	0.66	0.00	6.18	91.06	2.00	0.00	0.66	0.00
6.20	90.04	2.00	0.00	0.66	0.00	6.22	89.89	2.00	0.00	0.65	0.00
6.24	89.76	2.00	0.00	0.65	0.00	6.26	89.63	2.00	0.00	0.65	0.00
6.28	89.17	2.00	0.00	0.65	0.00	6.30	87.89	2.00	0.00	0.65	0.00
6.32	86.04	2.00	0.00	0.65	0.00	6.34	83.55	2.00	0.00	0.65	0.00
6.36	80.54	2.00	0.00	0.65	0.00	6.38	77.49	2.00	0.00	0.65	0.00
6.40	75.16	2.00	0.00	0.64	0.00	6.42	72.72	2.00	0.00	0.64	0.00
6.44	70.91	2.00	0.00	0.64	0.00	6.46	69.48	2.00	0.00	0.64	0.00
6.48	69.31	2.00	0.00	0.64	0.00	6.50	70.32	2.00	0.00	0.64	0.00
6.52	72.41	2.00	0.00	0.64	0.00	6.54	74.70	2.00	0.00	0.64	0.00
6.56	82.87	2.00	0.00	0.64	0.00	6.58	88.40	2.00	0.00	0.63	0.00
6.60	93.61	2.00	0.00	0.63	0.00	6.62	98.47	2.00	0.00	0.63	0.00
6.64	103.26	2.00	0.00	0.63	0.00	6.66	103.75	2.00	0.00	0.63	0.00
6.68	106.99	2.00	0.00	0.63	0.00	6.70	109.91	2.00	0.00	0.63	0.00
6.72	112.24	2.00	0.00	0.63	0.00	6.74	113.72	2.00	0.00	0.63	0.00
6.76	115.11	2.00	0.00	0.62	0.00	6.78	115.41	2.00	0.00	0.62	0.00
6.80	115.68	2.00	0.00	0.62	0.00	6.82	116.26	2.00	0.00	0.62	0.00
6.84	117.04	2.00	0.00	0.62	0.00	6.86	117.68	2.00	0.00	0.62	0.00
6.88	117.81	2.00	0.00	0.62	0.00	6.90	115.70	2.00	0.00	0.62	0.00
6.92	111.37	2.00	0.00	0.62	0.00	6.94	105.89	2.00	0.00	0.61	0.00
6.96	99.20	2.00	0.00	0.61	0.00	6.98	91.40	2.00	0.00	0.61	0.00
7.00	84.89	2.00	0.00	0.61	0.00	7.02	80.51	2.00	0.00	0.61	0.00
7.04	77.64	2.00	0.00	0.61	0.00	7.06	76.49	2.00	0.00	0.61	0.00
7.08	76.31	2.00	0.00	0.61	0.00	7.10	76.71	2.00	0.00	0.61	0.00
7.12	77.09	2.00	0.00	0.60	0.00	7.14	77.52	2.00	0.00	0.60	0.00
7.16	77.62	2.00	0.00	0.60	0.00	7.18	77.85	2.00	0.00	0.60	0.00
7.20	79.27	2.00	0.00	0.60	0.00	7.22	81.64	2.00	0.00	0.60	0.00
7.24	84.16	2.00	0.00	0.60	0.00	7.26	86.88	2.00	0.00	0.60	0.00
7.28	89.42	2.00	0.00	0.60	0.00	7.30	90.61	2.00	0.00	0.59	0.00
7.32	91.04	2.00	0.00	0.59	0.00	7.34	91.09	2.00	0.00	0.59	0.00
7.36	91.12	2.00	0.00	0.59	0.00	7.38	91.69	2.00	0.00	0.59	0.00
7.40	93.25	2.00	0.00	0.59	0.00	7.42	95.21	2.00	0.00	0.59	0.00
7.44	96.76	2.00	0.00	0.59	0.00	7.46	97.82	2.00	0.00	0.59	0.00
7.48	98.63	2.00	0.00	0.58	0.00	7.50	99.59	2.00	0.00	0.58	0.00
7.52	101.24	2.00	0.00	0.58	0.00	7.54	103.64	2.00	0.00	0.58	0.00
7.56	106.51	2.00	0.00	0.58	0.00	7.58	109.29	2.00	0.00	0.58	0.00
7.60	112.03	2.00	0.00	0.58	0.00	7.62	113.58	2.00	0.00	0.58	0.00
7.64	114.70	2.00	0.00	0.58	0.00	7.66	115.77	2.00	0.00	0.57	0.00
7.68	116.67	2.00	0.00	0.57	0.00	7.70	116.99	2.00	0.00	0.57	0.00
7.72	116.84	2.00	0.00	0.57	0.00	7.74	116.20	2.00	0.00	0.57	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
7.76	119.49	2.00	0.00	0.57	0.00	7.78	117.48	2.00	0.00	0.57	0.00
7.80	115.23	2.00	0.00	0.57	0.00	7.82	113.79	2.00	0.00	0.57	0.00
7.84	112.61	2.00	0.00	0.56	0.00	7.86	106.27	2.00	0.00	0.56	0.00
7.88	104.32	2.00	0.00	0.56	0.00	7.90	101.71	2.00	0.00	0.56	0.00
7.92	98.44	2.00	0.00	0.56	0.00	7.94	95.69	2.00	0.00	0.56	0.00
7.96	94.36	2.00	0.00	0.56	0.00	7.98	94.03	2.00	0.00	0.56	0.00
8.00	96.62	2.00	0.00	0.56	0.00	8.02	100.90	2.00	0.00	0.55	0.00
8.04	105.48	2.00	0.00	0.55	0.00	8.06	110.11	2.00	0.00	0.55	0.00
8.08	114.63	2.00	0.00	0.55	0.00	8.10	116.82	2.00	0.00	0.55	0.00
8.12	118.46	2.00	0.00	0.55	0.00	8.14	118.93	2.00	0.00	0.55	0.00
8.16	118.77	2.00	0.00	0.55	0.00	8.18	118.23	2.00	0.00	0.55	0.00
8.20	117.78	2.00	0.00	0.54	0.00	8.22	115.57	2.00	0.00	0.54	0.00
8.24	114.95	2.00	0.00	0.54	0.00	8.26	114.29	2.00	0.00	0.54	0.00
8.28	114.18	2.00	0.00	0.54	0.00	8.30	113.86	2.00	0.00	0.54	0.00
8.32	114.62	2.00	0.00	0.54	0.00	8.34	114.20	2.00	0.00	0.54	0.00
8.36	113.73	2.00	0.00	0.54	0.00	8.38	112.63	2.00	0.00	0.53	0.00
8.40	112.16	2.00	0.00	0.53	0.00	8.42	111.62	2.00	0.00	0.53	0.00
8.44	111.07	2.00	0.00	0.53	0.00	8.46	110.53	2.00	0.00	0.53	0.00
8.48	110.42	2.00	0.00	0.53	0.00	8.50	111.05	2.00	0.00	0.53	0.00
8.52	113.19	2.00	0.00	0.53	0.00	8.54	115.39	2.00	0.00	0.53	0.00
8.56	117.23	2.00	0.00	0.52	0.00	8.58	120.25	2.00	0.00	0.52	0.00
8.60	120.21	2.00	0.00	0.52	0.00	8.62	119.14	2.00	0.00	0.52	0.00
8.64	119.14	2.00	0.00	0.52	0.00	8.66	120.18	2.00	0.00	0.52	0.00
8.68	118.42	2.00	0.00	0.52	0.00	8.70	118.22	2.00	0.00	0.52	0.00
8.72	120.01	2.00	0.00	0.52	0.00	8.74	118.12	2.00	0.00	0.51	0.00
8.76	112.86	2.00	0.00	0.51	0.00	8.78	107.45	2.00	0.00	0.51	0.00
8.80	101.16	2.00	0.00	0.51	0.00	8.82	90.29	2.00	0.00	0.51	0.00
8.84	80.18	2.00	0.00	0.51	0.00	8.86	71.53	2.00	0.00	0.51	0.00
8.88	63.89	2.00	0.00	0.51	0.00	8.90	57.69	2.00	0.00	0.51	0.00
8.92	53.45	2.00	0.00	0.50	0.00	8.94	51.21	2.00	0.00	0.50	0.00
8.96	50.75	2.00	0.00	0.50	0.00	8.98	56.93	2.00	0.00	0.50	0.00
9.00	57.62	2.00	0.00	0.50	0.00	9.02	56.19	2.00	0.00	0.50	0.00
9.04	56.34	2.00	0.00	0.50	0.00	9.06	58.05	2.00	0.00	0.50	0.00
9.08	56.29	2.00	0.00	0.50	0.00	9.10	61.34	2.00	0.00	0.49	0.00
9.12	68.69	2.00	0.00	0.49	0.00	9.14	74.10	2.00	0.00	0.49	0.00
9.16	78.28	2.00	0.00	0.49	0.00	9.18	80.75	2.00	0.00	0.49	0.00
9.20	81.74	2.00	0.00	0.49	0.00	9.22	80.79	2.00	0.00	0.49	0.00
9.24	80.21	2.00	0.00	0.49	0.00	9.26	79.36	2.00	0.00	0.49	0.00
9.28	80.78	2.00	0.00	0.48	0.00	9.30	83.61	2.00	0.00	0.48	0.00
9.32	87.38	2.00	0.00	0.48	0.00	9.34	90.52	2.00	0.00	0.48	0.00
9.36	93.34	2.00	0.00	0.48	0.00	9.38	94.14	2.00	0.00	0.48	0.00
9.40	93.35	2.00	0.00	0.48	0.00	9.42	91.67	2.00	0.00	0.48	0.00
9.44	186.02	2.00	0.00	0.48	0.00	9.46	161.30	2.00	0.00	0.47	0.00
9.48	148.57	2.00	0.00	0.47	0.00	9.50	131.83	2.00	0.00	0.47	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.07	1.23	19.20	23.67	3.44	0.02	0.36
0.92	0.36	6.85	4.18	28.62	2.65	0.05	0.63
0.94	1.56	30.45	1.00	30.45	1.99	0.02	0.62
0.96	2.98	58.65	1.00	58.65	1.73	0.10	0.65
0.98	4.26	83.73	1.00	83.73	1.61	0.72	0.72
1.00	5.16	101.63	1.00	101.63	1.55	0.75	0.75
1.02	5.69	111.98	1.00	111.98	1.55	0.77	0.77
1.04	5.20	102.36	1.00	102.36	1.64	0.75	0.75
1.06	4.48	88.09	1.00	88.09	1.74	0.72	0.72
1.08	3.82	75.18	1.00	75.18	1.84	0.39	0.70
1.10	3.48	68.40	1.24	84.66	1.90	0.72	0.72
1.12	3.35	65.72	1.25	81.92	1.91	0.69	0.71
1.14	3.30	64.91	1.24	80.44	1.90	0.61	0.71
1.16	3.22	63.30	1.24	78.68	1.91	0.52	0.70
1.18	3.20	62.91	1.24	78.15	1.91	0.50	0.70
1.20	3.14	61.68	1.00	61.68	1.90	0.13	0.66
1.22	2.89	56.66	1.00	56.66	1.94	0.09	0.65
1.24	2.60	51.05	1.31	67.02	2.01	0.20	0.68
1.26	2.31	45.16	1.40	63.35	2.09	0.15	0.67
1.28	2.02	39.44	1.50	59.35	2.15	0.11	0.65
1.30	1.75	34.08	1.67	56.94	2.22	0.09	0.65
1.32	1.61	31.38	1.80	56.39	2.26	0.09	0.65
1.34	1.50	29.25	1.89	55.29	2.29	0.08	0.64
1.36	1.41	27.43	2.05	56.25	2.33	0.08	0.65
1.38	1.36	26.45	2.16	57.12	2.36	0.09	0.65
1.40	1.34	26.04	2.23	57.98	2.37	0.10	0.65
1.42	1.30	25.32	2.36	59.78	2.40	0.11	0.66
1.44	1.22	23.62	2.61	61.75	2.44	0.13	0.66
1.46	1.16	22.46	2.62	58.75	2.44	0.10	0.65
1.48	1.05	20.26	2.99	60.53	2.50	0.09	0.65
1.50	0.91	17.55	3.57	62.68	2.58	0.71	0.71
1.52	0.77	14.71	4.41	64.86	2.67	0.79	0.79
1.54	0.67	12.72	5.29	67.21	2.75	0.20	0.68
1.56	0.57	10.71	6.62	70.90	2.86	0.27	0.69
1.58	0.50	9.31	7.81	72.76	2.94	0.32	0.69
1.60	0.46	8.55	8.87	75.88	3.01	0.46	1.31
1.62	0.45	8.32	9.30	77.40	3.03	0.46	1.26
1.64	0.47	8.77	8.86	77.72	3.00	0.48	1.31
1.66	0.52	9.87	7.76	76.55	2.94	0.44	0.70
1.68	0.60	11.40	6.55	74.60	2.85	0.37	0.69
1.70	0.63	11.87	6.23	73.97	2.83	0.35	0.69
1.72	0.62	11.82	6.37	75.28	2.84	0.39	0.70
1.74	0.59	11.22	6.79	76.18	2.87	0.42	0.70
1.76	0.70	13.38	5.37	71.79	2.76	0.30	0.69
1.78	0.99	18.92	3.29	62.26	2.54	0.27	0.68
1.80	1.29	24.95	2.22	55.26	2.37	0.08	0.64
1.82	1.55	30.14	1.72	51.89	2.24	0.06	0.63
1.84	1.77	34.35	1.50	51.58	2.15	0.06	0.63

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.77	34.43	1.00	34.43	2.13	0.02	0.62
1.88	1.52	29.43	1.66	48.75	2.22	0.05	0.62
1.90	1.25	24.08	2.07	49.86	2.34	0.05	0.63
1.92	0.98	18.79	2.87	53.86	2.48	0.07	0.64
1.94	0.75	14.24	4.22	60.04	2.65	0.76	0.76
1.96	0.56	10.53	6.33	66.69	2.84	0.19	0.67
1.98	0.43	7.98	8.84	70.51	3.00	0.31	0.98
2.00	0.35	6.28	11.22	70.45	3.13	0.28	0.76
2.02	0.33	5.83	11.77	68.65	3.16	0.25	0.71
2.04	0.34	6.13	10.71	65.70	3.10	0.23	0.74
2.06	0.39	7.01	8.86	62.06	3.00	0.20	0.84
2.08	0.50	9.17	6.12	56.17	2.82	0.08	0.65
2.10	0.69	13.01	3.70	48.14	2.59	0.21	0.68
2.12	0.93	17.81	2.42	43.12	2.41	0.03	0.62
2.14	1.18	22.60	1.00	22.60	2.29	0.02	0.62
2.16	1.40	27.02	1.74	47.00	2.25	0.04	0.62
2.18	1.54	29.67	1.95	57.76	2.31	0.09	0.65
2.20	1.64	31.77	1.99	63.34	2.32	0.15	0.67
2.22	1.76	34.05	2.02	68.82	2.32	0.23	0.68
2.24	1.91	37.14	1.94	72.08	2.30	0.30	0.69
2.26	2.15	41.70	1.76	73.56	2.25	0.34	0.69
2.28	2.42	47.06	1.52	71.68	2.16	0.29	0.69
2.30	2.63	51.18	1.43	73.33	2.11	0.34	0.69
2.32	2.77	54.06	1.38	74.45	2.07	0.37	0.69
2.34	2.94	57.38	1.34	76.94	2.04	0.45	0.70
2.36	3.04	59.27	1.32	78.33	2.02	0.51	0.70
2.38	3.11	60.59	1.32	80.18	2.02	0.59	0.71
2.40	3.12	60.84	1.33	80.99	2.03	0.63	0.71
2.42	3.13	61.16	1.34	81.82	2.03	0.68	0.71
2.44	3.10	60.42	1.35	81.41	2.04	0.66	0.71
2.46	3.10	60.46	1.36	82.16	2.05	0.70	0.71
2.48	3.26	63.54	1.34	84.96	2.03	0.72	0.72
2.50	3.52	68.74	1.31	90.19	2.01	0.73	0.73
2.52	3.81	74.36	1.30	96.53	1.99	0.74	0.74
2.54	4.08	79.83	1.31	104.39	2.00	0.76	0.76
2.56	4.33	84.71	1.32	111.90	2.02	0.77	0.77
2.58	4.42	86.56	1.35	117.25	2.05	0.78	0.78
2.60	4.47	87.47	1.40	122.12	2.08	0.79	0.79
2.62	4.49	87.89	1.44	126.26	2.11	0.79	0.79
2.64	4.50	88.03	1.46	128.26	2.12	0.80	0.80
2.66	4.48	87.69	1.47	128.68	2.13	0.80	0.80
2.68	4.48	87.64	1.46	127.56	2.12	0.79	0.79
2.70	4.47	87.47	1.44	125.75	2.11	0.79	0.79
2.72	4.47	87.34	1.42	123.83	2.10	0.79	0.79
2.74	4.37	85.45	1.41	120.64	2.10	0.78	0.78
2.76	4.26	83.18	1.42	117.87	2.10	0.78	0.78
2.78	4.10	79.99	1.43	114.70	2.11	0.77	0.77
2.80	3.90	76.13	1.46	111.26	2.13	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	3.61	70.48	1.52	107.25	2.16	0.76	0.76
2.84	3.37	65.56	1.59	104.39	2.19	0.76	0.76
2.86	3.13	60.85	1.67	101.43	2.22	0.75	0.75
2.88	2.94	57.16	1.74	99.35	2.25	0.75	0.75
2.90	2.86	55.59	1.74	96.80	2.25	0.74	0.74
2.92	2.90	56.30	1.68	94.54	2.22	0.74	0.74
2.94	2.98	57.86	1.60	92.69	2.20	0.73	0.73
2.96	3.08	59.85	1.53	91.48	2.16	0.73	0.73
2.98	3.17	61.40	1.48	90.97	2.14	0.73	0.73
3.00	2.94	57.12	1.58	89.97	2.18	0.73	0.73
3.02	2.68	52.00	1.73	89.74	2.24	0.73	0.73
3.04	2.34	45.30	2.00	90.42	2.32	0.73	0.73
3.06	1.99	38.37	2.41	92.59	2.41	0.73	0.73
3.08	1.62	31.12	3.09	96.23	2.52	0.74	0.74
3.10	1.52	28.99	3.21	92.99	2.53	0.75	0.75
3.12	1.47	28.02	3.16	88.65	2.53	0.74	0.74
3.14	1.60	30.59	2.68	81.91	2.45	0.68	0.71
3.16	1.84	35.30	2.23	78.69	2.37	0.52	0.70
3.18	2.09	40.22	1.95	78.59	2.31	0.52	0.70
3.20	2.33	45.05	1.79	80.85	2.26	0.63	0.71
3.22	2.53	48.75	1.68	82.08	2.23	0.69	0.71
3.24	2.54	49.02	1.73	85.00	2.24	0.72	0.72
3.26	2.39	46.07	1.87	86.02	2.28	0.72	0.72
3.28	2.12	40.73	2.14	87.26	2.35	0.72	0.72
3.30	1.80	34.43	2.62	90.21	2.44	0.73	0.73
3.32	1.43	27.23	3.63	98.82	2.59	0.80	0.80
3.34	1.16	21.93	4.79	105.05	2.71	0.76	0.76
3.36	0.98	18.32	6.00	109.90	2.81	0.77	0.77
3.38	0.94	17.55	6.24	109.52	2.83	0.77	0.77
3.40	0.99	18.49	5.74	106.11	2.79	0.76	0.76
3.42	1.12	21.07	4.74	99.85	2.70	0.75	0.75
3.44	1.31	24.80	3.80	94.17	2.61	0.81	0.81
3.46	1.47	28.00	3.23	90.43	2.54	0.75	0.75
3.48	1.57	29.89	3.03	90.41	2.51	0.72	0.72
3.50	1.55	29.54	3.14	92.86	2.52	0.74	0.74
3.52	1.46	27.77	3.46	96.21	2.57	0.78	0.78
3.54	1.30	24.57	4.05	99.42	2.63	0.85	0.85
3.56	1.13	21.27	4.77	101.41	2.71	0.75	0.75
3.58	1.03	19.16	5.20	99.64	2.75	0.75	0.75
3.60	1.15	21.65	4.26	92.18	2.66	0.85	0.85
3.62	1.30	24.58	3.46	85.16	2.57	0.76	0.76
3.64	1.63	31.00	2.60	80.70	2.44	0.62	0.71
3.66	1.88	35.73	2.29	81.65	2.38	0.67	0.71
3.68	2.05	38.83	2.23	86.76	2.37	0.72	0.72
3.70	2.01	38.44	2.45	94.20	2.41	0.74	0.74
3.72	1.92	36.68	2.85	104.39	2.48	0.76	0.76
3.74	1.58	30.06	3.91	117.62	2.62	0.87	0.87
3.76	1.33	25.01	5.15	128.90	2.74	0.80	0.80

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	1.14	21.33	6.25	133.21	2.83	0.80	0.80
3.80	0.96	17.79	7.61	135.35	2.93	0.81	0.81
3.82	0.83	15.10	8.82	133.22	3.00	0.89	1.27
3.84	0.76	13.88	9.20	127.60	3.02	0.77	1.16
3.86	0.70	12.52	9.62	120.46	3.05	0.72	1.04
3.88	0.62	10.99	10.58	116.24	3.10	0.65	0.91
3.90	0.60	10.67	10.43	111.23	3.09	0.57	0.88
3.92	0.66	11.77	8.89	104.66	3.01	0.51	0.97
3.94	0.72	12.92	7.67	99.13	2.93	0.75	0.75
3.96	0.78	14.19	6.68	94.75	2.86	0.74	0.74
3.98	0.86	15.63	5.84	91.25	2.80	0.73	0.73
4.00	0.92	16.87	5.28	89.14	2.75	0.73	0.73
4.02	0.92	16.87	5.29	89.15	2.75	0.73	0.73
4.04	0.90	16.55	5.84	96.59	2.80	0.74	0.74
4.06	0.88	16.05	6.45	103.50	2.85	0.75	0.75
4.08	0.85	15.49	7.06	109.40	2.89	0.77	0.77
4.10	0.79	14.38	8.08	116.18	2.96	0.78	0.78
4.12	0.74	13.28	9.24	122.68	3.03	0.70	1.06
4.14	0.70	12.49	9.84	122.80	3.06	0.71	1.00
4.16	0.67	11.88	10.36	123.06	3.09	0.71	0.94
4.18	0.64	11.33	10.95	123.99	3.12	0.71	0.90
4.20	0.64	11.32	10.96	124.00	3.12	0.70	0.89
4.22	0.64	11.31	10.96	124.01	3.12	0.70	0.89
4.24	0.64	11.31	10.97	124.02	3.12	0.70	0.89
4.26	0.64	11.30	10.98	124.03	3.12	0.70	0.88
4.28	0.64	11.29	10.98	124.04	3.12	0.69	0.88
4.30	0.64	11.29	10.99	124.05	3.12	0.69	0.88
4.32	0.67	11.94	10.11	120.72	3.07	0.69	0.93
4.34	0.70	12.40	9.47	117.41	3.04	0.69	0.96
4.36	0.71	12.62	9.04	114.08	3.02	0.56	0.97
4.38	0.72	12.83	8.63	110.66	2.99	0.77	0.77
4.40	0.73	13.04	8.22	107.15	2.97	0.76	0.76
4.42	0.71	12.59	8.53	107.35	2.98	0.76	0.76
4.44	0.69	12.26	8.72	106.85	3.00	0.76	0.76
4.46	0.69	12.18	8.73	106.31	3.00	0.76	0.76
4.48	0.67	11.89	8.85	105.28	3.00	0.49	0.90
4.50	0.74	13.22	7.77	102.71	2.94	0.75	0.75
4.52	1.02	18.57	5.00	92.81	2.73	0.73	0.73
4.54	1.32	23.26	3.56	82.92	2.58	0.76	0.76
4.56	1.61	27.72	2.71	75.04	2.46	0.39	0.70
4.58	1.92	32.23	2.18	70.14	2.36	0.26	0.68
4.60	2.06	34.23	1.97	67.47	2.31	0.21	0.68
4.62	1.88	31.34	2.17	68.05	2.36	0.22	0.68
4.64	1.65	27.84	2.52	70.28	2.43	0.26	0.68
4.66	1.39	23.79	3.17	75.39	2.53	0.57	0.71
4.68	1.10	19.24	4.37	84.00	2.67	0.84	0.84
4.70	0.87	15.56	5.98	92.98	2.81	0.73	0.73
4.72	0.76	13.43	7.30	98.08	2.91	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.67	11.81	8.63	101.92	2.99	0.75	0.75
4.76	0.63	10.98	9.45	103.74	3.04	0.45	0.80
4.78	0.62	10.69	9.70	103.75	3.05	0.45	0.78
4.80	0.62	10.65	9.68	103.03	3.05	0.44	0.77
4.82	0.62	10.78	9.44	101.77	3.04	0.43	0.78
4.84	0.63	10.81	9.28	100.35	3.03	0.41	0.78
4.86	0.63	10.88	9.09	98.90	3.02	0.40	0.78
4.88	0.64	11.04	8.83	97.46	3.00	0.39	0.79
4.90	0.65	11.19	8.57	95.94	2.99	0.74	0.74
4.92	0.65	11.34	8.34	94.57	2.97	0.74	0.74
4.94	0.66	11.51	8.10	93.23	2.96	0.74	0.74
4.96	0.67	11.63	7.90	91.83	2.95	0.73	0.73
4.98	0.68	11.71	7.72	90.37	2.93	0.73	0.73
5.00	0.69	11.86	7.52	89.23	2.92	0.73	0.73
5.02	0.71	12.04	7.36	88.59	2.91	0.73	0.73
5.04	0.71	12.17	7.30	88.90	2.91	0.73	0.73
5.06	0.72	12.30	7.32	90.06	2.91	0.73	0.73
5.08	0.73	12.46	7.35	91.65	2.91	0.73	0.73
5.10	0.74	12.55	7.49	93.99	2.92	0.74	0.74
5.12	0.74	12.63	7.64	96.53	2.93	0.74	0.74
5.14	0.78	13.36	7.41	98.96	2.91	0.75	0.75
5.16	0.88	14.87	6.71	99.82	2.87	0.75	0.75
5.18	0.92	15.57	6.46	100.64	2.85	0.75	0.75
5.20	0.94	15.82	6.40	101.35	2.84	0.75	0.75
5.22	0.93	15.78	6.54	103.17	2.85	0.75	0.75
5.24	0.89	14.96	6.94	103.75	2.88	0.76	0.76
5.26	0.78	13.18	7.97	105.04	2.95	0.76	0.76
5.28	0.72	11.91	8.83	105.12	3.00	0.47	0.85
5.30	0.68	11.19	9.31	104.13	3.03	0.44	0.80
5.32	0.67	10.91	9.27	101.18	3.03	0.42	0.78
5.34	0.71	11.71	8.41	98.40	2.98	0.75	0.75
5.36	0.78	12.91	7.44	96.03	2.92	0.74	0.74
5.38	0.88	14.39	6.61	95.11	2.86	0.74	0.74
5.40	0.97	15.85	6.09	96.51	2.82	0.74	0.74
5.42	1.04	17.03	5.87	99.97	2.80	0.75	0.75
5.44	1.03	16.92	6.28	106.19	2.83	0.76	0.76
5.46	0.98	16.24	6.94	112.63	2.88	0.77	0.77
5.48	0.91	15.13	7.82	118.28	2.94	0.78	0.78
5.50	0.85	13.90	8.67	120.45	2.99	0.78	0.78
5.52	0.80	12.97	9.24	119.83	3.03	0.65	0.93
5.54	0.79	12.73	9.18	116.80	3.02	0.58	0.91
5.56	0.78	12.60	8.99	113.26	3.01	0.53	0.90
5.58	0.78	12.54	8.69	109.07	2.99	0.76	0.76
5.60	0.78	12.53	8.44	105.80	2.98	0.76	0.76
5.62	0.78	12.47	8.27	103.13	2.97	0.75	0.75
5.64	0.77	12.27	8.27	101.42	2.97	0.75	0.75
5.66	0.77	12.14	8.19	99.45	2.96	0.75	0.75
5.68	0.75	11.83	8.26	97.69	2.97	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.73	11.49	8.34	95.81	2.97	0.74	0.74
5.72	0.73	11.33	8.23	93.24	2.97	0.74	0.74
5.74	0.75	11.65	7.65	89.10	2.93	0.73	0.73
5.76	0.80	12.31	6.89	84.83	2.88	0.72	0.72
5.78	0.86	13.30	6.13	81.52	2.82	0.66	0.71
5.80	0.92	14.05	5.80	81.57	2.80	0.67	0.71
5.82	0.94	14.52	5.85	84.97	2.80	0.72	0.72
5.84	0.94	14.60	6.29	91.80	2.83	0.73	0.73
5.86	0.94	14.60	6.97	101.73	2.88	0.75	0.75
5.88	0.97	15.16	7.28	110.46	2.91	0.77	0.77
5.90	1.01	15.86	7.36	116.74	2.91	0.78	0.78
5.92	1.03	16.15	7.60	122.71	2.93	0.79	0.79
5.94	1.02	16.13	7.91	127.53	2.95	0.79	0.79
5.96	1.00	15.58	8.26	128.69	2.97	0.80	0.80
5.98	0.91	14.14	9.13	129.06	3.02	0.78	1.01
6.00	0.84	12.78	10.03	128.25	3.07	0.71	0.91
6.02	0.79	11.92	10.48	124.89	3.09	0.65	0.85
6.04	0.77	11.51	10.39	119.60	3.09	0.60	0.82
6.06	0.76	11.33	10.09	114.26	3.07	0.54	0.81
6.08	0.75	11.20	9.71	108.70	3.05	0.49	0.80
6.10	0.75	11.14	9.27	103.36	3.03	0.44	0.80
6.12	0.76	11.31	8.71	98.49	3.00	0.75	0.75
6.14	0.77	11.45	8.29	94.91	2.97	0.74	0.74
6.16	0.79	11.63	7.95	92.50	2.95	0.73	0.73
6.18	0.81	11.88	7.67	91.06	2.93	0.73	0.73
6.20	0.82	12.00	7.50	90.04	2.92	0.73	0.73
6.22	0.82	11.96	7.52	89.89	2.92	0.73	0.73
6.24	0.81	11.88	7.55	89.76	2.92	0.73	0.73
6.26	0.81	11.79	7.61	89.63	2.93	0.73	0.73
6.28	0.80	11.61	7.68	89.17	2.93	0.73	0.73
6.30	0.80	11.54	7.62	87.89	2.93	0.72	0.72
6.32	0.80	11.57	7.44	86.04	2.92	0.72	0.72
6.34	0.80	11.56	7.23	83.55	2.90	0.71	0.71
6.36	0.81	11.53	6.99	80.54	2.88	0.61	0.71
6.38	0.82	11.64	6.66	77.49	2.86	0.47	0.70
6.40	0.83	11.75	6.39	75.16	2.84	0.39	0.70
6.42	0.84	11.86	6.13	72.72	2.82	0.32	0.69
6.44	0.85	11.98	5.92	70.91	2.81	0.27	0.69
6.46	0.87	12.12	5.73	69.48	2.79	0.24	0.68
6.48	0.85	11.92	5.82	69.31	2.80	0.24	0.68
6.50	0.84	11.67	6.03	70.32	2.81	0.26	0.68
6.52	0.83	11.57	6.26	72.41	2.83	0.31	0.69
6.54	0.83	11.52	6.48	74.70	2.85	0.38	0.69
6.56	0.85	11.98	6.92	82.87	2.88	0.71	0.71
6.58	0.89	12.58	7.03	88.40	2.89	0.73	0.73
6.60	0.93	13.16	7.11	93.61	2.89	0.74	0.74
6.62	0.95	13.55	7.27	98.47	2.90	0.75	0.75
6.64	0.97	13.85	7.46	103.26	2.92	0.75	0.75

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	0.96	13.62	7.62	103.75	2.93	0.76	0.76
6.68	0.94	13.30	8.04	106.99	2.95	0.76	0.76
6.70	0.92	12.98	8.47	109.91	2.98	0.77	0.77
6.72	0.91	12.76	8.80	112.24	3.00	0.56	0.91
6.74	0.89	12.49	9.11	113.72	3.02	0.58	0.89
6.76	0.87	12.12	9.49	115.11	3.04	0.57	0.87
6.78	0.85	11.77	9.81	115.41	3.06	0.55	0.84
6.80	0.83	11.37	10.17	115.68	3.08	0.54	0.81
6.82	0.81	11.01	10.56	116.26	3.10	0.55	0.79
6.84	0.80	10.85	10.79	117.04	3.11	0.56	0.78
6.86	0.80	10.74	10.96	117.68	3.12	0.58	0.77
6.88	0.80	10.76	10.94	117.81	3.12	0.57	0.77
6.90	0.80	10.77	10.74	115.70	3.11	0.56	0.77
6.92	0.81	10.82	10.30	111.37	3.08	0.56	0.77
6.94	0.81	10.85	9.76	105.89	3.06	0.46	0.77
6.96	0.82	10.89	9.11	99.20	3.02	0.38	0.78
6.98	0.81	10.72	8.52	91.40	2.98	0.73	0.73
7.00	0.80	10.57	8.03	84.89	2.95	0.72	0.72
7.02	0.78	10.30	7.81	80.51	2.94	0.61	0.71
7.04	0.76	9.92	7.82	77.64	2.94	0.48	0.70
7.06	0.74	9.55	8.01	76.49	2.95	0.44	0.70
7.08	0.73	9.46	8.06	76.31	2.96	0.43	0.70
7.10	0.73	9.45	8.12	76.71	2.96	0.44	0.70
7.12	0.74	9.50	8.11	77.09	2.96	0.46	0.70
7.14	0.75	9.68	8.01	77.52	2.95	0.47	0.70
7.16	0.78	10.04	7.73	77.62	2.94	0.48	0.70
7.18	0.80	10.42	7.47	77.85	2.92	0.49	0.70
7.20	0.82	10.62	7.47	79.27	2.92	0.55	0.71
7.22	0.82	10.69	7.64	81.64	2.93	0.67	0.71
7.24	0.82	10.63	7.92	84.16	2.95	0.72	0.72
7.26	0.81	10.41	8.34	86.88	2.97	0.72	0.72
7.28	0.79	10.17	8.79	89.42	3.00	0.32	0.73
7.30	0.82	10.45	8.67	90.61	2.99	0.73	0.73
7.32	0.84	10.79	8.44	91.04	2.98	0.73	0.73
7.34	0.85	10.93	8.33	91.09	2.97	0.73	0.73
7.36	0.86	11.03	8.26	91.12	2.97	0.73	0.73
7.38	0.86	10.99	8.35	91.69	2.97	0.73	0.73
7.40	0.83	10.61	8.79	93.25	3.00	0.34	0.76
7.42	0.82	10.31	9.24	95.21	3.03	0.36	0.74
7.44	0.82	10.31	9.39	96.76	3.03	0.38	0.74
7.46	0.82	10.37	9.43	97.82	3.04	0.40	0.74
7.48	0.84	10.53	9.37	98.63	3.03	0.40	0.75
7.50	0.85	10.68	9.32	99.59	3.03	0.38	0.76
7.52	0.85	10.75	9.42	101.24	3.04	0.40	0.77
7.54	0.87	10.90	9.51	103.64	3.04	0.43	0.78
7.56	0.89	11.14	9.56	106.51	3.04	0.47	0.80
7.58	0.91	11.45	9.55	109.29	3.04	0.51	0.82
7.60	0.94	11.92	9.40	112.03	3.04	0.52	0.85

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	0.99	12.52	9.07	113.58	3.02	0.54	0.89
7.64	1.02	12.92	8.88	114.70	3.01	0.59	0.92
7.66	1.03	13.05	8.87	115.77	3.01	0.59	0.93
7.68	1.02	12.95	9.01	116.67	3.01	0.59	0.93
7.70	1.00	12.61	9.28	116.99	3.03	0.59	0.90
7.72	0.97	12.11	9.65	116.84	3.05	0.58	0.86
7.74	0.93	11.56	10.05	116.20	3.07	0.58	0.83
7.76	0.87	10.71	11.16	119.49	3.13	0.55	0.76
7.78	0.87	10.58	11.11	117.48	3.12	0.52	0.76
7.80	0.85	10.29	11.20	115.23	3.13	0.69	0.73
7.82	0.83	9.93	11.45	113.79	3.14	0.47	0.71
7.84	0.80	9.59	11.74	112.61	3.16	0.45	0.68
7.86	0.82	9.74	10.91	106.27	3.11	0.46	0.70
7.88	0.79	9.40	11.10	104.32	3.12	0.45	0.67
7.90	0.80	9.40	10.82	101.71	3.11	0.41	0.67
7.92	0.81	9.62	10.23	98.44	3.08	0.37	0.69
7.94	0.84	9.94	9.63	95.69	3.05	0.34	0.71
7.96	0.86	10.25	9.20	94.36	3.02	0.33	0.73
7.98	0.88	10.54	8.92	94.03	3.01	0.35	0.75
8.00	0.92	11.06	8.74	96.62	3.00	0.74	0.74
8.02	0.96	11.54	8.74	100.90	3.00	0.75	0.75
8.04	0.99	12.00	8.79	105.48	3.00	0.48	0.86
8.06	1.03	12.50	8.81	110.11	3.00	0.54	0.89
8.08	1.07	12.95	8.85	114.63	3.00	0.58	0.92
8.10	1.08	13.05	8.95	116.82	3.01	0.62	0.93
8.12	1.06	12.82	9.24	118.46	3.03	0.62	0.92
8.14	1.03	12.41	9.58	118.93	3.05	0.59	0.89
8.16	1.00	11.95	9.94	118.77	3.06	0.60	0.85
8.18	0.97	11.46	10.32	118.23	3.08	0.57	0.82
8.20	0.94	11.01	10.70	117.78	3.10	0.58	0.79
8.22	0.93	10.93	10.57	115.57	3.10	0.56	0.78
8.24	0.92	10.73	10.71	114.95	3.11	0.54	0.77
8.26	0.91	10.54	10.85	114.29	3.11	0.49	0.75
8.28	0.90	10.34	11.04	114.18	3.12	0.53	0.74
8.30	0.89	10.21	11.15	113.86	3.13	0.53	0.73
8.32	0.87	9.99	11.47	114.62	3.14	0.54	0.71
8.34	0.88	10.05	11.36	114.20	3.14	0.52	0.72
8.36	0.88	10.03	11.33	113.73	3.14	0.51	0.72
8.38	0.88	10.02	11.24	112.63	3.13	0.51	0.72
8.40	0.88	9.91	11.31	112.16	3.13	0.51	0.71
8.42	0.87	9.82	11.36	111.62	3.14	0.49	0.70
8.44	0.87	9.73	11.41	111.07	3.14	0.49	0.70
8.46	0.86	9.69	11.41	110.53	3.14	0.48	0.69
8.48	0.86	9.64	11.45	110.42	3.14	0.48	0.69
8.50	0.88	9.87	11.25	111.05	3.13	0.48	0.70
8.52	0.92	10.42	10.86	113.19	3.11	0.48	0.74
8.54	1.00	11.37	10.15	115.39	3.08	0.53	0.81
8.56	1.09	12.58	9.32	117.23	3.03	0.62	0.90

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	1.13	13.08	9.20	120.25	3.02	0.65	0.93
8.60	1.21	14.09	8.53	120.21	2.98	0.78	0.78
8.62	1.24	14.37	8.29	119.14	2.97	0.78	0.78
8.64	1.20	13.87	8.59	119.14	2.99	0.78	0.78
8.66	1.12	12.73	9.44	120.18	3.04	0.59	0.91
8.68	1.07	12.07	9.81	118.42	3.06	0.61	0.86
8.70	0.95	10.50	11.25	118.22	3.13	0.62	0.75
8.72	0.83	8.94	13.43	120.01	3.23	0.53	0.64
8.74	0.77	8.11	14.57	118.12	3.28	0.49	0.58
8.76	0.73	7.58	14.89	112.86	3.29	0.58	0.54
8.78	0.71	7.26	14.81	107.45	3.29	0.47	0.52
8.80	0.70	7.14	14.17	101.16	3.26	0.35	0.51
8.82	0.71	7.29	12.38	90.29	3.18	0.28	0.52
8.84	0.70	7.10	11.29	80.18	3.13	0.22	0.51
8.86	0.69	7.01	10.20	71.53	3.08	0.16	0.50
8.88	0.68	6.87	9.30	63.89	3.03	0.12	0.49
8.90	0.66	6.60	8.74	57.69	3.00	0.09	0.65
8.92	0.65	6.46	8.28	53.45	2.97	0.07	0.64
8.94	0.64	6.34	8.08	51.21	2.96	0.06	0.63
8.96	0.63	6.19	8.19	50.75	2.96	0.06	0.63
8.98	0.63	6.19	9.19	56.93	3.02	0.07	0.44
9.00	0.71	7.14	8.07	57.62	2.96	0.09	0.65
9.02	0.80	8.21	6.85	56.19	2.88	0.08	0.65
9.04	0.88	9.21	6.12	56.34	2.82	0.08	0.65
9.06	0.96	10.10	5.75	58.05	2.79	0.10	0.65
9.08	1.02	10.79	5.22	56.29	2.75	0.08	0.65
9.10	1.00	10.63	5.77	61.34	2.79	0.13	0.66
9.12	0.98	10.37	6.62	68.69	2.86	0.23	0.68
9.14	0.96	10.16	7.29	74.10	2.91	0.36	0.69
9.16	0.95	10.11	7.74	78.28	2.94	0.51	0.70
9.18	0.97	10.34	7.81	80.75	2.94	0.62	0.71
9.20	1.03	10.97	7.45	81.74	2.92	0.68	0.71
9.22	1.15	12.38	6.52	80.79	2.85	0.62	0.71
9.24	1.26	13.70	5.86	80.21	2.80	0.59	0.71
9.26	1.37	15.00	5.29	79.36	2.75	0.55	0.71
9.28	1.47	16.12	5.01	80.78	2.73	0.62	0.71
9.30	1.53	16.88	4.95	83.61	2.72	0.72	0.72
9.32	1.53	16.79	5.20	87.38	2.75	0.72	0.72
9.34	1.54	16.90	5.36	90.52	2.76	0.73	0.73
9.36	1.55	17.03	5.48	93.34	2.77	0.74	0.74
9.38	1.58	17.35	5.43	94.14	2.76	0.74	0.74
9.40	1.63	17.94	5.20	93.35	2.75	0.74	0.74
9.42	1.71	18.78	4.88	91.67	2.72	0.73	0.73
9.44	1.78	19.62	4.59	90.00	2.69	0.87	0.87
9.46	1.88	20.63	4.28	88.33	2.66	0.84	0.84
9.48	1.93	21.19	4.12	87.25	2.64	0.83	0.83
9.50	2.01	22.08	3.89	85.82	2.62	0.80	0.80

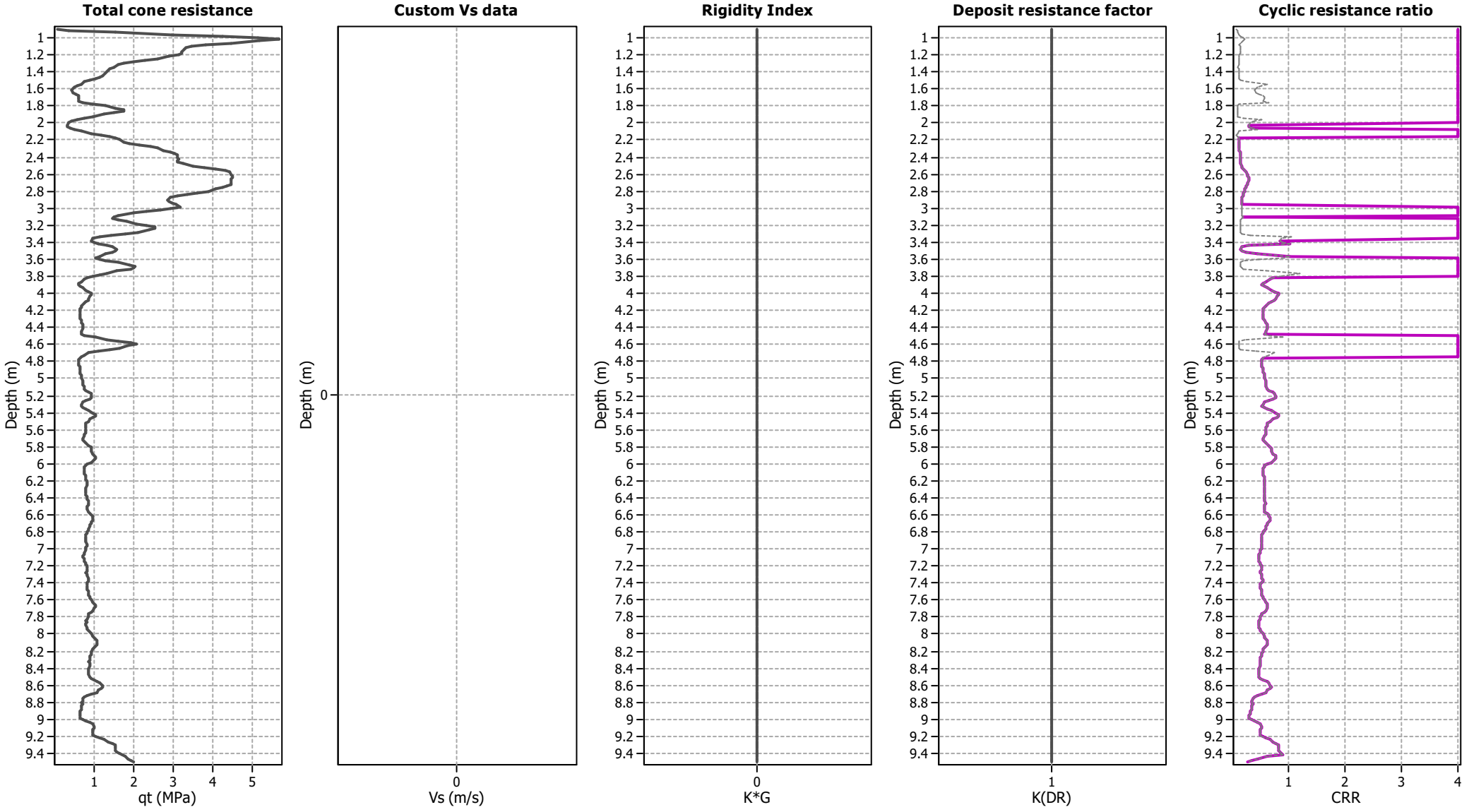
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



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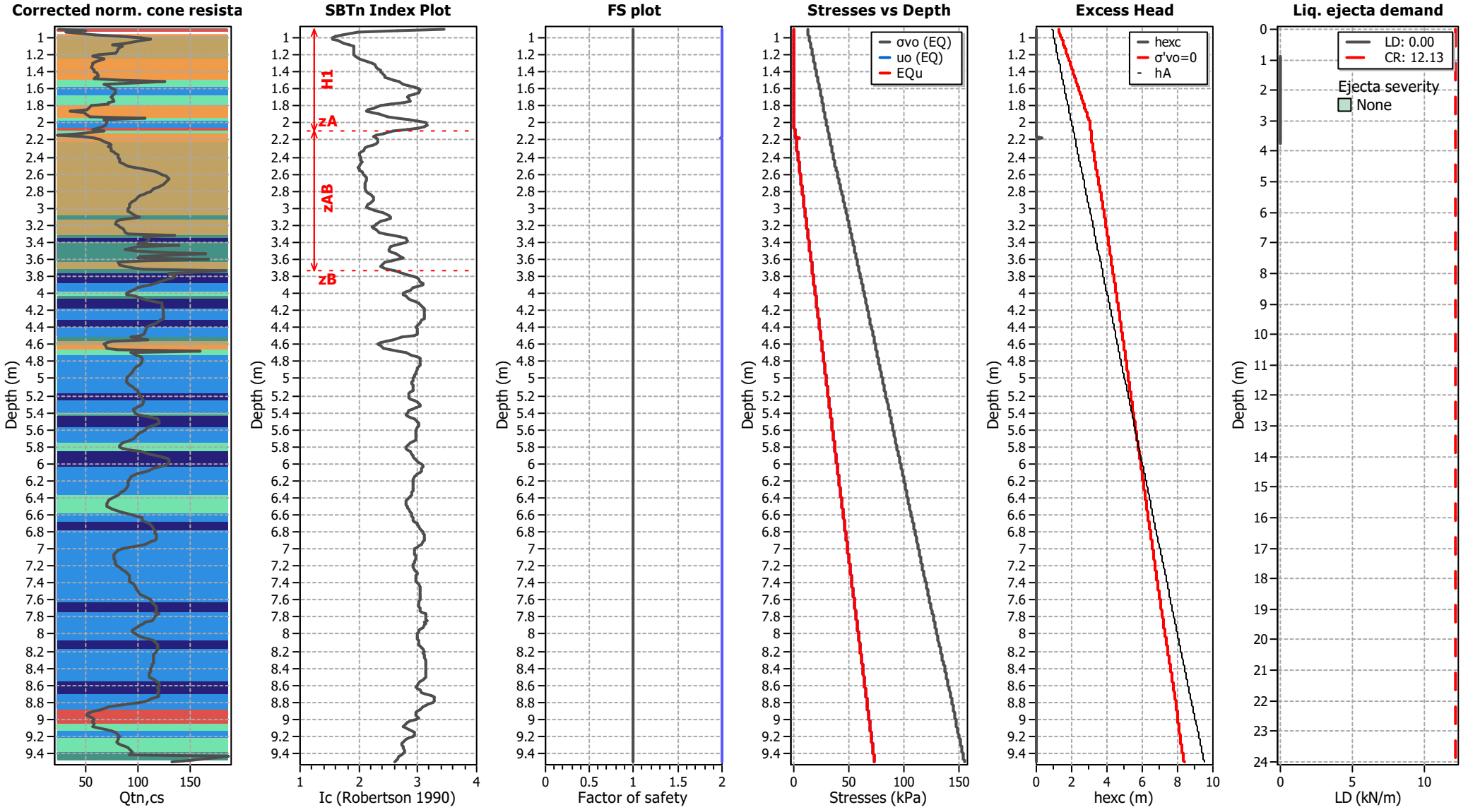
Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

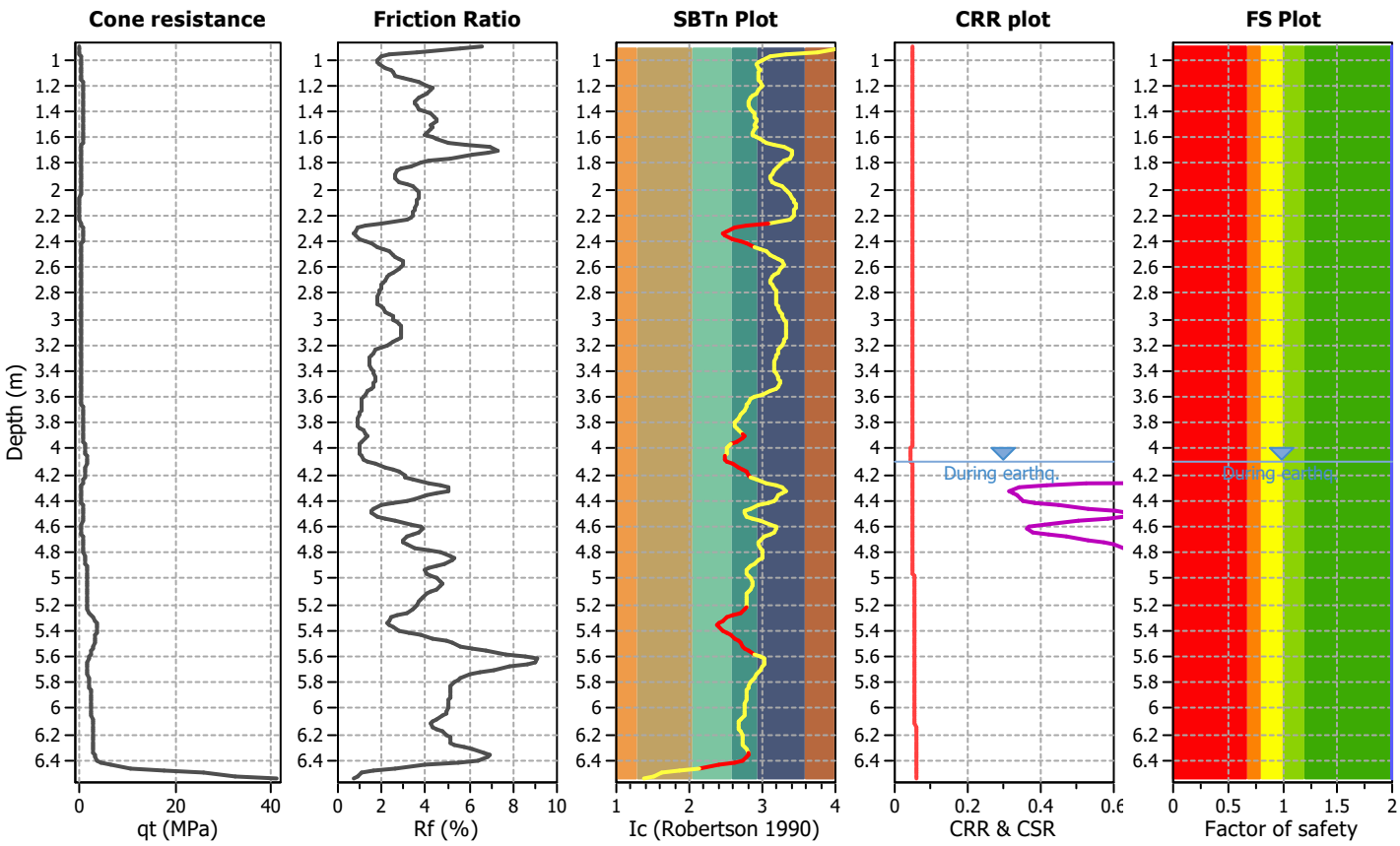
LIQUEFACTION ANALYSIS REPORT

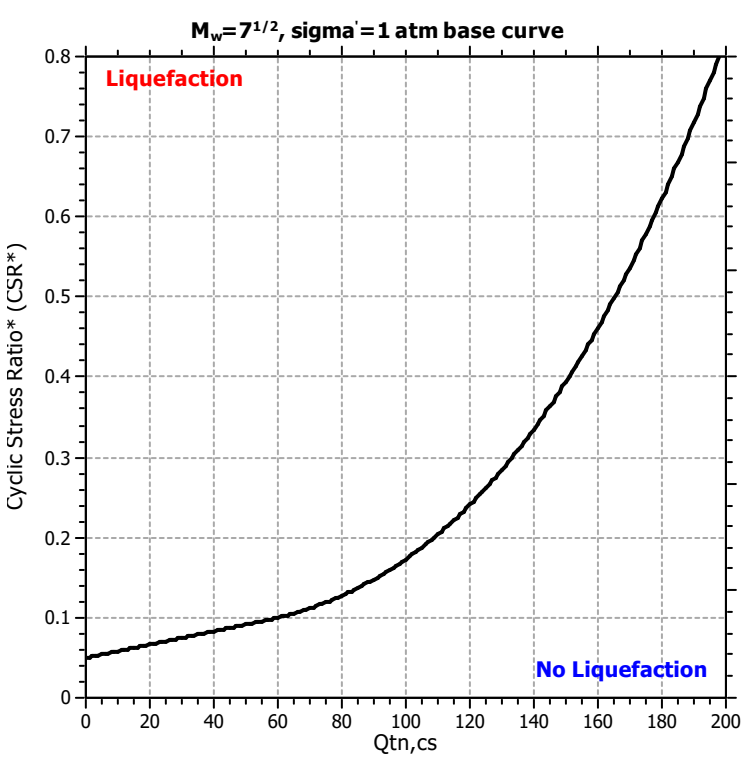
Project title : CWLP Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

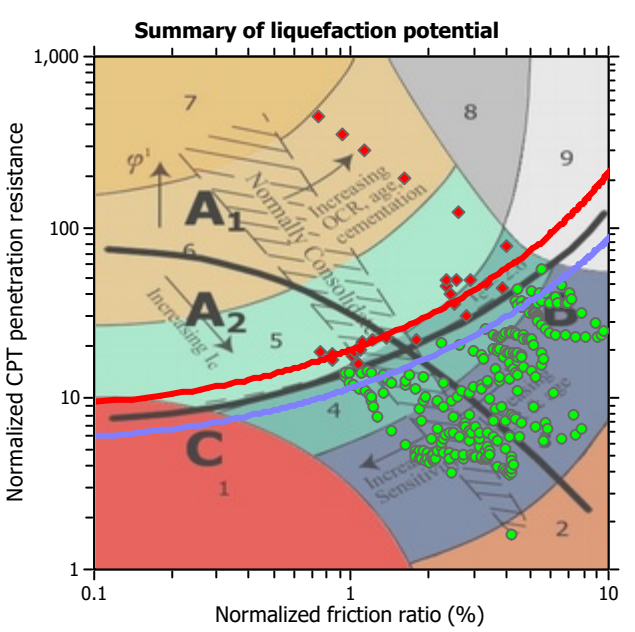
CPT file : cwlp CPT- 14CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	4.10 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.10 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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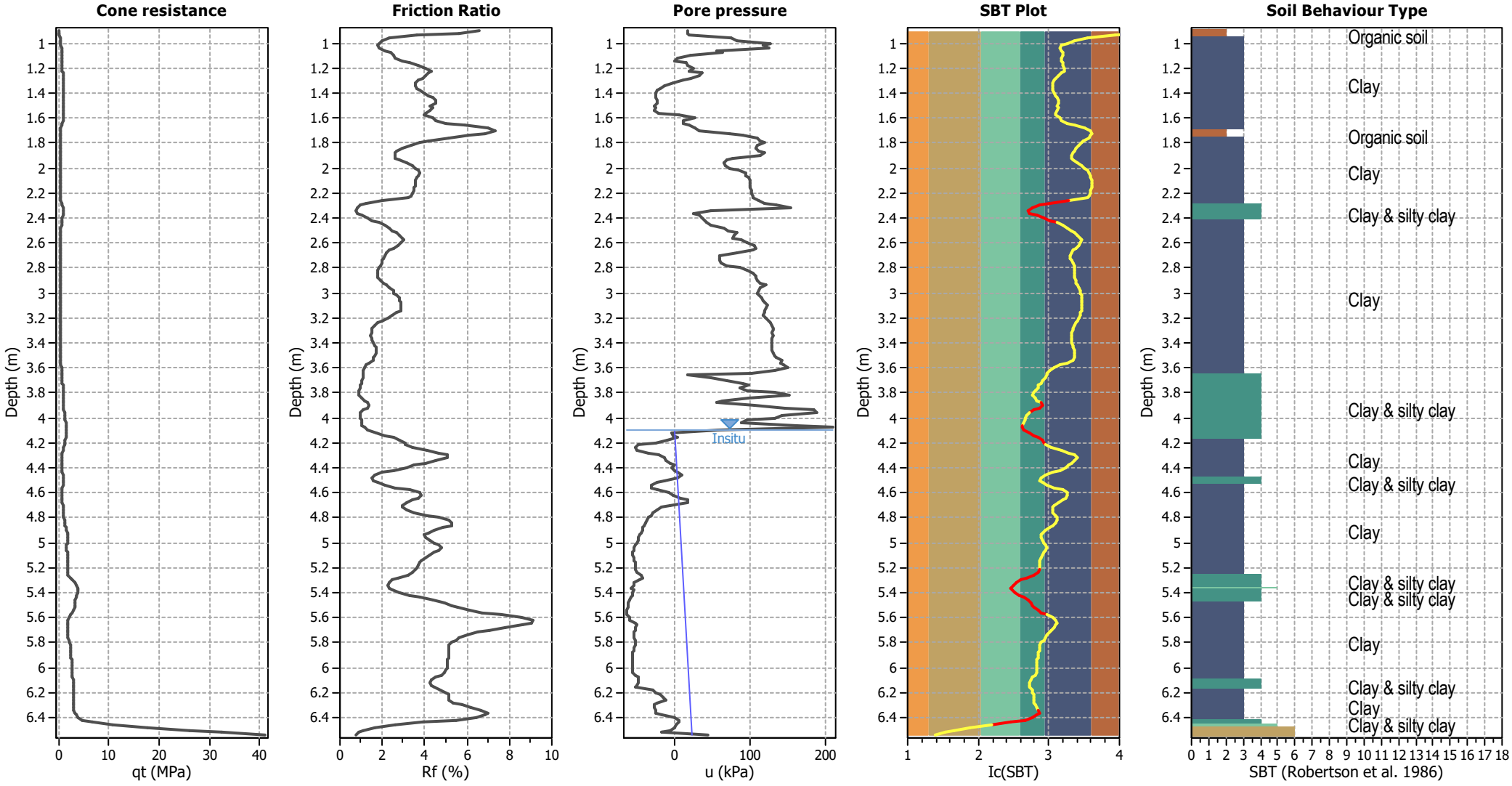
CPT name: cwlp CPT- 14CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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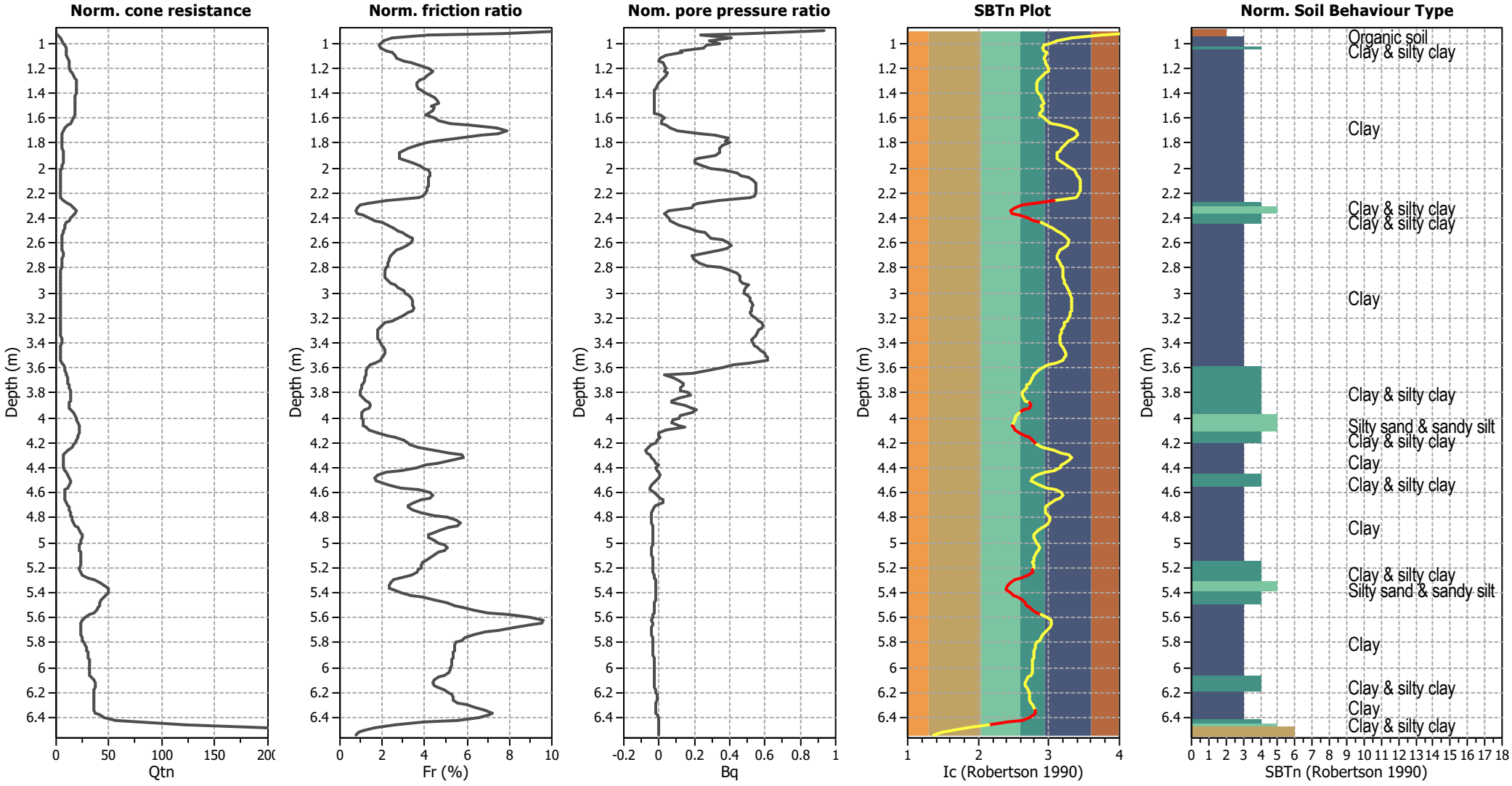
CPT name: cwlp CPT- 14CCR

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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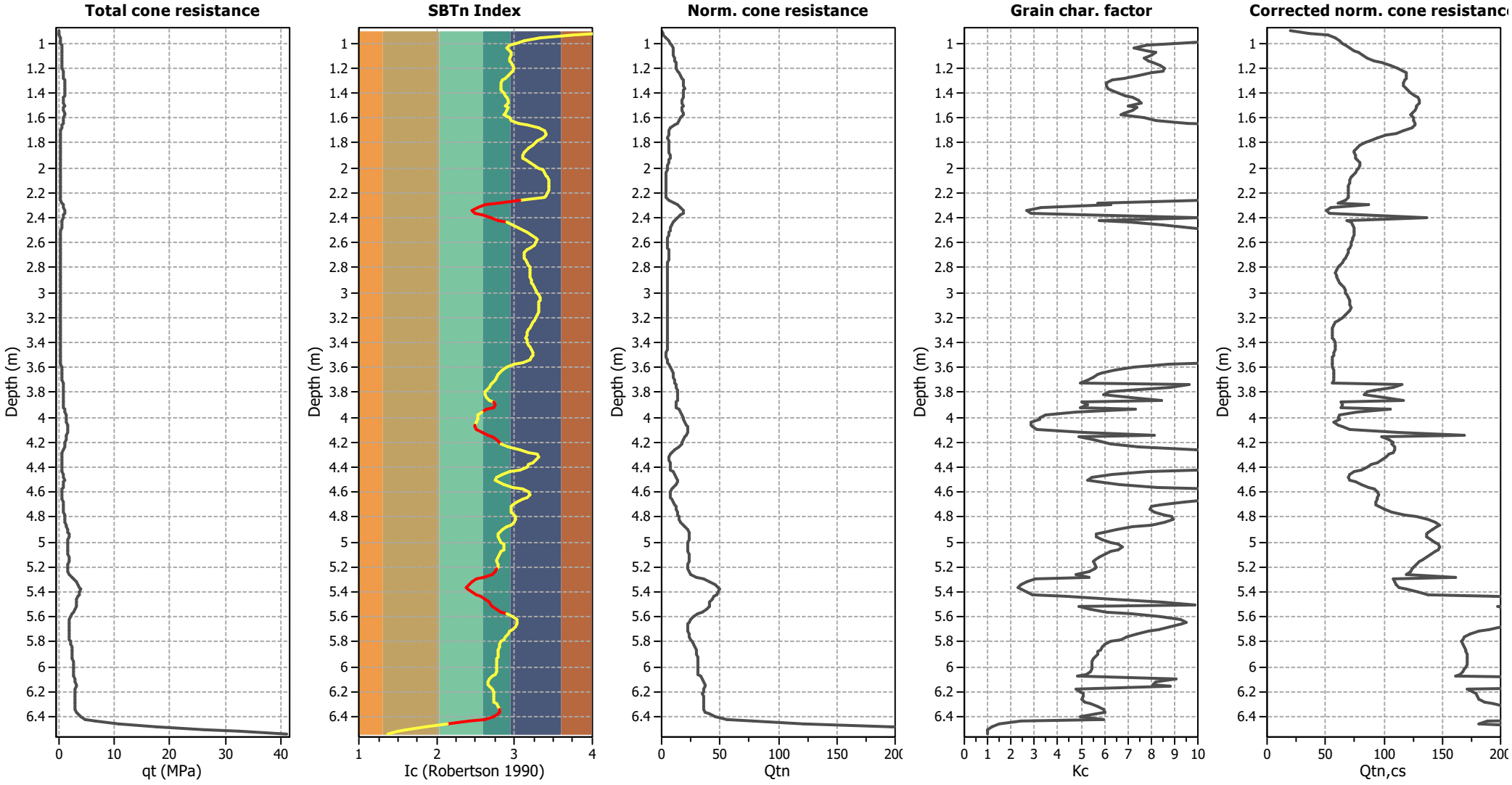
CPT name: cwlp CPT- 14CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

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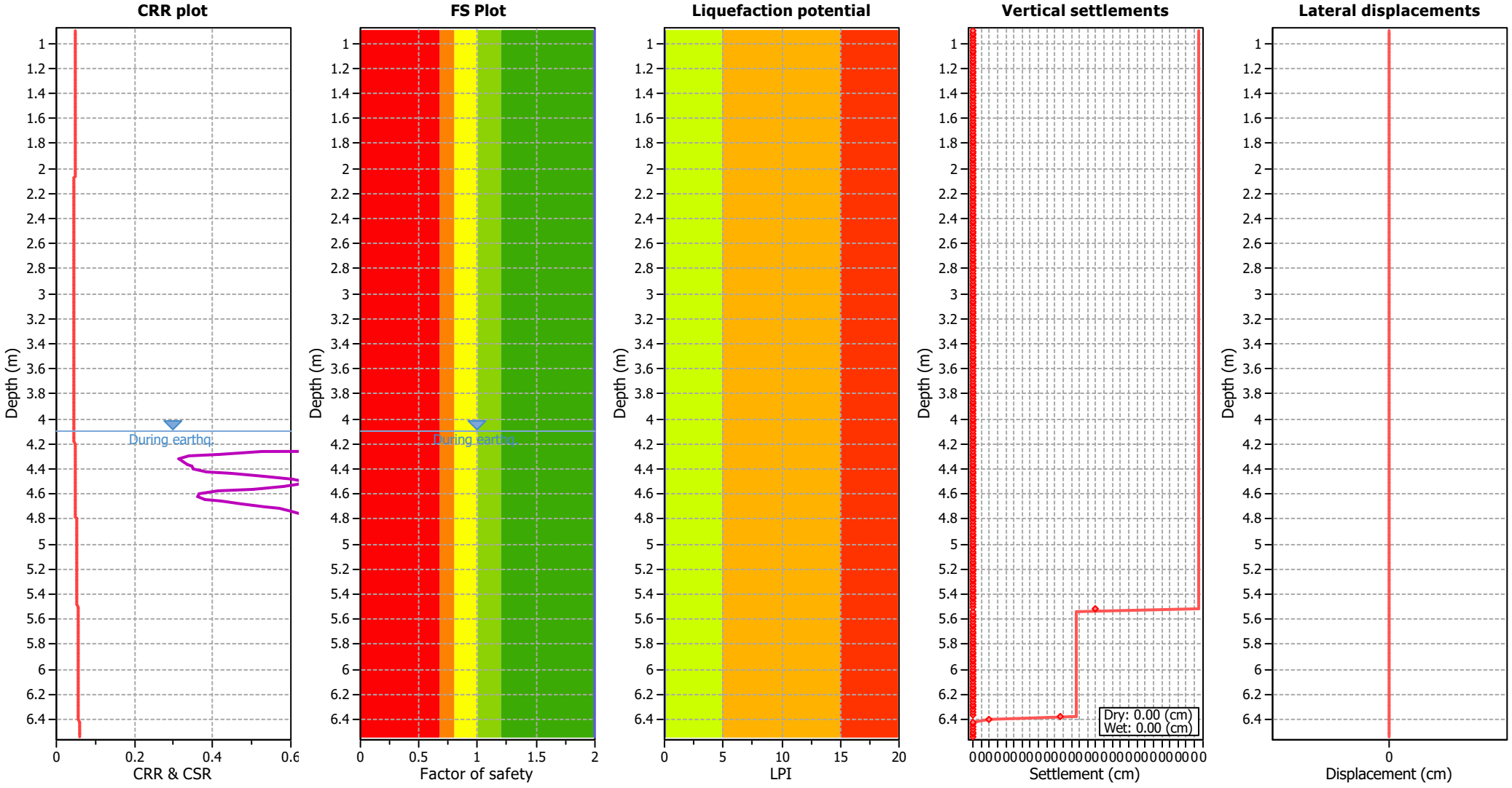
CPT name: cwlp CPT- 14CCR

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

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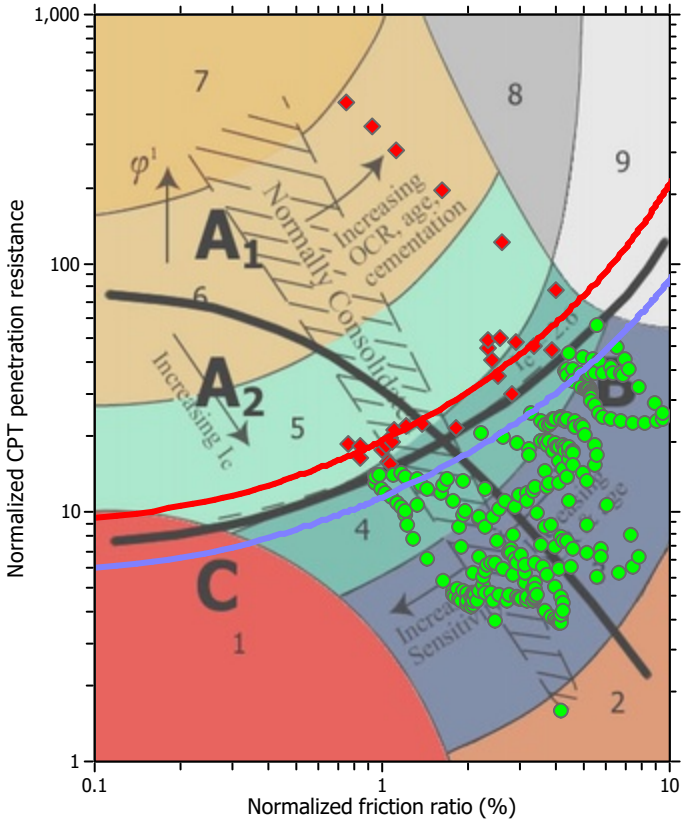
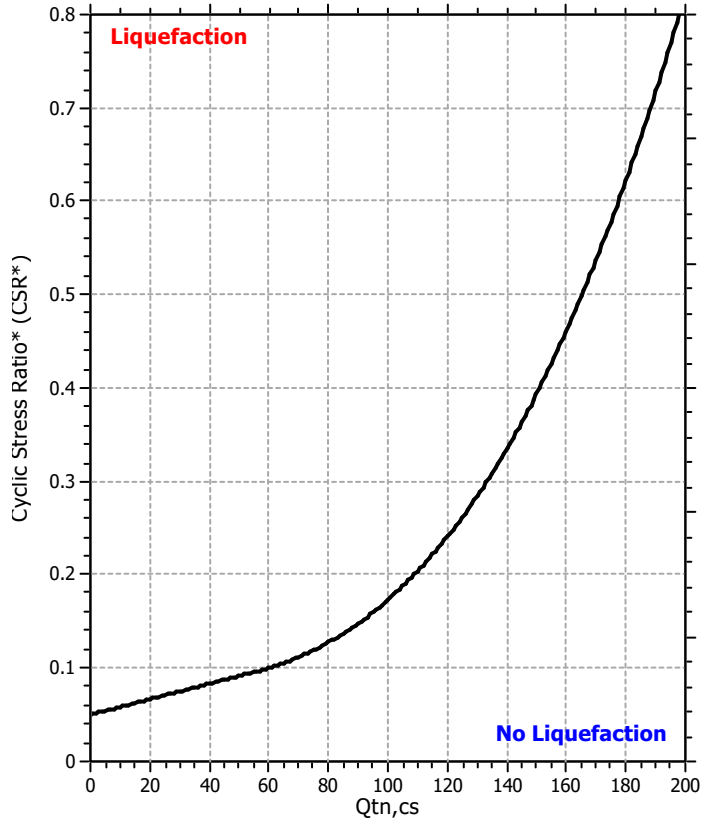
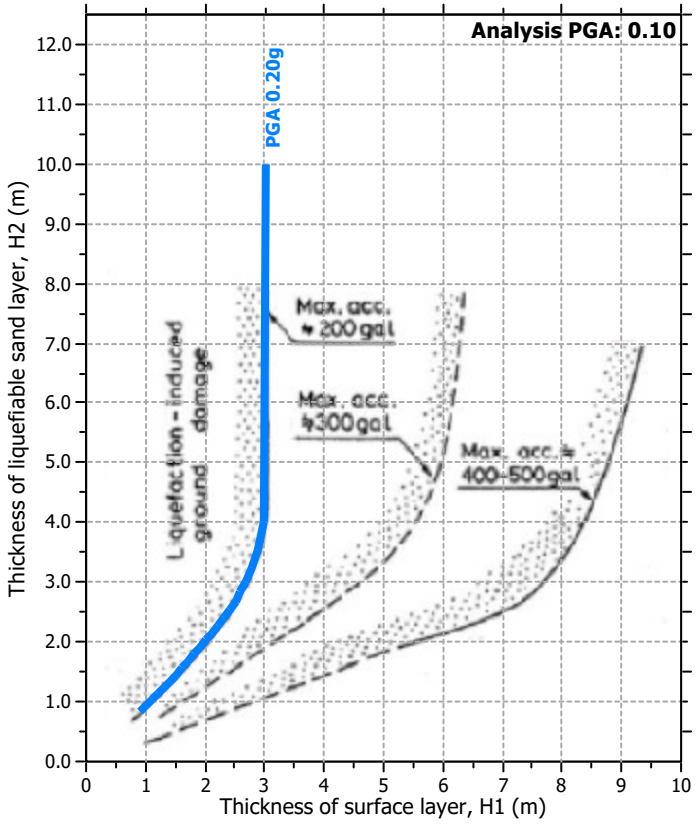
CPT name: cwlp CPT- 14CCR

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

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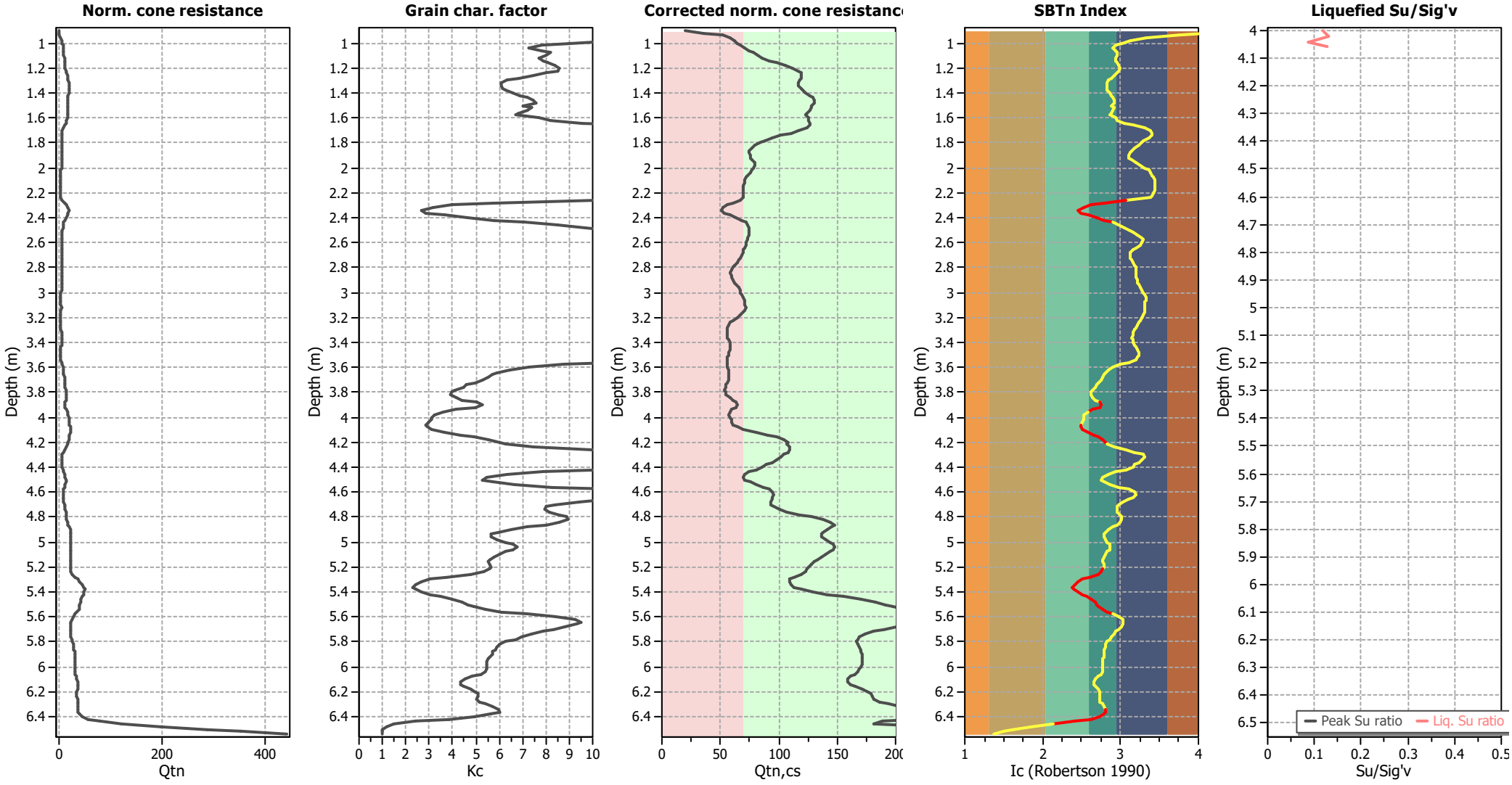
CPT name: cwlp CPT- 14CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

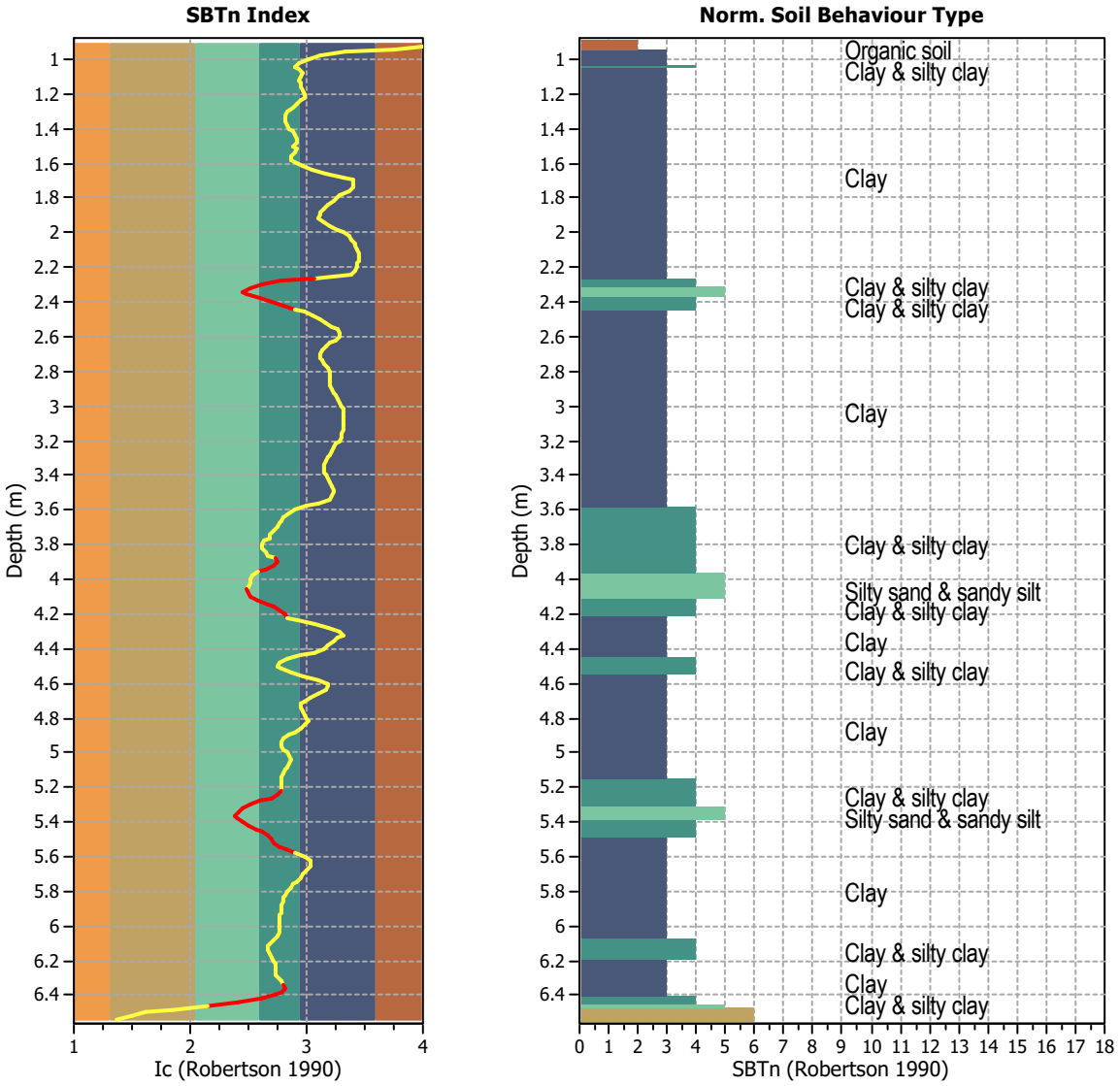
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.10 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	4.10 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	283
I_c maximum check value:	3.00	Total points excluded:	51
I_c change ratio value:	0.0100	Exclusion percentage:	18.02%
Minimum number of points in layer:	2	Number of layers detected:	7

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	4	Start depth: 2.28 (m)	4	Clay & silty clay
		End depth: 2.34 (m)	5	Silty sand & sandy silt
Transition layer 2	7	Start depth: 2.34 (m)	5	Silty sand & sandy silt
		End depth: 2.46 (m)	3	Clay
Transition layer 3	5	Start depth: 3.90 (m)	4	Clay & silty clay
		End depth: 3.98 (m)	5	Silty sand & sandy silt
Transition layer 4	9	Start depth: 4.08 (m)	5	Silty sand & sandy silt
		End depth: 4.24 (m)	3	Clay
Transition layer 5	7	Start depth: 5.24 (m)	4	Clay & silty clay
		End depth: 5.36 (m)	5	Silty sand & sandy silt
Transition layer 6	12	Start depth: 5.38 (m)	5	Silty sand & sandy silt
		End depth: 5.60 (m)	3	Clay
Transition layer 7	7	Start depth: 6.36 (m)	3	Clay
		End depth: 6.48 (m)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.02	1.40	17.40	100.00	13.73
2	0.92	0.02	1.40	17.40	100.00	13.73
3	0.94	0.07	4.60	18.80	100.00	13.73
4	0.96	0.09	4.30	74.50	83.37	14.12
5	0.98	0.24	5.10	82.10	66.90	14.59
6	1.00	0.52	7.50	127.10	59.12	14.85
7	1.02	0.52	8.40	117.20	54.53	15.09
8	1.04	0.45	9.60	124.90	52.34	15.31
9	1.06	0.44	10.10	56.50	54.50	15.43
10	1.08	0.51	11.70	63.10	56.19	15.57
11	1.10	0.51	13.10	20.10	55.45	15.73
12	1.12	0.55	15.20	4.30	54.11	15.90
13	1.14	0.63	16.70	0.50	54.74	16.11
14	1.16	0.67	18.90	15.20	55.66	16.31
15	1.18	0.66	25.30	16.60	56.79	16.48
16	1.20	0.64	28.20	24.70	57.75	16.65
17	1.22	0.65	30.80	20.00	57.36	16.80
18	1.24	0.74	34.00	36.10	55.41	16.89
19	1.26	0.87	35.10	32.50	52.97	16.97
20	1.28	0.93	33.80	20.20	50.49	17.04
21	1.30	0.96	35.00	11.60	48.30	17.07
22	1.32	1.00	36.80	-1.90	47.10	17.07
23	1.34	1.04	35.30	-13.90	47.09	17.08
24	1.36	1.02	33.50	-20.40	47.41	17.11
25	1.38	0.96	35.60	-23.50	48.04	17.13
26	1.40	0.98	39.60	-24.70	49.38	17.17
27	1.42	0.96	40.60	-25.10	50.79	17.21
28	1.44	0.94	41.80	-25.30	51.86	17.24
29	1.46	0.94	41.80	-24.20	52.97	17.22
30	1.48	0.89	41.50	-22.50	53.54	17.21
31	1.50	0.85	39.30	-27.00	51.08	17.21
32	1.52	0.89	39.50	-25.20	52.69	17.18
33	1.54	1.20	38.50	-26.80	52.06	17.16
34	1.56	0.71	38.50	-21.70	50.34	17.16
35	1.58	0.93	38.30	4.80	49.97	17.14
36	1.60	1.02	37.00	25.90	53.98	17.08
37	1.62	0.88	35.30	10.60	56.20	17.03
38	1.64	0.71	36.20	11.30	61.51	16.94
39	1.66	0.44	34.10	18.60	70.04	16.79
40	1.68	0.41	32.10	25.90	81.79	16.58
41	1.70	0.37	27.60	33.50	89.14	16.36
42	1.72	0.21	20.40	72.60	90.41	16.16
43	1.74	0.33	17.40	91.20	89.65	15.94
44	1.76	0.29	16.40	109.20	86.69	15.71
45	1.78	0.30	13.80	113.50	79.74	15.58
46	1.80	0.32	10.90	119.40	78.11	15.44
47	1.82	0.32	10.20	109.60	75.24	15.32
48	1.84	0.31	10.20	107.80	71.98	15.22

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.31	9.70	111.20	69.09	15.19
50	1.88	0.35	8.70	118.70	67.18	15.22
51	1.90	0.39	8.90	113.60	66.11	15.25
52	1.92	0.40	10.80	77.70	66.07	15.28
53	1.94	0.37	11.20	68.90	68.60	15.30
54	1.96	0.33	10.70	65.00	72.99	15.31
55	1.98	0.28	10.50	68.10	78.02	15.25
56	2.00	0.26	10.40	73.70	82.28	15.18
57	2.02	0.24	10.10	85.50	86.30	15.09
58	2.04	0.24	9.20	95.40	88.75	15.01
59	2.06	0.21	8.40	95.10	90.79	14.92
60	2.08	0.20	8.00	98.30	91.84	14.84
61	2.10	0.20	7.80	99.90	93.21	14.77
62	2.12	0.20	7.50	100.70	94.01	14.74
63	2.14	0.20	7.40	99.80	94.21	14.72
64	2.16	0.19	7.60	99.50	93.79	14.71
65	2.18	0.20	7.50	101.30	93.12	14.72
66	2.20	0.20	7.50	102.30	92.30	14.74
67	2.22	0.21	7.60	103.60	90.63	14.75
68	2.24	0.21	7.70	104.00	88.26	14.75
69	2.26	0.22	7.50	111.70	63.64	14.90
70	2.28	0.24	7.10	119.90	45.40	15.04
71	2.30	0.87	6.70	135.90	36.46	15.12
72	2.32	1.22	6.90	154.10	31.73	15.19
73	2.34	1.09	7.00	48.70	28.68	15.27
74	2.36	0.90	7.70	25.40	30.00	15.34
75	2.38	0.83	8.10	32.00	34.97	15.39
76	2.40	0.75	9.40	36.80	40.33	15.42
77	2.42	0.59	10.70	39.80	45.61	15.43
78	2.44	0.52	10.30	41.70	51.54	15.41
79	2.46	0.44	10.00	48.80	57.28	15.36
80	2.48	0.40	9.90	65.40	61.95	15.29
81	2.50	0.39	9.40	71.70	66.57	15.22
82	2.52	0.33	9.50	82.10	70.41	15.16
83	2.54	0.30	9.00	79.00	74.19	15.11
84	2.56	0.28	9.00	76.50	78.35	15.04
85	2.58	0.26	8.90	89.00	80.23	14.98
86	2.60	0.26	8.00	96.50	79.55	14.95
87	2.62	0.26	7.80	105.10	77.16	14.95
88	2.64	0.31	8.10	108.30	73.27	14.95
89	2.66	0.33	8.40	104.00	70.18	14.96
90	2.68	0.36	8.00	83.40	67.73	14.96
91	2.70	0.35	7.50	58.90	66.90	14.93
92	2.72	0.34	7.20	59.10	66.96	14.87
93	2.74	0.33	7.10	59.40	68.01	14.77
94	2.76	0.31	6.50	62.30	69.52	14.66
95	2.78	0.29	5.50	69.50	71.20	14.55
96	2.80	0.26	5.10	86.10	72.45	14.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.25	4.90	96.10	72.55	14.35
98	2.84	0.25	4.70	103.90	73.04	14.33
99	2.86	0.27	4.80	107.60	73.21	14.34
100	2.88	0.27	5.10	108.10	73.04	14.35
101	2.90	0.26	5.30	109.60	73.76	14.47
102	2.92	0.25	5.10	113.30	74.98	14.52
103	2.94	0.27	7.20	120.60	76.29	14.58
104	2.96	0.26	6.20	114.30	77.87	14.64
105	2.98	0.26	6.70	112.50	79.45	14.72
106	3.00	0.25	7.10	109.50	80.69	14.72
107	3.02	0.25	7.40	111.10	82.03	14.75
108	3.04	0.25	7.30	115.50	82.98	14.80
109	3.06	0.25	7.40	116.70	82.99	14.84
110	3.08	0.25	8.20	120.20	82.59	14.86
111	3.10	0.26	8.20	122.80	82.28	14.89
112	3.12	0.26	8.10	122.20	82.27	14.90
113	3.14	0.26	8.00	120.50	82.19	14.88
114	3.16	0.26	7.90	118.60	81.39	14.80
115	3.18	0.25	7.40	117.30	80.65	14.70
116	3.20	0.25	5.70	121.70	79.39	14.57
117	3.22	0.25	5.10	124.80	77.39	14.42
118	3.24	0.24	4.50	128.00	75.24	14.27
119	3.26	0.25	4.20	130.00	73.95	14.20
120	3.28	0.25	4.10	130.50	72.41	14.14
121	3.30	0.26	4.20	130.30	71.29	14.13
122	3.32	0.26	4.00	129.80	70.55	14.15
123	3.34	0.27	4.20	130.80	69.70	14.18
124	3.36	0.27	4.40	129.90	69.28	14.21
125	3.38	0.28	4.50	129.40	69.62	14.26
126	3.40	0.28	4.70	129.50	70.41	14.30
127	3.42	0.27	4.90	129.20	71.57	14.32
128	3.44	0.26	5.00	130.00	73.46	14.31
129	3.46	0.25	4.80	129.00	74.90	14.28
130	3.48	0.24	4.60	131.60	75.80	14.24
131	3.50	0.24	4.30	132.10	75.76	14.21
132	3.52	0.25	4.30	135.40	74.79	14.19
133	3.54	0.26	4.30	142.90	72.92	14.22
134	3.56	0.27	4.40	140.80	65.67	14.32
135	3.58	0.29	4.80	145.00	58.39	14.46
136	3.60	0.47	5.20	150.30	52.30	14.63
137	3.62	0.56	5.90	133.90	48.64	14.82
138	3.64	0.64	6.50	102.10	46.31	14.95
139	3.66	0.65	7.80	16.60	45.41	15.03
140	3.68	0.57	7.20	48.10	44.34	15.07
141	3.70	0.63	7.10	70.30	43.16	15.09
142	3.72	0.71	6.70	90.80	41.62	15.14
143	3.74	0.78	6.70	97.80	39.98	15.17
144	3.76	0.83	8.40	87.30	39.22	15.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.79	7.60	96.00	37.40	15.24
146	3.80	0.73	7.00	133.60	36.45	15.33
147	3.82	1.00	7.90	153.10	36.09	15.37
148	3.84	1.02	9.00	98.10	37.55	15.53
149	3.86	0.94	9.30	62.70	38.88	15.62
150	3.88	0.78	13.70	55.60	42.05	15.64
151	3.90	0.67	11.30	106.90	43.28	15.65
152	3.92	0.65	10.20	147.50	41.73	15.67
153	3.94	0.88	9.80	185.60	37.75	15.67
154	3.96	1.13	9.40	189.70	34.42	15.75
155	3.98	1.30	11.40	142.30	32.11	15.88
156	4.00	1.33	12.90	132.80	31.69	15.99
157	4.02	1.31	14.60	95.70	31.66	16.08
158	4.04	1.18	14.30	89.30	30.76	16.15
159	4.06	1.33	14.10	161.30	30.03	16.29
160	4.08	1.63	14.10	210.30	30.38	16.46
161	4.10	1.82	20.60	57.30	31.44	16.64
162	4.12	1.61	25.60	-4.80	34.95	16.88
163	4.14	1.34	29.00	-1.70	38.56	17.05
164	4.16	1.02	39.10	4.20	41.42	17.17
165	4.18	1.27	37.40	-9.30	44.45	17.20
166	4.20	1.55	39.60	-25.60	46.72	17.22
167	4.22	1.17	34.90	-48.00	47.91	17.14
168	4.24	1.03	34.50	-51.60	53.12	17.02
169	4.26	0.73	30.10	-50.00	63.00	16.83
170	4.28	0.44	29.20	-34.60	71.63	16.66
171	4.30	0.44	25.90	-21.50	79.70	16.47
172	4.32	0.47	23.10	-14.60	82.40	16.36
173	4.34	0.51	20.90	-11.10	78.78	16.30
174	4.36	0.54	20.90	-5.50	75.24	16.21
175	4.38	0.53	21.50	0.60	71.71	16.10
176	4.40	0.52	16.40	-4.90	69.53	15.99
177	4.42	0.54	13.00	-0.80	63.20	15.87
178	4.44	0.53	12.30	3.30	54.78	15.79
179	4.46	0.76	10.60	8.80	48.10	15.84
180	4.48	0.98	13.30	3.10	44.23	15.96
181	4.50	1.14	15.60	-13.10	43.39	16.08
182	4.52	1.11	17.00	-23.00	45.45	16.21
183	4.54	0.79	18.40	-31.30	49.60	16.28
184	4.56	0.68	19.50	-30.60	56.47	16.31
185	4.58	0.63	21.50	-23.60	65.54	16.29
186	4.60	0.55	22.10	-7.60	71.33	16.29
187	4.62	0.50	21.80	-1.70	72.19	16.31
188	4.64	0.49	21.50	7.50	70.07	16.33
189	4.66	0.65	21.60	17.40	65.90	16.38
190	4.68	0.75	22.30	17.60	61.05	16.45
191	4.70	0.82	23.50	-6.00	56.94	16.53
192	4.72	0.88	24.00	-17.80	55.27	16.65

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.90	26.20	-24.20	55.14	16.79
194	4.76	0.94	30.60	-28.90	55.97	16.98
195	4.78	0.97	37.40	-31.80	57.73	17.22
196	4.80	1.01	45.90	-34.20	58.94	17.45
197	4.82	1.08	59.90	-37.50	59.13	17.65
198	4.84	1.16	67.00	-38.10	57.76	17.82
199	4.86	1.28	70.30	-40.40	55.47	17.94
200	4.88	1.44	72.10	-42.40	52.11	18.00
201	4.90	1.56	70.70	-43.20	48.95	18.04
202	4.92	1.72	67.00	-44.60	46.38	18.06
203	4.94	1.81	68.10	-46.20	45.10	18.08
204	4.96	1.86	70.00	-48.20	45.07	18.09
205	4.98	1.76	71.50	-49.40	46.35	18.11
206	5.00	1.62	73.80	-50.80	47.94	18.13
207	5.02	1.52	76.90	-51.40	49.43	18.14
208	5.04	1.55	77.30	-54.50	50.11	18.14
209	5.06	1.60	76.00	-55.10	49.41	18.15
210	5.08	1.66	74.70	-55.90	48.00	18.14
211	5.10	1.77	72.70	-55.40	46.74	18.12
212	5.12	1.79	70.70	-53.70	45.60	18.09
213	5.14	1.76	68.90	-53.50	44.80	18.05
214	5.16	1.75	63.40	-52.60	44.61	18.00
215	5.18	1.72	61.70	-51.90	44.86	17.94
216	5.20	1.68	59.70	-51.60	45.01	17.90
217	5.22	1.59	58.20	-51.70	44.65	17.88
218	5.24	1.61	58.00	-50.60	43.56	17.90
219	5.26	1.79	58.50	-44.30	40.83	17.94
220	5.28	2.01	62.70	-42.70	35.27	18.06
221	5.30	2.48	63.50	-45.70	31.24	18.21
222	5.32	3.64	69.60	-54.20	28.75	18.38
223	5.34	3.80	81.30	-54.90	26.79	18.51
224	5.36	3.82	92.90	-57.70	25.89	18.65
225	5.38	3.93	93.60	-54.90	26.66	18.77
226	5.40	3.94	101.40	-55.80	28.51	18.88
227	5.42	3.92	114.00	-56.90	31.00	18.97
228	5.44	3.36	134.50	-58.20	33.71	19.06
229	5.46	2.98	148.30	-59.10	36.47	19.16
230	5.48	3.07	153.80	-61.50	38.87	19.24
231	5.50	3.17	167.10	-61.90	40.19	19.30
232	5.52	3.34	175.80	-62.20	41.41	19.34
233	5.54	3.16	179.30	-63.90	43.93	19.36
234	5.56	2.74	183.60	-63.20	47.14	19.35
235	5.58	2.24	186.40	-63.10	51.73	19.30
236	5.60	1.99	178.90	-60.80	56.83	19.24
237	5.62	1.81	179.40	-59.40	60.33	19.16
238	5.64	1.70	168.20	-52.00	61.21	19.08
239	5.66	1.77	151.00	-50.10	60.69	18.99
240	5.68	1.82	139.20	-51.50	58.75	18.88

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	1.82	126.70	-51.70	56.62	18.77
242	5.72	1.80	108.10	-54.20	54.88	18.68
243	5.74	1.75	105.40	-54.30	52.91	18.62
244	5.76	1.82	103.40	-54.10	51.06	18.61
245	5.78	2.01	105.40	-52.90	49.82	18.63
246	5.80	2.16	111.70	-52.10	47.98	18.69
247	5.82	2.16	112.30	-52.90	46.67	18.74
248	5.84	2.40	120.70	-55.10	46.15	18.79
249	5.86	2.37	120.70	-55.10	45.83	18.82
250	5.88	2.35	122.90	-55.90	45.28	18.85
251	5.90	2.39	123.80	-55.70	45.24	18.87
252	5.92	2.46	123.60	-56.10	44.90	18.89
253	5.94	2.52	130.40	-56.00	44.38	18.91
254	5.96	2.57	128.50	-56.00	44.10	18.92
255	5.98	2.60	127.60	-56.20	44.17	18.93
256	6.00	2.55	128.40	-56.50	44.17	18.92
257	6.02	2.48	127.20	-56.20	44.17	18.90
258	6.04	2.48	124.30	-56.20	44.00	18.89
259	6.06	2.52	121.40	-52.70	43.07	18.89
260	6.08	2.62	122.40	-48.90	41.05	18.91
261	6.10	2.82	119.90	-48.70	39.48	18.94
262	6.12	3.30	127.20	-48.50	38.63	18.98
263	6.14	3.21	127.90	-49.90	38.53	19.03
264	6.16	3.10	137.00	-51.50	39.22	19.07
265	6.18	2.93	144.20	-29.70	40.75	19.10
266	6.20	2.79	146.00	-24.70	41.76	19.13
267	6.22	2.84	150.10	-19.20	42.29	19.16
268	6.24	3.01	152.00	-15.40	42.27	19.18
269	6.26	3.05	154.30	-12.70	42.10	19.21
270	6.28	3.04	153.70	-23.50	42.56	19.26
271	6.30	3.06	164.90	-27.10	43.93	19.32
272	6.32	2.96	183.20	-26.80	45.26	19.40
273	6.34	2.86	200.40	-25.90	46.47	19.50
274	6.36	3.01	215.30	-25.90	46.76	19.62
275	6.38	3.19	235.60	-17.60	44.95	19.73
276	6.40	3.62	255.20	-1.00	41.82	19.84
277	6.42	4.38	261.50	4.90	36.07	19.97
278	6.44	5.05	266.80	5.40	26.84	20.13
279	6.46	7.39	270.80	2.40	17.14	20.35
280	6.48	12.96	261.00	0.00	9.26	20.58
281	6.50	23.42	312.20	-6.20	4.76	20.76
282	6.52	39.01	305.30	-17.00	2.86	20.87
283	6.54	47.62	305.30	45.20	1.18	21.00

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	0.00	12.36	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	12.91	0.00	12.91	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	13.19	0.00	13.19	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	13.48	0.00	13.48	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	13.78	0.00	13.78	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	14.08	0.00	14.08	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	14.39	0.00	14.39	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	14.70	0.00	14.70	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	15.01	0.00	15.01	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	15.32	0.00	15.32	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	15.64	0.00	15.64	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	15.96	0.00	15.96	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	16.29	0.00	16.29	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	16.62	0.00	16.62	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	16.95	0.00	16.95	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	17.29	0.00	17.29	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
18	1.24	17.63	0.00	17.63	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
19	1.26	17.97	0.00	17.97	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
20	1.28	18.31	0.00	18.31	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
21	1.30	18.65	0.00	18.65	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
22	1.32	18.99	0.00	18.99	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
23	1.34	19.33	0.00	19.33	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
24	1.36	19.67	0.00	19.67	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
25	1.38	20.02	0.00	20.02	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
26	1.40	20.36	0.00	20.36	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
27	1.42	20.70	0.00	20.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
28	1.44	21.05	0.00	21.05	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
29	1.46	21.39	0.00	21.39	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
30	1.48	21.74	0.00	21.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
31	1.50	22.08	0.00	22.08	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
32	1.52	22.42	0.00	22.42	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
33	1.54	22.77	0.00	22.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
34	1.56	23.11	0.00	23.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
35	1.58	23.45	0.00	23.45	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
36	1.60	23.80	0.00	23.80	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
37	1.62	24.14	0.00	24.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
38	1.64	24.47	0.00	24.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
39	1.66	24.81	0.00	24.81	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
40	1.68	25.14	0.00	25.14	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
41	1.70	25.47	0.00	25.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
42	1.72	25.79	0.00	25.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
43	1.74	26.11	0.00	26.11	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
44	1.76	26.43	0.00	26.43	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
45	1.78	26.74	0.00	26.74	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
46	1.80	27.05	0.00	27.05	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
47	1.82	27.35	0.00	27.35	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
48	1.84	27.66	0.00	27.66	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	1.86	27.96	0.00	27.96	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
50	1.88	28.26	0.00	28.26	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
51	1.90	28.57	0.00	28.57	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
52	1.92	28.88	0.00	28.88	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
53	1.94	29.18	0.00	29.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
54	1.96	29.49	0.00	29.49	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
55	1.98	29.79	0.00	29.79	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
56	2.00	30.10	0.00	30.10	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
57	2.02	30.40	0.00	30.40	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
58	2.04	30.70	0.00	30.70	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
59	2.06	31.00	0.00	31.00	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
60	2.08	31.29	0.00	31.29	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
61	2.10	31.59	0.00	31.59	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
62	2.12	31.88	0.00	31.88	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
63	2.14	32.18	0.00	32.18	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
64	2.16	32.47	0.00	32.47	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
65	2.18	32.77	0.00	32.77	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
66	2.20	33.06	0.00	33.06	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
67	2.22	33.36	0.00	33.36	0.99	0.064	1.38	0.047	1.00	1.00	2.000	No
68	2.24	33.65	0.00	33.65	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
69	2.26	33.95	0.00	33.95	0.98	0.064	1.38	0.047	1.00	1.00	2.000	No
70	2.28	34.25	0.00	34.25	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
71	2.30	34.55	0.00	34.55	0.98	0.064	1.38	0.047	1.00	1.00	2.000	Yes
72	2.32	34.86	0.00	34.86	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
73	2.34	35.16	0.00	35.16	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
74	2.36	35.47	0.00	35.47	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
75	2.38	35.78	0.00	35.78	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
76	2.40	36.08	0.00	36.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
77	2.42	36.39	0.00	36.39	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
78	2.44	36.70	0.00	36.70	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
79	2.46	37.01	0.00	37.01	0.98	0.064	1.38	0.046	1.00	1.00	2.000	Yes
80	2.48	37.31	0.00	37.31	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
81	2.50	37.62	0.00	37.62	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
82	2.52	37.92	0.00	37.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
83	2.54	38.22	0.00	38.22	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
84	2.56	38.52	0.00	38.52	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
85	2.58	38.82	0.00	38.82	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
86	2.60	39.12	0.00	39.12	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
87	2.62	39.42	0.00	39.42	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
88	2.64	39.72	0.00	39.72	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
89	2.66	40.02	0.00	40.02	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
90	2.68	40.32	0.00	40.32	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
91	2.70	40.62	0.00	40.62	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
92	2.72	40.92	0.00	40.92	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
93	2.74	41.21	0.00	41.21	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
94	2.76	41.50	0.00	41.50	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
95	2.78	41.80	0.00	41.80	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
96	2.80	42.08	0.00	42.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
97	2.82	42.37	0.00	42.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
98	2.84	42.66	0.00	42.66	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
99	2.86	42.94	0.00	42.94	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
100	2.88	43.23	0.00	43.23	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
101	2.90	43.52	0.00	43.52	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
102	2.92	43.81	0.00	43.81	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
103	2.94	44.10	0.00	44.10	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
104	2.96	44.40	0.00	44.40	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
105	2.98	44.69	0.00	44.69	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
106	3.00	44.98	0.00	44.98	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
107	3.02	45.28	0.00	45.28	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
108	3.04	45.58	0.00	45.58	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
109	3.06	45.87	0.00	45.87	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
110	3.08	46.17	0.00	46.17	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
111	3.10	46.47	0.00	46.47	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
112	3.12	46.76	0.00	46.76	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
113	3.14	47.06	0.00	47.06	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
114	3.16	47.36	0.00	47.36	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
115	3.18	47.65	0.00	47.65	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
116	3.20	47.94	0.00	47.94	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
117	3.22	48.23	0.00	48.23	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
118	3.24	48.52	0.00	48.52	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
119	3.26	48.80	0.00	48.80	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
120	3.28	49.08	0.00	49.08	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
121	3.30	49.37	0.00	49.37	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
122	3.32	49.65	0.00	49.65	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
123	3.34	49.93	0.00	49.93	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
124	3.36	50.22	0.00	50.22	0.98	0.064	1.38	0.046	1.00	1.00	2.000	No
125	3.38	50.50	0.00	50.50	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
126	3.40	50.79	0.00	50.79	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
127	3.42	51.08	0.00	51.08	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
128	3.44	51.36	0.00	51.36	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
129	3.46	51.65	0.00	51.65	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
130	3.48	51.93	0.00	51.93	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
131	3.50	52.22	0.00	52.22	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
132	3.52	52.50	0.00	52.50	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
133	3.54	52.78	0.00	52.78	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
134	3.56	53.07	0.00	53.07	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
135	3.58	53.36	0.00	53.36	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
136	3.60	53.65	0.00	53.65	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
137	3.62	53.95	0.00	53.95	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
138	3.64	54.25	0.00	54.25	0.98	0.063	1.38	0.046	1.00	1.00	2.000	No
139	3.66	54.55	0.00	54.55	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
140	3.68	54.85	0.00	54.85	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
141	3.70	55.15	0.00	55.15	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
142	3.72	55.45	0.00	55.45	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
143	3.74	55.76	0.00	55.76	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
144	3.76	56.06	0.00	56.06	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
145	3.78	56.37	0.00	56.37	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
146	3.80	56.67	0.00	56.67	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
147	3.82	56.98	0.00	56.98	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
148	3.84	57.29	0.00	57.29	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
149	3.86	57.60	0.00	57.60	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
150	3.88	57.92	0.00	57.92	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
151	3.90	58.23	0.00	58.23	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
152	3.92	58.54	0.00	58.54	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
153	3.94	58.86	0.00	58.86	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
154	3.96	59.17	0.00	59.17	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
155	3.98	59.49	0.00	59.49	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
156	4.00	59.81	0.00	59.81	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
157	4.02	60.13	0.00	60.13	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
158	4.04	60.45	0.00	60.45	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
159	4.06	60.78	0.00	60.78	0.97	0.063	1.38	0.046	1.00	1.00	2.000	No
160	4.08	61.11	0.00	61.11	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
161	4.10	61.44	0.00	61.44	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
162	4.12	61.78	0.20	61.58	0.97	0.063	1.38	0.046	1.00	1.00	2.000	Yes
163	4.14	62.12	0.39	61.73	0.97	0.064	1.38	0.046	1.00	1.00	2.000	Yes
164	4.16	62.46	0.59	61.87	0.97	0.064	1.38	0.046	1.00	1.00	2.000	Yes
165	4.18	62.81	0.78	62.02	0.97	0.064	1.38	0.046	1.00	1.00	2.000	Yes
166	4.20	63.15	0.98	62.17	0.97	0.064	1.38	0.047	1.00	1.00	2.000	Yes
167	4.22	63.49	1.18	62.32	0.97	0.064	1.38	0.047	1.00	1.00	2.000	Yes
168	4.24	63.83	1.37	62.46	0.97	0.064	1.38	0.047	1.00	1.00	2.000	Yes
169	4.26	64.17	1.57	62.60	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
170	4.28	64.50	1.77	62.74	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
171	4.30	64.83	1.96	62.87	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
172	4.32	65.16	2.16	63.00	0.97	0.065	1.38	0.047	1.00	1.00	0.047	No
173	4.34	65.49	2.35	63.13	0.97	0.065	1.38	0.048	1.00	1.00	0.048	No
174	4.36	65.81	2.55	63.26	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
175	4.38	66.13	2.75	63.39	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
176	4.40	66.45	2.94	63.51	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
177	4.42	66.77	3.14	63.63	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
178	4.44	67.09	3.34	63.75	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
179	4.46	67.40	3.53	63.87	0.97	0.066	1.38	0.048	1.00	1.00	0.048	No
180	4.48	67.72	3.73	63.99	0.97	0.067	1.38	0.048	1.00	1.00	0.048	No
181	4.50	68.04	3.92	64.12	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
182	4.52	68.37	4.12	64.25	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
183	4.54	68.69	4.32	64.38	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
184	4.56	69.02	4.51	64.51	0.97	0.067	1.38	0.049	1.00	1.00	0.049	No
185	4.58	69.35	4.71	64.64	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
186	4.60	69.67	4.91	64.77	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
187	4.62	70.00	5.10	64.90	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
188	4.64	70.32	5.30	65.03	0.97	0.068	1.38	0.049	1.00	1.00	0.049	No
189	4.66	70.65	5.49	65.16	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
190	4.68	70.98	5.69	65.29	0.97	0.068	1.38	0.050	1.00	1.00	0.050	No
191	4.70	71.31	5.89	65.43	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
192	4.72	71.64	6.08	65.56	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	4.74	71.98	6.28	65.70	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
194	4.76	72.32	6.47	65.85	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
195	4.78	72.66	6.67	65.99	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
196	4.80	73.01	6.87	66.15	0.97	0.069	1.38	0.050	1.00	1.00	0.050	No
197	4.82	73.37	7.06	66.30	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
198	4.84	73.72	7.26	66.46	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
199	4.86	74.08	7.46	66.63	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
200	4.88	74.44	7.65	66.79	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
201	4.90	74.80	7.85	66.95	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
202	4.92	75.16	8.04	67.12	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
203	4.94	75.53	8.24	67.28	0.97	0.070	1.38	0.051	1.00	1.00	0.051	No
204	4.96	75.89	8.44	67.45	0.97	0.071	1.38	0.051	1.00	1.00	0.051	No
205	4.98	76.25	8.63	67.62	0.97	0.071	1.38	0.051	1.00	1.00	0.051	No
206	5.00	76.61	8.83	67.78	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
207	5.02	76.97	9.03	67.95	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
208	5.04	77.34	9.22	68.12	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
209	5.06	77.70	9.42	68.28	0.97	0.071	1.38	0.052	1.00	1.00	0.052	No
210	5.08	78.06	9.61	68.45	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
211	5.10	78.43	9.81	68.62	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
212	5.12	78.79	10.01	68.78	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
213	5.14	79.15	10.20	68.95	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
214	5.16	79.51	10.40	69.11	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
215	5.18	79.87	10.59	69.27	0.96	0.072	1.38	0.053	1.00	1.00	0.053	No
216	5.20	80.23	10.79	69.43	0.96	0.072	1.38	0.053	1.00	1.00	0.053	No
217	5.22	80.58	10.99	69.60	0.96	0.073	1.38	0.053	1.00	1.00	0.053	No
218	5.24	80.94	11.18	69.76	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
219	5.26	81.30	11.38	69.92	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
220	5.28	81.66	11.58	70.08	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
221	5.30	82.03	11.77	70.25	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
222	5.32	82.39	11.97	70.42	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
223	5.34	82.76	12.16	70.60	0.96	0.073	1.38	0.053	1.00	1.00	2.000	Yes
224	5.36	83.14	12.36	70.78	0.96	0.074	1.38	0.053	1.00	1.00	2.000	Yes
225	5.38	83.51	12.56	70.95	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
226	5.40	83.89	12.75	71.14	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
227	5.42	84.27	12.95	71.32	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
228	5.44	84.65	13.15	71.50	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
229	5.46	85.03	13.34	71.69	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
230	5.48	85.42	13.54	71.88	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
231	5.50	85.80	13.73	72.07	0.96	0.074	1.38	0.054	1.00	1.00	2.000	Yes
232	5.52	86.19	13.93	72.26	0.96	0.075	1.38	0.054	1.00	1.00	2.000	Yes
233	5.54	86.58	14.13	72.45	0.96	0.075	1.38	0.054	1.00	1.00	2.000	Yes
234	5.56	86.96	14.32	72.64	0.96	0.075	1.38	0.054	1.00	1.00	2.000	Yes
235	5.58	87.35	14.52	72.83	0.96	0.075	1.38	0.054	1.00	1.00	2.000	Yes
236	5.60	87.74	14.72	73.02	0.96	0.075	1.38	0.055	1.00	1.00	2.000	Yes
237	5.62	88.12	14.91	73.21	0.96	0.075	1.38	0.055	1.00	1.00	0.055	No
238	5.64	88.50	15.11	73.39	0.96	0.075	1.38	0.055	1.00	1.00	0.055	No
239	5.66	88.88	15.30	73.58	0.96	0.075	1.38	0.055	1.00	1.00	0.055	No
240	5.68	89.26	15.50	73.76	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	5.70	89.63	15.70	73.94	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
242	5.72	90.01	15.89	74.11	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
243	5.74	90.38	16.09	74.29	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
244	5.76	90.75	16.28	74.47	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
245	5.78	91.12	16.48	74.64	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
246	5.80	91.50	16.68	74.82	0.96	0.076	1.38	0.055	1.00	1.00	0.055	No
247	5.82	91.87	16.87	75.00	0.96	0.076	1.38	0.056	1.00	1.00	0.056	No
248	5.84	92.25	17.07	75.18	0.96	0.076	1.38	0.056	1.00	1.00	0.056	No
249	5.86	92.62	17.27	75.36	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
250	5.88	93.00	17.46	75.54	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
251	5.90	93.38	17.66	75.72	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
252	5.92	93.76	17.85	75.90	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
253	5.94	94.13	18.05	76.08	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
254	5.96	94.51	18.25	76.27	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
255	5.98	94.89	18.44	76.45	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
256	6.00	95.27	18.64	76.63	0.96	0.077	1.38	0.056	1.00	1.00	0.056	No
257	6.02	95.65	18.84	76.81	0.96	0.078	1.38	0.056	1.00	1.00	0.056	No
258	6.04	96.03	19.03	76.99	0.96	0.078	1.38	0.056	1.00	1.00	0.056	No
259	6.06	96.40	19.23	77.18	0.96	0.078	1.38	0.056	1.00	1.00	0.056	No
260	6.08	96.78	19.42	77.36	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
261	6.10	97.16	19.62	77.54	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
262	6.12	97.54	19.82	77.72	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
263	6.14	97.92	20.01	77.91	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
264	6.16	98.30	20.21	78.09	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
265	6.18	98.68	20.40	78.28	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
266	6.20	99.07	20.60	78.47	0.96	0.078	1.38	0.057	1.00	1.00	0.057	No
267	6.22	99.45	20.80	78.65	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
268	6.24	99.83	20.99	78.84	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
269	6.26	100.22	21.19	79.03	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
270	6.28	100.60	21.39	79.22	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
271	6.30	100.99	21.58	79.41	0.96	0.079	1.38	0.057	1.00	1.00	0.057	No
272	6.32	101.38	21.78	79.60	0.95	0.079	1.38	0.057	1.00	1.00	0.057	No
273	6.34	101.77	21.97	79.79	0.95	0.079	1.38	0.058	1.00	1.00	0.058	No
274	6.36	102.16	22.17	79.99	0.95	0.079	1.38	0.058	1.00	1.00	2.000	Yes
275	6.38	102.55	22.37	80.19	0.95	0.079	1.38	0.058	1.00	1.00	2.000	Yes
276	6.40	102.95	22.56	80.39	0.95	0.079	1.38	0.058	1.00	1.00	2.000	Yes
277	6.42	103.35	22.76	80.59	0.95	0.080	1.38	0.058	1.00	1.00	2.000	Yes
278	6.44	103.75	22.96	80.80	0.95	0.080	1.38	0.058	1.00	1.00	2.000	Yes
279	6.46	104.16	23.15	81.01	0.95	0.080	1.38	0.058	1.00	1.00	2.000	Yes
280	6.48	104.57	23.35	81.22	0.95	0.080	1.38	0.058	1.00	1.00	2.000	Yes
281	6.50	104.99	23.54	81.44	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
282	6.52	105.41	23.74	81.66	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No
283	6.54	105.83	23.94	81.89	0.95	0.080	1.38	0.058	1.00	1.00	0.058	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.03	4.06	10.98	1.00	0.37	54.25	19.90	4.000	No	Yes	2.00
2	0.92	0.05	4.06	7.72	1.00	0.67	54.25	36.36	4.000	No	Yes	2.00
3	0.94	0.09	3.76	4.20	1.00	1.58	32.68	51.57	4.000	No	Yes	2.00
4	0.96	0.20	3.33	2.48	1.00	3.64	15.92	57.94	4.000	No	Yes	2.00
5	0.98	0.30	3.12	2.07	1.00	5.69	11.00	62.63	4.000	No	Yes	2.00
6	1.00	0.38	3.01	1.90	1.00	7.25	8.94	64.85	4.000	No	Yes	2.00
7	1.02	0.45	2.94	1.86	0.98	8.62	7.81	67.34	4.000	No	Yes	2.00
8	1.04	0.50	2.91	1.93	0.96	9.67	7.29	70.43	4.000	No	Yes	2.00
9	1.06	0.50	2.94	2.19	0.98	9.53	7.80	74.33	4.000	No	Yes	2.00
10	1.08	0.50	2.97	2.46	0.99	9.56	8.21	78.55	4.000	No	Yes	2.00
11	1.10	0.53	2.95	2.59	0.98	10.19	8.03	81.83	4.000	No	Yes	2.00
12	1.12	0.58	2.93	2.69	0.98	11.08	7.71	85.42	4.000	No	Yes	2.00
13	1.14	0.61	2.94	3.02	0.98	11.67	7.86	91.72	4.000	No	Yes	2.00
14	1.16	0.63	2.96	3.38	0.98	12.17	8.08	98.38	4.000	No	Yes	2.00
15	1.18	0.65	2.97	3.77	0.99	12.56	8.36	105.00	4.000	No	Yes	2.00
16	1.20	0.68	2.99	4.17	1.00	13.00	8.60	111.83	4.000	No	Yes	2.00
17	1.22	0.72	2.98	4.39	1.00	13.79	8.50	117.26	4.000	No	Yes	2.00
18	1.24	0.77	2.95	4.31	0.98	14.83	8.02	118.96	4.000	No	Yes	2.00
19	1.26	0.83	2.92	4.14	0.97	16.08	7.43	119.53	4.000	No	Yes	2.00
20	1.28	0.90	2.88	3.96	0.95	17.43	6.86	119.52	4.000	No	Yes	2.00
21	1.30	0.96	2.84	3.74	0.94	18.56	6.36	118.04	4.000	No	Yes	2.00
22	1.32	0.99	2.82	3.60	0.93	19.11	6.09	116.45	4.000	No	Yes	2.00
23	1.34	0.99	2.82	3.62	0.93	19.20	6.09	116.98	4.000	No	Yes	2.00
24	1.36	1.00	2.82	3.71	0.94	19.26	6.16	118.65	4.000	No	Yes	2.00
25	1.38	0.99	2.83	3.82	0.94	19.10	6.30	120.36	4.000	No	Yes	2.00
26	1.40	0.97	2.86	4.03	0.95	18.71	6.60	123.49	4.000	No	Yes	2.00
27	1.42	0.95	2.88	4.29	0.96	18.36	6.93	127.15	4.000	No	Yes	2.00
28	1.44	0.94	2.90	4.48	0.96	18.09	7.17	129.76	4.000	No	Yes	2.00
29	1.46	0.91	2.92	4.61	0.97	17.56	7.43	130.57	4.000	No	Yes	2.00
30	1.48	0.90	2.92	4.66	0.97	17.26	7.57	130.69	4.000	No	Yes	2.00
31	1.50	0.95	2.89	4.33	0.96	18.27	6.99	127.74	4.000	No	Yes	2.00
32	1.52	0.90	2.91	4.48	0.97	17.39	7.37	128.08	4.000	No	Yes	2.00
33	1.54	0.91	2.90	4.37	0.97	17.54	7.22	126.64	4.000	No	Yes	2.00
34	1.56	0.95	2.87	4.15	0.96	18.26	6.82	124.54	4.000	No	Yes	2.00
35	1.58	0.95	2.87	4.06	0.95	18.26	6.74	122.97	4.000	No	Yes	2.00
36	1.60	0.85	2.93	4.48	0.98	16.34	7.68	125.43	4.000	No	Yes	2.00
37	1.62	0.80	2.97	4.67	0.99	15.29	8.21	125.55	4.000	No	Yes	2.00
38	1.64	0.69	3.04	5.21	1.00	13.23	9.56	126.49	4.000	No	Yes	2.00
39	1.66	0.56	3.16	6.13	1.00	10.65	11.88	126.54	4.000	No	Yes	2.00
40	1.68	0.43	3.31	7.40	1.00	8.02	15.42	123.69	4.000	No	Yes	2.00
41	1.70	0.36	3.39	7.90	1.00	6.58	17.84	117.33	4.000	No	Yes	2.00
42	1.72	0.33	3.41	7.46	1.00	6.03	18.28	110.19	4.000	No	Yes	2.00
43	1.74	0.31	3.40	6.66	1.00	5.67	18.01	102.08	4.000	No	Yes	2.00
44	1.76	0.31	3.37	5.64	1.00	5.52	17.01	93.91	4.000	No	Yes	2.00
45	1.78	0.33	3.28	4.55	1.00	5.97	14.77	88.11	4.000	No	Yes	2.00
46	1.80	0.33	3.26	4.12	1.00	5.89	14.27	84.06	4.000	No	Yes	2.00
47	1.82	0.33	3.23	3.62	1.00	5.97	13.39	79.97	4.000	No	Yes	2.00
48	1.84	0.34	3.19	3.19	1.00	6.16	12.44	76.56	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	0.35	3.15	2.92	1.00	6.45	11.61	74.95	4.000	No	Yes	2.00
50	1.88	0.37	3.12	2.82	1.00	6.77	11.08	75.00	4.000	No	Yes	2.00
51	1.90	0.38	3.11	2.78	1.00	6.99	10.79	75.41	4.000	No	Yes	2.00
52	1.92	0.39	3.11	2.82	1.00	7.05	10.77	75.99	4.000	No	Yes	2.00
53	1.94	0.37	3.14	3.05	1.00	6.75	11.48	77.49	4.000	No	Yes	2.00
54	1.96	0.34	3.20	3.41	1.00	6.21	12.73	79.00	4.000	No	Yes	2.00
55	1.98	0.31	3.26	3.76	1.00	5.56	14.24	79.13	4.000	No	Yes	2.00
56	2.00	0.28	3.31	4.00	1.00	5.03	15.57	78.25	4.000	No	Yes	2.00
57	2.02	0.26	3.36	4.20	1.00	4.56	16.88	77.05	4.000	No	Yes	2.00
58	2.04	0.25	3.39	4.27	1.00	4.27	17.71	75.55	4.000	No	Yes	2.00
59	2.06	0.23	3.41	4.28	1.00	4.01	18.41	73.91	4.000	No	Yes	2.00
60	2.08	0.23	3.42	4.20	1.00	3.84	18.78	72.17	4.000	No	Yes	2.00
61	2.10	0.22	3.44	4.19	1.00	3.68	19.26	70.95	4.000	No	Yes	2.00
62	2.12	0.21	3.45	4.20	1.00	3.60	19.54	70.39	4.000	No	Yes	2.00
63	2.14	0.21	3.45	4.18	1.00	3.57	19.62	70.04	4.000	No	Yes	2.00
64	2.16	0.21	3.45	4.13	1.00	3.59	19.47	69.82	4.000	No	Yes	2.00
65	2.18	0.22	3.44	4.08	1.00	3.63	19.23	69.88	4.000	No	Yes	2.00
66	2.20	0.22	3.43	4.04	1.00	3.70	18.94	70.08	4.000	No	Yes	2.00
67	2.22	0.23	3.41	3.91	1.00	3.81	18.35	69.97	4.000	No	Yes	2.00
68	2.24	0.23	3.38	3.72	1.00	3.97	17.54	69.63	4.000	No	Yes	2.00
69	2.26	0.37	3.07	2.18	1.00	6.61	10.12	66.93	4.000	No	Yes	2.00
70	2.28	0.57	2.79	1.33	0.93	10.62	5.73	60.80	4.000	Yes	Yes	2.00
71	2.30	0.74	2.62	0.99	0.87	14.02	6.24	87.53	4.000	Yes	No	2.00
72	2.32	0.88	2.52	0.84	0.83	16.64	3.27	54.45	4.000	Yes	No	2.00
73	2.34	0.99	2.45	0.76	0.80	18.91	2.68	50.69	4.000	Yes	No	2.00
74	2.36	0.97	2.48	0.84	0.81	18.38	2.88	52.86	4.000	Yes	No	2.00
75	2.38	0.84	2.59	1.07	0.86	15.82	5.14	81.27	4.000	Yes	No	2.00
76	2.40	0.72	2.70	1.34	0.90	13.59	10.03	136.33	4.000	Yes	No	2.00
77	2.42	0.63	2.79	1.63	0.93	11.78	5.77	67.96	4.000	Yes	Yes	2.00
78	2.44	0.55	2.89	1.96	0.97	10.11	7.10	71.76	4.000	Yes	Yes	2.00
79	2.46	0.48	2.98	2.28	1.00	8.70	8.48	73.84	4.000	Yes	Yes	2.00
80	2.48	0.43	3.05	2.52	1.00	7.69	9.67	74.42	4.000	No	Yes	2.00
81	2.50	0.38	3.11	2.76	1.00	6.84	10.91	74.60	4.000	No	Yes	2.00
82	2.52	0.35	3.17	2.97	1.00	6.22	11.99	74.58	4.000	No	Yes	2.00
83	2.54	0.33	3.22	3.18	1.00	5.69	13.08	74.41	4.000	No	Yes	2.00
84	2.56	0.30	3.27	3.40	1.00	5.15	14.34	73.89	4.000	No	Yes	2.00
85	2.58	0.29	3.29	3.45	1.00	4.89	14.92	72.91	4.000	No	Yes	2.00
86	2.60	0.29	3.28	3.36	1.00	4.91	14.71	72.27	4.000	No	Yes	2.00
87	2.62	0.30	3.25	3.17	1.00	5.13	13.97	71.70	4.000	No	Yes	2.00
88	2.64	0.32	3.20	2.88	1.00	5.52	12.81	70.75	4.000	No	Yes	2.00
89	2.66	0.34	3.16	2.67	1.00	5.88	11.92	70.07	4.000	No	Yes	2.00
90	2.68	0.35	3.13	2.51	1.00	6.17	11.23	69.34	4.000	No	Yes	2.00
91	2.70	0.36	3.12	2.42	1.00	6.23	11.00	68.54	4.000	No	Yes	2.00
92	2.72	0.35	3.12	2.35	1.00	6.10	11.02	67.26	4.000	No	Yes	2.00
93	2.74	0.34	3.13	2.30	1.00	5.80	11.31	65.65	4.000	No	Yes	2.00
94	2.76	0.32	3.15	2.27	1.00	5.46	11.73	64.07	4.000	No	Yes	2.00
95	2.78	0.30	3.18	2.25	1.00	5.12	12.21	62.49	4.000	No	Yes	2.00
96	2.80	0.29	3.19	2.18	1.00	4.83	12.57	60.68	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.28	3.19	2.10	1.00	4.70	12.60	59.28	4.000	No	Yes	2.00
98	2.84	0.28	3.20	2.10	1.00	4.63	12.74	58.98	4.000	No	Yes	2.00
99	2.86	0.28	3.20	2.12	1.00	4.62	12.79	59.16	4.000	No	Yes	2.00
100	2.88	0.28	3.20	2.12	1.00	4.65	12.74	59.32	4.000	No	Yes	2.00
101	2.90	0.28	3.21	2.29	1.00	4.74	12.96	61.43	4.000	No	Yes	2.00
102	2.92	0.28	3.23	2.43	1.00	4.70	13.32	62.64	4.000	No	Yes	2.00
103	2.94	0.28	3.24	2.58	1.00	4.67	13.71	63.97	4.000	No	Yes	2.00
104	2.96	0.28	3.26	2.76	1.00	4.61	14.19	65.44	4.000	No	Yes	2.00
105	2.98	0.28	3.28	2.98	1.00	4.58	14.68	67.24	4.000	No	Yes	2.00
106	3.00	0.27	3.30	3.06	1.00	4.47	15.07	67.38	4.000	No	Yes	2.00
107	3.02	0.27	3.31	3.21	1.00	4.41	15.49	68.32	4.000	No	Yes	2.00
108	3.04	0.27	3.32	3.36	1.00	4.40	15.80	69.44	4.000	No	Yes	2.00
109	3.06	0.27	3.32	3.42	1.00	4.44	15.80	70.21	4.000	No	Yes	2.00
110	3.08	0.27	3.32	3.43	1.00	4.51	15.67	70.68	4.000	No	Yes	2.00
111	3.10	0.28	3.31	3.45	1.00	4.57	15.57	71.15	4.000	No	Yes	2.00
112	3.12	0.28	3.31	3.47	1.00	4.59	15.57	71.49	4.000	No	Yes	2.00
113	3.14	0.28	3.31	3.43	1.00	4.56	15.54	70.94	4.000	No	Yes	2.00
114	3.16	0.28	3.30	3.24	1.00	4.52	15.29	69.15	4.000	No	Yes	2.00
115	3.18	0.27	3.29	3.03	1.00	4.45	15.05	66.94	4.000	No	Yes	2.00
116	3.20	0.27	3.28	2.76	1.00	4.38	14.66	64.23	4.000	No	Yes	2.00
117	3.22	0.27	3.26	2.44	1.00	4.36	14.04	61.17	4.000	No	Yes	2.00
118	3.24	0.27	3.23	2.14	1.00	4.35	13.40	58.25	4.000	No	Yes	2.00
119	3.26	0.27	3.21	2.00	1.00	4.37	13.01	56.85	4.000	No	Yes	2.00
120	3.28	0.27	3.19	1.87	1.00	4.44	12.56	55.76	4.000	No	Yes	2.00
121	3.30	0.28	3.18	1.80	1.00	4.53	12.24	55.41	4.000	No	Yes	2.00
122	3.32	0.28	3.17	1.79	1.00	4.62	12.03	55.54	4.000	No	Yes	2.00
123	3.34	0.29	3.16	1.77	1.00	4.74	11.78	55.84	4.000	No	Yes	2.00
124	3.36	0.29	3.15	1.78	1.00	4.82	11.67	56.25	4.000	No	Yes	2.00
125	3.38	0.30	3.16	1.85	1.00	4.85	11.76	57.07	4.000	No	Yes	2.00
126	3.40	0.30	3.17	1.92	1.00	4.82	11.99	57.79	4.000	No	Yes	2.00
127	3.42	0.29	3.18	1.98	1.00	4.72	12.32	58.11	4.000	No	Yes	2.00
128	3.44	0.28	3.21	2.07	1.00	4.52	12.87	58.21	4.000	No	Yes	2.00
129	3.46	0.28	3.22	2.10	1.00	4.35	13.29	57.84	4.000	No	Yes	2.00
130	3.48	0.27	3.24	2.10	1.00	4.22	13.56	57.26	4.000	No	Yes	2.00
131	3.50	0.27	3.23	2.05	1.00	4.17	13.55	56.53	4.000	No	Yes	2.00
132	3.52	0.27	3.22	1.97	1.00	4.22	13.26	56.02	4.000	No	Yes	2.00
133	3.54	0.29	3.20	1.90	1.00	4.41	12.71	55.98	4.000	No	Yes	2.00
134	3.56	0.33	3.10	1.65	1.00	5.25	10.67	56.03	4.000	No	Yes	2.00
135	3.58	0.40	3.00	1.44	1.00	6.41	8.76	56.14	4.000	No	Yes	2.00
136	3.60	0.47	2.90	1.28	0.98	7.70	7.28	56.05	4.000	No	Yes	2.00
137	3.62	0.54	2.85	1.24	0.96	8.83	6.44	56.81	4.000	No	Yes	2.00
138	3.64	0.60	2.81	1.20	0.95	9.65	5.92	57.12	4.000	No	Yes	2.00
139	3.66	0.62	2.79	1.21	0.94	10.07	5.73	57.68	4.000	No	Yes	2.00
140	3.68	0.65	2.77	1.18	0.93	10.45	5.50	57.47	4.000	No	Yes	2.00
141	3.70	0.68	2.75	1.14	0.93	10.82	5.25	56.82	4.000	No	Yes	2.00
142	3.72	0.72	2.72	1.09	0.92	11.37	4.94	56.15	4.000	No	Yes	2.00
143	3.74	0.76	2.69	1.03	0.90	11.98	9.63	115.38	4.000	No	No	2.00
144	3.76	0.78	2.68	1.00	0.90	12.23	8.80	107.64	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.85	2.64	0.95	0.88	13.08	7.03	92.01	4.000	No	No	2.00
146	3.80	0.89	2.62	0.95	0.88	13.75	6.24	85.76	4.000	No	No	2.00
147	3.82	0.91	2.61	0.95	0.87	13.99	5.95	83.31	4.000	No	No	2.00
148	3.84	0.91	2.64	1.10	0.89	13.98	7.17	100.24	4.000	No	No	2.00
149	3.86	0.90	2.67	1.21	0.90	13.81	8.45	116.63	4.000	No	No	2.00
150	3.88	0.83	2.73	1.39	0.92	12.72	5.03	63.94	4.000	No	Yes	2.00
151	3.90	0.80	2.75	1.45	0.93	12.32	5.28	65.02	4.000	Yes	Yes	2.00
152	3.92	0.85	2.72	1.38	0.92	12.88	4.96	63.88	4.000	Yes	Yes	2.00
153	3.94	0.95	2.65	1.17	0.89	14.30	7.35	105.17	4.000	Yes	No	2.00
154	3.96	1.08	2.58	1.05	0.86	16.10	4.78	76.86	4.000	Yes	No	2.00
155	3.98	1.22	2.53	1.00	0.84	17.90	3.46	61.92	4.000	Yes	No	2.00
156	4.00	1.27	2.52	1.03	0.84	18.63	3.25	60.59	4.000	No	No	2.00
157	4.02	1.31	2.52	1.08	0.84	19.12	3.24	61.89	4.000	No	No	2.00
158	4.04	1.38	2.50	1.06	0.83	19.99	2.83	56.68	4.000	No	No	2.00
159	4.06	1.47	2.49	1.10	0.83	21.29	2.88	61.33	4.000	No	No	2.00
160	4.08	1.53	2.49	1.21	0.83	22.06	2.93	64.70	4.000	Yes	No	2.00
161	4.10	1.56	2.52	1.38	0.84	22.50	3.13	70.55	4.000	Yes	No	2.00
162	4.12	1.49	2.59	1.79	0.87	21.78	5.12	111.57	4.000	Yes	No	2.00
163	4.14	1.42	2.66	2.24	0.90	20.82	8.12	169.08	4.000	Yes	No	2.00
164	4.16	1.36	2.72	2.64	0.92	20.09	4.90	98.44	4.000	Yes	Yes	2.00
165	4.18	1.27	2.77	2.99	0.94	18.86	5.52	104.13	4.000	Yes	Yes	2.00
166	4.20	1.20	2.81	3.25	0.95	17.94	6.01	107.84	4.000	Yes	Yes	2.00
167	4.22	1.14	2.83	3.27	0.96	17.00	6.27	106.59	4.000	Yes	Yes	2.00
168	4.24	0.98	2.92	3.69	0.99	14.56	7.47	108.76	4.000	Yes	Yes	2.00
169	4.26	0.75	3.07	4.48	1.00	11.02	9.95	109.65	0.526	No	Yes	2.00
170	4.28	0.62	3.18	5.19	1.00	8.78	12.34	108.28	0.419	No	Yes	2.00
171	4.30	0.51	3.28	5.78	1.00	7.11	14.76	104.94	0.339	No	Yes	2.00
172	4.32	0.48	3.32	5.84	1.00	6.53	15.61	101.89	0.311	No	Yes	2.00
173	4.34	0.50	3.27	5.22	1.00	6.81	14.47	98.56	0.325	No	Yes	2.00
174	4.36	0.51	3.23	4.61	1.00	7.05	13.40	94.41	0.336	No	Yes	2.00
175	4.38	0.53	3.18	4.02	1.00	7.27	12.36	89.83	0.347	No	Yes	2.00
176	4.40	0.53	3.15	3.62	1.00	7.32	11.74	85.89	0.349	No	Yes	2.00
177	4.42	0.58	3.07	2.90	1.00	8.01	10.00	80.14	0.382	No	Yes	2.00
178	4.44	0.67	2.94	2.19	1.00	9.41	7.87	74.02	0.449	No	Yes	2.00
179	4.46	0.79	2.84	1.79	0.96	11.13	6.32	70.30	0.531	No	Yes	2.00
180	4.48	0.90	2.77	1.65	0.94	12.68	5.48	69.42	0.605	No	Yes	2.00
181	4.50	0.95	2.75	1.69	0.93	13.40	5.30	71.04	0.639	No	Yes	2.00
182	4.52	0.94	2.79	1.93	0.95	13.19	5.73	75.65	0.629	No	Yes	2.00
183	4.54	0.87	2.86	2.31	0.97	12.22	6.65	81.30	0.583	No	Yes	2.00
184	4.56	0.75	2.97	2.90	1.00	10.54	8.28	87.24	0.503	No	Yes	2.00
185	4.58	0.63	3.10	3.70	1.00	8.64	10.63	91.87	0.412	No	Yes	2.00
186	4.60	0.57	3.18	4.27	1.00	7.69	12.25	94.20	0.367	No	Yes	2.00
187	4.62	0.56	3.19	4.40	1.00	7.61	12.50	95.05	0.363	No	Yes	2.00
188	4.64	0.59	3.16	4.21	1.00	7.98	11.89	94.86	0.381	No	Yes	2.00
189	4.66	0.64	3.11	3.87	1.00	8.79	10.73	94.33	0.419	No	Yes	2.00
190	4.68	0.72	3.04	3.49	1.00	9.91	9.44	93.58	0.473	No	Yes	2.00
191	4.70	0.80	2.98	3.23	1.00	11.14	8.40	93.51	0.531	No	Yes	2.00
192	4.72	0.86	2.95	3.23	1.00	11.97	7.99	95.57	0.571	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.90	2.95	3.43	1.00	12.58	7.96	100.08	0.600	No	Yes	2.00
194	4.76	0.94	2.96	3.80	1.00	13.11	8.16	106.94	0.625	No	Yes	2.00
195	4.78	0.97	2.99	4.43	1.00	13.67	8.60	117.51	0.652	No	Yes	2.00
196	4.80	1.03	3.01	5.05	1.00	14.42	8.90	128.29	0.688	No	Yes	2.00
197	4.82	1.09	3.01	5.50	1.00	15.37	8.95	137.54	0.733	No	Yes	2.00
198	4.84	1.19	2.99	5.66	1.00	16.76	8.60	144.15	0.799	No	Yes	2.00
199	4.86	1.30	2.95	5.56	1.00	18.36	8.04	147.51	0.876	No	Yes	2.00
200	4.88	1.43	2.90	5.14	0.99	20.13	7.23	145.58	0.960	No	Yes	2.00
201	4.90	1.55	2.85	4.71	0.97	21.82	6.51	141.95	1.041	No	Yes	2.00
202	4.92	1.67	2.81	4.36	0.95	23.32	5.94	138.42	1.112	No	Yes	2.00
203	4.94	1.73	2.78	4.19	0.94	24.09	5.66	136.40	1.149	No	Yes	2.00
204	4.96	1.75	2.78	4.20	0.94	24.19	5.65	136.77	1.154	No	Yes	2.00
205	4.98	1.71	2.81	4.42	0.95	23.64	5.93	140.22	1.128	No	Yes	2.00
206	5.00	1.65	2.83	4.69	0.96	22.91	6.28	143.88	1.093	No	Yes	2.00
207	5.02	1.60	2.86	4.93	0.97	22.19	6.61	146.72	1.058	No	Yes	2.00
208	5.04	1.58	2.87	5.04	0.98	21.86	6.77	147.99	1.043	No	Yes	2.00
209	5.06	1.61	2.86	4.93	0.97	22.21	6.61	146.76	1.059	No	Yes	2.00
210	5.08	1.66	2.83	4.69	0.96	22.83	6.29	143.67	1.089	No	Yes	2.00
211	5.10	1.71	2.81	4.46	0.96	23.33	6.02	140.33	1.113	No	Yes	2.00
212	5.12	1.74	2.79	4.22	0.95	23.64	5.77	136.35	1.128	No	Yes	2.00
213	5.14	1.75	2.78	4.04	0.94	23.72	5.60	132.73	1.131	No	Yes	2.00
214	5.16	1.73	2.78	3.93	0.94	23.39	5.56	129.94	1.115	No	Yes	2.00
215	5.18	1.69	2.78	3.87	0.94	22.78	5.61	127.80	1.087	No	Yes	2.00
216	5.20	1.66	2.78	3.81	0.94	22.30	5.64	125.79	1.064	No	Yes	2.00
217	5.22	1.67	2.78	3.73	0.94	22.33	5.57	124.27	1.065	No	Yes	2.00
218	5.24	1.73	2.76	3.61	0.94	23.03	5.34	122.92	4.000	Yes	Yes	2.00
219	5.26	1.89	2.71	3.33	0.92	25.04	4.78	119.69	4.000	Yes	Yes	2.00
220	5.28	2.30	2.60	2.82	0.87	30.18	5.34	161.32	4.000	Yes	No	2.00
221	5.30	2.74	2.51	2.53	0.84	35.66	3.05	108.60	4.000	Yes	No	2.00
222	5.32	3.14	2.46	2.42	0.82	40.71	2.69	109.60	4.000	Yes	No	2.00
223	5.34	3.53	2.41	2.33	0.80	45.42	2.42	110.07	4.000	Yes	No	2.00
224	5.36	3.82	2.39	2.35	0.79	49.02	2.31	113.12	4.000	Yes	No	2.00
225	5.38	3.87	2.41	2.55	0.80	49.78	2.41	119.74	4.000	Yes	No	2.00
226	5.40	3.78	2.45	2.90	0.82	48.79	2.66	129.69	4.000	Yes	No	2.00
227	5.42	3.61	2.51	3.35	0.84	46.81	2.94	137.52	4.000	Yes	No	2.00
228	5.44	3.44	2.57	3.88	0.86	44.76	4.33	193.75	4.000	Yes	No	2.00
229	5.46	3.29	2.62	4.48	0.88	42.93	6.25	268.29	4.000	Yes	No	2.00
230	5.48	3.17	2.67	5.05	0.90	41.53	8.44	350.35	4.000	Yes	No	2.00
231	5.50	3.13	2.70	5.41	0.91	41.04	9.87	405.05	4.000	Yes	No	2.00
232	5.52	3.08	2.72	5.73	0.92	40.41	4.90	197.88	4.000	Yes	Yes	2.00
233	5.54	2.92	2.76	6.30	0.94	38.30	5.41	207.31	4.000	Yes	Yes	2.00
234	5.56	2.68	2.82	6.96	0.96	35.28	6.10	215.30	4.000	Yes	Yes	2.00
235	5.58	2.38	2.90	7.92	0.99	31.35	7.14	223.94	4.000	Yes	Yes	2.00
236	5.60	2.09	2.98	8.97	1.00	27.38	8.37	229.19	4.000	Yes	Yes	2.00
237	5.62	1.89	3.03	9.57	1.00	24.65	9.25	228.13	1.176	No	Yes	2.00
238	5.64	1.81	3.04	9.50	1.00	23.43	9.48	222.15	1.118	No	Yes	2.00
239	5.66	1.77	3.03	9.07	1.00	22.90	9.35	214.08	1.092	No	Yes	2.00
240	5.68	1.77	3.00	8.24	1.00	22.80	8.85	201.81	1.088	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	1.78	2.97	7.45	1.00	22.88	8.32	190.28	1.091	No	Yes	2.00
242	5.72	1.79	2.95	6.85	1.00	22.95	7.89	181.13	1.095	No	Yes	2.00
243	5.74	1.83	2.91	6.31	1.00	23.40	7.42	173.60	1.116	No	Yes	2.00
244	5.76	1.90	2.88	5.91	0.99	24.16	6.99	168.76	1.152	No	Yes	2.00
245	5.78	1.97	2.86	5.73	0.98	25.00	6.70	167.58	1.193	No	Yes	2.00
246	5.80	2.10	2.83	5.51	0.97	26.57	6.29	167.08	1.267	No	Yes	2.00
247	5.82	2.21	2.81	5.39	0.96	27.90	6.00	167.42	1.331	No	Yes	2.00
248	5.84	2.28	2.80	5.38	0.95	28.69	5.89	168.90	1.369	No	Yes	2.00
249	5.86	2.32	2.80	5.38	0.95	29.20	5.82	169.89	1.393	No	Yes	2.00
250	5.88	2.38	2.79	5.34	0.95	29.89	5.70	170.34	1.426	No	Yes	2.00
251	5.90	2.41	2.79	5.37	0.95	30.13	5.69	171.41	1.437	No	Yes	2.00
252	5.92	2.45	2.78	5.34	0.95	30.56	5.62	171.70	1.458	No	Yes	2.00
253	5.94	2.50	2.77	5.27	0.94	31.09	5.51	171.21	1.483	No	Yes	2.00
254	5.96	2.53	2.77	5.24	0.94	31.41	5.45	171.14	1.498	No	Yes	2.00
255	5.98	2.53	2.77	5.26	0.94	31.40	5.46	171.56	1.498	No	Yes	2.00
256	6.00	2.53	2.77	5.23	0.94	31.22	5.46	170.56	1.489	No	Yes	2.00
257	6.02	2.52	2.77	5.20	0.94	31.01	5.46	169.43	1.479	No	Yes	2.00
258	6.04	2.52	2.76	5.14	0.94	31.00	5.43	168.26	1.478	No	Yes	2.00
259	6.06	2.58	2.75	4.96	0.94	31.57	5.24	165.29	1.506	No	Yes	2.00
260	6.08	2.74	2.71	4.66	0.92	33.44	4.82	161.34	1.595	No	Yes	2.00
261	6.10	2.89	2.68	4.44	0.91	35.10	9.08	318.72	3.600	No	No	2.00
262	6.12	3.00	2.67	4.37	0.90	36.43	8.19	298.49	3.600	No	No	2.00
263	6.14	3.06	2.66	4.42	0.90	37.12	8.09	300.41	3.600	No	No	2.00
264	6.16	3.06	2.68	4.61	0.91	37.02	8.79	325.55	3.600	No	No	2.00
265	6.18	2.97	2.71	4.91	0.92	35.91	4.76	171.11	1.713	No	Yes	2.00
266	6.20	2.93	2.72	5.15	0.93	35.41	4.97	175.92	1.689	No	Yes	2.00
267	6.22	2.92	2.73	5.29	0.93	35.25	5.07	178.86	1.682	No	Yes	2.00
268	6.24	2.94	2.73	5.32	0.93	35.46	5.07	179.77	1.691	No	Yes	2.00
269	6.26	3.00	2.73	5.35	0.93	36.04	5.04	181.47	1.719	No	Yes	2.00
270	6.28	3.02	2.74	5.53	0.93	36.28	5.13	186.10	1.731	No	Yes	2.00
271	6.30	2.99	2.76	5.93	0.94	35.90	5.41	194.32	1.712	No	Yes	2.00
272	6.32	2.98	2.79	6.37	0.95	35.78	5.70	203.79	1.707	No	Yes	2.00
273	6.34	3.01	2.81	6.87	0.96	36.13	5.96	215.20	1.724	No	Yes	2.00
274	6.36	3.13	2.81	7.21	0.96	37.46	6.02	225.43	4.000	Yes	Yes	2.00
275	6.38	3.41	2.78	7.06	0.95	40.77	5.63	229.52	4.000	Yes	Yes	2.00
276	6.40	3.85	2.73	6.59	0.93	45.84	4.98	228.29	4.000	Yes	Yes	2.00
277	6.42	4.73	2.61	5.58	0.89	55.88	5.94	331.80	4.000	Yes	No	2.00
278	6.44	6.68	2.41	4.00	0.81	77.94	2.43	189.38	4.000	Yes	No	2.00
279	6.46	10.64	2.14	2.61	0.71	121.79	1.49	181.52	4.000	Yes	No	2.00
280	6.48	17.56	1.85	1.62	0.60	196.58	1.20	236.31	4.000	Yes	No	2.00
281	6.50	26.08	1.62	1.12	0.51	286.50	1.00	286.50	4.000	No	No	2.00
282	6.52	32.41	1.50	0.92	0.46	352.22	1.00	352.22	4.000	No	No	2.00
283	6.54	41.06	1.37	0.75	0.41	441.35	1.00	441.35	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00						

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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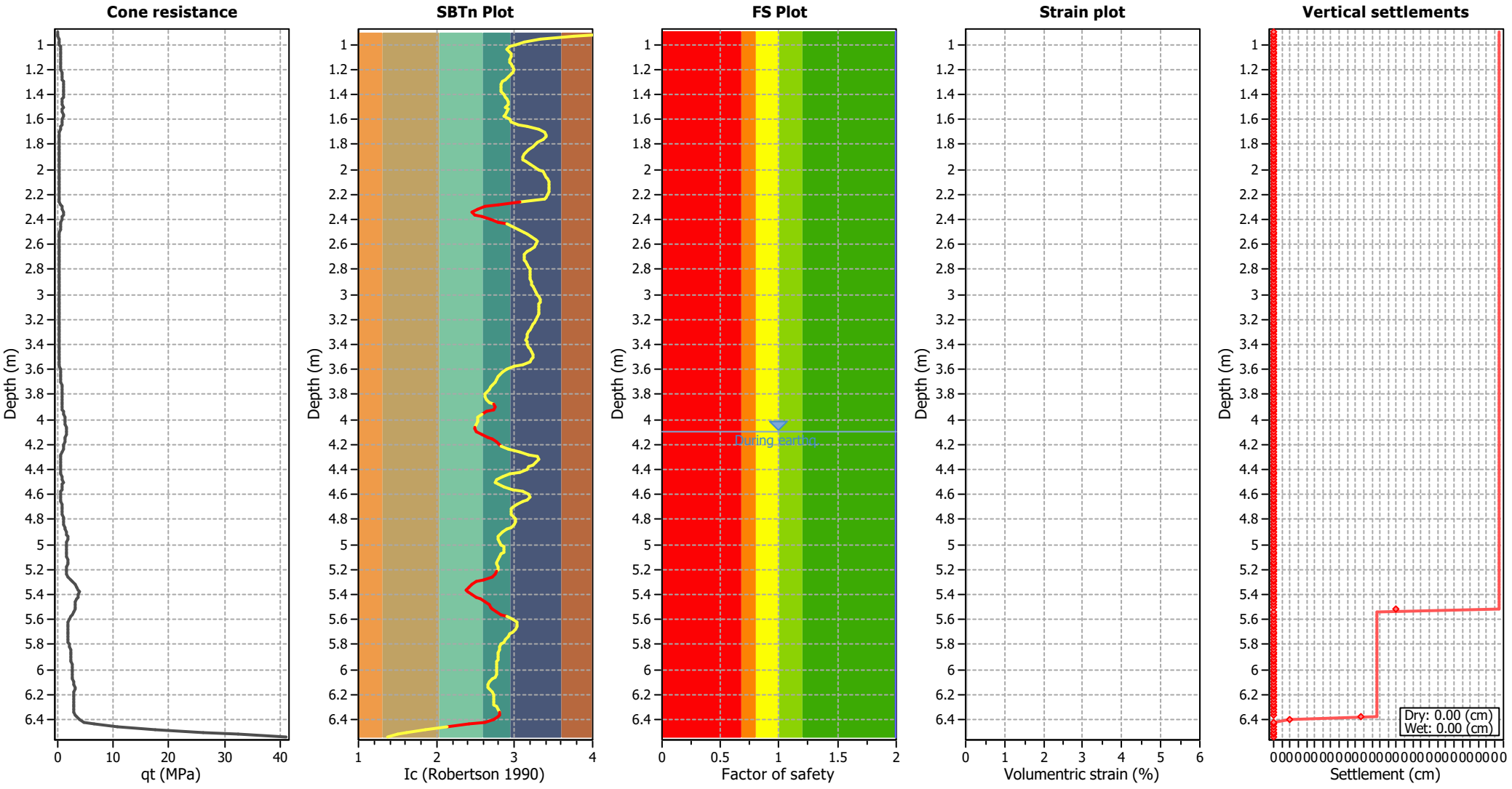
CPT name: cwlp CPT- 14CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.10	70.55	2.00	0.00	0.77	0.00	4.12	111.57	2.00	0.00	0.77	0.00
4.14	169.08	2.00	0.00	0.77	0.00	4.16	98.44	2.00	0.00	0.77	0.00
4.18	104.13	2.00	0.00	0.77	0.00	4.20	107.84	2.00	0.00	0.77	0.00
4.22	106.59	2.00	0.00	0.77	0.00	4.24	108.76	2.00	0.00	0.76	0.00
4.26	109.65	2.00	0.00	0.76	0.00	4.28	108.28	2.00	0.00	0.76	0.00
4.30	104.94	2.00	0.00	0.76	0.00	4.32	101.89	2.00	0.00	0.76	0.00
4.34	98.56	2.00	0.00	0.76	0.00	4.36	94.41	2.00	0.00	0.76	0.00
4.38	89.83	2.00	0.00	0.76	0.00	4.40	85.89	2.00	0.00	0.76	0.00
4.42	80.14	2.00	0.00	0.75	0.00	4.44	74.02	2.00	0.00	0.75	0.00
4.46	70.30	2.00	0.00	0.75	0.00	4.48	69.42	2.00	0.00	0.75	0.00
4.50	71.04	2.00	0.00	0.75	0.00	4.52	75.65	2.00	0.00	0.75	0.00
4.54	81.30	2.00	0.00	0.75	0.00	4.56	87.24	2.00	0.00	0.75	0.00
4.58	91.87	2.00	0.00	0.75	0.00	4.60	94.20	2.00	0.00	0.74	0.00
4.62	95.05	2.00	0.00	0.74	0.00	4.64	94.86	2.00	0.00	0.74	0.00
4.66	94.33	2.00	0.00	0.74	0.00	4.68	93.58	2.00	0.00	0.74	0.00
4.70	93.51	2.00	0.00	0.74	0.00	4.72	95.57	2.00	0.00	0.74	0.00
4.74	100.08	2.00	0.00	0.74	0.00	4.76	106.94	2.00	0.00	0.74	0.00
4.78	117.51	2.00	0.00	0.73	0.00	4.80	128.29	2.00	0.00	0.73	0.00
4.82	137.54	2.00	0.00	0.73	0.00	4.84	144.15	2.00	0.00	0.73	0.00
4.86	147.51	2.00	0.00	0.73	0.00	4.88	145.58	2.00	0.00	0.73	0.00
4.90	141.95	2.00	0.00	0.73	0.00	4.92	138.42	2.00	0.00	0.73	0.00
4.94	136.40	2.00	0.00	0.73	0.00	4.96	136.77	2.00	0.00	0.72	0.00
4.98	140.22	2.00	0.00	0.72	0.00	5.00	143.88	2.00	0.00	0.72	0.00
5.02	146.72	2.00	0.00	0.72	0.00	5.04	147.99	2.00	0.00	0.72	0.00
5.06	146.76	2.00	0.00	0.72	0.00	5.08	143.67	2.00	0.00	0.72	0.00
5.10	140.33	2.00	0.00	0.72	0.00	5.12	136.35	2.00	0.00	0.72	0.00
5.14	132.73	2.00	0.00	0.71	0.00	5.16	129.94	2.00	0.00	0.71	0.00
5.18	127.80	2.00	0.00	0.71	0.00	5.20	125.79	2.00	0.00	0.71	0.00
5.22	124.27	2.00	0.00	0.71	0.00	5.24	122.92	2.00	0.00	0.71	0.00
5.26	119.69	2.00	0.00	0.71	0.00	5.28	161.32	2.00	0.00	0.71	0.00
5.30	108.60	2.00	0.00	0.71	0.00	5.32	109.60	2.00	0.00	0.70	0.00
5.34	110.07	2.00	0.00	0.70	0.00	5.36	113.12	2.00	0.00	0.70	0.00
5.38	119.74	2.00	0.00	0.70	0.00	5.40	129.69	2.00	0.00	0.70	0.00
5.42	137.52	2.00	0.00	0.70	0.00	5.44	193.75	2.00	0.00	0.70	0.00
5.46	268.29	2.00	0.00	0.70	0.00	5.48	350.35	2.00	0.00	0.70	0.00
5.50	405.05	2.00	0.00	0.69	0.00	5.52	197.88	2.00	0.00	0.69	0.00
5.54	207.31	2.00	0.00	0.69	0.00	5.56	215.30	2.00	0.00	0.69	0.00
5.58	223.94	2.00	0.00	0.69	0.00	5.60	229.19	2.00	0.00	0.69	0.00
5.62	228.13	2.00	0.00	0.69	0.00	5.64	222.15	2.00	0.00	0.69	0.00
5.66	214.08	2.00	0.00	0.69	0.00	5.68	201.81	2.00	0.00	0.68	0.00
5.70	190.28	2.00	0.00	0.68	0.00	5.72	181.13	2.00	0.00	0.68	0.00
5.74	173.60	2.00	0.00	0.68	0.00	5.76	168.76	2.00	0.00	0.68	0.00
5.78	167.58	2.00	0.00	0.68	0.00	5.80	167.08	2.00	0.00	0.68	0.00
5.82	167.42	2.00	0.00	0.68	0.00	5.84	168.90	2.00	0.00	0.68	0.00
5.86	169.89	2.00	0.00	0.67	0.00	5.88	170.34	2.00	0.00	0.67	0.00
5.90	171.41	2.00	0.00	0.67	0.00	5.92	171.70	2.00	0.00	0.67	0.00
5.94	171.21	2.00	0.00	0.67	0.00	5.96	171.14	2.00	0.00	0.67	0.00
5.98	171.56	2.00	0.00	0.67	0.00	6.00	170.56	2.00	0.00	0.67	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.02	169.43	2.00	0.00	0.67	0.00	6.04	168.26	2.00	0.00	0.66	0.00
6.06	165.29	2.00	0.00	0.66	0.00	6.08	161.34	2.00	0.00	0.66	0.00
6.10	318.72	2.00	0.00	0.66	0.00	6.12	298.49	2.00	0.00	0.66	0.00
6.14	300.41	2.00	0.00	0.66	0.00	6.16	325.55	2.00	0.00	0.66	0.00
6.18	171.11	2.00	0.00	0.66	0.00	6.20	175.92	2.00	0.00	0.66	0.00
6.22	178.86	2.00	0.00	0.65	0.00	6.24	179.77	2.00	0.00	0.65	0.00
6.26	181.47	2.00	0.00	0.65	0.00	6.28	186.10	2.00	0.00	0.65	0.00
6.30	194.32	2.00	0.00	0.65	0.00	6.32	203.79	2.00	0.00	0.65	0.00
6.34	215.20	2.00	0.00	0.65	0.00	6.36	225.43	2.00	0.00	0.65	0.00
6.38	229.52	2.00	0.00	0.65	0.00	6.40	228.29	2.00	0.00	0.64	0.00
6.42	331.80	2.00	0.00	0.64	0.00	6.44	189.38	2.00	0.00	0.64	0.00
6.46	181.52	2.00	0.00	0.64	0.00	6.48	236.31	2.00	0.00	0.64	0.00
6.50	286.50	2.00	0.00	0.64	0.00	6.52	352.22	2.00	0.00	0.64	0.00
6.54	441.35	2.00	0.00	0.64	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.03	0.37	54.25	19.90	4.06	0.11	0.11
0.92	0.05	0.67	54.25	36.36	4.06	0.11	0.19
0.94	0.09	1.58	32.68	51.57	3.76	0.36	0.44
0.96	0.20	3.64	15.92	57.94	3.33	0.33	1.00
0.98	0.30	5.69	11.00	62.63	3.12	0.38	1.53
1.00	0.38	7.25	8.94	64.85	3.01	0.54	1.90
1.02	0.45	8.62	7.81	67.34	2.94	0.20	0.68
1.04	0.50	9.67	7.29	70.43	2.91	0.26	0.68
1.06	0.50	9.53	7.80	74.33	2.94	0.36	0.69
1.08	0.50	9.56	8.21	78.55	2.97	0.52	0.70
1.10	0.53	10.19	8.03	81.83	2.95	0.68	0.71
1.12	0.58	11.08	7.71	85.42	2.93	0.72	0.72
1.14	0.61	11.67	7.86	91.72	2.94	0.73	0.73
1.16	0.63	12.17	8.08	98.38	2.96	0.75	0.75
1.18	0.65	12.56	8.36	105.00	2.97	0.76	0.76
1.20	0.68	13.00	8.60	111.83	2.99	0.77	0.77
1.22	0.72	13.79	8.50	117.26	2.98	0.78	0.78
1.24	0.77	14.83	8.02	118.96	2.95	0.78	0.78
1.26	0.83	16.08	7.43	119.53	2.92	0.78	0.78
1.28	0.90	17.43	6.86	119.52	2.88	0.78	0.78
1.30	0.96	18.56	6.36	118.04	2.84	0.78	0.78
1.32	0.99	19.11	6.09	116.45	2.82	0.78	0.78
1.34	0.99	19.20	6.09	116.98	2.82	0.78	0.78
1.36	1.00	19.26	6.16	118.65	2.82	0.78	0.78
1.38	0.99	19.10	6.30	120.36	2.83	0.78	0.78
1.40	0.97	18.71	6.60	123.49	2.86	0.79	0.79
1.42	0.95	18.36	6.93	127.15	2.88	0.79	0.79
1.44	0.94	18.09	7.17	129.76	2.90	0.80	0.80
1.46	0.91	17.56	7.43	130.57	2.92	0.80	0.80
1.48	0.90	17.26	7.57	130.69	2.92	0.80	0.80
1.50	0.95	18.27	6.99	127.74	2.89	0.79	0.79
1.52	0.90	17.39	7.37	128.08	2.91	0.80	0.80
1.54	0.91	17.54	7.22	126.64	2.90	0.79	0.79
1.56	0.95	18.26	6.82	124.54	2.87	0.79	0.79
1.58	0.95	18.26	6.74	122.97	2.87	0.79	0.79
1.60	0.85	16.34	7.68	125.43	2.93	0.79	0.79
1.62	0.80	15.29	8.21	125.55	2.97	0.79	0.79
1.64	0.69	13.23	9.56	126.49	3.04	1.48	1.96
1.66	0.56	10.65	11.88	126.54	3.16	1.37	1.55
1.68	0.43	8.02	15.42	123.69	3.31	1.28	1.15
1.70	0.36	6.58	17.84	117.33	3.39	1.08	0.93
1.72	0.33	6.03	18.28	110.19	3.41	0.79	0.85
1.74	0.31	5.67	18.01	102.08	3.40	0.67	0.79
1.76	0.31	5.52	17.01	93.91	3.37	0.62	0.76
1.78	0.33	5.97	14.77	88.11	3.28	0.52	0.81
1.80	0.33	5.89	14.27	84.06	3.26	0.40	0.79
1.82	0.33	5.97	13.39	79.97	3.23	0.37	0.79
1.84	0.34	6.16	12.44	76.56	3.19	0.37	0.81

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.35	6.45	11.61	74.95	3.15	0.35	0.84
1.88	0.37	6.77	11.08	75.00	3.12	0.31	0.87
1.90	0.38	6.99	10.79	75.41	3.11	0.31	0.89
1.92	0.39	7.05	10.77	75.99	3.11	0.37	0.88
1.94	0.37	6.75	11.48	77.49	3.14	0.38	0.84
1.96	0.34	6.21	12.73	79.00	3.20	0.36	0.76
1.98	0.31	5.56	14.24	79.13	3.26	0.35	0.68
2.00	0.28	5.03	15.57	78.25	3.31	0.35	0.60
2.02	0.26	4.56	16.88	77.05	3.36	0.33	0.54
2.04	0.25	4.27	17.71	75.55	3.39	0.30	0.50
2.06	0.23	4.01	18.41	73.91	3.41	0.27	0.47
2.08	0.23	3.84	18.78	72.17	3.42	0.26	0.44
2.10	0.22	3.68	19.26	70.95	3.44	0.25	0.42
2.12	0.21	3.60	19.54	70.39	3.45	0.24	0.41
2.14	0.21	3.57	19.62	70.04	3.45	0.23	0.40
2.16	0.21	3.59	19.47	69.82	3.45	0.23	0.40
2.18	0.22	3.63	19.23	69.88	3.44	0.23	0.40
2.20	0.22	3.70	18.94	70.08	3.43	0.23	0.41
2.22	0.23	3.81	18.35	69.97	3.41	0.23	0.41
2.24	0.23	3.97	17.54	69.63	3.38	0.23	0.43
2.26	0.37	6.61	10.12	66.93	3.07	0.22	0.70
2.28	0.57	10.62	5.73	60.80	2.79	0.12	0.66
2.30	0.74	14.02	3.95	55.37	2.62	0.72	0.72
2.32	0.88	16.64	3.14	52.29	2.52	0.07	0.64
2.34	0.99	18.91	2.68	50.69	2.45	0.06	0.63
2.36	0.97	18.38	2.88	52.86	2.48	0.07	0.63
2.38	0.84	15.82	3.68	58.27	2.59	0.65	0.71
2.40	0.72	13.59	4.68	63.62	2.70	0.81	0.81
2.42	0.63	11.78	5.77	67.96	2.79	0.22	0.68
2.44	0.55	10.11	7.10	71.76	2.89	0.29	0.69
2.46	0.48	8.70	8.48	73.84	2.98	0.35	0.69
2.48	0.43	7.69	9.67	74.42	3.05	0.27	0.75
2.50	0.38	6.84	10.91	74.60	3.11	0.25	0.66
2.52	0.35	6.22	11.99	74.58	3.17	0.25	0.59
2.54	0.33	5.69	13.08	74.41	3.22	0.24	0.54
2.56	0.30	5.15	14.34	73.89	3.27	0.23	0.48
2.58	0.29	4.89	14.92	72.91	3.29	0.23	0.46
2.60	0.29	4.91	14.71	72.27	3.28	0.20	0.45
2.62	0.30	5.13	13.97	71.70	3.25	0.20	0.47
2.64	0.32	5.52	12.81	70.75	3.20	0.20	0.50
2.66	0.34	5.88	11.92	70.07	3.16	0.21	0.53
2.68	0.35	6.17	11.23	69.34	3.13	0.20	0.55
2.70	0.36	6.23	11.00	68.54	3.12	0.18	0.56
2.72	0.35	6.10	11.02	67.26	3.12	0.18	0.54
2.74	0.34	5.80	11.31	65.65	3.13	0.17	0.51
2.76	0.32	5.46	11.73	64.07	3.15	0.16	0.48
2.78	0.30	5.12	12.21	62.49	3.18	0.13	0.44
2.80	0.29	4.83	12.57	60.68	3.19	0.12	0.41

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.28	4.70	12.60	59.28	3.19	0.12	0.40
2.84	0.28	4.63	12.74	58.98	3.20	0.11	0.39
2.86	0.28	4.62	12.79	59.16	3.20	0.11	0.39
2.88	0.28	4.65	12.74	59.32	3.20	0.12	0.39
2.90	0.28	4.74	12.96	61.43	3.21	0.12	0.39
2.92	0.28	4.70	13.32	62.64	3.23	0.12	0.39
2.94	0.28	4.67	13.71	63.97	3.24	0.16	0.38
2.96	0.28	4.61	14.19	65.44	3.26	0.14	0.38
2.98	0.28	4.58	14.68	67.24	3.28	0.15	0.37
3.00	0.27	4.47	15.07	67.38	3.30	0.16	0.36
3.02	0.27	4.41	15.49	68.32	3.31	0.16	0.35
3.04	0.27	4.40	15.80	69.44	3.32	0.16	0.35
3.06	0.27	4.44	15.80	70.21	3.32	0.16	0.35
3.08	0.27	4.51	15.67	70.68	3.32	0.18	0.35
3.10	0.28	4.57	15.57	71.15	3.31	0.18	0.36
3.12	0.28	4.59	15.57	71.49	3.31	0.17	0.36
3.14	0.28	4.56	15.54	70.94	3.31	0.17	0.35
3.16	0.28	4.52	15.29	69.15	3.30	0.17	0.35
3.18	0.27	4.45	15.05	66.94	3.29	0.16	0.34
3.20	0.27	4.38	14.66	64.23	3.28	0.12	0.33
3.22	0.27	4.36	14.04	61.17	3.26	0.11	0.33
3.24	0.27	4.35	13.40	58.25	3.23	0.09	0.32
3.26	0.27	4.37	13.01	56.85	3.21	0.09	0.32
3.28	0.27	4.44	12.56	55.76	3.19	0.08	0.33
3.30	0.28	4.53	12.24	55.41	3.18	0.09	0.33
3.32	0.28	4.62	12.03	55.54	3.17	0.08	0.34
3.34	0.29	4.74	11.78	55.84	3.16	0.08	0.34
3.36	0.29	4.82	11.67	56.25	3.15	0.09	0.35
3.38	0.30	4.85	11.76	57.07	3.16	0.09	0.35
3.40	0.30	4.82	11.99	57.79	3.17	0.09	0.34
3.42	0.29	4.72	12.32	58.11	3.18	0.10	0.34
3.44	0.28	4.52	12.87	58.21	3.21	0.10	0.32
3.46	0.28	4.35	13.29	57.84	3.22	0.09	0.31
3.48	0.27	4.22	13.56	57.26	3.24	0.09	0.30
3.50	0.27	4.17	13.55	56.53	3.23	0.08	0.30
3.52	0.27	4.22	13.26	56.02	3.22	0.08	0.30
3.54	0.29	4.41	12.71	55.98	3.20	0.08	0.31
3.56	0.33	5.25	10.67	56.03	3.10	0.08	0.38
3.58	0.40	6.41	8.76	56.14	3.00	0.08	0.65
3.60	0.47	7.70	7.28	56.05	2.90	0.08	0.64
3.62	0.54	8.83	6.44	56.81	2.85	0.09	0.65
3.64	0.60	9.65	5.92	57.12	2.81	0.09	0.65
3.66	0.62	10.07	5.73	57.68	2.79	0.09	0.65
3.68	0.65	10.45	5.50	57.47	2.77	0.09	0.65
3.70	0.68	10.82	5.25	56.82	2.75	0.09	0.65
3.72	0.72	11.37	4.94	56.15	2.72	0.08	0.65
3.74	0.76	11.98	4.61	55.26	2.69	0.78	0.78
3.76	0.78	12.23	4.47	54.64	2.68	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.85	13.08	4.12	53.93	2.64	0.73	0.73
3.80	0.89	13.75	3.95	54.27	2.62	0.72	0.72
3.82	0.91	13.99	3.88	54.34	2.61	0.71	0.71
3.84	0.91	13.98	4.15	58.03	2.64	0.75	0.75
3.86	0.90	13.81	4.40	60.78	2.67	0.78	0.78
3.88	0.83	12.72	5.03	63.94	2.73	0.16	0.67
3.90	0.80	12.32	5.28	65.02	2.75	0.17	0.67
3.92	0.85	12.88	4.96	63.88	2.72	0.15	0.67
3.94	0.95	14.30	4.19	59.90	2.65	0.76	0.76
3.96	1.08	16.10	3.59	57.78	2.58	0.45	0.70
3.98	1.22	17.90	3.20	57.35	2.53	0.13	0.66
4.00	1.27	18.63	3.14	58.43	2.52	0.12	0.66
4.02	1.31	19.12	3.13	59.85	2.52	0.13	0.66
4.04	1.38	19.99	2.99	59.78	2.50	0.09	0.65
4.06	1.47	21.29	2.88	61.33	2.49	0.13	0.66
4.08	1.53	22.06	2.93	64.70	2.49	0.17	0.67
4.10	1.56	22.50	3.10	69.68	2.52	0.27	0.68
4.12	1.49	21.78	3.68	80.17	2.59	0.77	0.77
4.14	1.42	20.82	4.34	90.35	2.66	0.85	0.85
4.16	1.36	20.09	4.90	98.44	2.72	0.75	0.75
4.18	1.27	18.86	5.52	104.13	2.77	0.76	0.76
4.20	1.20	17.94	6.01	107.84	2.81	0.76	0.76
4.22	1.14	17.00	6.27	106.59	2.83	0.76	0.76
4.24	0.98	14.56	7.47	108.76	2.92	0.76	0.76
4.26	0.75	11.02	9.95	109.65	3.07	0.48	0.79
4.28	0.62	8.78	12.34	108.28	3.18	0.47	0.63
4.30	0.51	7.11	14.76	104.94	3.28	0.41	0.51
4.32	0.48	6.53	15.61	101.89	3.32	0.37	0.47
4.34	0.50	6.81	14.47	98.56	3.27	0.33	0.49
4.36	0.51	7.05	13.40	94.41	3.23	0.33	0.50
4.38	0.53	7.27	12.36	89.83	3.18	0.34	0.52
4.40	0.53	7.32	11.74	85.89	3.15	0.26	0.52
4.42	0.58	8.01	10.00	80.14	3.07	0.20	0.57
4.44	0.67	9.41	7.87	74.02	2.94	0.36	0.69
4.46	0.79	11.13	6.32	70.30	2.84	0.26	0.68
4.48	0.90	12.68	5.48	69.42	2.77	0.24	0.68
4.50	0.95	13.40	5.30	71.04	2.75	0.28	0.69
4.52	0.94	13.19	5.73	75.65	2.79	0.41	0.70
4.54	0.87	12.22	6.65	81.30	2.86	0.65	0.71
4.56	0.75	10.54	8.28	87.24	2.97	0.72	0.72
4.58	0.63	8.64	10.63	91.87	3.10	0.33	0.62
4.60	0.57	7.69	12.25	94.20	3.18	0.34	0.55
4.62	0.56	7.61	12.50	95.05	3.19	0.34	0.54
4.64	0.59	7.98	11.89	94.86	3.16	0.33	0.57
4.66	0.64	8.79	10.73	94.33	3.11	0.33	0.63
4.68	0.72	9.91	9.44	93.58	3.04	0.34	0.71
4.70	0.80	11.14	8.40	93.51	2.98	0.74	0.74
4.72	0.86	11.97	7.99	95.57	2.95	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.90	12.58	7.96	100.08	2.95	0.75	0.75
4.76	0.94	13.11	8.16	106.94	2.96	0.76	0.76
4.78	0.97	13.67	8.60	117.51	2.99	0.78	0.78
4.80	1.03	14.42	8.90	128.29	3.01	0.69	1.03
4.82	1.09	15.37	8.95	137.54	3.01	0.90	1.10
4.84	1.19	16.76	8.60	144.15	2.99	0.82	0.82
4.86	1.30	18.36	8.04	147.51	2.95	0.82	0.82
4.88	1.43	20.13	7.23	145.58	2.90	0.82	0.82
4.90	1.55	21.82	6.51	141.95	2.85	0.82	0.82
4.92	1.67	23.32	5.94	138.42	2.81	0.81	0.81
4.94	1.73	24.09	5.66	136.40	2.78	0.81	0.81
4.96	1.75	24.19	5.65	136.77	2.78	0.81	0.81
4.98	1.71	23.64	5.93	140.22	2.81	0.81	0.81
5.00	1.65	22.91	6.28	143.88	2.83	0.82	0.82
5.02	1.60	22.19	6.61	146.72	2.86	0.82	0.82
5.04	1.58	21.86	6.77	147.99	2.87	0.82	0.82
5.06	1.61	22.21	6.61	146.76	2.86	0.82	0.82
5.08	1.66	22.83	6.29	143.67	2.83	0.82	0.82
5.10	1.71	23.33	6.02	140.33	2.81	0.81	0.81
5.12	1.74	23.64	5.77	136.35	2.79	0.81	0.81
5.14	1.75	23.72	5.60	132.73	2.78	0.80	0.80
5.16	1.73	23.39	5.56	129.94	2.78	0.80	0.80
5.18	1.69	22.78	5.61	127.80	2.78	0.80	0.80
5.20	1.66	22.30	5.64	125.79	2.78	0.79	0.79
5.22	1.67	22.33	5.57	124.27	2.78	0.79	0.79
5.24	1.73	23.03	5.34	122.92	2.76	0.79	0.79
5.26	1.89	25.04	4.78	119.69	2.71	0.78	0.78
5.28	2.30	30.18	3.74	112.78	2.60	0.84	0.84
5.30	2.74	35.66	3.07	109.29	2.51	0.76	0.76
5.32	3.14	40.71	2.69	109.60	2.46	0.77	0.77
5.34	3.53	45.42	2.42	110.07	2.41	0.77	0.77
5.36	3.82	49.02	2.31	113.12	2.39	0.77	0.77
5.38	3.87	49.78	2.41	119.74	2.41	0.78	0.78
5.40	3.78	48.79	2.66	129.69	2.45	0.80	0.80
5.42	3.61	46.81	3.03	141.70	2.51	0.81	0.81
5.44	3.44	44.76	3.47	155.19	2.57	0.88	0.88
5.46	3.29	42.93	3.95	169.62	2.62	0.95	0.95
5.48	3.17	41.53	4.40	182.70	2.67	1.01	1.01
5.50	3.13	41.04	4.65	191.00	2.70	1.05	1.05
5.52	3.08	40.41	4.90	197.88	2.72	0.88	0.88
5.54	2.92	38.30	5.41	207.31	2.76	0.89	0.89
5.56	2.68	35.28	6.10	215.30	2.82	0.90	0.90
5.58	2.38	31.35	7.14	223.94	2.90	0.91	0.91
5.60	2.09	27.38	8.37	229.19	2.98	0.92	0.92
5.62	1.89	24.65	9.25	228.13	3.03	2.45	1.76
5.64	1.81	23.43	9.48	222.15	3.04	2.29	1.67
5.66	1.77	22.90	9.35	214.08	3.03	2.05	1.64
5.68	1.77	22.80	8.85	201.81	3.00	1.89	1.63

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	1.78	22.88	8.32	190.28	2.97	0.88	0.88
5.72	1.79	22.95	7.89	181.13	2.95	0.87	0.87
5.74	1.83	23.40	7.42	173.60	2.91	0.86	0.86
5.76	1.90	24.16	6.99	168.76	2.88	0.85	0.85
5.78	1.97	25.00	6.70	167.58	2.86	0.85	0.85
5.80	2.10	26.57	6.29	167.08	2.83	0.85	0.85
5.82	2.21	27.90	6.00	167.42	2.81	0.85	0.85
5.84	2.28	28.69	5.89	168.90	2.80	0.85	0.85
5.86	2.32	29.20	5.82	169.89	2.80	0.85	0.85
5.88	2.38	29.89	5.70	170.34	2.79	0.85	0.85
5.90	2.41	30.13	5.69	171.41	2.79	0.85	0.85
5.92	2.45	30.56	5.62	171.70	2.78	0.85	0.85
5.94	2.50	31.09	5.51	171.21	2.77	0.85	0.85
5.96	2.53	31.41	5.45	171.14	2.77	0.85	0.85
5.98	2.53	31.40	5.46	171.56	2.77	0.85	0.85
6.00	2.53	31.22	5.46	170.56	2.77	0.85	0.85
6.02	2.52	31.01	5.46	169.43	2.77	0.85	0.85
6.04	2.52	31.00	5.43	168.26	2.76	0.85	0.85
6.06	2.58	31.57	5.24	165.29	2.75	0.85	0.85
6.08	2.74	33.44	4.82	161.34	2.71	0.84	0.84
6.10	2.89	35.10	4.52	158.56	2.68	0.99	0.99
6.12	3.00	36.43	4.35	158.60	2.67	0.98	0.98
6.14	3.06	37.12	4.33	160.88	2.66	0.98	0.98
6.16	3.06	37.02	4.47	165.32	2.68	1.00	1.00
6.18	2.97	35.91	4.76	171.11	2.71	0.85	0.85
6.20	2.93	35.41	4.97	175.92	2.72	0.86	0.86
6.22	2.92	35.25	5.07	178.86	2.73	0.86	0.86
6.24	2.94	35.46	5.07	179.77	2.73	0.86	0.86
6.26	3.00	36.04	5.04	181.47	2.73	0.87	0.87
6.28	3.02	36.28	5.13	186.10	2.74	0.87	0.87
6.30	2.99	35.90	5.41	194.32	2.76	0.88	0.88
6.32	2.98	35.78	5.70	203.79	2.79	0.89	0.89
6.34	3.01	36.13	5.96	215.20	2.81	0.90	0.90
6.36	3.13	37.46	6.02	225.43	2.81	0.91	0.91
6.38	3.41	40.77	5.63	229.52	2.78	0.92	0.92
6.40	3.85	45.84	4.98	228.29	2.73	0.92	0.92
6.42	4.73	55.88	3.88	216.79	2.61	1.00	1.00
6.44	6.68	77.94	2.43	189.38	2.41	0.88	0.88
6.46	10.64	121.79	1.49	181.52	2.14	0.87	0.87
6.48	17.56	196.58	1.20	236.31	1.85	0.92	0.92
6.50	26.08	286.50	1.00	286.50	1.62	0.97	0.97
6.52	32.41	352.22	1.00	352.22	1.50	1.02	1.02
6.54	41.06	441.35	1.00	441.35	1.37	1.07	1.07

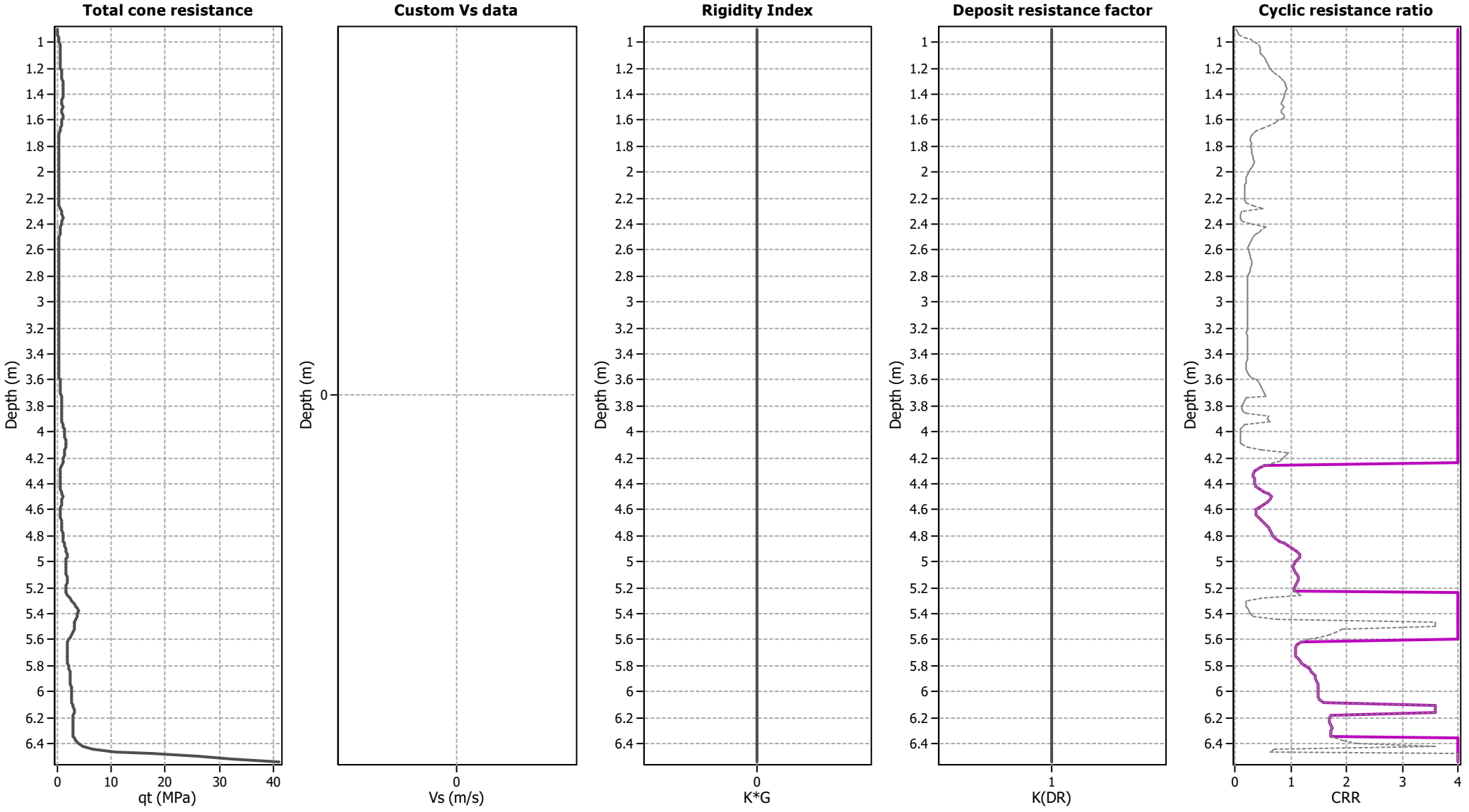
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

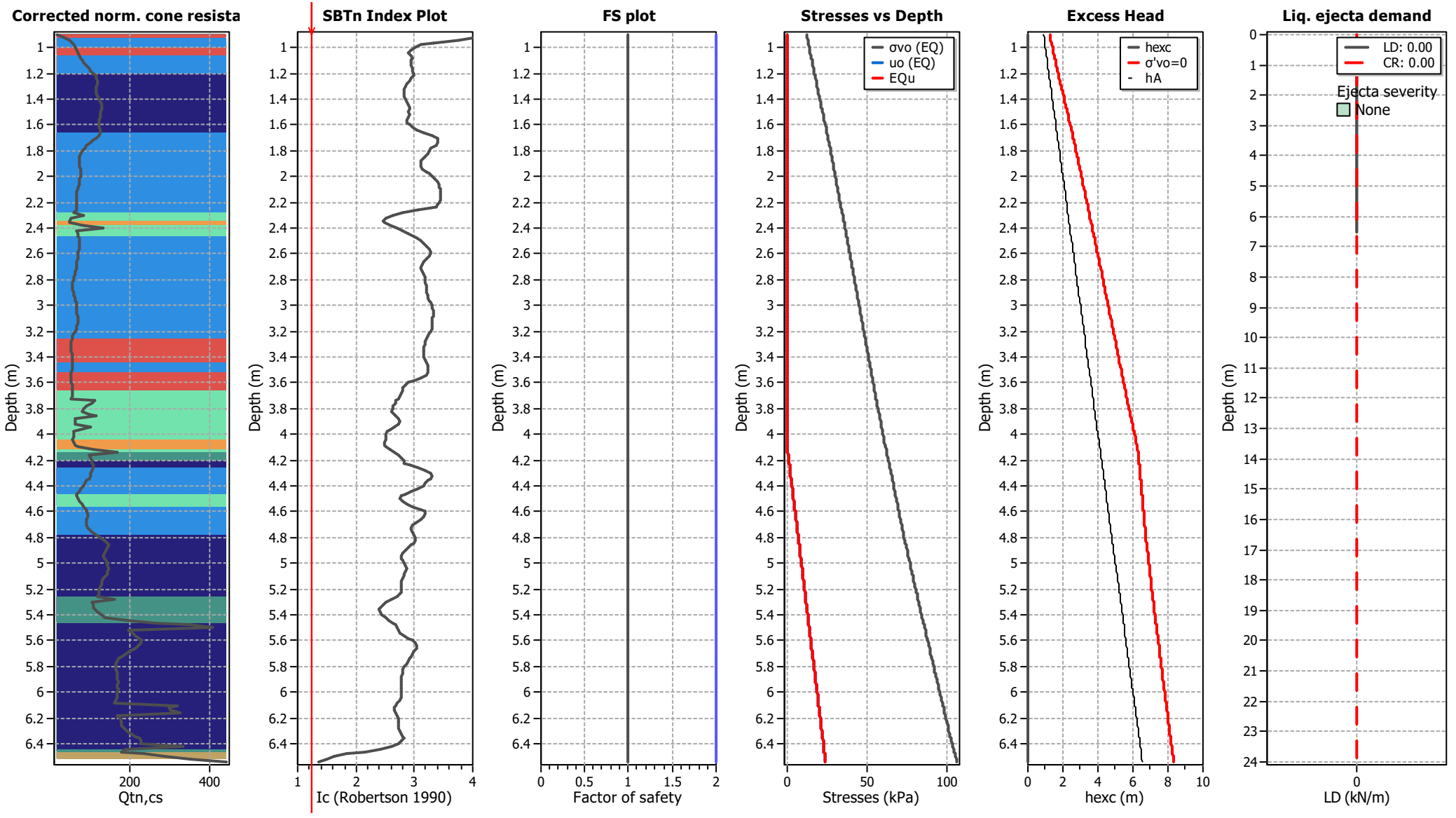
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



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LIQUEFACTION ANALYSIS REPORT

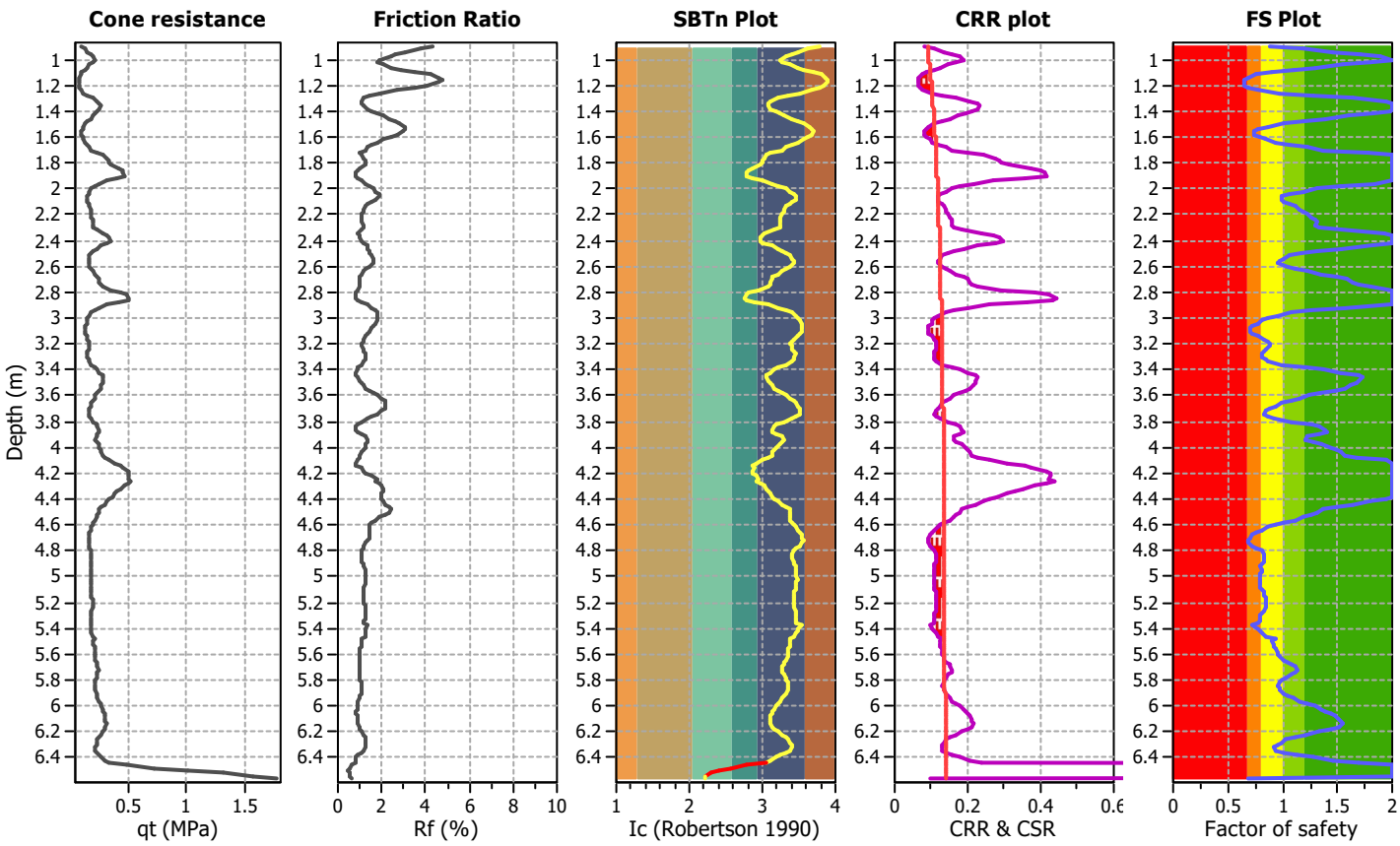
Project title : CWLP Liquefaction Analysis

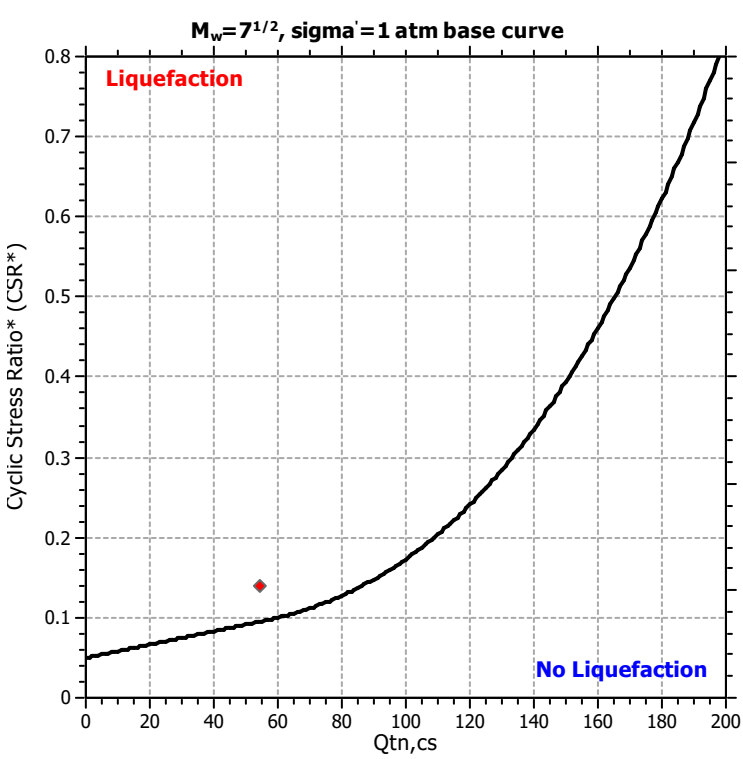
Location : East Lake Shore Drive, Springfield, Illinois

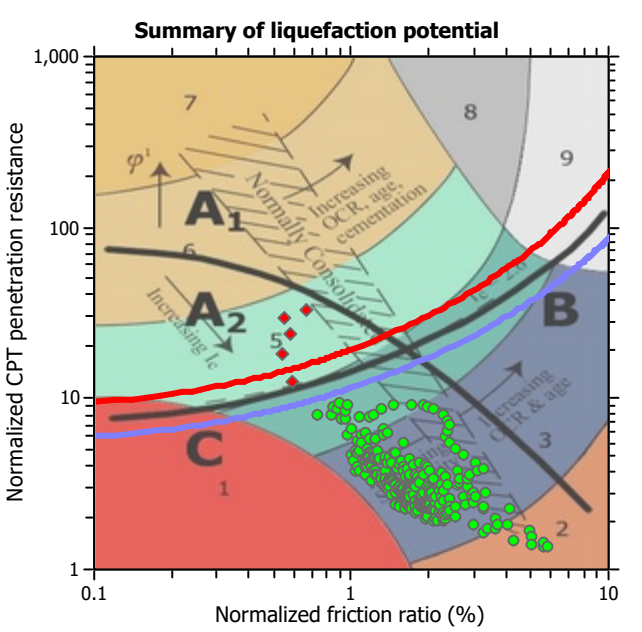
CPT file : CWLP CPT- 15CCR

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	0.30 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	0.30 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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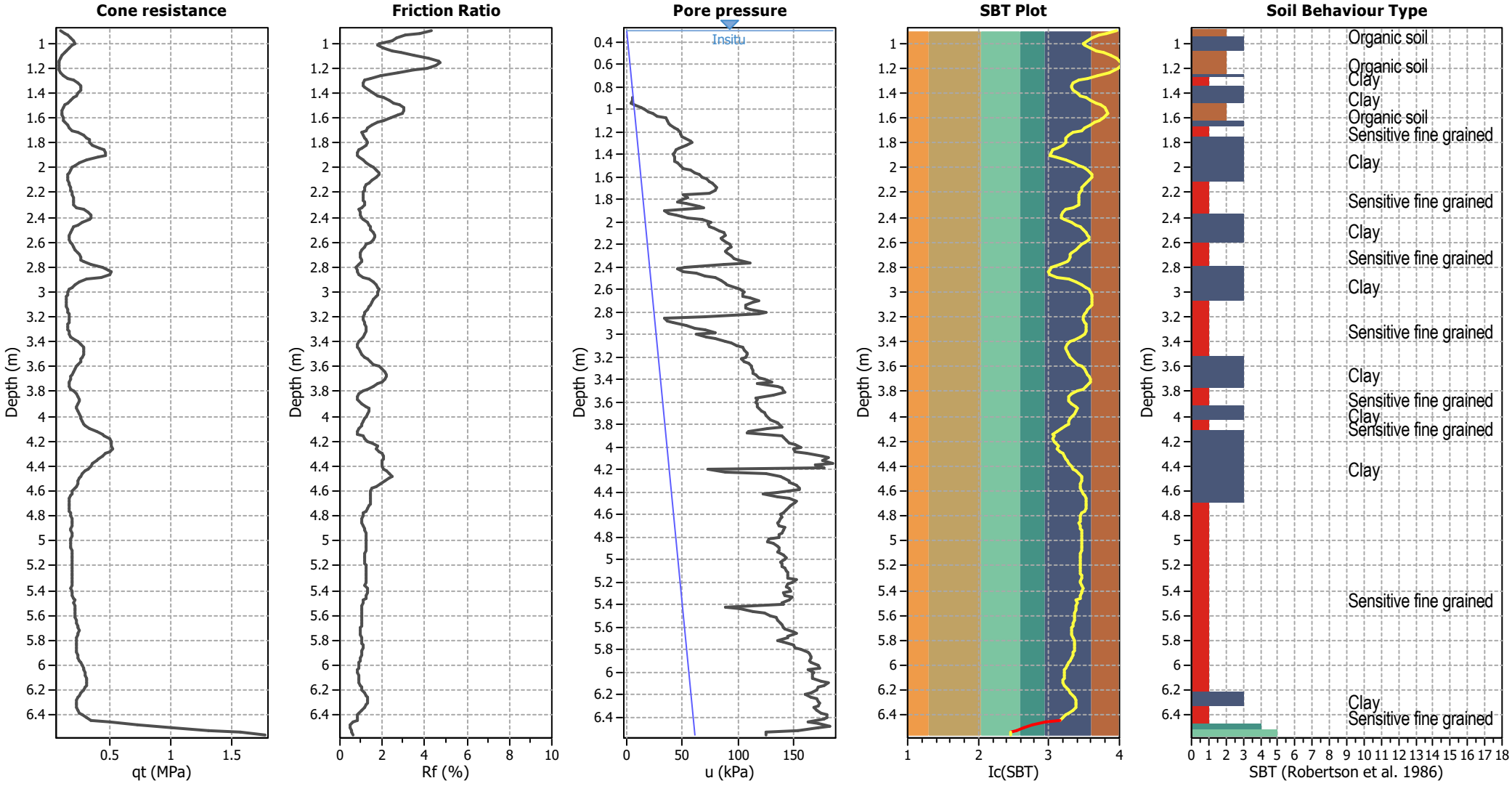
CPT name: CWLP CPT- 15CCR

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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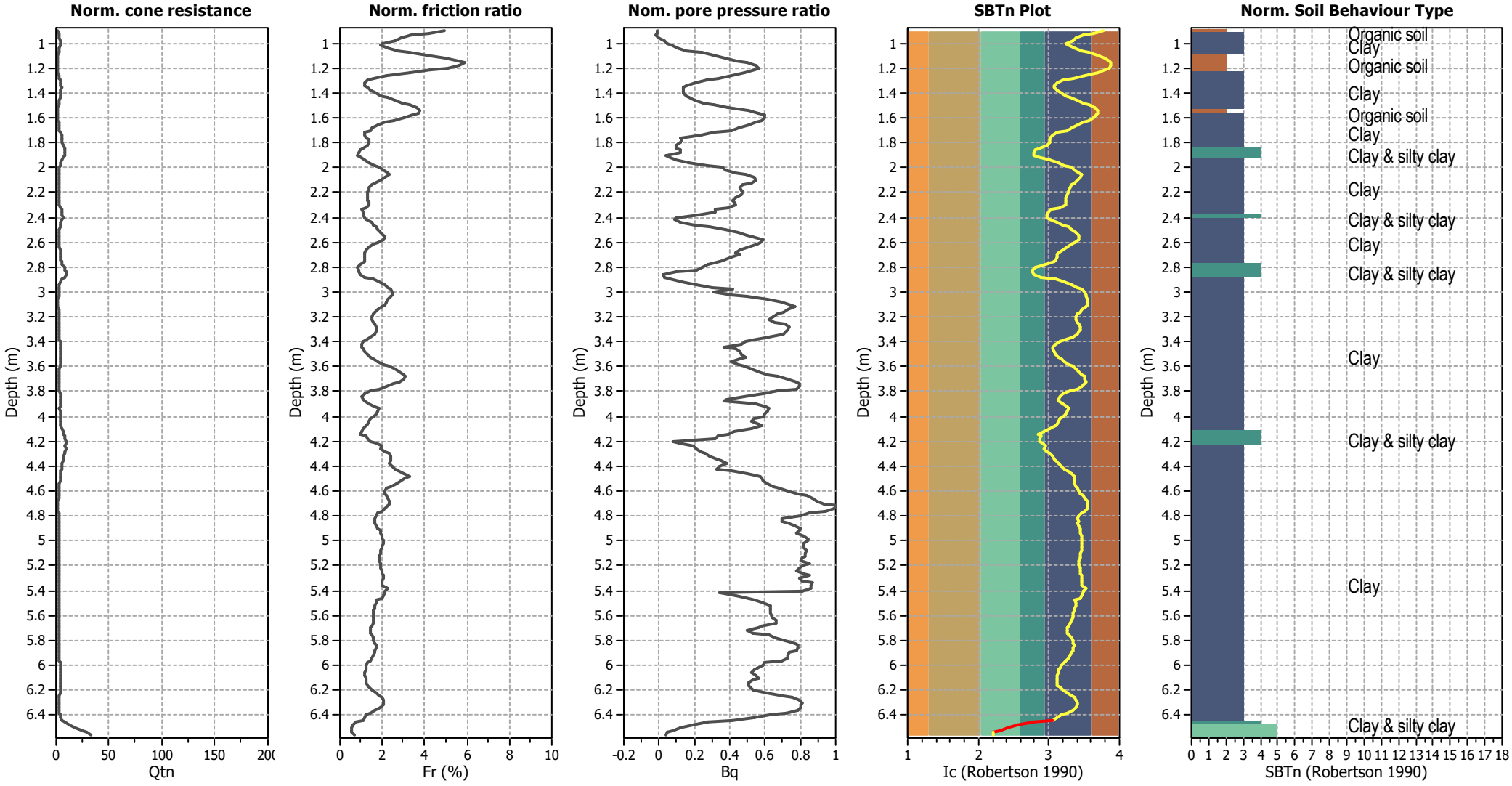
CPT name: CWLP CPT- 15CCR

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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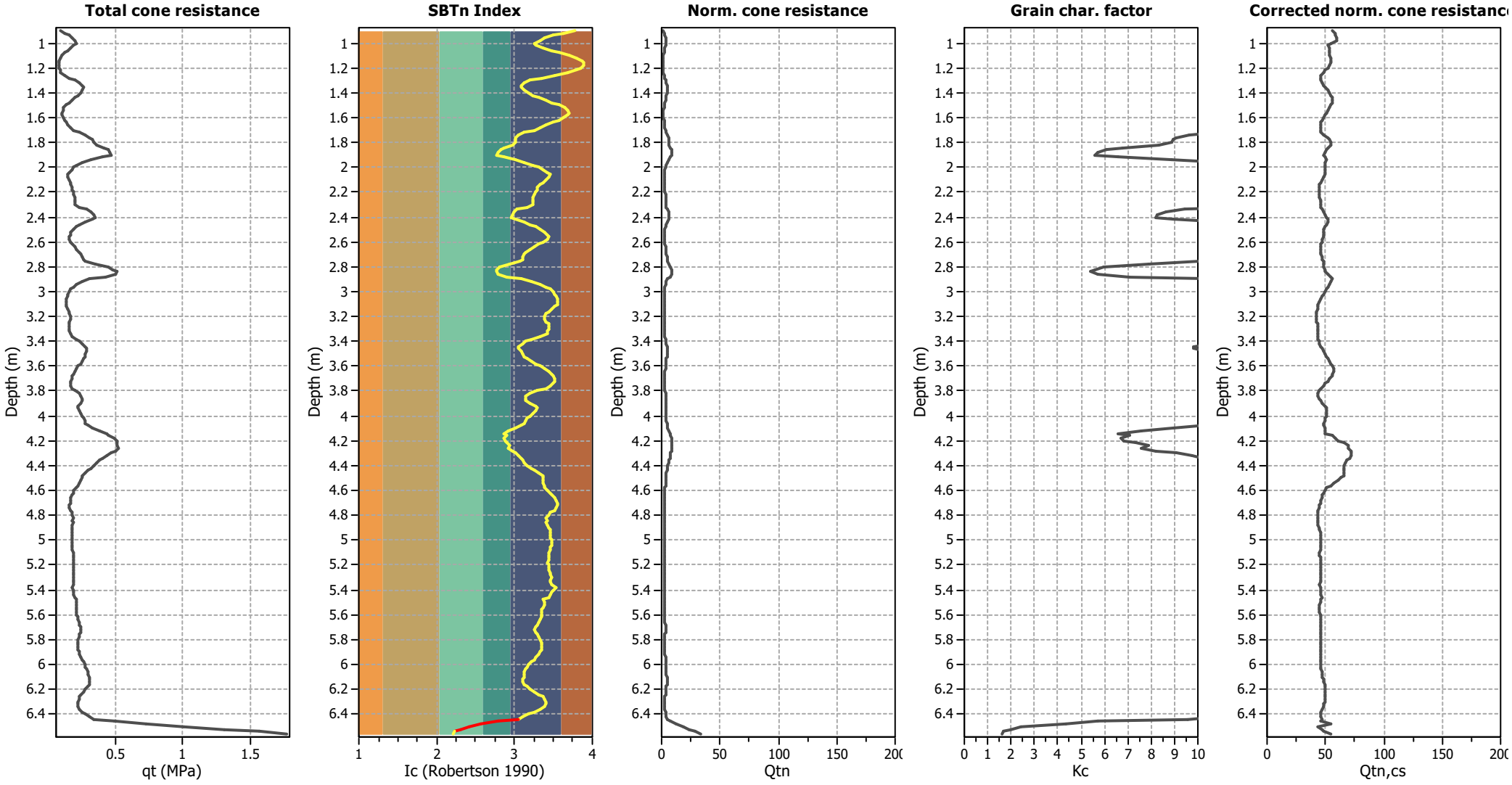
CPT name: CWLP CPT- 15CCR

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

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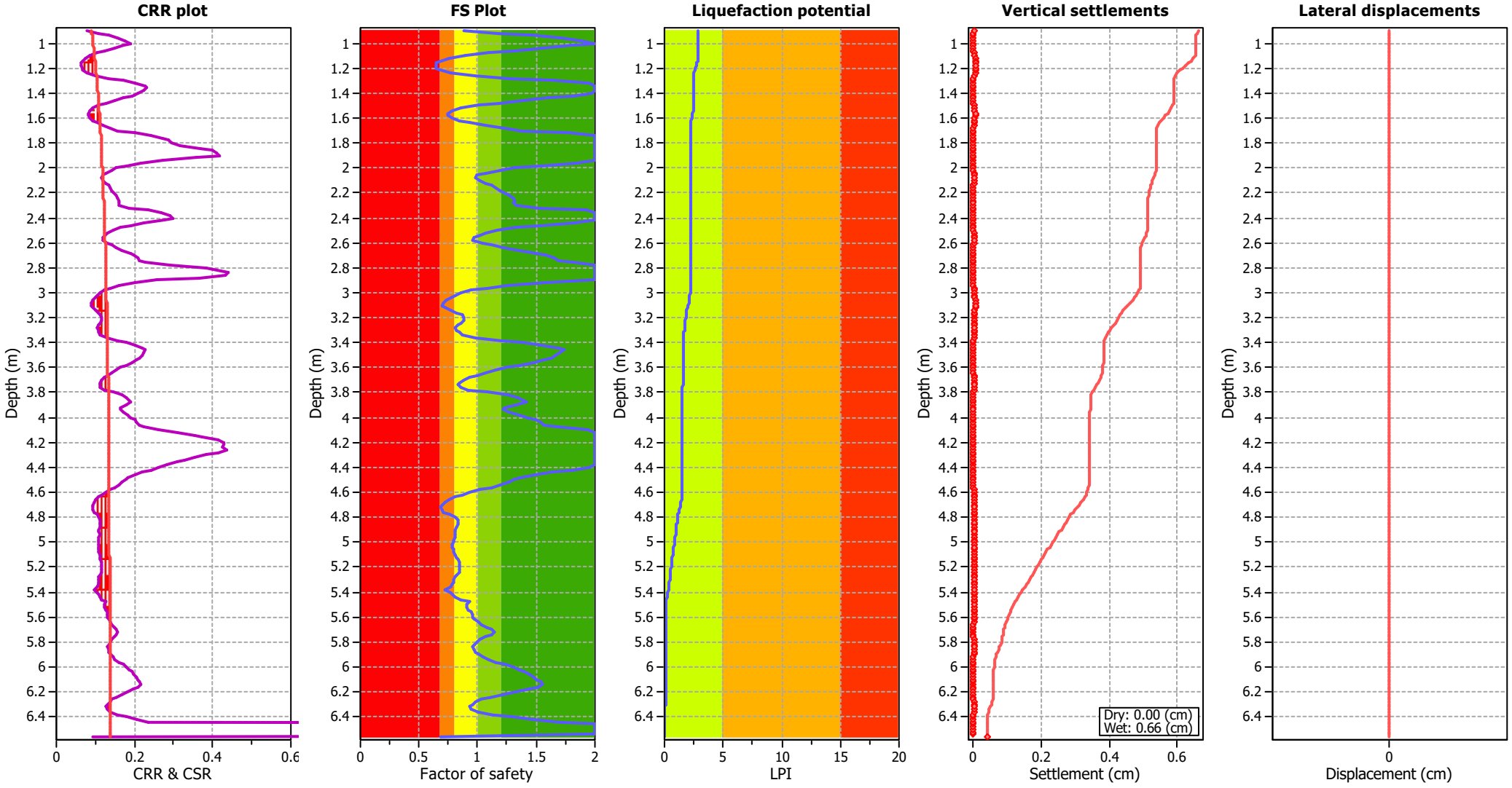
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

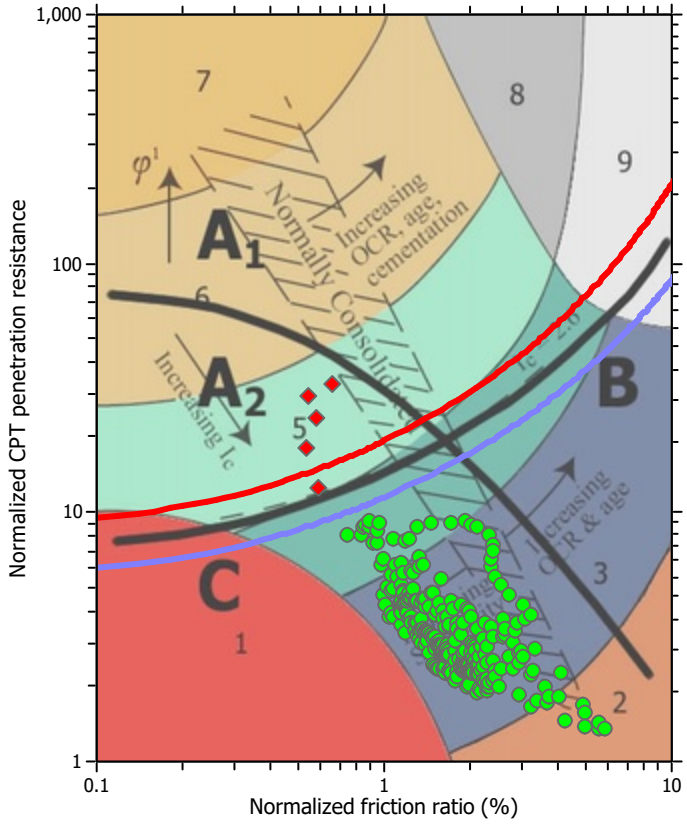
F.S. color scheme

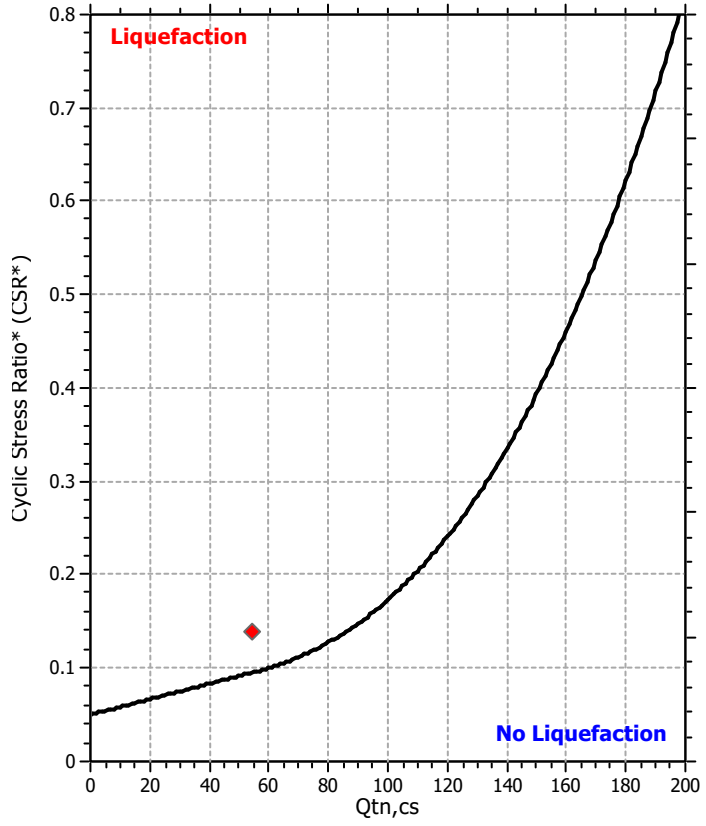
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

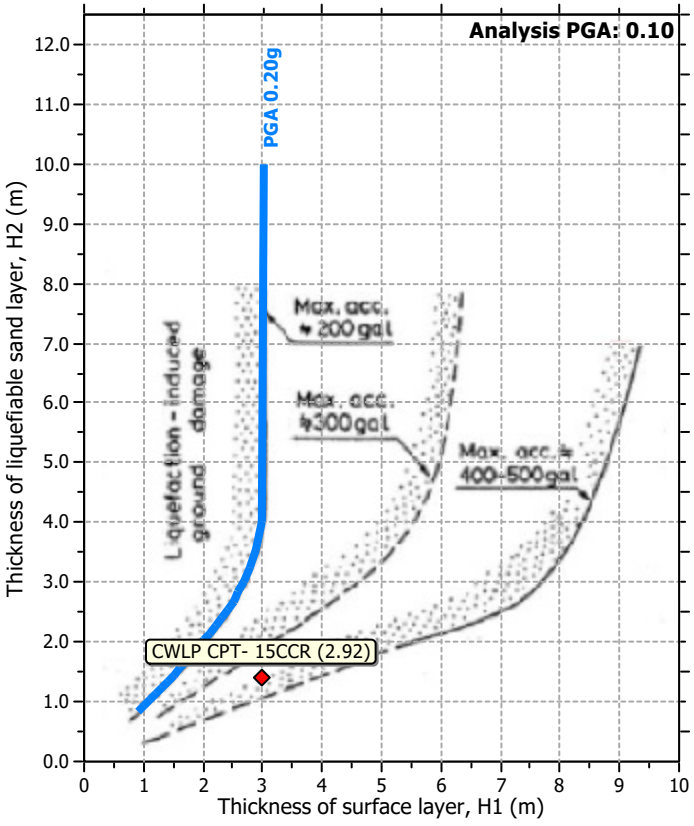
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

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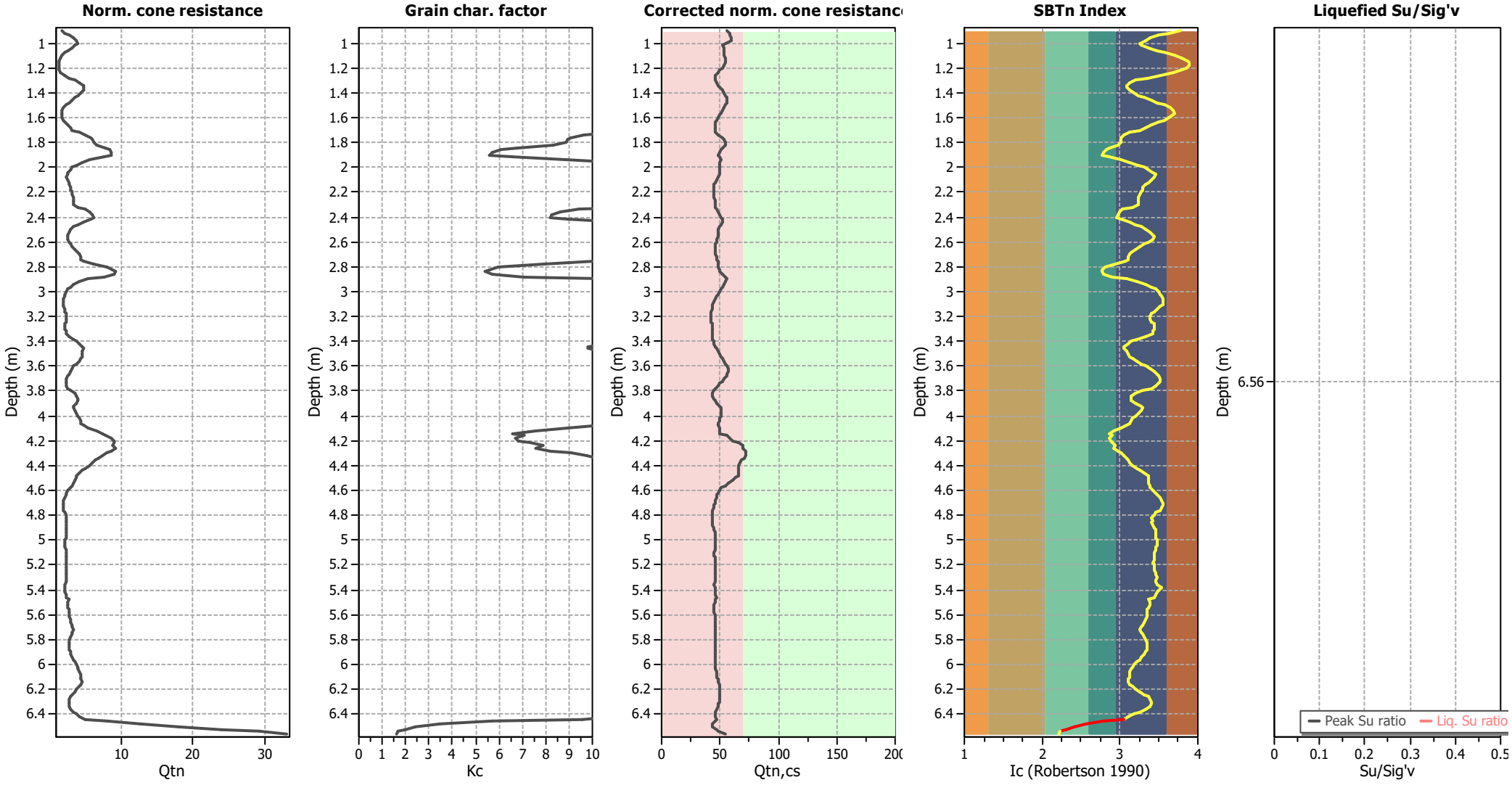
CPT name: CWLP CPT- 15CCR

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

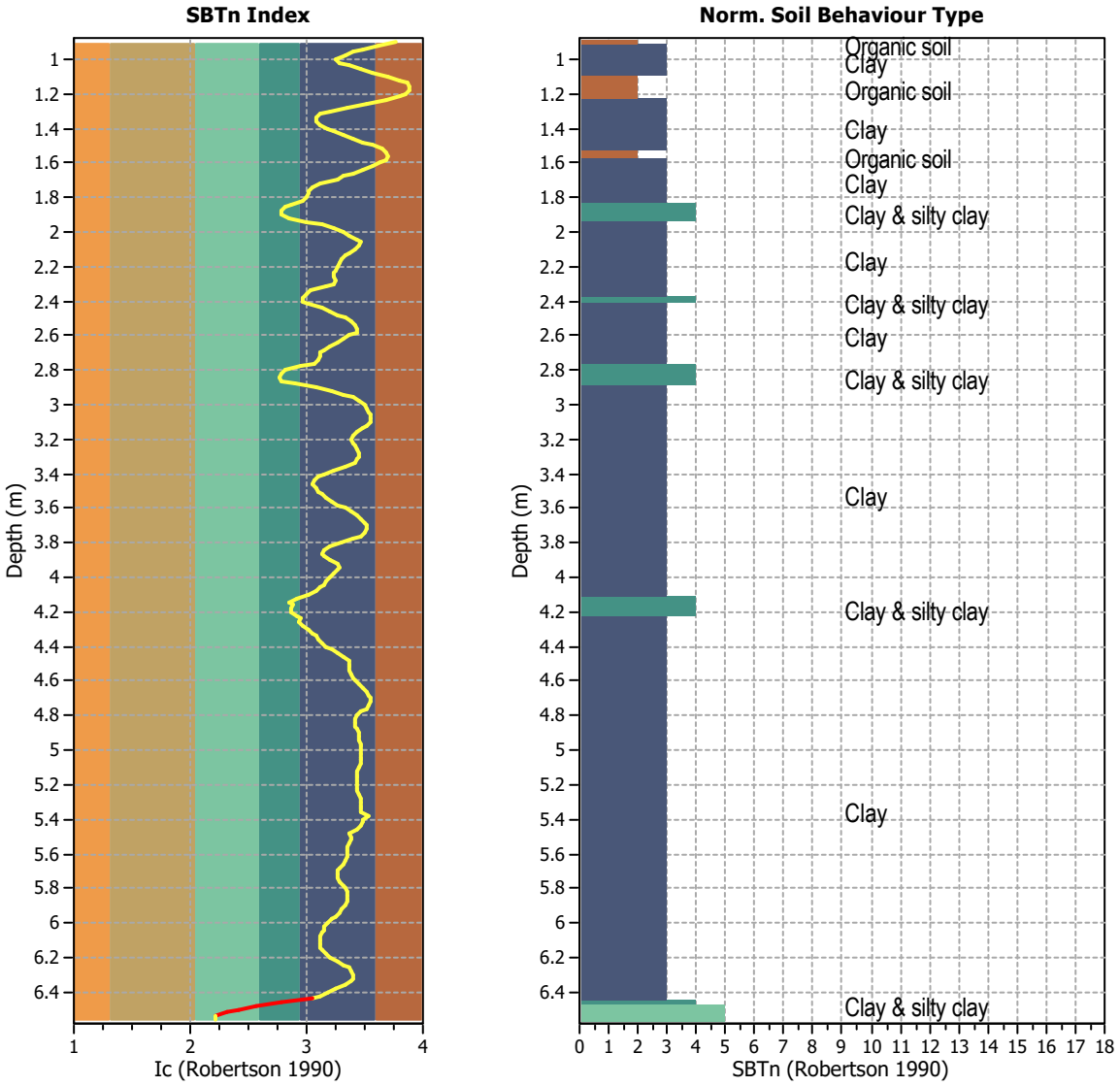
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.30 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	5	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	2

General statistics

Total points in CPT file:	284
Total points excluded:	5
Exclusion percentage:	1.76%
Number of layers detected:	1

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 6.46 (m)	4	Clay & silty clay
		End depth: 6.54 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.10	3.20	4.70	100.00	13.74
2	0.92	0.10	3.20	4.70	100.00	13.98
3	0.94	0.10	8.10	4.00	98.04	14.07
4	0.96	0.24	6.00	6.10	89.02	14.14
5	0.98	0.24	3.30	12.50	83.90	14.19
6	1.00	0.23	3.40	16.00	76.74	13.99
7	1.02	0.19	3.60	19.80	79.55	13.78
8	1.04	0.17	3.60	23.60	86.81	13.76
9	1.06	0.14	3.30	27.50	96.44	13.73
10	1.08	0.12	3.70	34.80	100.00	13.73
11	1.10	0.10	3.90	36.30	100.00	13.73
12	1.12	0.09	3.90	37.50	100.00	13.73
13	1.14	0.07	4.10	39.60	100.00	13.73
14	1.16	0.07	4.20	42.80	100.00	13.73
15	1.18	0.08	4.10	46.00	100.00	13.73
16	1.20	0.08	3.80	48.00	100.00	13.73
17	1.22	0.08	3.00	48.60	100.00	13.73
18	1.24	0.07	2.50	49.50	100.00	13.73
19	1.26	0.09	2.20	52.60	100.00	13.73
20	1.28	0.13	2.10	57.00	84.80	13.73
21	1.30	0.20	2.00	58.50	73.50	13.73
22	1.32	0.26	2.40	53.00	66.97	13.73
23	1.34	0.28	2.90	47.10	63.96	13.73
24	1.36	0.26	3.30	44.20	64.19	13.80
25	1.38	0.25	3.50	42.80	67.05	13.92
26	1.40	0.24	3.70	41.70	71.27	13.99
27	1.42	0.22	4.20	43.10	75.69	14.01
28	1.44	0.20	4.40	42.50	81.91	14.00
29	1.46	0.18	4.20	43.50	89.34	13.96
30	1.48	0.14	4.10	45.60	96.93	13.88
31	1.50	0.12	3.80	48.10	100.00	13.77
32	1.52	0.11	3.60	51.20	100.00	13.73
33	1.54	0.10	3.50	58.10	100.00	13.73
34	1.56	0.09	3.20	61.80	100.00	13.73
35	1.58	0.09	3.00	65.10	100.00	13.73
36	1.60	0.10	2.80	67.70	100.00	13.73
37	1.62	0.11	2.50	71.30	100.00	13.73
38	1.64	0.12	2.30	73.90	98.12	13.73
39	1.66	0.13	2.20	77.10	90.24	13.73
40	1.68	0.15	2.10	79.10	82.75	13.73
41	1.70	0.17	2.20	81.20	77.81	13.73
42	1.72	0.21	2.50	80.00	66.93	13.73
43	1.74	0.21	2.70	75.00	61.85	13.76
44	1.76	0.38	2.80	50.30	59.61	14.04
45	1.78	0.37	4.70	54.50	59.13	14.18
46	1.80	0.35	5.60	51.10	58.94	14.25
47	1.82	0.29	4.60	46.20	56.61	14.32
48	1.84	0.25	3.90	53.70	50.09	14.33

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.50	3.50	65.30	47.04	14.29
50	1.88	0.66	3.80	68.70	45.45	14.25
51	1.90	0.50	4.50	33.50	44.80	14.22
52	1.92	0.36	3.70	38.00	49.43	14.13
53	1.94	0.28	3.30	44.60	58.93	13.95
54	1.96	0.20	2.90	54.80	67.46	13.78
55	1.98	0.20	2.60	68.40	75.31	13.73
56	2.00	0.19	3.20	75.90	82.17	13.73
57	2.02	0.17	3.30	72.90	86.94	13.73
58	2.04	0.14	3.20	74.90	92.35	13.73
59	2.06	0.12	2.90	78.80	95.26	13.73
60	2.08	0.13	2.60	83.90	94.08	13.73
61	2.10	0.14	2.40	88.10	90.78	13.73
62	2.12	0.16	2.10	89.30	86.81	13.73
63	2.14	0.16	2.10	85.00	83.49	13.73
64	2.16	0.16	2.10	85.90	81.09	13.73
65	2.18	0.16	2.00	89.50	79.81	13.73
66	2.20	0.17	2.00	92.20	78.68	13.73
67	2.22	0.18	2.10	93.70	77.17	13.73
68	2.24	0.19	2.20	91.80	76.04	13.73
69	2.26	0.19	2.30	89.20	76.01	13.73
70	2.28	0.19	2.30	90.60	76.53	13.73
71	2.30	0.18	2.30	93.90	76.02	13.73
72	2.32	0.18	2.40	97.00	69.97	13.73
73	2.34	0.20	2.40	99.90	61.13	13.73
74	2.36	0.32	2.60	111.50	57.99	13.82
75	2.38	0.46	3.30	87.20	56.36	13.97
76	2.40	0.36	4.40	51.80	56.13	14.07
77	2.42	0.30	4.10	45.50	59.16	14.07
78	2.44	0.26	3.80	50.40	67.31	13.96
79	2.46	0.22	2.90	62.20	73.46	13.78
80	2.48	0.18	2.70	70.90	78.79	13.73
81	2.50	0.16	2.60	79.70	83.64	13.73
82	2.52	0.16	2.70	85.30	88.11	13.73
83	2.54	0.15	2.80	88.30	91.11	13.73
84	2.56	0.15	2.80	90.70	92.56	13.73
85	2.58	0.14	2.70	97.50	92.35	13.73
86	2.60	0.14	2.40	101.40	87.03	13.73
87	2.62	0.16	2.30	105.50	82.61	13.73
88	2.64	0.21	2.10	105.10	78.03	13.73
89	2.66	0.20	2.20	104.80	73.28	13.73
90	2.68	0.20	2.30	110.50	68.90	13.73
91	2.70	0.23	2.40	119.40	67.27	13.73
92	2.72	0.26	2.50	114.10	66.15	13.73
93	2.74	0.26	2.70	106.50	65.63	13.73
94	2.76	0.25	2.90	107.70	63.52	13.73
95	2.78	0.24	2.90	110.70	54.84	13.85
96	2.80	0.31	3.30	125.10	46.58	14.09

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.58	3.30	118.40	44.63	14.27
98	2.84	0.76	4.70	70.80	44.01	14.38
99	2.86	0.47	5.10	33.60	45.21	14.44
100	2.88	0.36	4.70	37.20	51.57	14.41
101	2.90	0.28	4.40	42.40	64.52	14.24
102	2.92	0.23	4.00	53.40	73.91	14.04
103	2.94	0.19	3.60	61.30	83.06	13.86
104	2.96	0.16	3.10	70.40	89.60	13.74
105	2.98	0.14	2.80	79.40	94.99	13.73
106	3.00	0.16	3.30	62.50	98.60	13.73
107	3.02	0.14	2.70	71.20	100.00	13.73
108	3.04	0.13	2.40	79.60	100.00	13.73
109	3.06	0.12	2.20	88.20	100.00	13.73
110	3.08	0.12	2.10	94.60	100.00	13.73
111	3.10	0.12	2.00	98.60	100.00	13.73
112	3.12	0.12	1.90	104.20	100.00	13.73
113	3.14	0.12	1.90	105.50	96.61	13.73
114	3.16	0.14	1.90	108.00	92.86	13.73
115	3.18	0.15	1.80	108.00	90.17	13.73
116	3.20	0.16	1.80	107.60	88.70	13.73
117	3.22	0.15	1.80	103.30	89.14	13.73
118	3.24	0.14	1.80	106.40	90.65	13.73
119	3.26	0.14	1.90	110.10	92.61	13.73
120	3.28	0.14	1.90	111.90	93.98	13.73
121	3.30	0.14	2.00	112.40	93.69	13.73
122	3.32	0.14	2.00	113.50	92.54	13.73
123	3.34	0.15	2.00	114.00	90.95	13.73
124	3.36	0.15	2.00	115.60	84.24	13.73
125	3.38	0.16	1.90	118.50	75.07	13.73
126	3.40	0.22	2.00	124.60	69.29	13.73
127	3.42	0.29	2.10	130.30	65.37	13.73
128	3.44	0.27	2.30	117.40	62.51	13.73
129	3.46	0.26	2.60	135.60	62.45	13.73
130	3.48	0.26	2.80	140.10	64.30	13.73
131	3.50	0.26	3.10	140.80	65.83	13.76
132	3.52	0.26	3.20	142.50	67.85	13.83
133	3.54	0.25	3.20	131.30	70.66	13.90
134	3.56	0.24	3.70	116.80	73.89	13.95
135	3.58	0.22	4.00	117.70	78.79	13.99
136	3.60	0.20	4.10	116.40	84.07	14.04
137	3.62	0.18	4.30	117.20	88.63	14.07
138	3.64	0.18	4.50	117.90	92.57	14.05
139	3.66	0.17	4.50	118.60	96.31	14.00
140	3.68	0.16	4.00	121.60	98.79	13.94
141	3.70	0.15	3.70	123.90	100.00	13.83
142	3.72	0.14	3.40	125.70	100.00	13.73
143	3.74	0.14	3.00	127.40	100.00	13.73
144	3.76	0.14	2.60	129.50	95.81	13.73

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.16	2.30	135.40	89.96	13.73
146	3.80	0.17	2.10	137.00	80.43	13.73
147	3.82	0.19	2.00	139.20	72.46	13.73
148	3.84	0.26	1.90	126.00	69.17	13.73
149	3.86	0.27	1.90	110.10	68.34	13.73
150	3.88	0.22	2.00	109.00	68.92	13.73
151	3.90	0.21	2.80	139.20	72.90	13.73
152	3.92	0.20	3.00	141.10	78.16	13.73
153	3.94	0.20	3.20	143.20	80.18	13.74
154	3.96	0.20	3.30	146.70	78.58	13.79
155	3.98	0.21	3.40	151.70	75.37	13.81
156	4.00	0.24	3.40	156.50	72.51	13.79
157	4.02	0.27	2.90	150.80	70.31	13.77
158	4.04	0.25	2.80	151.30	68.59	13.75
159	4.06	0.23	2.80	162.50	67.16	13.73
160	4.08	0.24	3.00	175.70	64.62	13.76
161	4.10	0.27	3.00	181.40	59.21	13.86
162	4.12	0.34	3.10	176.30	53.44	14.00
163	4.14	0.44	3.50	185.40	49.36	14.11
164	4.16	0.50	3.90	169.80	51.46	14.51
165	4.18	0.47	4.00	177.90	49.80	14.74
166	4.20	0.39	10.00	73.10	50.38	14.92
167	4.22	0.57	7.50	89.20	52.55	15.10
168	4.24	0.53	8.00	125.90	54.90	15.26
169	4.26	0.50	9.60	138.20	53.59	15.26
170	4.28	0.46	10.10	141.60	56.22	15.29
171	4.30	0.44	9.50	146.60	59.54	15.28
172	4.32	0.44	9.50	146.60	62.17	15.19
173	4.34	0.36	8.40	152.50	64.07	15.10
174	4.36	0.34	7.40	155.70	65.58	14.99
175	4.38	0.34	7.40	155.70	67.77	14.86
176	4.40	0.34	6.30	135.70	70.59	14.78
177	4.42	0.32	6.10	123.20	73.84	14.73
178	4.44	0.25	6.80	135.90	77.73	14.67
179	4.46	0.24	6.60	146.60	82.59	14.64
180	4.48	0.23	6.50	152.40	86.78	14.59
181	4.50	0.23	6.30	151.00	86.87	14.49
182	4.52	0.22	5.50	147.40	87.04	14.35
183	4.54	0.22	4.30	145.70	87.16	14.17
184	4.56	0.20	3.50	143.90	87.69	13.95
185	4.58	0.18	3.00	140.90	89.19	13.73
186	4.60	0.17	2.70	139.00	91.78	13.73
187	4.62	0.16	2.50	139.30	94.29	13.73
188	4.64	0.16	2.50	138.90	97.35	13.73
189	4.66	0.15	2.50	137.00	100.00	13.73
190	4.68	0.14	2.50	135.50	100.00	13.73
191	4.70	0.14	2.40	136.60	100.00	13.73
192	4.72	0.14	2.20	142.10	100.00	13.73

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.14	2.00	141.60	100.00	13.73
194	4.76	0.14	2.00	139.70	100.00	13.73
195	4.78	0.15	2.00	136.70	95.83	13.73
196	4.80	0.15	2.00	136.70	92.56	13.73
197	4.82	0.18	1.90	127.90	90.79	13.73
198	4.84	0.17	1.90	127.00	91.07	13.73
199	4.86	0.16	1.90	131.70	90.75	13.73
200	4.88	0.15	2.00	135.50	92.15	13.73
201	4.90	0.16	2.10	137.70	93.65	13.73
202	4.92	0.16	2.20	137.00	94.59	13.73
203	4.94	0.16	2.20	136.20	94.50	13.73
204	4.96	0.16	2.40	141.10	95.03	13.73
205	4.98	0.16	2.40	143.60	95.52	13.73
206	5.00	0.16	2.30	141.80	96.34	13.73
207	5.02	0.16	2.20	139.00	96.41	13.73
208	5.04	0.16	2.30	139.20	96.25	13.73
209	5.06	0.16	2.30	140.30	95.77	13.73
210	5.08	0.16	2.20	142.70	95.15	13.73
211	5.10	0.16	2.20	143.90	94.14	13.73
212	5.12	0.17	2.20	145.10	93.40	13.73
213	5.14	0.17	2.20	145.20	92.99	13.73
214	5.16	0.17	2.30	145.20	92.59	13.73
215	5.18	0.17	2.30	152.20	92.34	13.73
216	5.20	0.17	2.40	148.50	92.63	13.73
217	5.22	0.18	2.40	144.90	93.03	13.73
218	5.24	0.17	2.40	143.20	93.44	13.73
219	5.26	0.17	2.40	146.40	94.44	13.73
220	5.28	0.17	2.40	148.00	95.56	13.73
221	5.30	0.16	2.40	140.80	96.18	13.73
222	5.32	0.16	2.30	142.60	95.51	13.73
223	5.34	0.16	2.30	148.50	95.80	13.73
224	5.36	0.17	2.20	146.60	96.29	13.73
225	5.38	0.16	2.20	139.40	100.00	13.73
226	5.40	0.16	2.10	140.90	97.86	13.73
227	5.42	0.13	3.00	89.40	96.92	13.73
228	5.44	0.21	2.40	102.00	95.10	13.73
229	5.46	0.19	2.30	113.60	92.92	13.73
230	5.48	0.19	2.30	123.40	87.24	13.73
231	5.50	0.19	2.30	129.00	88.05	13.73
232	5.52	0.18	2.20	134.80	87.62	13.73
233	5.54	0.19	2.10	136.20	86.72	13.73
234	5.56	0.19	2.20	138.00	85.74	13.73
235	5.58	0.20	2.20	139.60	85.08	13.73
236	5.60	0.20	2.20	141.60	85.18	13.73
237	5.62	0.19	2.30	142.30	84.75	13.73
238	5.64	0.19	2.30	149.60	83.27	13.73
239	5.66	0.20	2.30	152.50	81.94	13.73
240	5.68	0.22	2.40	144.80	80.08	13.73

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.22	2.40	144.80	78.58	13.73
242	5.72	0.23	2.50	136.10	77.74	13.73
243	5.74	0.22	2.40	140.60	78.23	13.73
244	5.76	0.21	2.30	150.50	80.17	13.73
245	5.78	0.21	2.20	151.90	82.30	13.73
246	5.80	0.19	2.30	156.90	83.92	13.73
247	5.82	0.19	2.40	163.10	84.91	13.73
248	5.84	0.19	2.40	164.00	85.92	13.73
249	5.86	0.20	2.30	165.90	85.45	13.73
250	5.88	0.20	2.40	165.50	84.96	13.73
251	5.90	0.20	2.40	164.10	83.30	13.73
252	5.92	0.20	2.40	166.40	81.67	13.73
253	5.94	0.22	2.40	172.10	79.39	13.73
254	5.96	0.22	2.30	173.70	76.85	13.73
255	5.98	0.24	2.40	163.20	73.86	13.73
256	6.00	0.24	2.40	168.70	71.26	13.73
257	6.02	0.26	2.40	167.50	69.77	13.73
258	6.04	0.27	2.40	166.60	68.85	13.73
259	6.06	0.26	2.50	167.60	67.78	13.73
260	6.08	0.26	2.60	174.90	67.01	13.73
261	6.10	0.27	2.70	180.90	66.72	13.73
262	6.12	0.29	2.80	177.30	66.26	13.73
263	6.14	0.29	2.90	172.90	66.26	13.75
264	6.16	0.29	2.90	171.00	67.37	13.77
265	6.18	0.28	3.00	166.30	69.98	13.77
266	6.20	0.26	3.00	160.90	73.62	13.76
267	6.22	0.23	3.00	166.00	78.02	13.75
268	6.24	0.21	3.00	171.20	82.47	13.73
269	6.26	0.20	3.10	172.70	86.08	13.73
270	6.28	0.20	3.10	173.30	88.19	13.73
271	6.30	0.20	3.00	172.00	89.41	13.73
272	6.32	0.20	2.80	168.50	89.93	13.73
273	6.34	0.19	2.60	170.50	88.20	13.73
274	6.36	0.19	2.40	175.60	83.80	13.73
275	6.38	0.21	2.30	180.00	77.39	13.73
276	6.40	0.25	2.20	179.70	71.57	13.73
277	6.42	0.29	2.20	177.10	66.54	13.73
278	6.44	0.31	2.60	163.60	61.64	13.73
279	6.46	0.32	3.00	172.80	45.38	14.00
280	6.48	0.38	3.50	182.50	33.77	14.38
281	6.50	1.03	3.90	172.30	26.81	14.82
282	6.52	1.46	5.70	154.30	22.85	15.34
283	6.54	1.69	8.50	125.50	19.74	15.56
284	6.56	1.86	13.80	125.50	19.36	15.98

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.90	12.36	5.89	6.48	1.00	0.123	1.38	0.090	1.00	1.00	0.090	No
2	0.92	12.64	6.08	6.56	0.99	0.125	1.38	0.091	1.00	1.00	0.091	No
3	0.94	12.92	6.28	6.65	0.99	0.126	1.38	0.091	1.00	1.00	0.091	No
4	0.96	13.21	6.47	6.73	0.99	0.127	1.38	0.092	1.00	1.00	0.092	No
5	0.98	13.49	6.67	6.82	0.99	0.128	1.38	0.093	1.00	1.00	0.093	No
6	1.00	13.77	6.87	6.90	0.99	0.129	1.38	0.094	1.00	1.00	0.094	No
7	1.02	14.05	7.06	6.98	0.99	0.130	1.38	0.094	1.00	1.00	0.094	No
8	1.04	14.32	7.26	7.06	0.99	0.131	1.38	0.095	1.00	1.00	0.095	No
9	1.06	14.60	7.46	7.14	0.99	0.132	1.38	0.096	1.00	1.00	0.096	No
10	1.08	14.87	7.65	7.22	0.99	0.133	1.38	0.097	1.00	1.00	0.097	No
11	1.10	15.15	7.85	7.30	0.99	0.134	1.38	0.097	1.00	1.00	0.097	No
12	1.12	15.42	8.04	7.38	0.99	0.135	1.38	0.098	1.00	1.00	0.098	No
13	1.14	15.70	8.24	7.45	0.99	0.136	1.38	0.099	1.00	1.00	0.099	No
14	1.16	15.97	8.44	7.53	0.99	0.137	1.38	0.099	1.00	1.00	0.099	No
15	1.18	16.24	8.63	7.61	0.99	0.138	1.38	0.100	1.00	1.00	0.100	No
16	1.20	16.52	8.83	7.69	0.99	0.139	1.38	0.101	1.00	1.00	0.101	No
17	1.22	16.79	9.03	7.77	0.99	0.139	1.38	0.101	1.00	1.00	0.101	No
18	1.24	17.07	9.22	7.85	0.99	0.140	1.38	0.102	1.00	1.00	0.102	No
19	1.26	17.34	9.42	7.93	0.99	0.141	1.38	0.103	1.00	1.00	0.103	No
20	1.28	17.62	9.61	8.00	0.99	0.142	1.38	0.103	1.00	1.00	0.103	No
21	1.30	17.89	9.81	8.08	0.99	0.143	1.38	0.104	1.00	1.00	0.104	No
22	1.32	18.17	10.01	8.16	0.99	0.144	1.38	0.104	1.00	1.00	0.104	No
23	1.34	18.44	10.20	8.24	0.99	0.144	1.38	0.105	1.00	1.00	0.105	No
24	1.36	18.72	10.40	8.32	0.99	0.145	1.38	0.105	1.00	1.00	0.105	No
25	1.38	19.00	10.59	8.40	0.99	0.146	1.38	0.106	1.00	1.00	0.106	No
26	1.40	19.28	10.79	8.49	0.99	0.146	1.38	0.106	1.00	1.00	0.106	No
27	1.42	19.56	10.99	8.57	0.99	0.147	1.38	0.107	1.00	1.00	0.107	No
28	1.44	19.84	11.18	8.65	0.99	0.148	1.38	0.107	1.00	1.00	0.107	No
29	1.46	20.12	11.38	8.74	0.99	0.148	1.38	0.108	1.00	1.00	0.108	No
30	1.48	20.39	11.58	8.82	0.99	0.149	1.38	0.108	1.00	1.00	0.108	No
31	1.50	20.67	11.77	8.90	0.99	0.150	1.38	0.109	1.00	1.00	0.109	No
32	1.52	20.94	11.97	8.98	0.99	0.150	1.38	0.109	1.00	1.00	0.109	No
33	1.54	21.22	12.16	9.05	0.99	0.151	1.38	0.110	1.00	1.00	0.110	No
34	1.56	21.49	12.36	9.13	0.99	0.151	1.38	0.110	1.00	1.00	0.110	No
35	1.58	21.77	12.56	9.21	0.99	0.152	1.38	0.111	1.00	1.00	0.111	No
36	1.60	22.04	12.75	9.29	0.99	0.153	1.38	0.111	1.00	1.00	0.111	No
37	1.62	22.32	12.95	9.37	0.99	0.153	1.38	0.111	1.00	1.00	0.111	No
38	1.64	22.59	13.15	9.45	0.99	0.154	1.38	0.112	1.00	1.00	0.112	No
39	1.66	22.87	13.34	9.52	0.99	0.154	1.38	0.112	1.00	1.00	0.112	No
40	1.68	23.14	13.54	9.60	0.99	0.155	1.38	0.113	1.00	1.00	0.113	No
41	1.70	23.42	13.73	9.68	0.99	0.155	1.38	0.113	1.00	1.00	0.113	No
42	1.72	23.69	13.93	9.76	0.99	0.156	1.38	0.113	1.00	1.00	0.113	No
43	1.74	23.97	14.13	9.84	0.99	0.157	1.38	0.114	1.00	1.00	0.114	No
44	1.76	24.25	14.32	9.92	0.99	0.157	1.38	0.114	1.00	1.00	0.114	No
45	1.78	24.53	14.52	10.01	0.99	0.157	1.38	0.114	1.00	1.00	0.114	No
46	1.80	24.81	14.72	10.10	0.99	0.158	1.38	0.115	1.00	1.00	0.115	No
47	1.82	25.10	14.91	10.19	0.99	0.158	1.38	0.115	1.00	1.00	0.115	No
48	1.84	25.39	15.11	10.28	0.99	0.159	1.38	0.115	1.00	1.00	0.115	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	1.86	25.67	15.30	10.37	0.99	0.159	1.38	0.116	1.00	1.00	0.116	No
50	1.88	25.96	15.50	10.46	0.99	0.159	1.38	0.116	1.00	1.00	0.116	No
51	1.90	26.24	15.70	10.55	0.99	0.160	1.38	0.116	1.00	1.00	0.116	No
52	1.92	26.53	15.89	10.63	0.99	0.160	1.38	0.116	1.00	1.00	0.116	No
53	1.94	26.80	16.09	10.72	0.99	0.160	1.38	0.117	1.00	1.00	0.117	No
54	1.96	27.08	16.28	10.80	0.99	0.161	1.38	0.117	1.00	1.00	0.117	No
55	1.98	27.35	16.48	10.87	0.99	0.161	1.38	0.117	1.00	1.00	0.117	No
56	2.00	27.63	16.68	10.95	0.99	0.162	1.38	0.118	1.00	1.00	0.118	No
57	2.02	27.90	16.87	11.03	0.99	0.162	1.38	0.118	1.00	1.00	0.118	No
58	2.04	28.18	17.07	11.11	0.99	0.163	1.38	0.118	1.00	1.00	0.118	No
59	2.06	28.45	17.27	11.19	0.99	0.163	1.38	0.118	1.00	1.00	0.118	No
60	2.08	28.73	17.46	11.27	0.99	0.163	1.38	0.119	1.00	1.00	0.119	No
61	2.10	29.00	17.66	11.34	0.99	0.164	1.38	0.119	1.00	1.00	0.119	No
62	2.12	29.28	17.85	11.42	0.99	0.164	1.38	0.119	1.00	1.00	0.119	No
63	2.14	29.55	18.05	11.50	0.99	0.165	1.38	0.120	1.00	1.00	0.120	No
64	2.16	29.83	18.25	11.58	0.99	0.165	1.38	0.120	1.00	1.00	0.120	No
65	2.18	30.10	18.44	11.66	0.99	0.165	1.38	0.120	1.00	1.00	0.120	No
66	2.20	30.38	18.64	11.74	0.99	0.166	1.38	0.120	1.00	1.00	0.120	No
67	2.22	30.65	18.84	11.82	0.99	0.166	1.38	0.121	1.00	1.00	0.121	No
68	2.24	30.93	19.03	11.89	0.98	0.166	1.38	0.121	1.00	1.00	0.121	No
69	2.26	31.20	19.23	11.97	0.98	0.167	1.38	0.121	1.00	1.00	0.121	No
70	2.28	31.48	19.42	12.05	0.98	0.167	1.38	0.121	1.00	1.00	0.121	No
71	2.30	31.75	19.62	12.13	0.98	0.167	1.38	0.122	1.00	1.00	0.122	No
72	2.32	32.02	19.82	12.21	0.98	0.168	1.38	0.122	1.00	1.00	0.122	No
73	2.34	32.30	20.01	12.29	0.98	0.168	1.38	0.122	1.00	1.00	0.122	No
74	2.36	32.58	20.21	12.37	0.98	0.168	1.38	0.122	1.00	1.00	0.122	No
75	2.38	32.85	20.40	12.45	0.98	0.169	1.38	0.123	1.00	1.00	0.123	No
76	2.40	33.14	20.60	12.54	0.98	0.169	1.38	0.123	1.00	1.00	0.123	No
77	2.42	33.42	20.80	12.62	0.98	0.169	1.38	0.123	1.00	1.00	0.123	No
78	2.44	33.70	20.99	12.70	0.98	0.170	1.38	0.123	1.00	1.00	0.123	No
79	2.46	33.97	21.19	12.78	0.98	0.170	1.38	0.123	1.00	1.00	0.123	No
80	2.48	34.25	21.39	12.86	0.98	0.170	1.38	0.124	1.00	1.00	0.124	No
81	2.50	34.52	21.58	12.94	0.98	0.170	1.38	0.124	1.00	1.00	0.124	No
82	2.52	34.80	21.78	13.02	0.98	0.171	1.38	0.124	1.00	1.00	0.124	No
83	2.54	35.07	21.97	13.10	0.98	0.171	1.38	0.124	1.00	1.00	0.124	No
84	2.56	35.35	22.17	13.18	0.98	0.171	1.38	0.125	1.00	1.00	0.125	No
85	2.58	35.62	22.37	13.25	0.98	0.172	1.38	0.125	1.00	1.00	0.125	No
86	2.60	35.89	22.56	13.33	0.98	0.172	1.38	0.125	1.00	1.00	0.125	No
87	2.62	36.17	22.76	13.41	0.98	0.172	1.38	0.125	1.00	1.00	0.125	No
88	2.64	36.44	22.96	13.49	0.98	0.172	1.38	0.125	1.00	1.00	0.125	No
89	2.66	36.72	23.15	13.57	0.98	0.173	1.38	0.126	1.00	1.00	0.126	No
90	2.68	36.99	23.35	13.65	0.98	0.173	1.38	0.126	1.00	1.00	0.126	No
91	2.70	37.27	23.54	13.72	0.98	0.173	1.38	0.126	1.00	1.00	0.126	No
92	2.72	37.54	23.74	13.80	0.98	0.174	1.38	0.126	1.00	1.00	0.126	No
93	2.74	37.82	23.94	13.88	0.98	0.174	1.38	0.126	1.00	1.00	0.126	No
94	2.76	38.09	24.13	13.96	0.98	0.174	1.38	0.126	1.00	1.00	0.126	No
95	2.78	38.37	24.33	14.04	0.98	0.174	1.38	0.127	1.00	1.00	0.127	No
96	2.80	38.65	24.53	14.13	0.98	0.174	1.38	0.127	1.00	1.00	0.127	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	2.82	38.94	24.72	14.22	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
98	2.84	39.22	24.92	14.31	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
99	2.86	39.51	25.11	14.40	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
100	2.88	39.80	25.31	14.49	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
101	2.90	40.09	25.51	14.58	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
102	2.92	40.37	25.70	14.66	0.98	0.175	1.38	0.127	1.00	1.00	0.127	No
103	2.94	40.64	25.90	14.75	0.98	0.176	1.38	0.128	1.00	1.00	0.128	No
104	2.96	40.92	26.09	14.82	0.98	0.176	1.38	0.128	1.00	1.00	0.128	No
105	2.98	41.19	26.29	14.90	0.98	0.176	1.38	0.128	1.00	1.00	0.128	No
106	3.00	41.47	26.49	14.98	0.98	0.176	1.38	0.128	1.00	1.00	0.128	No
107	3.02	41.74	26.68	15.06	0.98	0.176	1.38	0.128	1.00	1.00	0.128	No
108	3.04	42.02	26.88	15.14	0.98	0.177	1.38	0.128	1.00	1.00	0.128	No
109	3.06	42.29	27.08	15.22	0.98	0.177	1.38	0.129	1.00	1.00	0.129	No
110	3.08	42.57	27.27	15.30	0.98	0.177	1.38	0.129	1.00	1.00	0.129	No
111	3.10	42.84	27.47	15.37	0.98	0.177	1.38	0.129	1.00	1.00	0.129	No
112	3.12	43.12	27.66	15.45	0.98	0.177	1.38	0.129	1.00	1.00	0.129	No
113	3.14	43.39	27.86	15.53	0.98	0.178	1.38	0.129	1.00	1.00	0.129	No
114	3.16	43.67	28.06	15.61	0.98	0.178	1.38	0.129	1.00	1.00	0.129	No
115	3.18	43.94	28.25	15.69	0.98	0.178	1.38	0.129	1.00	1.00	0.129	No
116	3.20	44.22	28.45	15.77	0.98	0.178	1.38	0.130	1.00	1.00	0.130	No
117	3.22	44.49	28.65	15.84	0.98	0.178	1.38	0.130	1.00	1.00	0.130	No
118	3.24	44.76	28.84	15.92	0.98	0.179	1.38	0.130	1.00	1.00	0.130	No
119	3.26	45.04	29.04	16.00	0.98	0.179	1.38	0.130	1.00	1.00	0.130	No
120	3.28	45.31	29.23	16.08	0.98	0.179	1.38	0.130	1.00	1.00	0.130	No
121	3.30	45.59	29.43	16.16	0.98	0.179	1.38	0.130	1.00	1.00	0.130	No
122	3.32	45.86	29.63	16.24	0.98	0.179	1.38	0.130	1.00	1.00	0.130	No
123	3.34	46.14	29.82	16.32	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
124	3.36	46.41	30.02	16.39	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
125	3.38	46.69	30.21	16.47	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
126	3.40	46.96	30.41	16.55	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
127	3.42	47.24	30.61	16.63	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
128	3.44	47.51	30.80	16.71	0.98	0.180	1.38	0.131	1.00	1.00	0.131	No
129	3.46	47.79	31.00	16.79	0.98	0.181	1.38	0.131	1.00	1.00	0.131	No
130	3.48	48.06	31.20	16.86	0.98	0.181	1.38	0.131	1.00	1.00	0.131	No
131	3.50	48.34	31.39	16.94	0.98	0.181	1.38	0.132	1.00	1.00	0.132	No
132	3.52	48.61	31.59	17.02	0.98	0.181	1.38	0.132	1.00	1.00	0.132	No
133	3.54	48.89	31.78	17.11	0.98	0.181	1.38	0.132	1.00	1.00	0.132	No
134	3.56	49.17	31.98	17.19	0.98	0.181	1.38	0.132	1.00	1.00	0.132	No
135	3.58	49.45	32.18	17.27	0.98	0.182	1.38	0.132	1.00	1.00	0.132	No
136	3.60	49.73	32.37	17.36	0.98	0.182	1.38	0.132	1.00	1.00	0.132	No
137	3.62	50.01	32.57	17.44	0.98	0.182	1.38	0.132	1.00	1.00	0.132	No
138	3.64	50.29	32.77	17.53	0.98	0.182	1.38	0.132	1.00	1.00	0.132	No
139	3.66	50.57	32.96	17.61	0.97	0.182	1.38	0.132	1.00	1.00	0.132	No
140	3.68	50.85	33.16	17.69	0.97	0.182	1.38	0.132	1.00	1.00	0.132	No
141	3.70	51.13	33.35	17.77	0.97	0.182	1.38	0.132	1.00	1.00	0.132	No
142	3.72	51.40	33.55	17.85	0.97	0.182	1.38	0.133	1.00	1.00	0.133	No
143	3.74	51.68	33.75	17.93	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
144	3.76	51.95	33.94	18.01	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	3.78	52.23	34.14	18.09	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
146	3.80	52.50	34.34	18.17	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
147	3.82	52.78	34.53	18.24	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
148	3.84	53.05	34.73	18.32	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
149	3.86	53.33	34.92	18.40	0.97	0.183	1.38	0.133	1.00	1.00	0.133	No
150	3.88	53.60	35.12	18.48	0.97	0.184	1.38	0.133	1.00	1.00	0.133	No
151	3.90	53.87	35.32	18.56	0.97	0.184	1.38	0.133	1.00	1.00	0.133	No
152	3.92	54.15	35.51	18.64	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
153	3.94	54.42	35.71	18.72	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
154	3.96	54.70	35.90	18.80	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
155	3.98	54.98	36.10	18.88	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
156	4.00	55.25	36.30	18.95	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
157	4.02	55.53	36.49	19.03	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
158	4.04	55.80	36.69	19.11	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
159	4.06	56.08	36.89	19.19	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
160	4.08	56.35	37.08	19.27	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
161	4.10	56.63	37.28	19.35	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
162	4.12	56.91	37.47	19.44	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
163	4.14	57.19	37.67	19.52	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
164	4.16	57.48	37.87	19.62	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
165	4.18	57.78	38.06	19.71	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
166	4.20	58.07	38.26	19.82	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
167	4.22	58.38	38.46	19.92	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
168	4.24	58.68	38.65	20.03	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
169	4.26	58.99	38.85	20.14	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
170	4.28	59.29	39.04	20.25	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
171	4.30	59.60	39.24	20.36	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
172	4.32	59.90	39.44	20.47	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
173	4.34	60.20	39.63	20.57	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
174	4.36	60.50	39.83	20.68	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
175	4.38	60.80	40.02	20.78	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
176	4.40	61.10	40.22	20.88	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
177	4.42	61.39	40.42	20.97	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
178	4.44	61.68	40.61	21.07	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
179	4.46	61.98	40.81	21.17	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
180	4.48	62.27	41.01	21.26	0.97	0.184	1.38	0.134	1.00	1.00	0.134	No
181	4.50	62.56	41.20	21.36	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
182	4.52	62.85	41.40	21.45	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
183	4.54	63.13	41.59	21.53	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
184	4.56	63.41	41.79	21.62	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
185	4.58	63.68	41.99	21.70	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
186	4.60	63.96	42.18	21.77	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
187	4.62	64.23	42.38	21.85	0.97	0.185	1.38	0.134	1.00	1.00	0.134	No
188	4.64	64.51	42.58	21.93	0.97	0.185	1.38	0.135	1.00	1.00	0.135	No
189	4.66	64.78	42.77	22.01	0.97	0.185	1.38	0.135	1.00	1.00	0.135	No
190	4.68	65.06	42.97	22.09	0.97	0.185	1.38	0.135	1.00	1.00	0.135	No
191	4.70	65.33	43.16	22.17	0.97	0.185	1.38	0.135	1.00	1.00	0.135	No
192	4.72	65.61	43.36	22.25	0.97	0.185	1.38	0.135	1.00	1.00	0.135	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
193	4.74	65.88	43.56	22.32	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
194	4.76	66.15	43.75	22.40	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
195	4.78	66.43	43.95	22.48	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
196	4.80	66.70	44.15	22.56	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
197	4.82	66.98	44.34	22.64	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
198	4.84	67.25	44.54	22.72	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
199	4.86	67.53	44.73	22.79	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
200	4.88	67.80	44.93	22.87	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
201	4.90	68.08	45.13	22.95	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
202	4.92	68.35	45.32	23.03	0.97	0.186	1.38	0.135	1.00	1.00	0.135	No
203	4.94	68.63	45.52	23.11	0.97	0.186	1.38	0.136	1.00	1.00	0.136	No
204	4.96	68.90	45.71	23.19	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
205	4.98	69.18	45.91	23.27	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
206	5.00	69.45	46.11	23.34	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
207	5.02	69.73	46.30	23.42	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
208	5.04	70.00	46.50	23.50	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
209	5.06	70.28	46.70	23.58	0.97	0.187	1.38	0.136	1.00	1.00	0.136	No
210	5.08	70.55	46.89	23.66	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
211	5.10	70.82	47.09	23.74	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
212	5.12	71.10	47.28	23.82	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
213	5.14	71.37	47.48	23.89	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
214	5.16	71.65	47.68	23.97	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
215	5.18	71.92	47.87	24.05	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
216	5.20	72.20	48.07	24.13	0.96	0.187	1.38	0.136	1.00	1.00	0.136	No
217	5.22	72.47	48.27	24.21	0.96	0.188	1.38	0.136	1.00	1.00	0.136	No
218	5.24	72.75	48.46	24.29	0.96	0.188	1.38	0.136	1.00	1.00	0.136	No
219	5.26	73.02	48.66	24.36	0.96	0.188	1.38	0.136	1.00	1.00	0.136	No
220	5.28	73.30	48.85	24.44	0.96	0.188	1.38	0.136	1.00	1.00	0.136	No
221	5.30	73.57	49.05	24.52	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
222	5.32	73.85	49.25	24.60	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
223	5.34	74.12	49.44	24.68	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
224	5.36	74.40	49.64	24.76	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
225	5.38	74.67	49.83	24.84	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
226	5.40	74.94	50.03	24.91	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
227	5.42	75.22	50.23	24.99	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
228	5.44	75.49	50.42	25.07	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
229	5.46	75.77	50.62	25.15	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
230	5.48	76.04	50.82	25.23	0.96	0.188	1.38	0.137	1.00	1.00	0.137	No
231	5.50	76.32	51.01	25.31	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
232	5.52	76.59	51.21	25.38	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
233	5.54	76.87	51.40	25.46	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
234	5.56	77.14	51.60	25.54	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
235	5.58	77.42	51.80	25.62	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
236	5.60	77.69	51.99	25.70	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
237	5.62	77.97	52.19	25.78	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
238	5.64	78.24	52.39	25.86	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
239	5.66	78.52	52.58	25.93	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
240	5.68	78.79	52.78	26.01	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	5.70	79.06	52.97	26.09	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
242	5.72	79.34	53.17	26.17	0.96	0.189	1.38	0.137	1.00	1.00	0.137	No
243	5.74	79.61	53.37	26.25	0.96	0.189	1.38	0.138	1.00	1.00	0.138	No
244	5.76	79.89	53.56	26.33	0.96	0.189	1.38	0.138	1.00	1.00	0.138	No
245	5.78	80.16	53.76	26.40	0.96	0.189	1.38	0.138	1.00	1.00	0.138	No
246	5.80	80.44	53.96	26.48	0.96	0.189	1.38	0.138	1.00	1.00	0.138	No
247	5.82	80.71	54.15	26.56	0.96	0.189	1.38	0.138	1.00	1.00	0.138	No
248	5.84	80.99	54.35	26.64	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
249	5.86	81.26	54.54	26.72	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
250	5.88	81.54	54.74	26.80	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
251	5.90	81.81	54.94	26.88	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
252	5.92	82.09	55.13	26.95	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
253	5.94	82.36	55.33	27.03	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
254	5.96	82.64	55.52	27.11	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
255	5.98	82.91	55.72	27.19	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
256	6.00	83.19	55.92	27.27	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
257	6.02	83.46	56.11	27.35	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
258	6.04	83.73	56.31	27.43	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
259	6.06	84.01	56.51	27.50	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
260	6.08	84.28	56.70	27.58	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
261	6.10	84.56	56.90	27.66	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
262	6.12	84.83	57.09	27.74	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
263	6.14	85.11	57.29	27.82	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
264	6.16	85.38	57.49	27.90	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
265	6.18	85.66	57.68	27.98	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
266	6.20	85.93	57.88	28.06	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
267	6.22	86.21	58.08	28.13	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
268	6.24	86.48	58.27	28.21	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
269	6.26	86.76	58.47	28.29	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
270	6.28	87.03	58.66	28.37	0.96	0.190	1.38	0.138	1.00	1.00	0.138	No
271	6.30	87.31	58.86	28.45	0.96	0.191	1.38	0.138	1.00	1.00	0.138	No
272	6.32	87.58	59.06	28.53	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
273	6.34	87.86	59.25	28.60	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
274	6.36	88.13	59.45	28.68	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
275	6.38	88.41	59.64	28.76	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
276	6.40	88.68	59.84	28.84	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
277	6.42	88.96	60.04	28.92	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
278	6.44	89.23	60.23	29.00	0.95	0.191	1.38	0.139	1.00	1.00	0.139	No
279	6.46	89.51	60.43	29.08	0.95	0.191	1.38	0.139	1.00	1.00	2.000	Yes
280	6.48	89.80	60.63	29.17	0.95	0.191	1.38	0.139	1.00	1.00	2.000	Yes
281	6.50	90.09	60.82	29.27	0.95	0.191	1.38	0.139	1.00	1.00	2.000	Yes
282	6.52	90.40	61.02	29.38	0.95	0.191	1.38	0.139	1.00	1.00	2.000	Yes
283	6.54	90.71	61.21	29.50	0.95	0.190	1.38	0.138	1.00	1.00	2.000	Yes
284	6.56	91.03	61.41	29.62	0.95	0.190	1.38	0.138	1.00	1.00	0.138	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.90	0.10	3.77	4.96	1.00	1.66	33.54	55.83	0.079	No	Yes	0.88
2	0.92	0.13	3.62	4.17	1.00	2.25	26.13	58.68	0.107	No	Yes	1.18
3	0.94	0.15	3.49	3.36	1.00	2.80	21.02	58.86	0.134	No	Yes	1.46
4	0.96	0.18	3.39	2.86	1.00	3.32	17.80	59.02	0.158	No	Yes	1.72
5	0.98	0.20	3.33	2.62	1.00	3.68	16.09	59.29	0.176	No	Yes	1.89
6	1.00	0.21	3.25	1.98	1.00	3.97	13.85	54.95	0.189	No	Yes	2.00
7	1.02	0.19	3.28	1.91	1.00	3.56	14.71	52.36	0.170	No	Yes	1.80
8	1.04	0.17	3.37	2.24	1.00	3.10	17.05	52.87	0.148	No	Yes	1.55
9	1.06	0.15	3.47	2.74	1.00	2.61	20.43	53.36	0.125	No	Yes	1.30
10	1.08	0.13	3.57	3.28	1.00	2.22	24.15	53.56	0.106	No	Yes	1.09
11	1.10	0.11	3.70	4.09	1.00	1.82	29.58	53.91	0.087	No	Yes	0.89
12	1.12	0.09	3.80	5.02	1.00	1.56	35.13	54.70	0.074	No	Yes	0.76
13	1.14	0.09	3.86	5.65	1.00	1.41	38.99	55.03	0.067	No	Yes	0.68
14	1.16	0.08	3.89	5.87	1.00	1.35	40.61	54.91	0.064	No	Yes	0.65
15	1.18	0.08	3.88	5.64	1.00	1.34	40.17	53.99	0.064	No	Yes	0.64
16	1.20	0.09	3.85	5.05	1.00	1.38	38.03	52.32	0.066	No	Yes	0.65
17	1.22	0.09	3.79	4.27	1.00	1.44	34.78	50.16	0.069	No	Yes	0.68
18	1.24	0.10	3.69	3.27	1.00	1.64	29.26	47.97	0.078	No	Yes	0.77
19	1.26	0.12	3.52	2.22	1.00	2.10	21.92	46.04	0.100	No	Yes	0.98
20	1.28	0.16	3.34	1.59	1.00	2.78	16.39	45.49	0.132	No	Yes	1.28
21	1.30	0.20	3.21	1.29	1.00	3.56	12.88	45.90	0.170	No	Yes	1.64
22	1.32	0.23	3.12	1.18	1.00	4.26	11.02	46.93	0.203	No	Yes	1.95
23	1.34	0.26	3.08	1.18	1.00	4.73	10.21	48.26	0.226	No	Yes	2.00
24	1.36	0.27	3.08	1.28	1.00	4.88	10.27	50.07	0.233	No	Yes	2.00
25	1.38	0.26	3.12	1.47	1.00	4.72	11.04	52.13	0.225	No	Yes	2.00
26	1.40	0.24	3.18	1.71	1.00	4.41	12.23	53.90	0.210	No	Yes	1.98
27	1.42	0.23	3.23	1.94	1.00	4.07	13.53	55.00	0.194	No	Yes	1.81
28	1.44	0.20	3.31	2.25	1.00	3.61	15.45	55.78	0.172	No	Yes	1.60
29	1.46	0.18	3.40	2.61	1.00	3.13	17.91	55.97	0.149	No	Yes	1.38
30	1.48	0.16	3.48	2.95	1.00	2.69	20.61	55.38	0.128	No	Yes	1.18
31	1.50	0.14	3.56	3.30	1.00	2.30	23.70	54.40	0.109	No	Yes	1.01
32	1.52	0.12	3.64	3.66	1.00	1.96	27.13	53.25	0.094	No	Yes	0.86
33	1.54	0.11	3.68	3.75	1.00	1.80	28.91	52.02	0.086	No	Yes	0.78
34	1.56	0.11	3.70	3.69	1.00	1.72	29.56	50.89	0.082	No	Yes	0.75
35	1.58	0.11	3.68	3.42	1.00	1.73	28.71	49.66	0.083	No	Yes	0.75
36	1.60	0.11	3.63	2.99	1.00	1.82	26.49	48.33	0.087	No	Yes	0.78
37	1.62	0.12	3.56	2.54	1.00	1.99	23.77	47.22	0.095	No	Yes	0.85
38	1.64	0.13	3.49	2.14	1.00	2.20	21.05	46.22	0.105	No	Yes	0.94
39	1.66	0.15	3.41	1.78	1.00	2.50	18.22	45.57	0.119	No	Yes	1.06
40	1.68	0.17	3.32	1.54	1.00	2.90	15.72	45.63	0.138	No	Yes	1.23
41	1.70	0.19	3.26	1.42	1.00	3.25	14.17	46.11	0.155	No	Yes	1.37
42	1.72	0.24	3.12	1.15	1.00	4.22	11.01	46.46	0.201	No	Yes	1.78
43	1.74	0.28	3.05	1.16	1.00	5.07	9.65	48.90	0.242	No	Yes	2.00
44	1.76	0.31	3.02	1.26	1.00	5.73	9.07	51.94	0.273	No	Yes	2.00
45	1.78	0.33	3.01	1.34	1.00	6.01	8.95	53.76	0.287	No	Yes	2.00
46	1.80	0.34	3.01	1.39	1.00	6.15	8.90	54.77	0.294	No	Yes	2.00
47	1.82	0.36	2.97	1.33	0.99	6.60	8.32	54.92	0.315	No	Yes	2.00
48	1.84	0.42	2.87	1.09	0.95	7.77	6.76	52.57	0.371	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	1.86	0.45	2.82	0.96	0.93	8.34	6.08	50.74	0.398	No	Yes	2.00
50	1.88	0.46	2.79	0.89	0.92	8.63	5.73	49.47	0.412	No	Yes	2.00
51	1.90	0.47	2.78	0.85	0.91	8.71	5.60	48.76	0.416	No	Yes	2.00
52	1.92	0.41	2.86	0.96	0.94	7.52	6.61	49.72	0.359	No	Yes	2.00
53	1.94	0.32	3.01	1.18	1.00	5.69	8.90	50.61	0.271	No	Yes	2.00
54	1.96	0.26	3.13	1.38	1.00	4.50	11.16	50.25	0.215	No	Yes	1.84
55	1.98	0.22	3.23	1.61	1.00	3.74	13.42	50.23	0.179	No	Yes	1.52
56	2.00	0.19	3.31	1.85	1.00	3.24	15.54	50.26	0.154	No	Yes	1.31
57	2.02	0.18	3.37	2.04	1.00	2.94	17.10	50.29	0.140	No	Yes	1.19
58	2.04	0.16	3.43	2.26	1.00	2.65	18.96	50.26	0.126	No	Yes	1.07
59	2.06	0.15	3.46	2.31	1.00	2.47	20.00	49.32	0.118	No	Yes	0.99
60	2.08	0.15	3.45	2.13	1.00	2.45	19.57	47.91	0.117	No	Yes	0.98
61	2.10	0.16	3.41	1.89	1.00	2.53	18.41	46.59	0.121	No	Yes	1.01
62	2.12	0.16	3.37	1.67	1.00	2.67	17.05	45.60	0.128	No	Yes	1.07
63	2.14	0.17	3.33	1.50	1.00	2.81	15.96	44.84	0.134	No	Yes	1.12
64	2.16	0.18	3.30	1.39	1.00	2.92	15.19	44.31	0.139	No	Yes	1.16
65	2.18	0.18	3.28	1.36	1.00	3.00	14.79	44.31	0.143	No	Yes	1.19
66	2.20	0.19	3.27	1.33	1.00	3.08	14.44	44.44	0.147	No	Yes	1.22
67	2.22	0.19	3.25	1.31	1.00	3.20	13.98	44.69	0.153	No	Yes	1.26
68	2.24	0.20	3.24	1.30	1.00	3.31	13.63	45.07	0.158	No	Yes	1.30
69	2.26	0.20	3.24	1.33	1.00	3.34	13.63	45.45	0.159	No	Yes	1.31
70	2.28	0.20	3.24	1.37	1.00	3.33	13.78	45.84	0.159	No	Yes	1.31
71	2.30	0.20	3.24	1.37	1.00	3.38	13.63	46.08	0.161	No	Yes	1.32
72	2.32	0.23	3.16	1.21	1.00	3.90	11.86	46.26	0.186	No	Yes	1.53
73	2.34	0.28	3.04	1.04	1.00	4.94	9.46	46.78	0.236	No	Yes	1.93
74	2.36	0.32	2.99	1.06	1.00	5.61	8.66	48.60	0.268	No	Yes	2.00
75	2.38	0.34	2.97	1.09	0.99	6.06	8.25	50.00	0.289	No	Yes	2.00
76	2.40	0.35	2.96	1.15	0.99	6.25	8.20	51.26	0.298	No	Yes	2.00
77	2.42	0.33	3.01	1.26	1.00	5.81	8.95	52.06	0.277	No	Yes	2.00
78	2.44	0.27	3.13	1.50	1.00	4.72	11.12	52.45	0.225	No	Yes	1.83
79	2.46	0.23	3.21	1.60	1.00	3.96	12.87	51.01	0.189	No	Yes	1.53
80	2.48	0.21	3.27	1.69	1.00	3.43	14.47	49.66	0.164	No	Yes	1.32
81	2.50	0.19	3.33	1.78	1.00	3.03	16.01	48.57	0.145	No	Yes	1.17
82	2.52	0.18	3.38	1.94	1.00	2.77	17.49	48.44	0.132	No	Yes	1.06
83	2.54	0.17	3.42	2.05	1.00	2.61	18.52	48.42	0.125	No	Yes	1.00
84	2.56	0.16	3.43	2.09	1.00	2.53	19.03	48.17	0.121	No	Yes	0.97
85	2.58	0.16	3.43	2.04	1.00	2.52	18.96	47.68	0.120	No	Yes	0.96
86	2.60	0.17	3.37	1.77	1.00	2.74	17.13	46.87	0.131	No	Yes	1.04
87	2.62	0.19	3.32	1.57	1.00	2.94	15.68	46.14	0.140	No	Yes	1.12
88	2.64	0.20	3.26	1.39	1.00	3.20	14.24	45.61	0.153	No	Yes	1.22
89	2.66	0.22	3.20	1.26	1.00	3.55	12.82	45.52	0.169	No	Yes	1.35
90	2.68	0.24	3.15	1.15	1.00	3.95	11.56	45.61	0.188	No	Yes	1.50
91	2.70	0.25	3.12	1.15	1.00	4.16	11.11	46.24	0.199	No	Yes	1.58
92	2.72	0.26	3.11	1.16	1.00	4.35	10.80	46.99	0.208	No	Yes	1.65
93	2.74	0.26	3.10	1.18	1.00	4.47	10.65	47.63	0.213	No	Yes	1.69
94	2.76	0.28	3.07	1.18	1.00	4.80	10.09	48.43	0.229	No	Yes	1.81
95	2.78	0.35	2.94	0.98	0.98	6.10	7.88	48.08	0.291	No	Yes	2.00
96	2.80	0.44	2.81	0.84	0.93	8.02	5.98	47.93	0.382	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	2.82	0.49	2.78	0.86	0.91	8.83	5.56	49.10	0.421	No	Yes	2.00
98	2.84	0.51	2.77	0.90	0.91	9.26	5.43	50.27	0.442	No	Yes	2.00
99	2.86	0.50	2.79	0.97	0.92	9.07	5.68	51.57	0.433	No	Yes	2.00
100	2.88	0.43	2.89	1.19	0.96	7.63	7.11	54.19	0.364	No	Yes	2.00
101	2.90	0.31	3.09	1.60	1.00	5.39	10.36	55.76	0.257	No	Yes	2.00
102	2.92	0.25	3.21	1.86	1.00	4.21	13.00	54.73	0.201	No	Yes	1.58
103	2.94	0.21	3.32	2.10	1.00	3.36	15.82	53.14	0.160	No	Yes	1.26
104	2.96	0.19	3.40	2.29	1.00	2.89	18.00	52.03	0.138	No	Yes	1.08
105	2.98	0.17	3.46	2.41	1.00	2.54	19.90	50.57	0.121	No	Yes	0.95
106	3.00	0.16	3.50	2.44	1.00	2.32	21.23	49.15	0.110	No	Yes	0.86
107	3.02	0.15	3.52	2.44	1.00	2.16	22.20	48.04	0.103	No	Yes	0.81
108	3.04	0.15	3.53	2.39	1.00	2.10	22.49	47.16	0.100	No	Yes	0.78
109	3.06	0.14	3.55	2.29	1.00	1.97	23.13	45.46	0.094	No	Yes	0.73
110	3.08	0.14	3.55	2.19	1.00	1.91	23.27	44.37	0.091	No	Yes	0.71
111	3.10	0.14	3.55	2.11	1.00	1.89	23.14	43.68	0.090	No	Yes	0.70
112	3.12	0.14	3.52	1.97	1.00	1.96	22.06	43.32	0.094	No	Yes	0.73
113	3.14	0.15	3.48	1.79	1.00	2.10	20.49	42.98	0.100	No	Yes	0.77
114	3.16	0.16	3.43	1.64	1.00	2.24	19.14	42.77	0.107	No	Yes	0.82
115	3.18	0.16	3.41	1.55	1.00	2.35	18.20	42.68	0.112	No	Yes	0.86
116	3.20	0.17	3.39	1.49	1.00	2.41	17.69	42.56	0.115	No	Yes	0.89
117	3.22	0.17	3.39	1.51	1.00	2.39	17.84	42.55	0.114	No	Yes	0.88
118	3.24	0.16	3.41	1.56	1.00	2.32	18.36	42.67	0.111	No	Yes	0.85
119	3.26	0.16	3.43	1.65	1.00	2.25	19.05	42.92	0.107	No	Yes	0.83
120	3.28	0.16	3.45	1.71	1.00	2.21	19.54	43.18	0.105	No	Yes	0.81
121	3.30	0.16	3.44	1.73	1.00	2.24	19.43	43.47	0.107	No	Yes	0.82
122	3.32	0.16	3.43	1.70	1.00	2.29	19.02	43.64	0.109	No	Yes	0.84
123	3.34	0.17	3.41	1.65	1.00	2.36	18.47	43.66	0.113	No	Yes	0.86
124	3.36	0.18	3.34	1.45	1.00	2.70	16.21	43.75	0.129	No	Yes	0.99
125	3.38	0.21	3.23	1.20	1.00	3.29	13.34	43.87	0.157	No	Yes	1.20
126	3.40	0.24	3.15	1.08	1.00	3.78	11.67	44.12	0.180	No	Yes	1.38
127	3.42	0.26	3.10	1.02	1.00	4.22	10.59	44.68	0.201	No	Yes	1.54
128	3.44	0.28	3.06	1.00	1.00	4.64	9.82	45.54	0.221	No	Yes	1.69
129	3.46	0.29	3.06	1.07	1.00	4.77	9.81	46.80	0.228	No	Yes	1.73
130	3.48	0.29	3.08	1.18	1.00	4.68	10.30	48.18	0.223	No	Yes	1.70
131	3.50	0.28	3.10	1.28	1.00	4.60	10.71	49.28	0.219	No	Yes	1.67
132	3.52	0.28	3.13	1.41	1.00	4.49	11.27	50.59	0.214	No	Yes	1.63
133	3.54	0.27	3.17	1.57	1.00	4.31	12.06	52.00	0.206	No	Yes	1.56
134	3.56	0.26	3.21	1.76	1.00	4.09	12.99	53.17	0.195	No	Yes	1.48
135	3.58	0.24	3.27	2.03	1.00	3.76	14.47	54.44	0.179	No	Yes	1.36
136	3.60	0.22	3.34	2.35	1.00	3.46	16.15	55.82	0.165	No	Yes	1.25
137	3.62	0.21	3.39	2.64	1.00	3.21	17.67	56.63	0.153	No	Yes	1.16
138	3.64	0.20	3.43	2.84	1.00	2.98	19.03	56.65	0.142	No	Yes	1.07
139	3.66	0.19	3.47	3.00	1.00	2.76	20.38	56.26	0.132	No	Yes	1.00
140	3.68	0.18	3.50	3.05	1.00	2.60	21.30	55.36	0.124	No	Yes	0.94
141	3.70	0.18	3.52	2.99	1.00	2.46	21.92	53.84	0.117	No	Yes	0.88
142	3.72	0.17	3.52	2.82	1.00	2.33	22.20	51.82	0.111	No	Yes	0.84
143	3.74	0.17	3.51	2.55	1.00	2.32	21.55	49.95	0.111	No	Yes	0.83
144	3.76	0.17	3.47	2.22	1.00	2.38	20.20	48.12	0.114	No	Yes	0.86

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	3.78	0.18	3.40	1.85	1.00	2.56	18.12	46.47	0.122	No	Yes	0.92
146	3.80	0.21	3.29	1.43	1.00	3.01	14.98	45.11	0.144	No	Yes	1.08
147	3.82	0.23	3.19	1.15	1.00	3.51	12.58	44.09	0.167	No	Yes	1.26
148	3.84	0.24	3.15	1.04	1.00	3.75	11.64	43.59	0.179	No	Yes	1.34
149	3.86	0.25	3.14	1.07	1.00	3.90	11.40	44.46	0.186	No	Yes	1.40
150	3.88	0.25	3.15	1.16	1.00	3.95	11.57	45.73	0.189	No	Yes	1.41
151	3.90	0.24	3.20	1.36	1.00	3.73	12.71	47.45	0.178	No	Yes	1.33
152	3.92	0.23	3.26	1.64	1.00	3.45	14.28	49.20	0.164	No	Yes	1.23
153	3.94	0.23	3.29	1.82	1.00	3.41	14.91	50.78	0.163	No	Yes	1.22
154	3.96	0.24	3.27	1.80	1.00	3.57	14.41	51.39	0.170	No	Yes	1.27
155	3.98	0.25	3.23	1.68	1.00	3.81	13.43	51.19	0.182	No	Yes	1.36
156	4.00	0.26	3.19	1.55	1.00	4.02	12.59	50.65	0.192	No	Yes	1.43
157	4.02	0.27	3.17	1.44	1.00	4.18	11.96	50.01	0.199	No	Yes	1.49
158	4.04	0.27	3.14	1.36	1.00	4.31	11.47	49.48	0.206	No	Yes	1.53
159	4.06	0.28	3.12	1.29	1.00	4.42	11.07	48.95	0.211	No	Yes	1.57
160	4.08	0.30	3.09	1.23	1.00	4.72	10.38	48.96	0.225	No	Yes	1.68
161	4.10	0.33	3.01	1.11	1.00	5.47	8.97	49.08	0.261	No	Yes	1.94
162	4.12	0.39	2.92	1.00	0.97	6.51	7.55	49.16	0.311	No	Yes	2.00
163	4.14	0.43	2.86	0.93	0.95	7.44	6.60	49.09	0.355	No	Yes	2.00
164	4.16	0.45	2.89	1.24	0.96	7.82	7.08	55.40	0.373	No	Yes	2.00
165	4.18	0.50	2.86	1.32	0.95	8.67	6.70	58.07	0.414	No	Yes	2.00
166	4.20	0.51	2.87	1.47	0.95	8.97	6.83	61.31	0.428	No	Yes	2.00
167	4.22	0.51	2.91	1.72	0.97	8.95	7.34	65.69	0.427	No	Yes	2.00
168	4.24	0.51	2.95	2.01	0.98	8.88	7.90	70.15	0.424	No	Yes	2.00
169	4.26	0.52	2.93	1.93	0.97	9.15	7.58	69.41	0.437	No	Yes	2.00
170	4.28	0.50	2.97	2.12	0.99	8.69	8.22	71.45	0.415	No	Yes	2.00
171	4.30	0.47	3.02	2.32	1.00	8.03	9.05	72.65	0.383	No	Yes	2.00
172	4.32	0.43	3.05	2.40	1.00	7.39	9.73	71.96	0.353	No	Yes	2.00
173	4.34	0.41	3.08	2.41	1.00	6.91	10.24	70.68	0.329	No	Yes	2.00
174	4.36	0.39	3.10	2.38	1.00	6.47	10.64	68.87	0.309	No	Yes	2.00
175	4.38	0.36	3.13	2.36	1.00	5.95	11.24	66.89	0.284	No	Yes	2.00
176	4.40	0.34	3.17	2.44	1.00	5.49	12.04	66.10	0.262	No	Yes	1.95
177	4.42	0.32	3.21	2.58	1.00	5.07	12.98	65.83	0.242	No	Yes	1.80
178	4.44	0.30	3.26	2.76	1.00	4.62	14.15	65.44	0.221	No	Yes	1.65
179	4.46	0.27	3.32	3.04	1.00	4.19	15.67	65.68	0.200	No	Yes	1.49
180	4.48	0.26	3.37	3.26	1.00	3.83	17.04	65.35	0.183	No	Yes	1.36
181	4.50	0.25	3.37	3.11	1.00	3.71	17.07	63.38	0.177	No	Yes	1.32
182	4.52	0.24	3.37	2.90	1.00	3.55	17.13	60.82	0.169	No	Yes	1.26
183	4.54	0.23	3.37	2.65	1.00	3.36	17.17	57.73	0.160	No	Yes	1.20
184	4.56	0.22	3.38	2.40	1.00	3.13	17.35	54.30	0.149	No	Yes	1.11
185	4.58	0.21	3.39	2.20	1.00	2.87	17.86	51.17	0.137	No	Yes	1.02
186	4.60	0.20	3.42	2.14	1.00	2.62	18.75	49.12	0.125	No	Yes	0.93
187	4.62	0.19	3.45	2.14	1.00	2.44	19.65	47.90	0.116	No	Yes	0.87
188	4.64	0.18	3.48	2.20	1.00	2.28	20.76	47.24	0.109	No	Yes	0.81
189	4.66	0.17	3.51	2.29	1.00	2.14	21.89	46.81	0.102	No	Yes	0.76
190	4.68	0.17	3.54	2.34	1.00	2.04	22.75	46.39	0.097	No	Yes	0.72
191	4.70	0.16	3.55	2.33	1.00	1.97	23.25	45.71	0.094	No	Yes	0.70
192	4.72	0.16	3.56	2.29	1.00	1.91	23.52	45.03	0.091	No	Yes	0.68

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	4.74	0.16	3.54	2.14	1.00	1.95	22.76	44.40	0.093	No	Yes	0.69
194	4.76	0.17	3.51	2.00	1.00	2.01	21.80	43.90	0.096	No	Yes	0.71
195	4.78	0.18	3.47	1.81	1.00	2.16	20.20	43.57	0.103	No	Yes	0.76
196	4.80	0.18	3.43	1.69	1.00	2.29	19.03	43.50	0.109	No	Yes	0.81
197	4.82	0.19	3.41	1.62	1.00	2.36	18.41	43.39	0.112	No	Yes	0.83
198	4.84	0.19	3.42	1.63	1.00	2.34	18.51	43.38	0.112	No	Yes	0.83
199	4.86	0.19	3.41	1.63	1.00	2.37	18.39	43.53	0.113	No	Yes	0.83
200	4.88	0.19	3.43	1.71	1.00	2.33	18.88	43.92	0.111	No	Yes	0.82
201	4.90	0.18	3.44	1.80	1.00	2.28	19.42	44.31	0.109	No	Yes	0.80
202	4.92	0.18	3.45	1.89	1.00	2.28	19.76	44.97	0.109	No	Yes	0.80
203	4.94	0.19	3.45	1.93	1.00	2.31	19.72	45.50	0.110	No	Yes	0.81
204	4.96	0.19	3.46	1.98	1.00	2.30	19.91	45.75	0.110	No	Yes	0.81
205	4.98	0.18	3.46	1.99	1.00	2.28	20.09	45.75	0.109	No	Yes	0.80
206	5.00	0.18	3.47	2.04	1.00	2.25	20.39	45.86	0.107	No	Yes	0.79
207	5.02	0.18	3.47	2.03	1.00	2.24	20.42	45.73	0.107	No	Yes	0.79
208	5.04	0.18	3.47	2.00	1.00	2.23	20.36	45.47	0.107	No	Yes	0.78
209	5.06	0.18	3.47	1.97	1.00	2.25	20.18	45.35	0.107	No	Yes	0.79
210	5.08	0.19	3.46	1.95	1.00	2.27	19.96	45.36	0.108	No	Yes	0.80
211	5.10	0.19	3.45	1.90	1.00	2.31	19.59	45.24	0.110	No	Yes	0.81
212	5.12	0.19	3.44	1.87	1.00	2.34	19.33	45.26	0.112	No	Yes	0.82
213	5.14	0.19	3.44	1.87	1.00	2.37	19.18	45.40	0.113	No	Yes	0.83
214	5.16	0.19	3.43	1.88	1.00	2.40	19.04	45.66	0.114	No	Yes	0.84
215	5.18	0.19	3.43	1.89	1.00	2.42	18.95	45.93	0.116	No	Yes	0.85
216	5.20	0.19	3.43	1.92	1.00	2.42	19.06	46.18	0.116	No	Yes	0.85
217	5.22	0.19	3.44	1.95	1.00	2.41	19.20	46.30	0.115	No	Yes	0.84
218	5.24	0.19	3.44	1.97	1.00	2.40	19.34	46.42	0.114	No	Yes	0.84
219	5.26	0.19	3.45	2.01	1.00	2.36	19.70	46.41	0.112	No	Yes	0.82
220	5.28	0.19	3.46	2.04	1.00	2.30	20.10	46.26	0.110	No	Yes	0.80
221	5.30	0.19	3.47	2.05	1.00	2.27	20.33	46.12	0.108	No	Yes	0.79
222	5.32	0.19	3.46	2.01	1.00	2.28	20.09	45.88	0.109	No	Yes	0.80
223	5.34	0.19	3.47	1.99	1.00	2.26	20.19	45.61	0.108	No	Yes	0.79
224	5.36	0.19	3.47	1.97	1.00	2.22	20.37	45.20	0.106	No	Yes	0.77
225	5.38	0.18	3.53	2.26	1.00	2.06	22.36	46.02	0.098	No	Yes	0.72
226	5.40	0.19	3.49	2.13	1.00	2.21	20.95	46.22	0.105	No	Yes	0.77
227	5.42	0.19	3.48	2.11	1.00	2.25	20.61	46.37	0.107	No	Yes	0.78
228	5.44	0.19	3.46	2.05	1.00	2.33	19.94	46.53	0.111	No	Yes	0.81
229	5.46	0.20	3.44	1.99	1.00	2.44	19.16	46.81	0.117	No	Yes	0.85
230	5.48	0.21	3.37	1.70	1.00	2.67	17.20	45.86	0.127	No	Yes	0.93
231	5.50	0.21	3.38	1.70	1.00	2.60	17.47	45.46	0.124	No	Yes	0.91
232	5.52	0.21	3.38	1.67	1.00	2.62	17.32	45.34	0.125	No	Yes	0.91
233	5.54	0.21	3.37	1.63	1.00	2.66	17.02	45.21	0.127	No	Yes	0.92
234	5.56	0.21	3.36	1.59	1.00	2.70	16.70	45.09	0.129	No	Yes	0.94
235	5.58	0.22	3.35	1.58	1.00	2.74	16.48	45.23	0.131	No	Yes	0.95
236	5.60	0.22	3.35	1.60	1.00	2.75	16.51	45.49	0.131	No	Yes	0.96
237	5.62	0.22	3.34	1.60	1.00	2.79	16.37	45.62	0.133	No	Yes	0.97
238	5.64	0.22	3.33	1.57	1.00	2.89	15.89	45.88	0.138	No	Yes	1.00
239	5.66	0.23	3.31	1.55	1.00	2.98	15.46	46.14	0.142	No	Yes	1.04
240	5.68	0.24	3.29	1.51	1.00	3.12	14.88	46.38	0.149	No	Yes	1.08

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	5.70	0.24	3.27	1.47	1.00	3.23	14.41	46.49	0.154	No	Yes	1.12
242	5.72	0.25	3.26	1.44	1.00	3.28	14.15	46.48	0.157	No	Yes	1.14
243	5.74	0.24	3.27	1.44	1.00	3.23	14.30	46.24	0.154	No	Yes	1.12
244	5.76	0.24	3.29	1.49	1.00	3.09	14.90	46.13	0.148	No	Yes	1.07
245	5.78	0.23	3.31	1.55	1.00	2.95	15.58	46.01	0.141	No	Yes	1.02
246	5.80	0.23	3.33	1.60	1.00	2.86	16.10	46.01	0.136	No	Yes	0.99
247	5.82	0.22	3.35	1.63	1.00	2.80	16.42	46.00	0.134	No	Yes	0.97
248	5.84	0.22	3.36	1.69	1.00	2.76	16.76	46.25	0.132	No	Yes	0.96
249	5.86	0.22	3.35	1.68	1.00	2.79	16.60	46.38	0.133	No	Yes	0.97
250	5.88	0.22	3.35	1.66	1.00	2.82	16.44	46.38	0.135	No	Yes	0.98
251	5.90	0.23	3.33	1.61	1.00	2.92	15.90	46.39	0.139	No	Yes	1.01
252	5.92	0.23	3.31	1.56	1.00	3.02	15.38	46.39	0.144	No	Yes	1.04
253	5.94	0.24	3.28	1.49	1.00	3.16	14.66	46.37	0.151	No	Yes	1.09
254	5.96	0.25	3.25	1.41	1.00	3.34	13.88	46.34	0.159	No	Yes	1.15
255	5.98	0.26	3.21	1.32	1.00	3.56	12.99	46.28	0.170	No	Yes	1.23
256	6.00	0.27	3.18	1.24	1.00	3.78	12.23	46.20	0.180	No	Yes	1.31
257	6.02	0.28	3.16	1.22	1.00	3.93	11.80	46.37	0.187	No	Yes	1.36
258	6.04	0.29	3.15	1.20	1.00	4.03	11.54	46.57	0.192	No	Yes	1.39
259	6.06	0.30	3.13	1.19	1.00	4.17	11.25	46.86	0.199	No	Yes	1.44
260	6.08	0.30	3.12	1.20	1.00	4.28	11.03	47.27	0.204	No	Yes	1.48
261	6.10	0.31	3.12	1.22	1.00	4.37	10.95	47.82	0.208	No	Yes	1.51
262	6.12	0.31	3.11	1.23	1.00	4.45	10.83	48.23	0.212	No	Yes	1.54
263	6.14	0.31	3.11	1.26	1.00	4.50	10.83	48.67	0.214	No	Yes	1.55
264	6.16	0.31	3.13	1.31	1.00	4.41	11.13	49.07	0.210	No	Yes	1.52
265	6.18	0.30	3.16	1.40	1.00	4.17	11.86	49.45	0.199	No	Yes	1.44
266	6.20	0.28	3.21	1.53	1.00	3.85	12.92	49.73	0.184	No	Yes	1.33
267	6.22	0.26	3.26	1.69	1.00	3.52	14.24	50.09	0.168	No	Yes	1.21
268	6.24	0.25	3.32	1.87	1.00	3.22	15.63	50.27	0.153	No	Yes	1.11
269	6.26	0.24	3.36	2.01	1.00	2.99	16.81	50.29	0.143	No	Yes	1.03
270	6.28	0.23	3.38	2.07	1.00	2.86	17.52	50.06	0.136	No	Yes	0.98
271	6.30	0.23	3.40	2.08	1.00	2.77	17.93	49.60	0.132	No	Yes	0.95
272	6.32	0.22	3.40	2.04	1.00	2.69	18.11	48.79	0.128	No	Yes	0.93
273	6.34	0.23	3.38	1.89	1.00	2.73	17.52	47.85	0.130	No	Yes	0.94
274	6.36	0.24	3.33	1.66	1.00	2.92	16.06	46.88	0.139	No	Yes	1.00
275	6.38	0.25	3.26	1.41	1.00	3.28	14.04	46.10	0.157	No	Yes	1.13
276	6.40	0.28	3.18	1.24	1.00	3.73	12.32	45.96	0.178	No	Yes	1.28
277	6.42	0.30	3.11	1.14	1.00	4.26	10.90	46.43	0.203	No	Yes	1.47
278	6.44	0.34	3.05	1.08	1.00	4.94	9.59	47.38	0.236	No	Yes	1.70
279	6.46	0.50	2.79	0.75	0.93	8.02	5.72	45.88	4.000	Yes	Yes	2.00
280	6.48	0.73	2.57	0.59	0.84	12.61	4.37	55.05	4.000	Yes	No	2.00
281	6.50	1.00	2.41	0.54	0.78	18.03	2.43	43.73	4.000	Yes	No	2.00
282	6.52	1.31	2.31	0.58	0.74	24.06	1.96	47.12	4.000	Yes	No	2.00
283	6.54	1.57	2.22	0.55	0.71	29.18	1.67	48.77	4.000	Yes	No	2.00
284	6.56	1.77	2.21	0.66	0.71	33.10	1.64	54.34	0.095	No	No	0.69

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.90	0.88	0.00	0.00	0.02	0.02	0.92	1.18	0.00	0.00	0.02	0.00
0.94	1.46	0.00	0.00	0.02	0.00	0.96	1.72	0.00	0.00	0.02	0.00
0.98	1.89	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	1.80	0.00	0.00	0.02	0.00	1.04	1.55	0.00	0.00	0.02	0.00
1.06	1.30	0.00	0.00	0.02	0.00	1.08	1.09	0.00	0.00	0.02	0.00
1.10	0.89	0.00	0.00	0.02	0.02	1.12	0.76	0.00	0.00	0.02	0.05
1.14	0.68	0.00	0.00	0.02	0.06	1.16	0.65	0.00	0.00	0.02	0.07
1.18	0.64	0.00	0.00	0.02	0.07	1.20	0.65	0.00	0.00	0.02	0.07
1.22	0.68	0.00	0.00	0.02	0.06	1.24	0.77	0.00	0.00	0.02	0.04
1.26	0.98	0.00	0.00	0.02	0.00	1.28	1.28	0.00	0.00	0.02	0.00
1.30	1.64	0.00	0.00	0.02	0.00	1.32	1.95	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	1.98	0.00	0.00	0.02	0.00
1.42	1.81	0.00	0.00	0.02	0.00	1.44	1.60	0.00	0.00	0.02	0.00
1.46	1.38	0.00	0.00	0.02	0.00	1.48	1.18	0.00	0.00	0.02	0.00
1.50	1.01	0.00	0.00	0.02	0.00	1.52	0.86	0.00	0.00	0.02	0.03
1.54	0.78	0.00	0.00	0.02	0.04	1.56	0.75	0.00	0.00	0.02	0.05
1.58	0.75	0.00	0.00	0.02	0.05	1.60	0.78	0.00	0.00	0.02	0.04
1.62	0.85	0.00	0.00	0.02	0.03	1.64	0.94	0.00	0.00	0.02	0.01
1.66	1.06	0.00	0.00	0.02	0.00	1.68	1.23	0.00	0.00	0.02	0.00
1.70	1.37	0.00	0.00	0.02	0.00	1.72	1.78	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	1.84	0.00	0.00	0.02	0.00
1.98	1.52	0.00	0.00	0.02	0.00	2.00	1.31	0.00	0.00	0.02	0.00
2.02	1.19	0.00	0.00	0.02	0.00	2.04	1.07	0.00	0.00	0.02	0.00
2.06	0.99	0.00	0.00	0.02	0.00	2.08	0.98	0.00	0.00	0.02	0.00
2.10	1.01	0.00	0.00	0.02	0.00	2.12	1.07	0.00	0.00	0.02	0.00
2.14	1.12	0.00	0.00	0.02	0.00	2.16	1.16	0.00	0.00	0.02	0.00
2.18	1.19	0.00	0.00	0.02	0.00	2.20	1.22	0.00	0.00	0.02	0.00
2.22	1.26	0.00	0.00	0.02	0.00	2.24	1.30	0.00	0.00	0.02	0.00
2.26	1.31	0.00	0.00	0.02	0.00	2.28	1.31	0.00	0.00	0.02	0.00
2.30	1.32	0.00	0.00	0.02	0.00	2.32	1.53	0.00	0.00	0.02	0.00
2.34	1.93	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	1.83	0.00	0.00	0.02	0.00
2.46	1.53	0.00	0.00	0.02	0.00	2.48	1.32	0.00	0.00	0.02	0.00
2.50	1.17	0.00	0.00	0.02	0.00	2.52	1.06	0.00	0.00	0.02	0.00
2.54	1.00	0.00	0.00	0.02	0.00	2.56	0.97	0.00	0.00	0.02	0.01
2.58	0.96	0.00	0.00	0.02	0.01	2.60	1.04	0.00	0.00	0.02	0.00
2.62	1.12	0.00	0.00	0.02	0.00	2.64	1.22	0.00	0.00	0.02	0.00
2.66	1.35	0.00	0.00	0.02	0.00	2.68	1.50	0.00	0.00	0.02	0.00
2.70	1.58	0.00	0.00	0.02	0.00	2.72	1.65	0.00	0.00	0.02	0.00
2.74	1.69	0.00	0.00	0.02	0.00	2.76	1.81	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	1.58	0.00	0.00	0.02	0.00
2.94	1.26	0.00	0.00	0.02	0.00	2.96	1.08	0.00	0.00	0.02	0.00
2.98	0.95	0.00	0.00	0.02	0.01	3.00	0.86	0.00	0.00	0.02	0.02
3.02	0.81	0.00	0.00	0.02	0.03	3.04	0.78	0.00	0.00	0.02	0.04
3.06	0.73	0.00	0.00	0.02	0.05	3.08	0.71	0.29	0.95	0.02	0.05
3.10	0.70	0.30	0.91	0.02	0.05	3.12	0.73	0.00	0.00	0.02	0.05
3.14	0.77	0.00	0.00	0.02	0.04	3.16	0.82	0.00	0.00	0.02	0.03
3.18	0.86	0.00	0.00	0.02	0.02	3.20	0.89	0.00	0.00	0.02	0.02
3.22	0.88	0.00	0.00	0.02	0.02	3.24	0.85	0.00	0.00	0.02	0.02
3.26	0.83	0.00	0.00	0.02	0.03	3.28	0.81	0.00	0.00	0.02	0.03
3.30	0.82	0.00	0.00	0.02	0.03	3.32	0.84	0.00	0.00	0.02	0.03
3.34	0.86	0.00	0.00	0.02	0.02	3.36	0.99	0.00	0.00	0.02	0.00
3.38	1.20	0.00	0.00	0.02	0.00	3.40	1.38	0.00	0.00	0.02	0.00
3.42	1.54	0.00	0.00	0.02	0.00	3.44	1.69	0.00	0.00	0.02	0.00
3.46	1.73	0.00	0.00	0.02	0.00	3.48	1.70	0.00	0.00	0.02	0.00
3.50	1.67	0.00	0.00	0.02	0.00	3.52	1.63	0.00	0.00	0.02	0.00
3.54	1.56	0.00	0.00	0.02	0.00	3.56	1.48	0.00	0.00	0.02	0.00
3.58	1.36	0.00	0.00	0.02	0.00	3.60	1.25	0.00	0.00	0.02	0.00
3.62	1.16	0.00	0.00	0.02	0.00	3.64	1.07	0.00	0.00	0.02	0.00
3.66	1.00	0.00	0.00	0.02	0.00	3.68	0.94	0.00	0.00	0.02	0.01
3.70	0.88	0.00	0.00	0.02	0.02	3.72	0.84	0.00	0.00	0.02	0.03
3.74	0.83	0.00	0.00	0.02	0.03	3.76	0.86	0.00	0.00	0.02	0.02
3.78	0.92	0.00	0.00	0.02	0.01	3.80	1.08	0.00	0.00	0.02	0.00
3.82	1.26	0.00	0.00	0.02	0.00	3.84	1.34	0.00	0.00	0.02	0.00
3.86	1.40	0.00	0.00	0.02	0.00	3.88	1.41	0.00	0.00	0.02	0.00
3.90	1.33	0.00	0.00	0.02	0.00	3.92	1.23	0.00	0.00	0.02	0.00
3.94	1.22	0.00	0.00	0.02	0.00	3.96	1.27	0.00	0.00	0.02	0.00
3.98	1.36	0.00	0.00	0.02	0.00	4.00	1.43	0.00	0.00	0.02	0.00
4.02	1.49	0.00	0.00	0.02	0.00	4.04	1.53	0.00	0.00	0.02	0.00
4.06	1.57	0.00	0.00	0.02	0.00	4.08	1.68	0.00	0.00	0.02	0.00
4.10	1.94	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	1.95	0.00	0.00	0.02	0.00
4.42	1.80	0.00	0.00	0.02	0.00	4.44	1.65	0.00	0.00	0.02	0.00
4.46	1.49	0.00	0.00	0.02	0.00	4.48	1.36	0.00	0.00	0.02	0.00
4.50	1.32	0.00	0.00	0.02	0.00	4.52	1.26	0.00	0.00	0.02	0.00
4.54	1.20	0.00	0.00	0.02	0.00	4.56	1.11	0.00	0.00	0.02	0.00
4.58	1.02	0.00	0.00	0.02	0.00	4.60	0.93	0.00	0.00	0.02	0.01
4.62	0.87	0.00	0.00	0.02	0.02	4.64	0.81	0.00	0.00	0.02	0.03
4.66	0.76	0.00	0.00	0.02	0.04	4.68	0.72	0.00	0.00	0.02	0.04
4.70	0.70	0.30	0.90	0.02	0.05	4.72	0.68	0.32	0.83	0.02	0.05

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
4.74	0.69	0.31	0.88	0.02	0.05	4.76	0.71	0.29	0.97	0.02	0.04
4.78	0.76	0.00	0.00	0.02	0.04	4.80	0.81	0.00	0.00	0.02	0.03
4.82	0.83	0.00	0.00	0.02	0.03	4.84	0.83	0.00	0.00	0.02	0.03
4.86	0.83	0.00	0.00	0.02	0.03	4.88	0.82	0.00	0.00	0.02	0.03
4.90	0.80	0.00	0.00	0.02	0.03	4.92	0.80	0.00	0.00	0.02	0.03
4.94	0.81	0.00	0.00	0.02	0.03	4.96	0.81	0.00	0.00	0.02	0.03
4.98	0.80	0.00	0.00	0.02	0.03	5.00	0.79	0.00	0.00	0.02	0.03
5.02	0.79	0.00	0.00	0.02	0.03	5.04	0.78	0.00	0.00	0.02	0.03
5.06	0.79	0.00	0.00	0.02	0.03	5.08	0.80	0.00	0.00	0.02	0.03
5.10	0.81	0.00	0.00	0.02	0.03	5.12	0.82	0.00	0.00	0.02	0.03
5.14	0.83	0.00	0.00	0.02	0.03	5.16	0.84	0.00	0.00	0.02	0.02
5.18	0.85	0.00	0.00	0.02	0.02	5.20	0.85	0.00	0.00	0.02	0.02
5.22	0.84	0.00	0.00	0.02	0.02	5.24	0.84	0.00	0.00	0.02	0.02
5.26	0.82	0.00	0.00	0.02	0.03	5.28	0.80	0.00	0.00	0.02	0.03
5.30	0.79	0.00	0.00	0.02	0.03	5.32	0.80	0.00	0.00	0.02	0.03
5.34	0.79	0.00	0.00	0.02	0.03	5.36	0.77	0.00	0.00	0.02	0.03
5.38	0.72	0.28	1.00	0.02	0.04	5.40	0.77	0.00	0.00	0.02	0.03
5.42	0.78	0.00	0.00	0.02	0.03	5.44	0.81	0.00	0.00	0.02	0.03
5.46	0.85	0.00	0.00	0.02	0.02	5.48	0.93	0.00	0.00	0.02	0.01
5.50	0.91	0.00	0.00	0.02	0.01	5.52	0.91	0.00	0.00	0.02	0.01
5.54	0.92	0.00	0.00	0.02	0.01	5.56	0.94	0.00	0.00	0.02	0.01
5.58	0.95	0.00	0.00	0.02	0.01	5.60	0.96	0.00	0.00	0.02	0.01
5.62	0.97	0.00	0.00	0.02	0.00	5.64	1.00	0.00	0.00	0.02	0.00
5.66	1.04	0.00	0.00	0.02	0.00	5.68	1.08	0.00	0.00	0.02	0.00
5.70	1.12	0.00	0.00	0.02	0.00	5.72	1.14	0.00	0.00	0.02	0.00
5.74	1.12	0.00	0.00	0.02	0.00	5.76	1.07	0.00	0.00	0.02	0.00
5.78	1.02	0.00	0.00	0.02	0.00	5.80	0.99	0.00	0.00	0.02	0.00
5.82	0.97	0.00	0.00	0.02	0.00	5.84	0.96	0.00	0.00	0.02	0.01
5.86	0.97	0.00	0.00	0.02	0.00	5.88	0.98	0.00	0.00	0.02	0.00
5.90	1.01	0.00	0.00	0.02	0.00	5.92	1.04	0.00	0.00	0.02	0.00
5.94	1.09	0.00	0.00	0.02	0.00	5.96	1.15	0.00	0.00	0.02	0.00
5.98	1.23	0.00	0.00	0.02	0.00	6.00	1.31	0.00	0.00	0.02	0.00
6.02	1.36	0.00	0.00	0.02	0.00	6.04	1.39	0.00	0.00	0.02	0.00
6.06	1.44	0.00	0.00	0.02	0.00	6.08	1.48	0.00	0.00	0.02	0.00
6.10	1.51	0.00	0.00	0.02	0.00	6.12	1.54	0.00	0.00	0.02	0.00
6.14	1.55	0.00	0.00	0.02	0.00	6.16	1.52	0.00	0.00	0.02	0.00
6.18	1.44	0.00	0.00	0.02	0.00	6.20	1.33	0.00	0.00	0.02	0.00
6.22	1.21	0.00	0.00	0.02	0.00	6.24	1.11	0.00	0.00	0.02	0.00
6.26	1.03	0.00	0.00	0.02	0.00	6.28	0.98	0.00	0.00	0.02	0.00
6.30	0.95	0.00	0.00	0.02	0.01	6.32	0.93	0.00	0.00	0.02	0.01
6.34	0.94	0.00	0.00	0.02	0.01	6.36	1.00	0.00	0.00	0.02	0.00
6.38	1.13	0.00	0.00	0.02	0.00	6.40	1.28	0.00	0.00	0.02	0.00
6.42	1.47	0.00	0.00	0.02	0.00	6.44	1.70	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	0.69	0.31	0.87	0.02	0.04

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

Overall liquefaction potential: 2.92

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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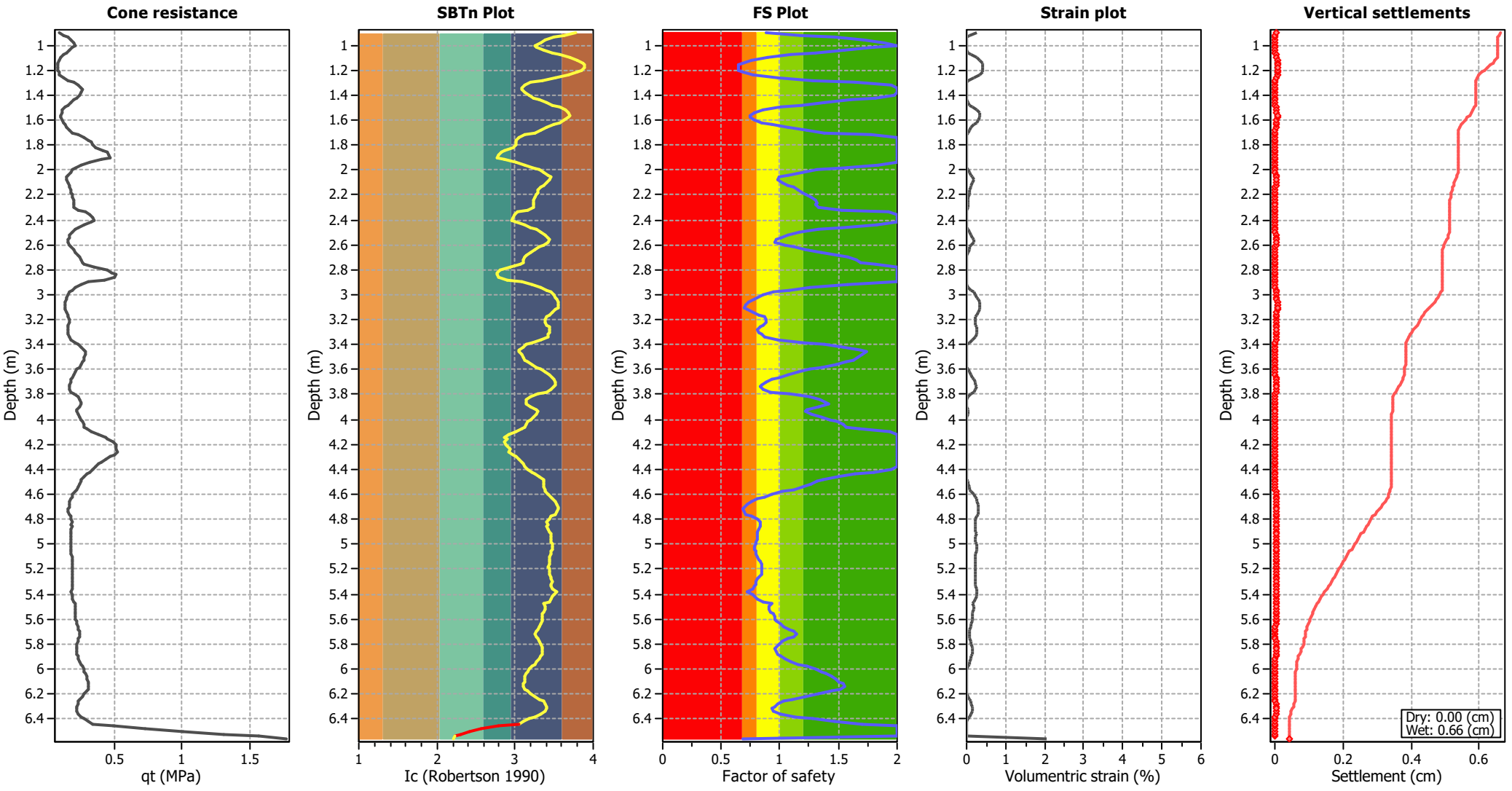
CPT name: CWLP CPT- 15CCR

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
0.90	55.83	0.88	0.25	0.95	0.01	0.92	58.68	1.18	0.08	0.95	0.00
0.94	58.86	1.46	0.02	0.95	0.00	0.96	59.02	1.72	0.00	0.95	0.00
0.98	59.29	1.89	0.00	0.95	0.00	1.00	54.95	2.00	0.00	0.94	0.00
1.02	52.36	1.80	0.00	0.94	0.00	1.04	52.87	1.55	0.01	0.94	0.00
1.06	53.36	1.30	0.04	0.94	0.00	1.08	53.56	1.09	0.11	0.94	0.00
1.10	53.91	0.89	0.24	0.94	0.00	1.12	54.70	0.76	0.35	0.94	0.01
1.14	55.03	0.68	0.40	0.94	0.01	1.16	54.91	0.65	0.41	0.94	0.01
1.18	53.99	0.64	0.42	0.93	0.01	1.20	52.32	0.65	0.41	0.93	0.01
1.22	50.16	0.68	0.40	0.93	0.01	1.24	47.97	0.77	0.34	0.93	0.01
1.26	46.04	0.98	0.18	0.93	0.00	1.28	45.49	1.28	0.05	0.93	0.00
1.30	45.90	1.64	0.00	0.93	0.00	1.32	46.93	1.95	0.00	0.93	0.00
1.34	48.26	2.00	0.00	0.93	0.00	1.36	50.07	2.00	0.00	0.92	0.00
1.38	52.13	2.00	0.00	0.92	0.00	1.40	53.90	1.98	0.00	0.92	0.00
1.42	55.00	1.81	0.00	0.92	0.00	1.44	55.78	1.60	0.00	0.92	0.00
1.46	55.97	1.38	0.02	0.92	0.00	1.48	55.38	1.18	0.07	0.92	0.00
1.50	54.40	1.01	0.16	0.92	0.00	1.52	53.25	0.86	0.26	0.92	0.01
1.54	52.02	0.78	0.32	0.91	0.01	1.56	50.89	0.75	0.34	0.91	0.01
1.58	49.66	0.75	0.34	0.91	0.01	1.60	48.33	0.78	0.32	0.91	0.01
1.62	47.22	0.85	0.27	0.91	0.01	1.64	46.22	0.94	0.20	0.91	0.00
1.66	45.57	1.06	0.13	0.91	0.00	1.68	45.63	1.23	0.06	0.91	0.00
1.70	46.11	1.37	0.02	0.91	0.00	1.72	46.46	1.78	0.00	0.90	0.00
1.74	48.90	2.00	0.00	0.90	0.00	1.76	51.94	2.00	0.00	0.90	0.00
1.78	53.76	2.00	0.00	0.90	0.00	1.80	54.77	2.00	0.00	0.90	0.00
1.82	54.92	2.00	0.00	0.90	0.00	1.84	52.57	2.00	0.00	0.90	0.00
1.86	50.74	2.00	0.00	0.90	0.00	1.88	49.47	2.00	0.00	0.90	0.00
1.90	48.76	2.00	0.00	0.89	0.00	1.92	49.72	2.00	0.00	0.89	0.00
1.94	50.61	2.00	0.00	0.89	0.00	1.96	50.25	1.84	0.00	0.89	0.00
1.98	50.23	1.52	0.01	0.89	0.00	2.00	50.26	1.31	0.03	0.89	0.00
2.02	50.29	1.19	0.07	0.89	0.00	2.04	50.26	1.07	0.12	0.89	0.00
2.06	49.32	0.99	0.16	0.89	0.00	2.08	47.91	0.98	0.17	0.88	0.00
2.10	46.59	1.01	0.15	0.88	0.00	2.12	45.60	1.07	0.12	0.88	0.00
2.14	44.84	1.12	0.10	0.88	0.00	2.16	44.31	1.16	0.08	0.88	0.00
2.18	44.31	1.19	0.07	0.88	0.00	2.20	44.44	1.22	0.06	0.88	0.00
2.22	44.69	1.26	0.05	0.88	0.00	2.24	45.07	1.30	0.03	0.88	0.00
2.26	45.45	1.31	0.03	0.87	0.00	2.28	45.84	1.31	0.03	0.87	0.00
2.30	46.08	1.32	0.03	0.87	0.00	2.32	46.26	1.53	0.00	0.87	0.00
2.34	46.78	1.93	0.00	0.87	0.00	2.36	48.60	2.00	0.00	0.87	0.00
2.38	50.00	2.00	0.00	0.87	0.00	2.40	51.26	2.00	0.00	0.87	0.00
2.42	52.06	2.00	0.00	0.87	0.00	2.44	52.45	1.83	0.00	0.86	0.00
2.46	51.01	1.53	0.00	0.86	0.00	2.48	49.66	1.32	0.03	0.86	0.00
2.50	48.57	1.17	0.08	0.86	0.00	2.52	48.44	1.06	0.12	0.86	0.00
2.54	48.42	1.00	0.15	0.86	0.00	2.56	48.17	0.97	0.17	0.86	0.00
2.58	47.68	0.96	0.18	0.86	0.00	2.60	46.87	1.04	0.13	0.86	0.00
2.62	46.14	1.12	0.09	0.85	0.00	2.64	45.61	1.22	0.06	0.85	0.00
2.66	45.52	1.35	0.02	0.85	0.00	2.68	45.61	1.50	0.01	0.85	0.00
2.70	46.24	1.58	0.00	0.85	0.00	2.72	46.99	1.65	0.00	0.85	0.00
2.74	47.63	1.69	0.00	0.85	0.00	2.76	48.43	1.81	0.00	0.85	0.00
2.78	48.08	2.00	0.00	0.85	0.00	2.80	47.93	2.00	0.00	0.84	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
2.82	49.10	2.00	0.00	0.84	0.00	2.84	50.27	2.00	0.00	0.84	0.00
2.86	51.57	2.00	0.00	0.84	0.00	2.88	54.19	2.00	0.00	0.84	0.00
2.90	55.76	2.00	0.00	0.84	0.00	2.92	54.73	1.58	0.00	0.84	0.00
2.94	53.14	1.26	0.04	0.84	0.00	2.96	52.03	1.08	0.11	0.84	0.00
2.98	50.57	0.95	0.18	0.83	0.00	3.00	49.15	0.86	0.24	0.83	0.00
3.02	48.04	0.81	0.28	0.83	0.01	3.04	47.16	0.78	0.29	0.83	0.01
3.06	45.46	0.73	0.32	0.83	0.01	3.08	44.37	0.71	0.34	0.83	0.01
3.10	43.68	0.70	0.34	0.83	0.01	3.12	43.32	0.73	0.32	0.83	0.01
3.14	42.98	0.77	0.29	0.83	0.01	3.16	42.77	0.82	0.26	0.82	0.01
3.18	42.68	0.86	0.23	0.82	0.00	3.20	42.56	0.89	0.22	0.82	0.00
3.22	42.55	0.88	0.22	0.82	0.00	3.24	42.67	0.85	0.24	0.82	0.00
3.26	42.92	0.83	0.26	0.82	0.01	3.28	43.18	0.81	0.27	0.82	0.01
3.30	43.47	0.82	0.26	0.82	0.01	3.32	43.64	0.84	0.25	0.82	0.00
3.34	43.66	0.86	0.23	0.81	0.00	3.36	43.75	0.99	0.15	0.81	0.00
3.38	43.87	1.20	0.06	0.81	0.00	3.40	44.12	1.38	0.01	0.81	0.00
3.42	44.68	1.54	0.00	0.81	0.00	3.44	45.54	1.69	0.00	0.81	0.00
3.46	46.80	1.73	0.00	0.81	0.00	3.48	48.18	1.70	0.00	0.81	0.00
3.50	49.28	1.67	0.00	0.81	0.00	3.52	50.59	1.63	0.00	0.80	0.00
3.54	52.00	1.56	0.00	0.80	0.00	3.56	53.17	1.48	0.01	0.80	0.00
3.58	54.44	1.36	0.02	0.80	0.00	3.60	55.82	1.25	0.04	0.80	0.00
3.62	56.63	1.16	0.07	0.80	0.00	3.64	56.65	1.07	0.11	0.80	0.00
3.66	56.26	1.00	0.14	0.80	0.00	3.68	55.36	0.94	0.18	0.80	0.00
3.70	53.84	0.88	0.21	0.79	0.00	3.72	51.82	0.84	0.24	0.79	0.00
3.74	49.95	0.83	0.24	0.79	0.00	3.76	48.12	0.86	0.23	0.79	0.00
3.78	46.47	0.92	0.19	0.79	0.00	3.80	45.11	1.08	0.10	0.79	0.00
3.82	44.09	1.26	0.04	0.79	0.00	3.84	43.59	1.34	0.02	0.79	0.00
3.86	44.46	1.40	0.01	0.79	0.00	3.88	45.73	1.41	0.01	0.78	0.00
3.90	47.45	1.33	0.02	0.78	0.00	3.92	49.20	1.23	0.04	0.78	0.00
3.94	50.78	1.22	0.05	0.78	0.00	3.96	51.39	1.27	0.03	0.78	0.00
3.98	51.19	1.36	0.01	0.78	0.00	4.00	50.65	1.43	0.01	0.78	0.00
4.02	50.01	1.49	0.00	0.78	0.00	4.04	49.48	1.53	0.00	0.78	0.00
4.06	48.95	1.57	0.00	0.77	0.00	4.08	48.96	1.68	0.00	0.77	0.00
4.10	49.08	1.94	0.00	0.77	0.00	4.12	49.16	2.00	0.00	0.77	0.00
4.14	49.09	2.00	0.00	0.77	0.00	4.16	55.40	2.00	0.00	0.77	0.00
4.18	58.07	2.00	0.00	0.77	0.00	4.20	61.31	2.00	0.00	0.77	0.00
4.22	65.69	2.00	0.00	0.77	0.00	4.24	70.15	2.00	0.00	0.76	0.00
4.26	69.41	2.00	0.00	0.76	0.00	4.28	71.45	2.00	0.00	0.76	0.00
4.30	72.65	2.00	0.00	0.76	0.00	4.32	71.96	2.00	0.00	0.76	0.00
4.34	70.68	2.00	0.00	0.76	0.00	4.36	68.87	2.00	0.00	0.76	0.00
4.38	66.89	2.00	0.00	0.76	0.00	4.40	66.10	1.95	0.00	0.76	0.00
4.42	65.83	1.80	0.00	0.75	0.00	4.44	65.44	1.65	0.00	0.75	0.00
4.46	65.68	1.49	0.00	0.75	0.00	4.48	65.35	1.36	0.01	0.75	0.00
4.50	63.38	1.32	0.02	0.75	0.00	4.52	60.82	1.26	0.03	0.75	0.00
4.54	57.73	1.20	0.06	0.75	0.00	4.56	54.30	1.11	0.08	0.75	0.00
4.58	51.17	1.02	0.12	0.75	0.00	4.60	49.12	0.93	0.17	0.74	0.00
4.62	47.90	0.87	0.21	0.74	0.00	4.64	47.24	0.81	0.24	0.74	0.00
4.66	46.81	0.76	0.27	0.74	0.01	4.68	46.39	0.72	0.29	0.74	0.01
4.70	45.71	0.70	0.31	0.74	0.01	4.72	45.03	0.68	0.31	0.74	0.01

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
4.74	44.40	0.69	0.31	0.74	0.01	4.76	43.90	0.71	0.30	0.74	0.01
4.78	43.57	0.76	0.27	0.73	0.01	4.80	43.50	0.81	0.24	0.73	0.00
4.82	43.39	0.83	0.23	0.73	0.00	4.84	43.38	0.83	0.23	0.73	0.00
4.86	43.53	0.83	0.22	0.73	0.00	4.88	43.92	0.82	0.23	0.73	0.00
4.90	44.31	0.80	0.24	0.73	0.00	4.92	44.97	0.80	0.24	0.73	0.00
4.94	45.50	0.81	0.24	0.73	0.00	4.96	45.75	0.81	0.24	0.72	0.00
4.98	45.75	0.80	0.24	0.72	0.00	5.00	45.86	0.79	0.25	0.72	0.00
5.02	45.73	0.79	0.25	0.72	0.00	5.04	45.47	0.78	0.25	0.72	0.01
5.06	45.35	0.79	0.25	0.72	0.00	5.08	45.36	0.80	0.24	0.72	0.00
5.10	45.24	0.81	0.23	0.72	0.00	5.12	45.26	0.82	0.23	0.72	0.00
5.14	45.40	0.83	0.22	0.71	0.00	5.16	45.66	0.84	0.22	0.71	0.00
5.18	45.93	0.85	0.21	0.71	0.00	5.20	46.18	0.85	0.21	0.71	0.00
5.22	46.30	0.84	0.21	0.71	0.00	5.24	46.42	0.84	0.21	0.71	0.00
5.26	46.41	0.82	0.22	0.71	0.00	5.28	46.26	0.80	0.23	0.71	0.00
5.30	46.12	0.79	0.24	0.71	0.00	5.32	45.88	0.80	0.24	0.70	0.00
5.34	45.61	0.79	0.24	0.70	0.00	5.36	45.20	0.77	0.25	0.70	0.00
5.38	46.02	0.72	0.28	0.70	0.01	5.40	46.22	0.77	0.25	0.70	0.01
5.42	46.37	0.78	0.24	0.70	0.00	5.44	46.53	0.81	0.23	0.70	0.00
5.46	46.81	0.85	0.20	0.70	0.00	5.48	45.86	0.93	0.16	0.70	0.00
5.50	45.46	0.91	0.17	0.69	0.00	5.52	45.34	0.91	0.17	0.69	0.00
5.54	45.21	0.92	0.16	0.69	0.00	5.56	45.09	0.94	0.15	0.69	0.00
5.58	45.23	0.95	0.15	0.69	0.00	5.60	45.49	0.96	0.14	0.69	0.00
5.62	45.62	0.97	0.14	0.69	0.00	5.64	45.88	1.00	0.12	0.69	0.00
5.66	46.14	1.04	0.11	0.69	0.00	5.68	46.38	1.08	0.09	0.68	0.00
5.70	46.49	1.12	0.07	0.68	0.00	5.72	46.48	1.14	0.07	0.68	0.00
5.74	46.24	1.12	0.07	0.68	0.00	5.76	46.13	1.07	0.09	0.68	0.00
5.78	46.01	1.02	0.11	0.68	0.00	5.80	46.01	0.99	0.13	0.68	0.00
5.82	46.00	0.97	0.13	0.68	0.00	5.84	46.25	0.96	0.14	0.68	0.00
5.86	46.38	0.97	0.14	0.67	0.00	5.88	46.38	0.98	0.13	0.67	0.00
5.90	46.39	1.01	0.12	0.67	0.00	5.92	46.39	1.04	0.10	0.67	0.00
5.94	46.37	1.09	0.08	0.67	0.00	5.96	46.34	1.15	0.06	0.67	0.00
5.98	46.28	1.23	0.03	0.67	0.00	6.00	46.20	1.31	0.02	0.67	0.00
6.02	46.37	1.36	0.01	0.67	0.00	6.04	46.57	1.39	0.01	0.66	0.00
6.06	46.86	1.44	0.01	0.66	0.00	6.08	47.27	1.48	0.00	0.66	0.00
6.10	47.82	1.51	0.00	0.66	0.00	6.12	48.23	1.54	0.00	0.66	0.00
6.14	48.67	1.55	0.00	0.66	0.00	6.16	49.07	1.52	0.00	0.66	0.00
6.18	49.45	1.44	0.01	0.66	0.00	6.20	49.73	1.33	0.01	0.66	0.00
6.22	50.09	1.21	0.04	0.65	0.00	6.24	50.27	1.11	0.07	0.65	0.00
6.26	50.29	1.03	0.10	0.65	0.00	6.28	50.06	0.98	0.12	0.65	0.00
6.30	49.60	0.95	0.14	0.65	0.00	6.32	48.79	0.93	0.15	0.65	0.00
6.34	47.85	0.94	0.14	0.65	0.00	6.36	46.88	1.00	0.11	0.65	0.00
6.38	46.10	1.13	0.07	0.65	0.00	6.40	45.96	1.28	0.02	0.64	0.00
6.42	46.43	1.47	0.00	0.64	0.00	6.44	47.38	1.70	0.00	0.64	0.00
6.46	45.88	2.00	0.00	0.64	0.00	6.48	55.05	2.00	0.00	0.64	0.00
6.50	43.73	2.00	0.00	0.64	0.00	6.52	47.12	2.00	0.00	0.64	0.00
6.54	48.77	2.00	0.00	0.64	0.00	6.56	54.34	0.69	2.06	0.64	0.04

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)

Total estimated settlement: 0.66

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.10	1.66	33.54	55.83	3.77	0.49	0.93
0.92	0.13	2.25	26.13	58.68	3.62	0.49	1.24
0.94	0.15	2.80	21.02	58.86	3.49	1.22	1.52
0.96	0.18	3.32	17.80	59.02	3.39	0.89	1.78
0.98	0.20	3.68	16.09	59.29	3.33	0.48	1.95
1.00	0.21	3.97	13.85	54.95	3.25	0.49	2.08
1.02	0.19	3.56	14.71	52.36	3.28	0.52	1.84
1.04	0.17	3.10	17.05	52.87	3.37	0.51	1.59
1.06	0.15	2.61	20.43	53.36	3.47	0.46	1.32
1.08	0.13	2.22	24.15	53.56	3.57	0.51	1.11
1.10	0.11	1.82	29.58	53.91	3.70	0.53	0.90
1.12	0.09	1.56	35.13	54.70	3.80	0.53	0.76
1.14	0.09	1.41	38.99	55.03	3.86	0.55	0.69
1.16	0.08	1.35	40.61	54.91	3.89	0.56	0.65
1.18	0.08	1.34	40.17	53.99	3.88	0.54	0.64
1.20	0.09	1.38	38.03	52.32	3.85	0.49	0.65
1.22	0.09	1.44	34.78	50.16	3.79	0.39	0.67
1.24	0.10	1.64	29.26	47.97	3.69	0.32	0.76
1.26	0.12	2.10	21.92	46.04	3.52	0.28	0.96
1.28	0.16	2.78	16.39	45.49	3.34	0.26	1.25
1.30	0.20	3.56	12.88	45.90	3.21	0.25	1.60
1.32	0.23	4.26	11.02	46.93	3.12	0.29	1.89
1.34	0.26	4.73	10.21	48.26	3.08	0.35	2.08
1.36	0.27	4.88	10.27	50.07	3.08	0.40	2.12
1.38	0.26	4.72	11.04	52.13	3.12	0.42	2.03
1.40	0.24	4.41	12.23	53.90	3.18	0.44	1.88
1.42	0.23	4.07	13.53	55.00	3.23	0.49	1.72
1.44	0.20	3.61	15.45	55.78	3.31	0.51	1.51
1.46	0.18	3.13	17.91	55.97	3.40	0.48	1.29
1.48	0.16	2.69	20.61	55.38	3.48	0.46	1.10
1.50	0.14	2.30	23.70	54.40	3.56	0.43	0.93
1.52	0.12	1.96	27.13	53.25	3.64	0.40	0.79
1.54	0.11	1.80	28.91	52.02	3.68	0.39	0.72
1.56	0.11	1.72	29.56	50.89	3.70	0.35	0.68
1.58	0.11	1.73	28.71	49.66	3.68	0.33	0.68
1.60	0.11	1.82	26.49	48.33	3.63	0.30	0.71
1.62	0.12	1.99	23.77	47.22	3.56	0.27	0.77
1.64	0.13	2.20	21.05	46.22	3.49	0.24	0.84
1.66	0.15	2.50	18.22	45.57	3.41	0.23	0.95
1.68	0.17	2.90	15.72	45.63	3.32	0.22	1.09
1.70	0.19	3.25	14.17	46.11	3.26	0.23	1.22
1.72	0.24	4.22	11.01	46.46	3.12	0.26	1.56
1.74	0.28	5.07	9.65	48.90	3.05	0.27	1.86
1.76	0.31	5.73	9.07	51.94	3.02	0.28	2.09
1.78	0.33	6.01	8.95	53.76	3.01	0.47	2.17
1.80	0.34	6.15	8.90	54.77	3.01	0.55	2.21
1.82	0.36	6.60	8.32	54.92	2.97	0.08	0.64
1.84	0.42	7.77	6.76	52.57	2.87	0.06	0.63

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.45	8.34	6.08	50.74	2.82	0.06	0.63
1.88	0.46	8.63	5.73	49.47	2.79	0.05	0.62
1.90	0.47	8.71	5.60	48.76	2.78	0.05	0.62
1.92	0.41	7.52	6.61	49.72	2.86	0.05	0.62
1.94	0.32	5.69	8.90	50.61	3.01	0.31	1.92
1.96	0.26	4.50	11.16	50.25	3.13	0.27	1.51
1.98	0.22	3.74	13.42	50.23	3.23	0.24	1.25
2.00	0.19	3.24	15.54	50.26	3.31	0.29	1.07
2.02	0.18	2.94	17.10	50.29	3.37	0.30	0.96
2.04	0.16	2.65	18.96	50.26	3.43	0.29	0.86
2.06	0.15	2.47	20.00	49.32	3.46	0.26	0.80
2.08	0.15	2.45	19.57	47.91	3.45	0.23	0.79
2.10	0.16	2.53	18.41	46.59	3.41	0.21	0.81
2.12	0.16	2.67	17.05	45.60	3.37	0.18	0.85
2.14	0.17	2.81	15.96	44.84	3.33	0.18	0.88
2.16	0.18	2.92	15.19	44.31	3.30	0.18	0.91
2.18	0.18	3.00	14.79	44.31	3.28	0.17	0.93
2.20	0.19	3.08	14.44	44.44	3.27	0.17	0.95
2.22	0.19	3.20	13.98	44.69	3.25	0.18	0.98
2.24	0.20	3.31	13.63	45.07	3.24	0.18	1.01
2.26	0.20	3.34	13.63	45.45	3.24	0.19	1.01
2.28	0.20	3.33	13.78	45.84	3.24	0.19	1.00
2.30	0.20	3.38	13.63	46.08	3.24	0.19	1.01
2.32	0.23	3.90	11.86	46.26	3.16	0.20	1.16
2.34	0.28	4.94	9.46	46.78	3.04	0.20	1.46
2.36	0.32	5.61	8.66	48.60	2.99	0.05	0.62
2.38	0.34	6.06	8.25	50.00	2.97	0.05	0.63
2.40	0.35	6.25	8.20	51.26	2.96	0.06	0.63
2.42	0.33	5.81	8.95	52.06	3.01	0.32	1.67
2.44	0.27	4.72	11.12	52.45	3.13	0.30	1.34
2.46	0.23	3.96	12.87	51.01	3.21	0.23	1.12
2.48	0.21	3.43	14.47	49.66	3.27	0.21	0.97
2.50	0.19	3.03	16.01	48.57	3.33	0.20	0.85
2.52	0.18	2.77	17.49	48.44	3.38	0.21	0.77
2.54	0.17	2.61	18.52	48.42	3.42	0.21	0.72
2.56	0.16	2.53	19.03	48.17	3.43	0.21	0.70
2.58	0.16	2.52	18.96	47.68	3.43	0.20	0.69
2.60	0.17	2.74	17.13	46.87	3.37	0.18	0.74
2.62	0.19	2.94	15.68	46.14	3.32	0.17	0.79
2.64	0.20	3.20	14.24	45.61	3.26	0.16	0.86
2.66	0.22	3.55	12.82	45.52	3.20	0.16	0.95
2.68	0.24	3.95	11.56	45.61	3.15	0.17	1.05
2.70	0.25	4.16	11.11	46.24	3.12	0.17	1.10
2.72	0.26	4.35	10.80	46.99	3.11	0.18	1.14
2.74	0.26	4.47	10.65	47.63	3.10	0.19	1.17
2.76	0.28	4.80	10.09	48.43	3.07	0.21	1.24
2.78	0.35	6.10	7.88	48.08	2.94	0.05	0.62
2.80	0.44	8.02	5.98	47.93	2.81	0.05	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.49	8.83	5.56	49.10	2.78	0.05	0.62
2.84	0.51	9.26	5.43	50.27	2.77	0.05	0.63
2.86	0.50	9.07	5.68	51.57	2.79	0.06	0.63
2.88	0.43	7.63	7.11	54.19	2.89	0.07	0.64
2.90	0.31	5.39	10.36	55.76	3.09	0.30	1.34
2.92	0.25	4.21	13.00	54.73	3.21	0.27	1.04
2.94	0.21	3.36	15.82	53.14	3.32	0.24	0.82
2.96	0.19	2.89	18.00	52.03	3.40	0.21	0.71
2.98	0.17	2.54	19.90	50.57	3.46	0.19	0.62
3.00	0.16	2.32	21.23	49.15	3.50	0.22	0.56
3.02	0.15	2.16	22.20	48.04	3.52	0.18	0.52
3.04	0.15	2.10	22.49	47.16	3.53	0.16	0.50
3.06	0.14	1.97	23.13	45.46	3.55	0.14	0.47
3.08	0.14	1.91	23.27	44.37	3.55	0.14	0.45
3.10	0.14	1.89	23.14	43.68	3.55	0.13	0.44
3.12	0.14	1.96	22.06	43.32	3.52	0.12	0.46
3.14	0.15	2.10	20.49	42.98	3.48	0.12	0.49
3.16	0.16	2.24	19.14	42.77	3.43	0.12	0.52
3.18	0.16	2.35	18.20	42.68	3.41	0.11	0.54
3.20	0.17	2.41	17.69	42.56	3.39	0.11	0.55
3.22	0.17	2.39	17.84	42.55	3.39	0.11	0.54
3.24	0.16	2.32	18.36	42.67	3.41	0.11	0.53
3.26	0.16	2.25	19.05	42.92	3.43	0.12	0.51
3.28	0.16	2.21	19.54	43.18	3.45	0.12	0.50
3.30	0.16	2.24	19.43	43.47	3.44	0.12	0.50
3.32	0.16	2.29	19.02	43.64	3.43	0.12	0.51
3.34	0.17	2.36	18.47	43.66	3.41	0.12	0.52
3.36	0.18	2.70	16.21	43.75	3.34	0.12	0.60
3.38	0.21	3.29	13.34	43.87	3.23	0.12	0.72
3.40	0.24	3.78	11.67	44.12	3.15	0.12	0.83
3.42	0.26	4.22	10.59	44.68	3.10	0.13	0.92
3.44	0.28	4.64	9.82	45.54	3.06	0.14	1.00
3.46	0.29	4.77	9.81	46.80	3.06	0.15	1.03
3.48	0.29	4.68	10.30	48.18	3.08	0.17	1.00
3.50	0.28	4.60	10.71	49.28	3.10	0.18	0.98
3.52	0.28	4.49	11.27	50.59	3.13	0.19	0.95
3.54	0.27	4.31	12.06	52.00	3.17	0.19	0.91
3.56	0.26	4.09	12.99	53.17	3.21	0.22	0.86
3.58	0.24	3.76	14.47	54.44	3.27	0.23	0.79
3.60	0.22	3.46	16.15	55.82	3.34	0.24	0.72
3.62	0.21	3.21	17.67	56.63	3.39	0.25	0.67
3.64	0.20	2.98	19.03	56.65	3.43	0.26	0.61
3.66	0.19	2.76	20.38	56.26	3.47	0.26	0.57
3.68	0.18	2.60	21.30	55.36	3.50	0.23	0.53
3.70	0.18	2.46	21.92	53.84	3.52	0.21	0.50
3.72	0.17	2.33	22.20	51.82	3.52	0.19	0.47
3.74	0.17	2.32	21.55	49.95	3.51	0.17	0.47
3.76	0.17	2.38	20.20	48.12	3.47	0.14	0.48

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.18	2.56	18.12	46.47	3.40	0.13	0.51
3.80	0.21	3.01	14.98	45.11	3.29	0.12	0.60
3.82	0.23	3.51	12.58	44.09	3.19	0.11	0.70
3.84	0.24	3.75	11.64	43.59	3.15	0.10	0.74
3.86	0.25	3.90	11.40	44.46	3.14	0.10	0.77
3.88	0.25	3.95	11.57	45.73	3.15	0.11	0.77
3.90	0.24	3.73	12.71	47.45	3.20	0.15	0.73
3.92	0.23	3.45	14.28	49.20	3.26	0.16	0.67
3.94	0.23	3.41	14.91	50.78	3.29	0.17	0.66
3.96	0.24	3.57	14.41	51.39	3.27	0.18	0.69
3.98	0.25	3.81	13.43	51.19	3.23	0.18	0.73
4.00	0.26	4.02	12.59	50.65	3.19	0.18	0.77
4.02	0.27	4.18	11.96	50.01	3.17	0.15	0.80
4.04	0.27	4.31	11.47	49.48	3.14	0.15	0.82
4.06	0.28	4.42	11.07	48.95	3.12	0.15	0.83
4.08	0.30	4.72	10.38	48.96	3.09	0.16	0.89
4.10	0.33	5.47	8.97	49.08	3.01	0.16	1.02
4.12	0.39	6.51	7.55	49.16	2.92	0.05	0.62
4.14	0.43	7.44	6.60	49.09	2.86	0.05	0.62
4.16	0.45	7.82	7.08	55.40	2.89	0.08	0.64
4.18	0.50	8.67	6.70	58.07	2.86	0.10	0.65
4.20	0.51	8.97	6.83	61.31	2.87	0.13	0.66
4.22	0.51	8.95	7.34	65.69	2.91	0.18	0.67
4.24	0.51	8.88	7.90	70.15	2.95	0.26	0.68
4.26	0.52	9.15	7.58	69.41	2.93	0.24	0.68
4.28	0.50	8.69	8.22	71.45	2.97	0.29	0.69
4.30	0.47	8.03	9.05	72.65	3.02	0.47	1.43
4.32	0.43	7.39	9.73	71.96	3.05	0.46	1.31
4.34	0.41	6.91	10.24	70.68	3.08	0.41	1.21
4.36	0.39	6.47	10.64	68.87	3.10	0.36	1.13
4.38	0.36	5.95	11.24	66.89	3.13	0.36	1.04
4.40	0.34	5.49	12.04	66.10	3.17	0.30	0.95
4.42	0.32	5.07	12.98	65.83	3.21	0.29	0.87
4.44	0.30	4.62	14.15	65.44	3.26	0.32	0.79
4.46	0.27	4.19	15.67	65.68	3.32	0.31	0.72
4.48	0.26	3.83	17.04	65.35	3.37	0.31	0.65
4.50	0.25	3.71	17.07	63.38	3.37	0.29	0.63
4.52	0.24	3.55	17.13	60.82	3.37	0.26	0.60
4.54	0.23	3.36	17.17	57.73	3.37	0.20	0.56
4.56	0.22	3.13	17.35	54.30	3.38	0.16	0.52
4.58	0.21	2.87	17.86	51.17	3.39	0.14	0.48
4.60	0.20	2.62	18.75	49.12	3.42	0.12	0.44
4.62	0.19	2.44	19.65	47.90	3.45	0.11	0.40
4.64	0.18	2.28	20.76	47.24	3.48	0.11	0.38
4.66	0.17	2.14	21.89	46.81	3.51	0.11	0.35
4.68	0.17	2.04	22.75	46.39	3.54	0.11	0.33
4.70	0.16	1.97	23.25	45.71	3.55	0.11	0.32
4.72	0.16	1.91	23.52	45.03	3.56	0.10	0.31

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.16	1.95	22.76	44.40	3.54	0.09	0.32
4.76	0.17	2.01	21.80	43.90	3.51	0.09	0.33
4.78	0.18	2.16	20.20	43.57	3.47	0.09	0.35
4.80	0.18	2.29	19.03	43.50	3.43	0.09	0.37
4.82	0.19	2.36	18.41	43.39	3.41	0.08	0.38
4.84	0.19	2.34	18.51	43.38	3.42	0.08	0.37
4.86	0.19	2.37	18.39	43.53	3.41	0.08	0.38
4.88	0.19	2.33	18.88	43.92	3.43	0.09	0.37
4.90	0.18	2.28	19.42	44.31	3.44	0.09	0.36
4.92	0.18	2.28	19.76	44.97	3.45	0.10	0.36
4.94	0.19	2.31	19.72	45.50	3.45	0.10	0.36
4.96	0.19	2.30	19.91	45.75	3.46	0.10	0.36
4.98	0.18	2.28	20.09	45.75	3.46	0.10	0.35
5.00	0.18	2.25	20.39	45.86	3.47	0.10	0.35
5.02	0.18	2.24	20.42	45.73	3.47	0.09	0.35
5.04	0.18	2.23	20.36	45.47	3.47	0.10	0.34
5.06	0.18	2.25	20.18	45.35	3.47	0.10	0.34
5.08	0.19	2.27	19.96	45.36	3.46	0.09	0.35
5.10	0.19	2.31	19.59	45.24	3.45	0.09	0.35
5.12	0.19	2.34	19.33	45.26	3.44	0.09	0.36
5.14	0.19	2.37	19.18	45.40	3.44	0.09	0.36
5.16	0.19	2.40	19.04	45.66	3.43	0.10	0.36
5.18	0.19	2.42	18.95	45.93	3.43	0.10	0.36
5.20	0.19	2.42	19.06	46.18	3.43	0.10	0.36
5.22	0.19	2.41	19.20	46.30	3.44	0.10	0.36
5.24	0.19	2.40	19.34	46.42	3.44	0.10	0.36
5.26	0.19	2.36	19.70	46.41	3.45	0.10	0.35
5.28	0.19	2.30	20.10	46.26	3.46	0.10	0.34
5.30	0.19	2.27	20.33	46.12	3.47	0.10	0.33
5.32	0.19	2.28	20.09	45.88	3.46	0.09	0.34
5.34	0.19	2.26	20.19	45.61	3.47	0.09	0.33
5.36	0.19	2.22	20.37	45.20	3.47	0.09	0.32
5.38	0.18	2.06	22.36	46.02	3.53	0.09	0.30
5.40	0.19	2.21	20.95	46.22	3.49	0.08	0.32
5.42	0.19	2.25	20.61	46.37	3.48	0.12	0.33
5.44	0.19	2.33	19.94	46.53	3.46	0.10	0.34
5.46	0.20	2.44	19.16	46.81	3.44	0.09	0.35
5.48	0.21	2.67	17.20	45.86	3.37	0.09	0.38
5.50	0.21	2.60	17.47	45.46	3.38	0.09	0.37
5.52	0.21	2.62	17.32	45.34	3.38	0.09	0.37
5.54	0.21	2.66	17.02	45.21	3.37	0.08	0.38
5.56	0.21	2.70	16.70	45.09	3.36	0.09	0.38
5.58	0.22	2.74	16.48	45.23	3.35	0.09	0.39
5.60	0.22	2.75	16.51	45.49	3.35	0.09	0.39
5.62	0.22	2.79	16.37	45.62	3.34	0.09	0.39
5.64	0.22	2.89	15.89	45.88	3.33	0.09	0.40
5.66	0.23	2.98	15.46	46.14	3.31	0.09	0.42
5.68	0.24	3.12	14.88	46.38	3.29	0.09	0.43

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.24	3.23	14.41	46.49	3.27	0.09	0.45
5.72	0.25	3.28	14.15	46.48	3.26	0.10	0.45
5.74	0.24	3.23	14.30	46.24	3.27	0.09	0.45
5.76	0.24	3.09	14.90	46.13	3.29	0.09	0.43
5.78	0.23	2.95	15.58	46.01	3.31	0.08	0.40
5.80	0.23	2.86	16.10	46.01	3.33	0.09	0.39
5.82	0.22	2.80	16.42	46.00	3.35	0.09	0.38
5.84	0.22	2.76	16.76	46.25	3.36	0.09	0.37
5.86	0.22	2.79	16.60	46.38	3.35	0.09	0.38
5.88	0.22	2.82	16.44	46.38	3.35	0.09	0.38
5.90	0.23	2.92	15.90	46.39	3.33	0.09	0.39
5.92	0.23	3.02	15.38	46.39	3.31	0.09	0.40
5.94	0.24	3.16	14.66	46.37	3.28	0.09	0.42
5.96	0.25	3.34	13.88	46.34	3.25	0.08	0.45
5.98	0.26	3.56	12.99	46.28	3.21	0.09	0.47
6.00	0.27	3.78	12.23	46.20	3.18	0.09	0.50
6.02	0.28	3.93	11.80	46.37	3.16	0.09	0.52
6.04	0.29	4.03	11.54	46.57	3.15	0.09	0.53
6.06	0.30	4.17	11.25	46.86	3.13	0.09	0.55
6.08	0.30	4.28	11.03	47.27	3.12	0.09	0.56
6.10	0.31	4.37	10.95	47.82	3.12	0.10	0.57
6.12	0.31	4.45	10.83	48.23	3.11	0.10	0.58
6.14	0.31	4.50	10.83	48.67	3.11	0.10	0.58
6.16	0.31	4.41	11.13	49.07	3.13	0.10	0.57
6.18	0.30	4.17	11.86	49.45	3.16	0.11	0.54
6.20	0.28	3.85	12.92	49.73	3.21	0.11	0.50
6.22	0.26	3.52	14.24	50.09	3.26	0.11	0.45
6.24	0.25	3.22	15.63	50.27	3.32	0.11	0.41
6.26	0.24	2.99	16.81	50.29	3.36	0.11	0.38
6.28	0.23	2.86	17.52	50.06	3.38	0.11	0.36
6.30	0.23	2.77	17.93	49.60	3.40	0.11	0.35
6.32	0.22	2.69	18.11	48.79	3.40	0.10	0.34
6.34	0.23	2.73	17.52	47.85	3.38	0.09	0.35
6.36	0.24	2.92	16.06	46.88	3.33	0.08	0.37
6.38	0.25	3.28	14.04	46.10	3.26	0.08	0.41
6.40	0.28	3.73	12.32	45.96	3.18	0.08	0.47
6.42	0.30	4.26	10.90	46.43	3.11	0.08	0.53
6.44	0.34	4.94	9.59	47.38	3.05	0.09	0.62
6.46	0.50	8.02	5.72	45.88	2.79	0.04	0.62
6.48	0.73	12.61	3.48	43.84	2.57	0.08	0.64
6.50	1.00	18.03	2.43	43.73	2.41	0.03	0.62
6.52	1.31	24.06	1.96	47.12	2.31	0.04	0.62
6.54	1.57	29.18	1.67	48.77	2.22	0.05	0.62
6.56	1.77	33.10	1.64	54.34	2.21	0.07	0.64

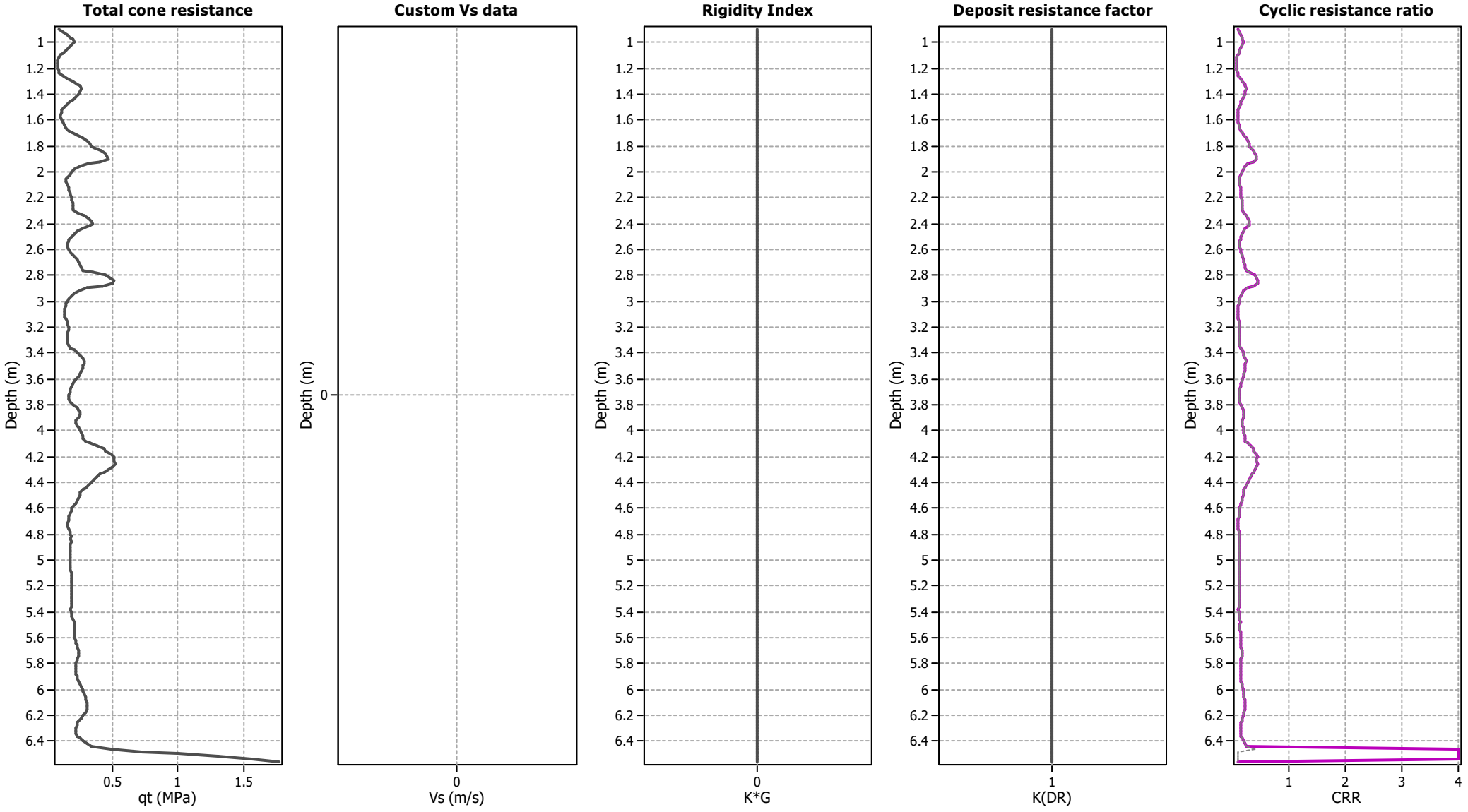
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

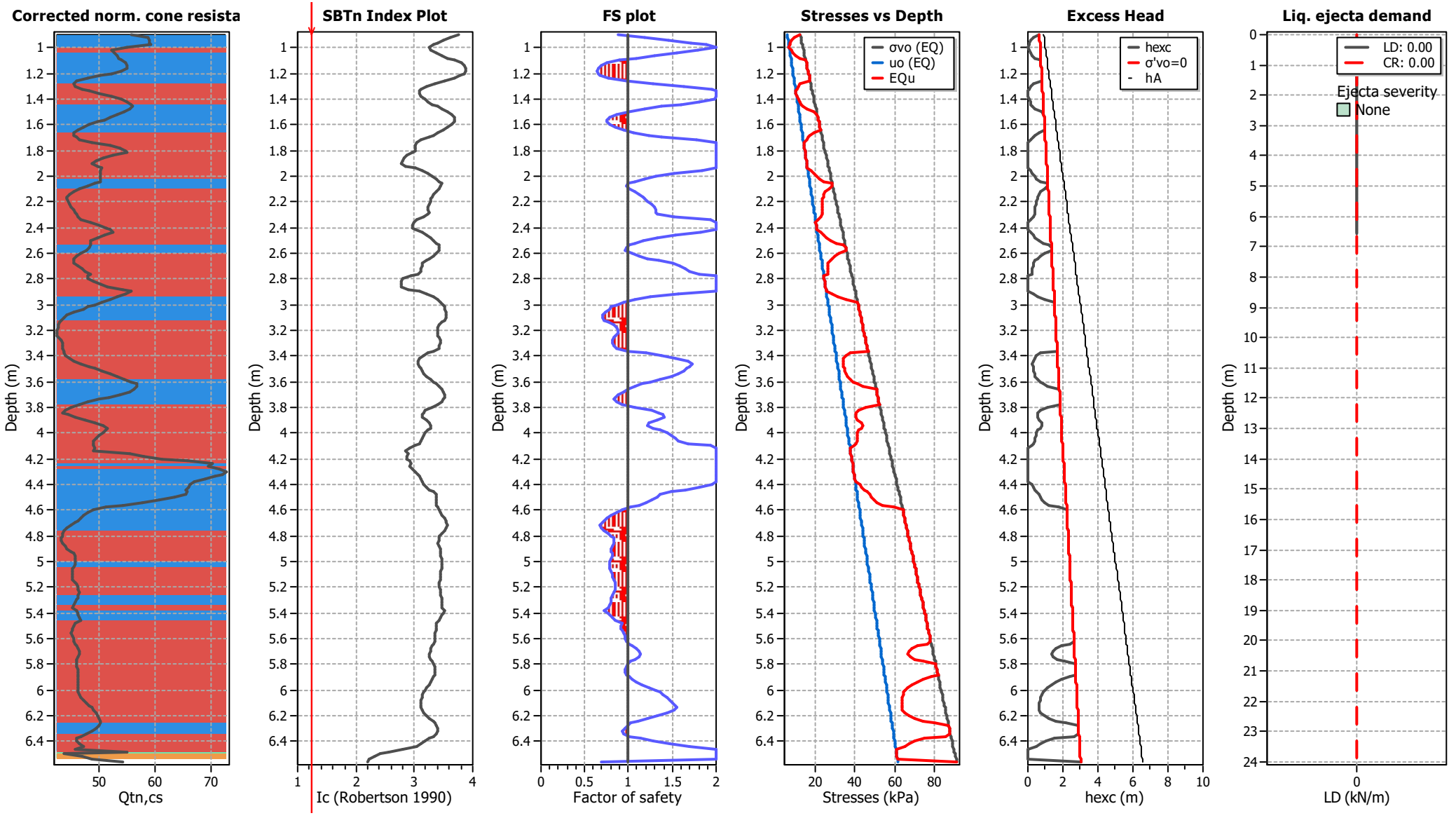
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation

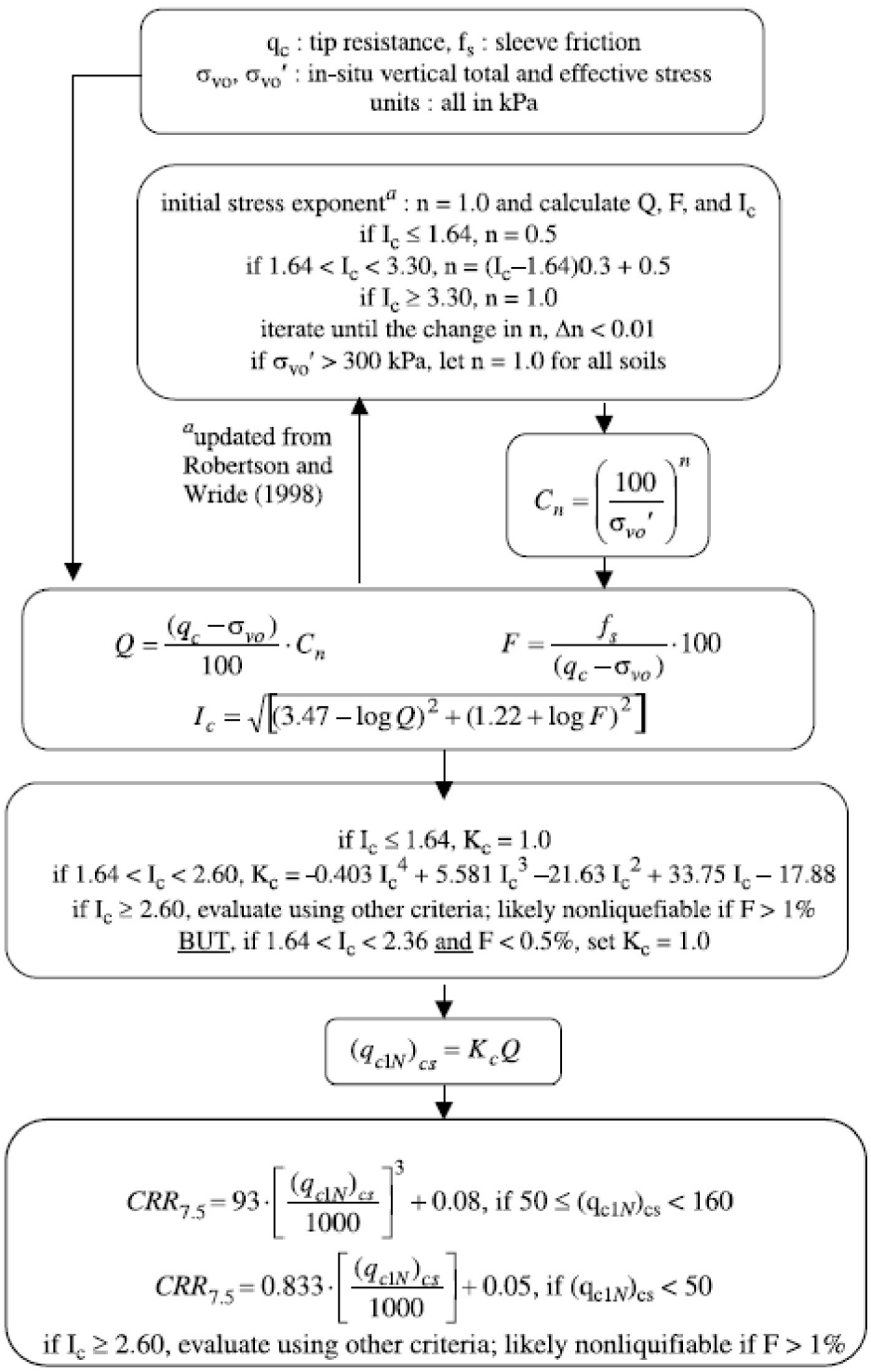


Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

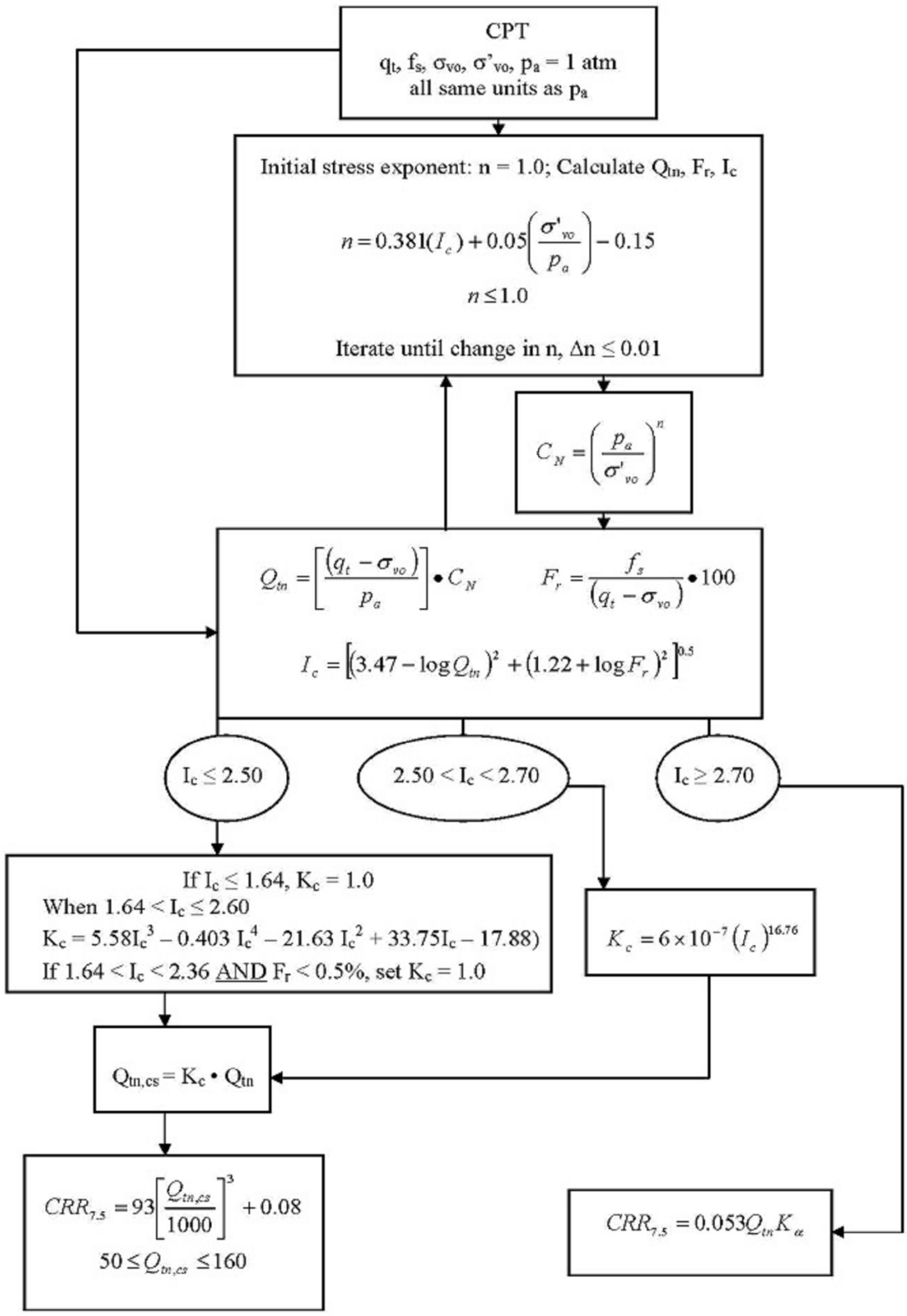
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

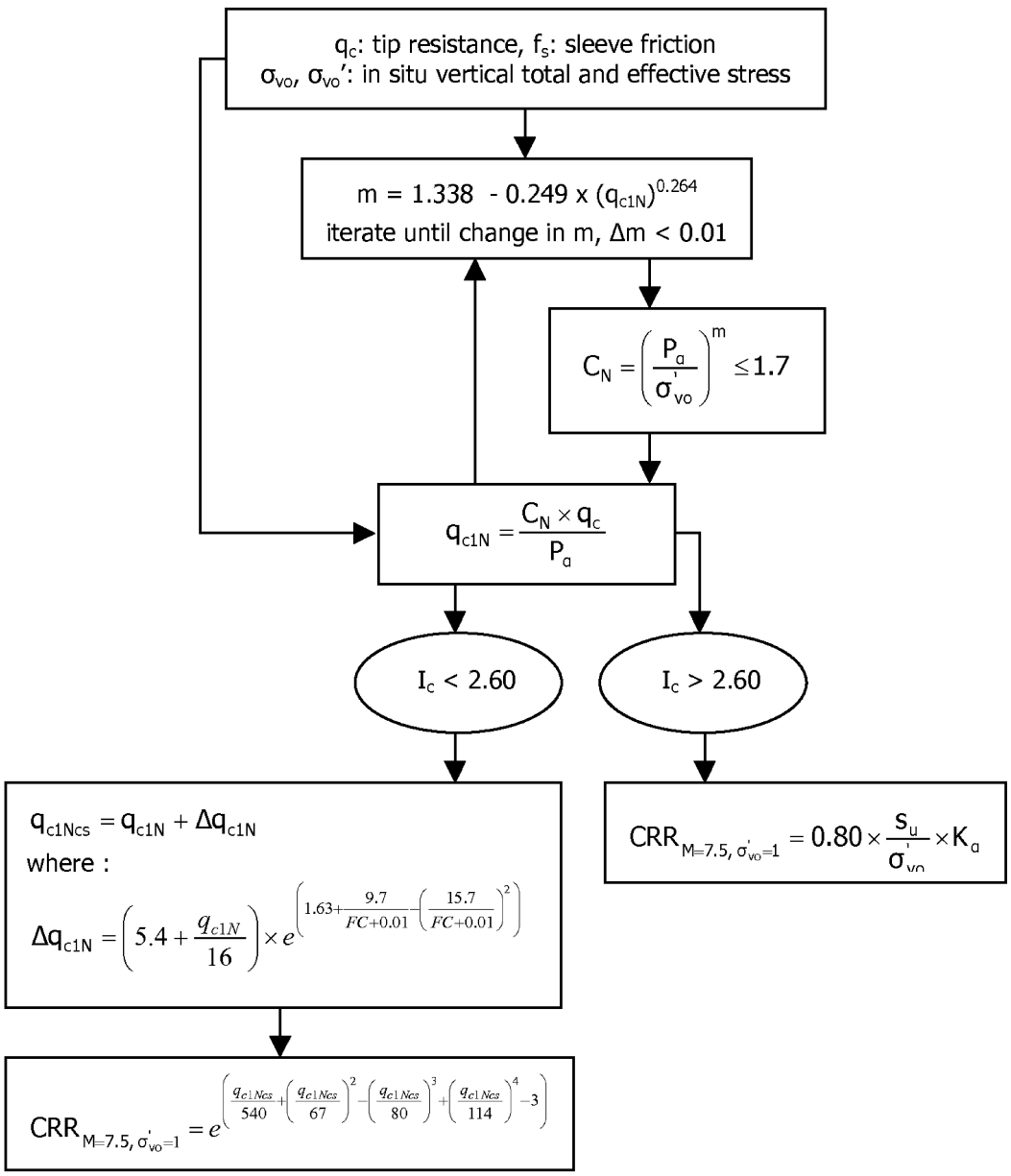
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

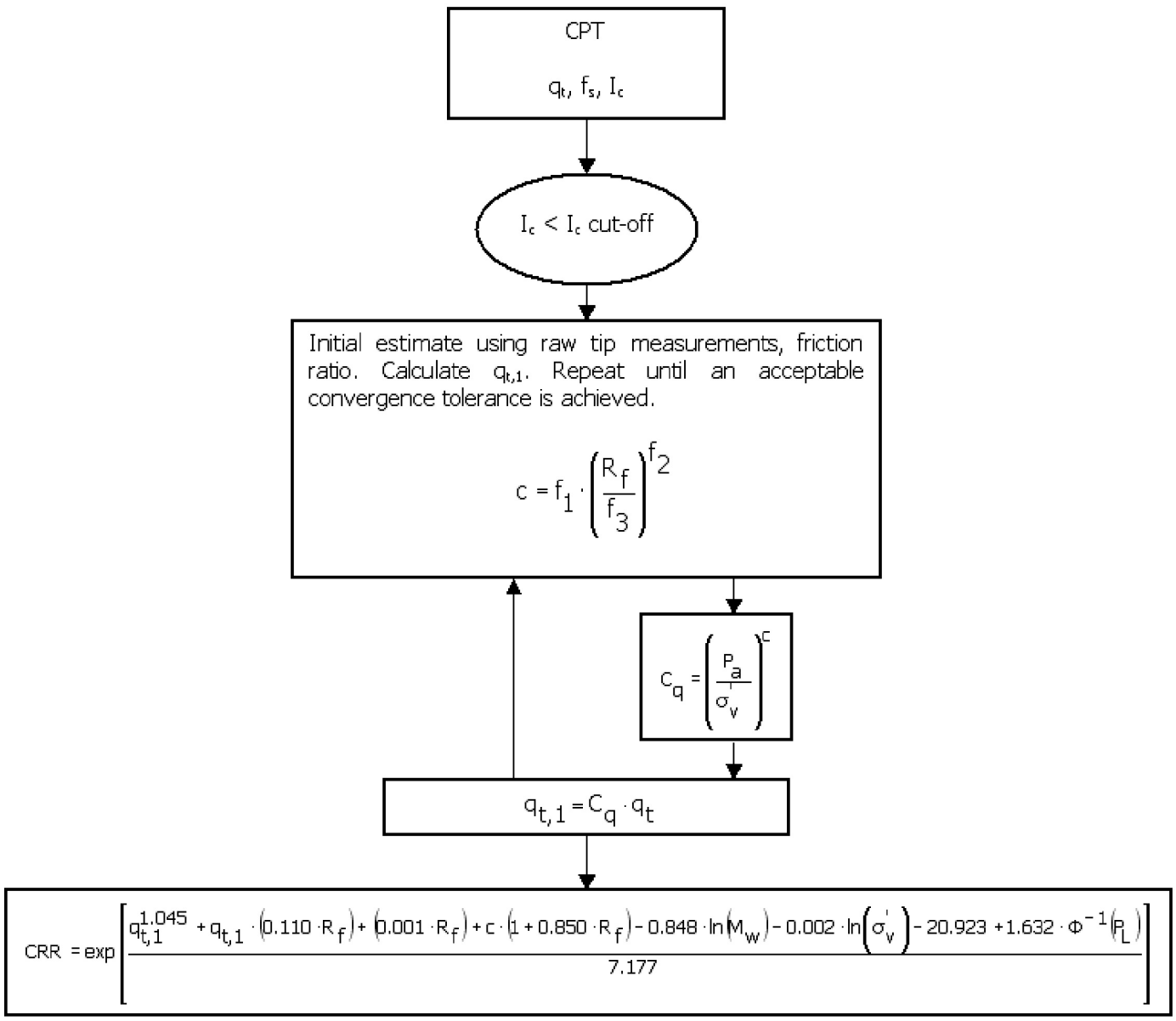


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

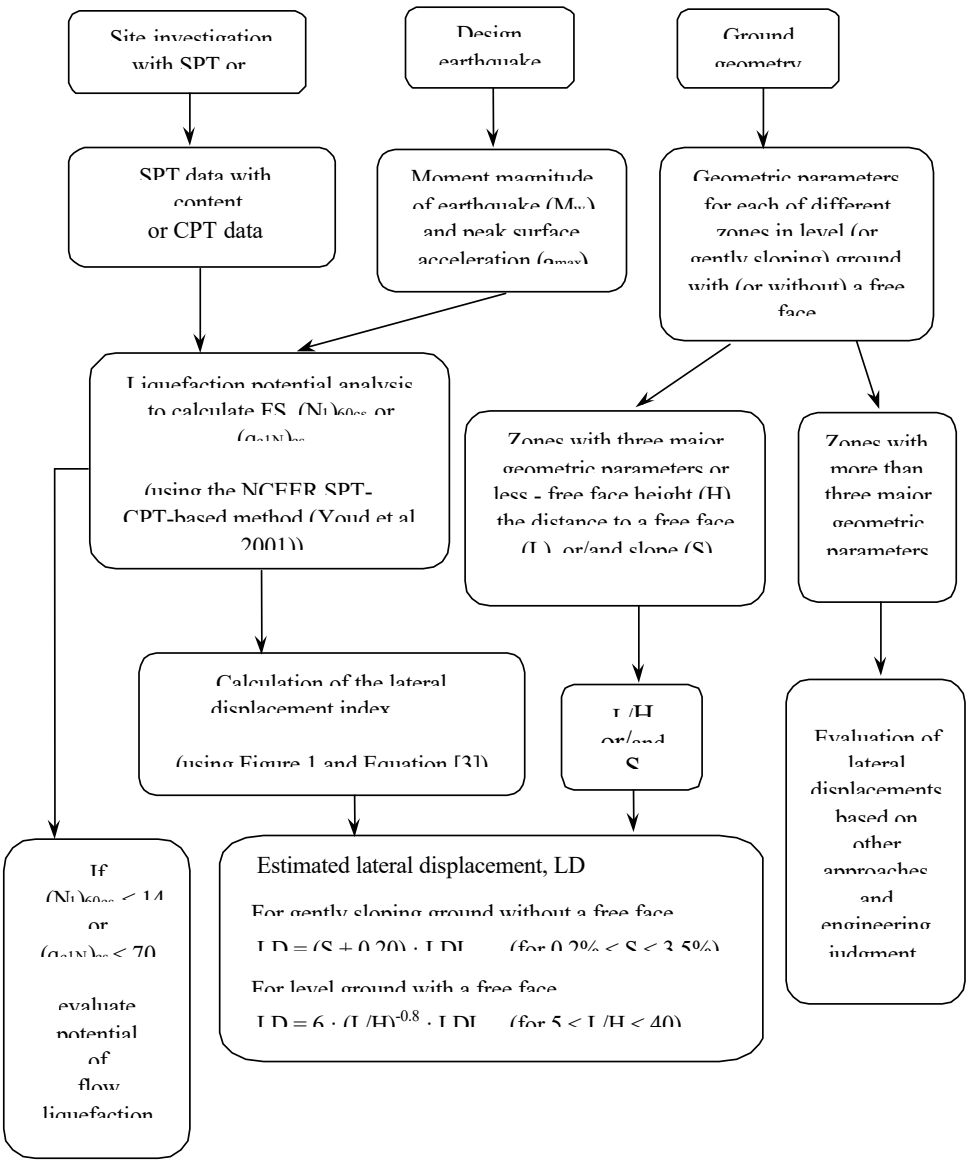
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

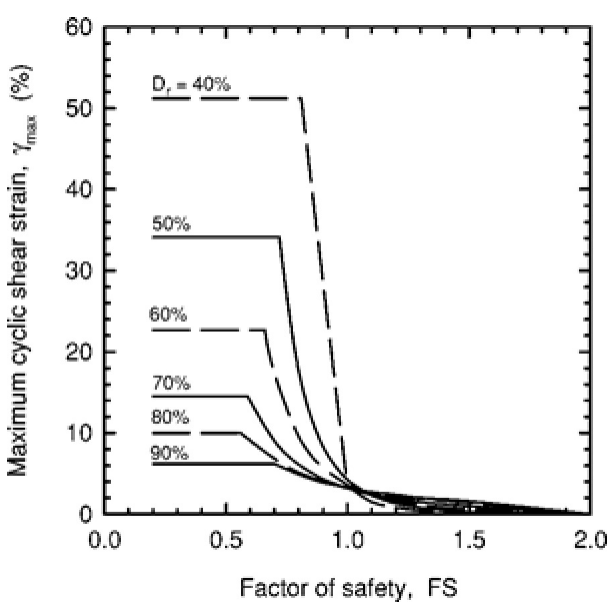
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



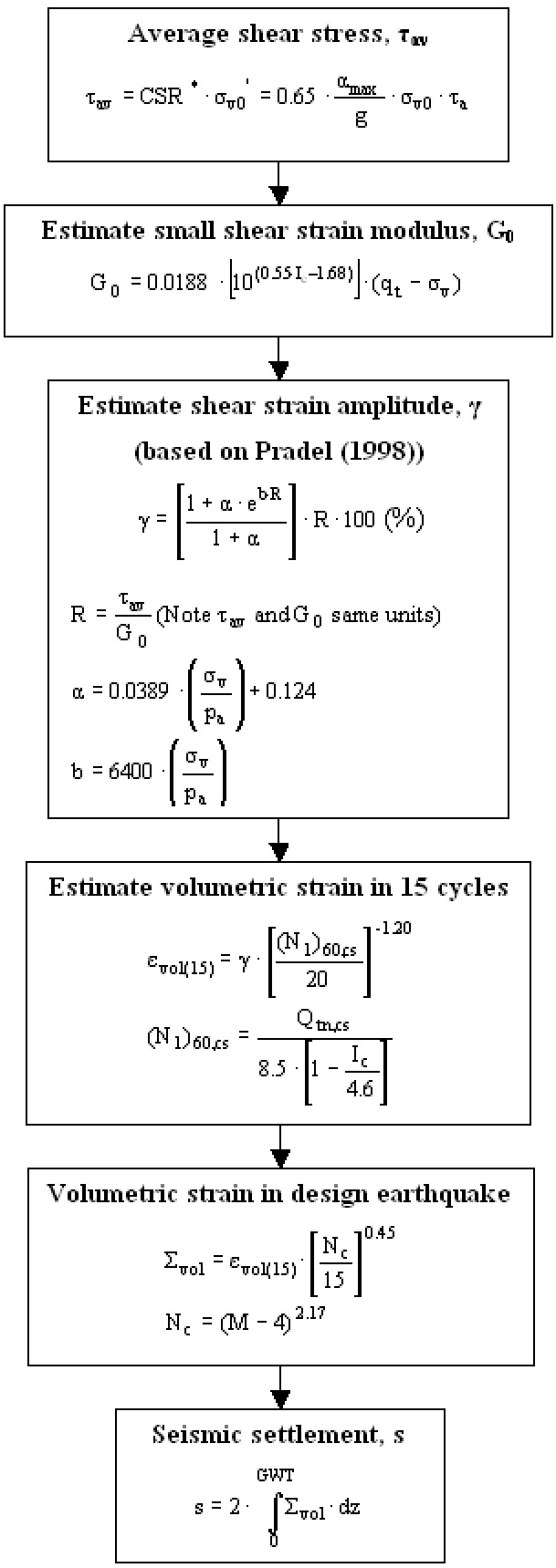
[1] Figure 1

$$\mathrm{LDI} = \int_0^{z_{\max}} \gamma_{\max} dz$$

[1] Equation [3]

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

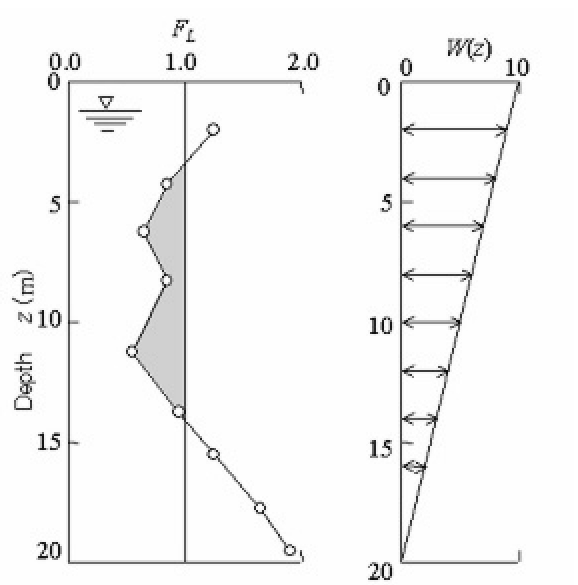
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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APPENDIX B

Waste Characterization Boring Location Map

&Laboratory Analytical Reports

Tab: L & D FIGURE Last Saved: August 29, 2024, by Ben Karpus Plotted: Thursday, August 29, 2024 9:29:14 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\PROFILES Updated.dwg

FIG. 1

WASTE CHARACTERIZATION BORINGS

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024
PROJECT ID: 240227/0010
SHEET NUMBER:

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

NO.	DATE	REVISION DESCRIPTION	BY

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TCLP Analyses

Teklab, Inc.
Environmental Laboratory
http://www.teklabinc.com/

May 28, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050235

Dear Eric Staley:

TEKLAB, INC received 4 samples on 5/2/2024 1:11:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	11
Chain of Custody	Appended

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power **Work Order:** 24050235

Client Project: CWLP Borings **Report Date:** 28-May-24

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24

Qualifiers

- Unknown hydrocarbon
B - Analyte detected in associated Method Blank
C - RL shown is a Client Requested Quantitation Limit
E - Value above quantitation range
H - Holding times exceeded
I - Associated internal standard was outside method criteria
J - Analyte detected below quantitation limits
M - Manual Integration used to determine area response
ND - Not Detected at the Reporting Limit
R - RPD outside accepted recovery limits
S - Spike Recovery outside recovery limits
T - TIC(Tentatively identified compound)
X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050235
Report Date: 28-May-24

Cooler Receipt Temp: 2.9 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
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Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050235-001
Client Sample ID: D2 33.5-35.5
Matrix: SOLID
Collection Date: 04/29/2024 10:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**158**	mg/L	10	05/09/2024 14:01	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.37	1.0	J	**0.37**	mg/L	10	05/10/2024 9:26	R347102
Elevated reporting limit due to matrix interference.									
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**8**	mg/L	1	05/09/2024 13:56	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.18**		1	05/06/2024 11:24	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.345**	mg/L	1	05/07/2024 17:27	222522
Barium	NELAP	0.0150	0.0450		**0.352**	mg/L	1	05/07/2024 17:27	222522
Beryllium	NELAP	0.0002	0.0010	J	**0.0002**	mg/L	1	05/07/2024 17:27	222522
Boron	NELAP	0.250	1.00		**4.05**	mg/L	1	05/07/2024 17:27	222522
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/07/2024 17:27	222522
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 17:27	222522
Cobalt	NELAP	0.0020	0.0060		**0.0130**	mg/L	1	05/07/2024 17:27	222522
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:27	222522
Molybdenum	NELAP	0.0037	0.0100		**1.27**	mg/L	1	05/07/2024 17:27	222522
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/07/2024 17:27	222522
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0125**	mg/L	5	05/09/2024 9:41	222522
Lithium	*	0.0015	0.0030		**0.0707**	mg/L	5	05/09/2024 9:41	222522
Thallium	NELAP	0.0010	0.0020	J	**0.0018**	mg/L	5	05/09/2024 9:41	222522
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 0:32	222519
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0390**	mg/L	1	05/08/2024 17:27	222567
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/07/2024 16:58	222567
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/07/2024 16:58	222567
Boron	NELAP	0.250	1.00		**3.05**	mg/L	1	05/07/2024 16:58	222567
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/07/2024 16:58	222567
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 16:58	222567
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/07/2024 16:58	222567
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 16:58	222567
Molybdenum	NELAP	0.0037	0.0100		**5.21**	mg/L	1	05/07/2024 16:58	222567
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/07/2024 16:58	222567
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0273**	mg/L	5	05/09/2024 10:45	222567
Lithium	*	0.0015	0.0030		**0.0065**	mg/L	5	05/09/2024 10:45	222567
Thallium	NELAP	0.0010	0.0020	J	**0.0015**	mg/L	5	05/09/2024 10:45	222567
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 17:08	223125
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050235-002
Client Sample ID: D1 36.5-38.5
Matrix: SOLID
Collection Date: 04/29/2024 15:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	6	10		**45**	mg/L	1	05/09/2024 14:04	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.19**	mg/L	1	05/09/2024 13:44	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4	J	**1**	mg/L	1	05/09/2024 14:04	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.64**		1	05/06/2024 11:30	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0528**	mg/L	1	05/07/2024 17:45	222522
Barium	NELAP	0.0150	0.0450		**0.514**	mg/L	1	05/07/2024 17:45	222522
Beryllium	NELAP	0.0002	0.0010		**0.0085**	mg/L	1	05/07/2024 17:45	222522
Boron	NELAP	0.250	1.00		**10.9**	mg/L	1	05/07/2024 17:45	222522
Cadmium	NELAP	0.0005	0.0020		**0.0706**	mg/L	1	05/07/2024 17:45	222522
Chromium	NELAP	0.0034	0.0100		**0.0707**	mg/L	1	05/07/2024 17:45	222522
Cobalt	NELAP	0.0020	0.0060		**0.0116**	mg/L	1	05/07/2024 17:45	222522
Lead	NELAP	0.0040	0.0075		**0.0102**	mg/L	1	05/08/2024 13:13	222522
Molybdenum	NELAP	0.0037	0.0100		**0.0554**	mg/L	1	05/07/2024 17:45	222522
Selenium	NELAP	0.017	0.050	J	**0.037**	mg/L	1	05/07/2024 17:45	222522
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0237**	mg/L	5	05/09/2024 9:36	222522
Lithium	*	0.0015	0.0030		**0.0367**	mg/L	5	05/09/2024 9:36	222522
Thallium	NELAP	0.0010	0.0020		**0.0268**	mg/L	5	05/08/2024 14:55	222522
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 0:39	222519
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0471**	mg/L	1	05/08/2024 17:23	222567
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/07/2024 17:03	222567
Beryllium	NELAP	0.0002	0.0010	J	**0.0002**	mg/L	1	05/07/2024 17:03	222567
Boron	NELAP	0.250	1.00		**2.94**	mg/L	1	05/07/2024 17:03	222567
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/07/2024 17:03	222567
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 17:03	222567
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/07/2024 17:03	222567
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:03	222567
Molybdenum	NELAP	0.0037	0.0100		**0.144**	mg/L	1	05/07/2024 17:03	222567
Selenium	NELAP	0.017	0.050	J	**0.021**	mg/L	1	05/07/2024 17:03	222567
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0078**	mg/L	5	05/08/2024 15:04	222567
Lithium	*	0.0015	0.0030		**0.0112**	mg/L	5	05/09/2024 10:24	222567
Thallium	NELAP	0.0010	0.0020	J	**0.0010**	mg/L	5	05/08/2024 15:04	222567
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 17:12	223125
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050235-003
Client Sample ID: D3 14.5-29.5
Matrix: SOLID
Collection Date: 04/30/2024 10:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	6	10		**31**	mg/L	1	05/09/2024 14:28	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.11**	mg/L	1	05/09/2024 13:47	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**< 4**	mg/L	1	05/09/2024 14:28	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.38**		1	05/06/2024 11:33	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0155**	mg/L	1	05/08/2024 13:15	222522
Barium	NELAP	0.0150	0.0450		**0.373**	mg/L	1	05/07/2024 17:46	222522
Beryllium	NELAP	0.0002	0.0010		**0.0113**	mg/L	1	05/07/2024 17:46	222522
Boron	NELAP	0.250	1.00		**8.74**	mg/L	1	05/07/2024 17:46	222522
Cadmium	NELAP	0.0005	0.0020		**0.0475**	mg/L	1	05/07/2024 17:46	222522
Chromium	NELAP	0.0034	0.0100		**0.0438**	mg/L	1	05/07/2024 17:46	222522
Cobalt	NELAP	0.0020	0.0060	J	**0.0054**	mg/L	1	05/07/2024 17:46	222522
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:46	222522
Molybdenum	NELAP	0.0037	0.0100		**0.0415**	mg/L	1	05/07/2024 17:46	222522
Selenium	NELAP	0.017	0.050	J	**0.030**	mg/L	1	05/07/2024 17:46	222522
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0197**	mg/L	5	05/10/2024 7:34	222522
Lithium	*	0.0015	0.0030		**0.0100**	mg/L	5	05/09/2024 10:29	222522
Thallium	NELAP	0.0010	0.0020		**0.0185**	mg/L	5	05/08/2024 15:29	222522
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 0:42	222519
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0173**	mg/L	1	05/08/2024 17:29	222567
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/07/2024 17:04	222567
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/07/2024 17:04	222567
Boron	NELAP	0.250	1.00		**2.34**	mg/L	1	05/07/2024 17:04	222567
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/07/2024 17:04	222567
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 17:04	222567
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/07/2024 17:04	222567
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:04	222567
Molybdenum	NELAP	0.0037	0.0100		**0.0355**	mg/L	1	05/07/2024 17:04	222567
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/07/2024 17:04	222567
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0070**	mg/L	5	05/09/2024 11:07	222567
Lithium	*	0.0015	0.0030		**0.0034**	mg/L	5	05/09/2024 11:07	222567
Thallium	NELAP	0.0010	0.0020	J	**0.0017**	mg/L	5	05/09/2024 11:07	222567
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 17:14	223125

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050235
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050235-004
Client Sample ID: D4 29.5-31.5
Matrix: SOLID
Collection Date: 04/30/2024 15:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**102**	mg/L	10	05/09/2024 14:41	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.14**	mg/L	1	05/09/2024 13:49	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**11**	mg/L	1	05/09/2024 14:36	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**10.2**		1	05/06/2024 11:35	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0242**	mg/L	1	05/07/2024 17:49	222522
Barium	NELAP	0.0150	0.0450		**0.287**	mg/L	1	05/07/2024 17:49	222522
Beryllium	NELAP	0.0002	0.0010		**0.0012**	mg/L	1	05/07/2024 17:49	222522
Boron	NELAP	0.250	1.00		**6.25**	mg/L	1	05/07/2024 17:49	222522
Cadmium	NELAP	0.0005	0.0020		**0.0063**	mg/L	1	05/07/2024 17:49	222522
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 17:49	222522
Cobalt	NELAP	0.0020	0.0060		**0.0089**	mg/L	1	05/07/2024 17:49	222522
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:49	222522
Molybdenum	NELAP	0.0037	0.0100		**0.179**	mg/L	1	05/07/2024 17:49	222522
Selenium	NELAP	0.017	0.050	J	**0.022**	mg/L	1	05/07/2024 17:49	222522
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0376**	mg/L	5	05/09/2024 10:18	222522
Lithium	*	0.0015	0.0030		**0.0374**	mg/L	5	05/09/2024 10:18	222522
Thallium	NELAP	0.0010	0.0020		**0.0243**	mg/L	5	05/08/2024 15:00	222522
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/19/2024 16:25	223122
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0114**	mg/L	1	05/08/2024 17:31	222567
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/07/2024 17:05	222567
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/07/2024 17:05	222567
Boron	NELAP	0.250	1.00		**2.77**	mg/L	1	05/07/2024 17:05	222567
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/07/2024 17:05	222567
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/07/2024 17:05	222567
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/07/2024 17:05	222567
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/07/2024 17:05	222567
Molybdenum	NELAP	0.0037	0.0100		**0.134**	mg/L	1	05/07/2024 17:05	222567
Selenium	NELAP	0.017	0.050	J	**0.021**	mg/L	1	05/07/2024 17:05	222567
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0240**	mg/L	5	05/09/2024 11:44	222567
Lithium	*	0.0015	0.0030		**0.0059**	mg/L	5	05/09/2024 11:44	222567
Thallium	NELAP	0.0010	0.0020	J	**0.0013**	mg/L	5	05/08/2024 16:14	222567
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 17:21	223125
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050235
Report Date: 28-May-24

Carrier: Paul Reeves

Received By: NR

Completed by: Amber Dilallo
On: 03-May-24

Reviewed by: Ellie Hopkins
On: 03-May-24

Pages to follow: Chain of custody [1] Extra pages included [14]

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C **2.9**
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☐	No ☑		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☐	No ☐	NA ☑	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

Samples requiring pH should be analyzed as soon as possible after collection. Samples submitted for pH analysis are analyzed as soon as practicable upon arrival at the laboratory. - amberdilallo - 5/3/2024 10:02:55 AM

Limited volume for D3 sample; additional volume for Radium-226 and -228 was submitted on WO#24050346. SAH 5/28/24

Print PDF

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050235

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 2.9 °C #7
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES:

TEKLAB

Client Comments:
TCLP & SPLP for all metals

Courier

email results to C. Grey and datamanagement@andrews-eng.com

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [ ] No
Are these samples known to be hazardous? [ ] Yes [ ] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [ ] Yes [ ] No

PROJECT NAME/NUMBER	SAMPLE COLLECTOR'S NAME
CWLP Borings	S. Van Hook

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	TCLP & SPLP Sb, As, Ba, Be	TCLP & SPLP B, Cd, Cr, Co, Pb, Se, Tl	TCLP & SPLP Li, Mo	TCLP & SPLP Hg	Neutral Leach Cl, F+, SO4	pH
24050235 001	D2 33.5-35.5	4/29/24 10 AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
002	D1 36.5-38.5	4/29/24 3:30PM	Soil	2									✓	✓	✓	✓	✓	✓	✓
003	D3 14.5-29.5	4/30/24 10:15am	Soil	2									✓	✓	✓	✓	✓	✓	✓
004	D4 29.5-31.5	4/30/24 3:00PM	Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2									✓	✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5/1/24 7:00pm	ASI Secure Storage	5/1/24 7:00P
ASI Secure Storage CWLP	5/2/24 7:40A	[signature]	5.2.24 0740
[signature]	5.2.24 1311	[signature]	5/2/24 1311

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

UM 5/2

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

May 23, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050235

Order No.: 24050488

Dear Shelly Hennessy:

Summit Environmental Technologies, Inc. received 3 sample(s) on 5/7/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

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Case Narrative

WO#: **24050488**
Date: **5/23/2024**

CLIENT: TEKLAB Inc,
Project: 24050235

WorkOrder Narrative:
24050488: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
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Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **24050488**
Date: **5/23/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **24050488**

23-May-24

CLIENT: TEKLAB Inc,
Project: 24050235

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050488-001	24050235-001		4/29/2024 10:00:00 AM	5/7/2024 11:30:00 AM	Solid
24050488-002	24050235-002		4/29/2024 3:30:00 PM	5/7/2024 11:30:00 AM	Solid
24050488-003	24050235-004		4/30/2024 3:00:00 PM	5/7/2024 11:30:00 AM	Solid

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DATES REPORT

WO#: **24050488**

23-May-24

Client: TEKLAB Inc,
Project: 24050235

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050488-001A	24050235-001	4/29/2024 10:00:00 AM	Solid	Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050488-002A	24050235-002	4/29/2024 3:30:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050488-003A	24050235-004	4/30/2024 3:00:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM

Original

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Analytical Report

(consolidated)

WO#: **24050488**

Date Reported: **5/23/2024**

CLIENT: TEKLAB Inc,

Collection Date: 4/29/2024 10:00:00 AM

Project: 24050235

Lab ID: 24050488-001

Matrix: SOLID

Client Sample ID: 24050235-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**SW9315**	**E903-904**	Analyst: **SMZ**
RADIUM-226 ANALYSIS (9315)							
Radium-226	ND	1.00		pCi/g	± 0.100	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RAD226/228					**SW9320**	**E903-904**	Analyst: **SMZ**
RADIUM-228 ANALYSIS (9320)							
Radium-228	ND	2.00		pCi/g	± 0.330	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050488**

Date Reported: **5/23/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/29/2024 3:30:00 PM

Project: 24050235

Lab ID: 24050488-002
Matrix: SOLID

Client Sample ID: 24050235-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**SW9315**	**E903-904**	Analyst: **SMZ**
RADIUM-226 ANALYSIS (9315)							
Radium-226	ND	1.00		pCi/g	± 0.130	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RAD226/228					**SW9320**	**E903-904**	Analyst: **SMZ**
RADIUM-228 ANALYSIS (9320)							
Radium-228	ND	2.00		pCi/g	± 0.270	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **24050488**

Date Reported: **5/23/2024**

CLIENT: TEKLAB Inc,

Collection Date: 4/30/2024 3:00:00 PM

Project: 24050235

Lab ID: 24050488-003

Matrix: SOLID

Client Sample ID: 24050235-004

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**SW9315**	**E903-904**	Analyst: **SMZ**
RADIUM-226 ANALYSIS (9315)							
Radium-226	ND	1.00		pCi/g	± 0.160	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RAD226/228					**SW9320**	**E903-904**	Analyst: **SMZ**
RADIUM-228 ANALYSIS (9320)							
Radium-228	ND	2.00		pCi/g	± 0.300	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050488**
23-May-24

Client: TEKLAB Inc,
Project: 24050235 **BatchID:** **75515**

Sample ID: **MB-75515**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **PBS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	2.00									
Yield	1.00										

Sample ID: **LCS-75515**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043899**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.62	2.00	5.000	0	72.4	50	130				

Sample ID: **LCSD-75515**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS02**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043900**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.01	2.00	5.000	0	60.2	50	130	3.620	18.4	20	

Sample ID: **24041932-001ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **BatchQC**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050488**
23-May-24

Client: TEKLAB Inc,
Project: 24050235 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186135**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9320** **E903-904** Analysis Date: **5/22/2024** SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	8.89	2.00	10.00	0	88.9	0	0	6.490	31.2	20	RS
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050488**
23-May-24

Client: TEKLAB Inc,
Project: 24050235 **BatchID:** **75515**

Sample ID: **MB-75515** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **PBS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044082**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-75515** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.20	1.00	5.000	0	124	70	130				

Sample ID: **LCSD-75515** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS02** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.76	1.00	5.000	0	115	60	140	6.200	7.36	40	

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050488**
23-May-24

Client: TEKLAB Inc,
Project: 24050235 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.51	1.00						6.960	6.68	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Pg ___ of ___

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

W.8-0.2- Cooler Temp: 26.6°d Sampler: Client QC Level: 2

Fedex, Cooler

Project# 24050235

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36226 Phone: (618) 344-1004 ext. 36

24050488

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228		CPM
	24050235-001	4/29/24 1000	Unpres	Soil	✔		38
	24050235-002	4/29/24 1530	Unpres	Soil	✔		34
	24050235-004	4/30/24 1500	Unpres	Soil	✔		38
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			
			Other	Aqueous			

*Relinquished By	Date/Time	Received By	Date/Time
	5/3/24 1700		5/7/24, 1130

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights.

SubCocRevA

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050488 RcptNo: 1

Logged by:	Christina N. Gemma	5/7/2024 11:30:00 AM	C. Gemma
Completed By:	Christina N. Gemma	5/7/2024 5:25:54 PM	C. Gemma
Reviewed By:	Jennifer Woolf	5/8/2024 11:11:39 AM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
   No. Seal Date: Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	20.6	Good	Not Present			

Teklab, Inc.
Environmental Laboratory

http://www.teklabinc.com/

June 05, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050346

Dear Eric Staley:

TEKLAB, INC received 10 samples on 5/3/2024 1:50:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050346
Report Date: 05-Jun-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	17
Chain of Custody	Appended

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power **Work Order:** 24050346

Client Project: CWLP Borings **Report Date:** 05-Jun-24

Abbr Definition

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050346
Report Date: 05-Jun-24

Cooler Receipt Temp: 3.3 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-001
Client Sample ID: L4 10ft-15.3ft
Matrix: SOLID
Collection Date: 05/02/2024 8:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**149**	mg/L	10	05/09/2024 14:49	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.42**	mg/L	1	05/09/2024 13:52	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**25**	mg/L	1	05/09/2024 14:44	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.49**		1	05/06/2024 11:10	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:00	222742
Barium	NELAP	0.0150	0.0450		**1.04**	mg/L	1	05/10/2024 14:00	222742
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:00	222742
Boron	NELAP	0.25	1.0	J	**0.59**	mg/L	1	05/10/2024 14:00	222742
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:00	222742
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:00	222742
Cobalt	NELAP	0.0020	0.0060		**0.0077**	mg/L	1	05/10/2024 14:00	222742
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:00	222742
Molybdenum	NELAP	0.0037	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:00	222742
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:00	222742
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0012**	mg/L	5	05/14/2024 9:03	222742
Lithium	*	0.0015	0.0030		**0.0034**	mg/L	5	05/14/2024 9:03	222742
Thallium	NELAP	0.0010	0.0020	J	**0.0015**	mg/L	5	05/15/2024 12:16	222742
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/16/2024 7:17	222743
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:13	222744
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/10/2024 14:13	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:13	222744
Boron	NELAP	0.250	1.00		**< 1.00**	mg/L	1	05/10/2024 14:13	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:13	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:13	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:13	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:13	222744
Molybdenum	NELAP	0.0037	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:13	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:13	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010	J	**0.0009**	mg/L	5	05/14/2024 12:23	222744
Lithium	*	0.0015	0.0030		**< 0.0030**	mg/L	5	05/14/2024 12:23	222744
Thallium	NELAP	0.0010	0.0020	J	**0.0011**	mg/L	5	05/15/2024 14:31	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:27	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-002
Client Sample ID: L3 29.5-32.7
Matrix: SOLID
Collection Date: 05/02/2024 11:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	307	500		**574**	mg/L	50	05/10/2024 13:21	R347112
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.20**	mg/L	1	05/09/2024 13:53	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**13**	mg/L	1	05/09/2024 14:52	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.79**		1	05/06/2024 11:12	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0337**	mg/L	1	05/10/2024 14:01	222742
Barium	NELAP	0.0150	0.0450		**0.470**	mg/L	1	05/10/2024 14:01	222742
Beryllium	NELAP	0.0002	0.0010		**0.0054**	mg/L	1	05/10/2024 14:01	222742
Boron	NELAP	0.250	1.00		**1.23**	mg/L	1	05/10/2024 14:01	222742
Cadmium	NELAP	0.0005	0.0020		**0.0397**	mg/L	1	05/10/2024 14:01	222742
Chromium	NELAP	0.0034	0.0100		**0.0185**	mg/L	1	05/10/2024 14:01	222742
Cobalt	NELAP	0.0020	0.0060		**0.0161**	mg/L	1	05/10/2024 14:01	222742
Lead	NELAP	0.0040	0.0075		**0.0247**	mg/L	1	05/10/2024 14:01	222742
Molybdenum	NELAP	0.0037	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:01	222742
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:01	222742
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0024**	mg/L	5	05/14/2024 9:57	222742
Lithium	*	0.0015	0.0030		**0.0061**	mg/L	5	05/14/2024 9:57	222742
Thallium	NELAP	0.0010	0.0020		**0.0060**	mg/L	5	05/15/2024 12:31	222742
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/16/2024 7:20	222743
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/16/2024 17:50	222744
Barium	NELAP	0.015	0.045	J	**0.025**	mg/L	1	05/10/2024 14:14	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:14	222744
Boron	NELAP	0.25	1.0	J	**0.60**	mg/L	1	05/10/2024 14:14	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:14	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:14	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:14	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:14	222744
Molybdenum	NELAP	0.0037	0.0100		**0.0169**	mg/L	1	05/10/2024 14:14	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:14	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0037**	mg/L	5	05/14/2024 12:28	222744
Lithium	*	0.0015	0.0030	J	**0.0030**	mg/L	5	05/14/2024 12:28	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 14:36	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:29	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/31/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/31/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-003
Client Sample ID: L3 19.5-21.5
Matrix: SOLID
Collection Date: 05/02/2024 11:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**224**	mg/L	10	05/09/2024 15:05	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.20**	mg/L	1	05/09/2024 13:56	R347045
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4	J	**4**	mg/L	1	05/09/2024 15:00	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.14**		1	05/06/2024 11:14	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0279**	mg/L	1	05/16/2024 17:49	222740
Barium	NELAP	0.0150	0.0450		**0.635**	mg/L	1	05/10/2024 14:56	222740
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:56	222740
Boron	NELAP	0.25	1.0	J	**0.69**	mg/L	1	05/10/2024 14:56	222740
Cadmium	NELAP	0.0005	0.0020		**0.0154**	mg/L	1	05/10/2024 14:56	222740
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:56	222740
Cobalt	NELAP	0.0020	0.0060		**0.0065**	mg/L	1	05/14/2024 12:11	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:56	222740
Molybdenum	NELAP	0.0037	0.0100		**0.0307**	mg/L	1	05/10/2024 14:56	222740
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:56	222740
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0066**	mg/L	5	05/14/2024 9:42	222740
Lithium	*	0.0015	0.0030		**0.0053**	mg/L	5	05/14/2024 9:42	222740
Thallium	NELAP	0.0010	0.0020		**0.0086**	mg/L	5	05/15/2024 13:21	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**0.00028**	mg/L	1	05/14/2024 14:21	222612
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0195**	mg/L	1	05/10/2024 14:15	222744
Barium	NELAP	0.015	0.045	J	**0.028**	mg/L	1	05/10/2024 14:15	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:15	222744
Boron	NELAP	0.25	1.0	J	**0.32**	mg/L	1	05/10/2024 14:15	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:15	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:15	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:15	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:15	222744
Molybdenum	NELAP	0.0037	0.0100		**0.0111**	mg/L	1	05/10/2024 14:15	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:15	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0054**	mg/L	5	05/14/2024 12:33	222744
Lithium	*	0.0015	0.0030	J	**0.0015**	mg/L	5	05/14/2024 12:33	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 14:41	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:36	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

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Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-004
Client Sample ID: L1 24.5-31.5
Matrix: SOLID
Collection Date: 05/02/2024 15:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**139**	mg/L	10	05/09/2024 15:29	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.21**	mg/L	1	05/10/2024 9:32	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**5**	mg/L	1	05/09/2024 15:24	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.14**		1	05/06/2024 11:15	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:56	222740
Barium	NELAP	0.0150	0.0450		**0.172**	mg/L	1	05/10/2024 14:56	222740
Beryllium	NELAP	0.0002	0.0010		**0.0015**	mg/L	1	05/10/2024 14:56	222740
Boron	NELAP	0.250	1.00		**17.2**	mg/L	1	05/10/2024 14:56	222740
Cadmium	NELAP	0.0005	0.0020		**0.0045**	mg/L	1	05/10/2024 14:56	222740
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:56	222740
Cobalt	NELAP	0.0020	0.0060	J	**0.0033**	mg/L	1	05/10/2024 14:56	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:56	222740
Molybdenum	NELAP	0.0037	0.0100		**0.0118**	mg/L	1	05/10/2024 14:56	222740
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:56	222740
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0064**	mg/L	5	05/14/2024 9:47	222740
Lithium	*	0.0015	0.0030		**0.0087**	mg/L	5	05/14/2024 9:47	222740
Thallium	NELAP	0.0010	0.0020		**0.0041**	mg/L	5	05/15/2024 13:26	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 16:51	222741
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:16	222744
Barium	NELAP	0.015	0.045	J	**0.026**	mg/L	1	05/10/2024 14:16	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:16	222744
Boron	NELAP	0.250	1.00		**2.69**	mg/L	1	05/10/2024 14:16	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:16	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:16	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:16	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:16	222744
Molybdenum	NELAP	0.0037	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:16	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:16	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0012**	mg/L	5	05/14/2024 12:39	222744
Lithium	*	0.0015	0.0030	J	**0.0030**	mg/L	5	05/14/2024 12:39	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 14:45	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:43	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

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Laboratory Results

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Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-005
Client Sample ID: L1 14.5-21.5
Matrix: SOLID
Collection Date: 05/02/2024 14:50

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**103**	mg/L	10	05/09/2024 15:37	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.37**	mg/L	1	05/10/2024 9:35	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4	J	**1**	mg/L	1	05/09/2024 15:32	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.13**		1	05/06/2024 11:16	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:57	222740
Barium	NELAP	0.0150	0.0450		**0.345**	mg/L	1	05/10/2024 14:57	222740
Beryllium	NELAP	0.0002	0.0010	J	**0.0007**	mg/L	1	05/10/2024 14:57	222740
Boron	NELAP	0.25	1.0	J	**0.32**	mg/L	1	05/10/2024 14:57	222740
Cadmium	NELAP	0.0005	0.0020		**0.0045**	mg/L	1	05/10/2024 14:57	222740
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:57	222740
Cobalt	NELAP	0.0020	0.0060	J	**0.0054**	mg/L	1	05/10/2024 14:57	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:57	222740
Molybdenum	NELAP	0.0037	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:57	222740
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:57	222740
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0019**	mg/L	5	05/14/2024 10:18	222740
Lithium	*	0.0015	0.0030		**0.0036**	mg/L	5	05/14/2024 10:18	222740
Thallium	NELAP	0.0010	0.0020		**0.0023**	mg/L	5	05/15/2024 13:36	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 16:54	222741
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0276**	mg/L	1	05/10/2024 14:16	222744
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/10/2024 14:16	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:16	222744
Boron	NELAP	0.250	1.00		**< 1.00**	mg/L	1	05/10/2024 14:16	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:16	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:16	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:16	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:16	222744
Molybdenum	NELAP	0.0037	0.0100		**0.0145**	mg/L	1	05/10/2024 14:16	222744
Selenium	NELAP	0.017	0.050	J	**0.019**	mg/L	1	05/10/2024 14:16	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0114**	mg/L	5	05/14/2024 13:05	222744
Lithium	*	0.0015	0.0030		**< 0.0030**	mg/L	5	05/14/2024 13:05	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 15:05	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:45	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

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Laboratory Results

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Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-006
Client Sample ID: D3 9.5-11.5
Matrix: SOLID
Collection Date: 04/30/2024 10:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-007
Client Sample ID: D3 4.5-6.5
Matrix: SOLID
Collection Date: 04/30/2024 10:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	6	10		**45**	mg/L	1	05/09/2024 15:42	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10	J	**0.08**	mg/L	1	05/10/2024 9:36	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**< 4**	mg/L	1	05/09/2024 15:42	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.93**		1	05/06/2024 11:18	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:59	222740
Barium	NELAP	0.0150	0.0450		**0.492**	mg/L	1	05/10/2024 14:59	222740
Beryllium	NELAP	0.0002	0.0010		**0.0114**	mg/L	1	05/10/2024 14:59	222740
Boron	NELAP	0.500	2.00		**25.9**	mg/L	2	05/13/2024 11:33	222740
Cadmium	NELAP	0.0005	0.0020		**0.0302**	mg/L	1	05/10/2024 14:59	222740
Chromium	NELAP	0.0034	0.0100		**0.0692**	mg/L	1	05/10/2024 14:59	222740
Cobalt	NELAP	0.0020	0.0060		**0.0118**	mg/L	1	05/10/2024 14:59	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:59	222740
Molybdenum	NELAP	0.0037	0.0100		**0.0375**	mg/L	1	05/10/2024 14:59	222740
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:59	222740
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0178**	mg/L	5	05/14/2024 9:52	222740
Lithium	*	0.0015	0.0030		**0.0131**	mg/L	5	05/14/2024 9:52	222740
Thallium	NELAP	0.0010	0.0020		**0.0252**	mg/L	5	05/15/2024 13:31	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 16:56	222741
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/16/2024 17:50	222744
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/10/2024 14:24	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:24	222744
Boron	NELAP	0.250	1.00		**2.65**	mg/L	1	05/10/2024 14:24	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:24	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:24	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:24	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:24	222744
Molybdenum	NELAP	0.0037	0.0100		**0.0138**	mg/L	1	05/10/2024 14:24	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:24	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0029**	mg/L	5	05/14/2024 12:44	222744
Lithium	*	0.0015	0.0030		**0.0033**	mg/L	5	05/14/2024 12:44	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 14:50	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:47	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-008
Client Sample ID: D1 19.5-21.5
Matrix: SOLID
Collection Date: 04/29/2024 15:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	31	50		**65**	mg/L	5	05/10/2024 13:23	R347112
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.13**	mg/L	1	05/10/2024 9:39	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4	J	**1**	mg/L	1	05/09/2024 15:50	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**10.0**		1	05/06/2024 11:20	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 15:06	222740
Barium	NELAP	0.0150	0.0450		**0.358**	mg/L	1	05/10/2024 15:06	222740
Beryllium	NELAP	0.0002	0.0010		**0.0145**	mg/L	1	05/10/2024 15:06	222740
Boron	NELAP	0.500	2.00		**26.6**	mg/L	2	05/13/2024 11:33	222740
Cadmium	NELAP	0.0005	0.0020		**0.0293**	mg/L	1	05/10/2024 15:06	222740
Chromium	NELAP	0.0034	0.0100		**0.105**	mg/L	1	05/10/2024 15:06	222740
Cobalt	NELAP	0.0020	0.0060		**0.0145**	mg/L	1	05/10/2024 15:06	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 15:06	222740
Molybdenum	NELAP	0.0037	0.0100		**0.0402**	mg/L	1	05/10/2024 15:06	222740
Selenium	NELAP	0.017	0.050	J	**0.017**	mg/L	1	05/10/2024 15:06	222740
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0170**	mg/L	5	05/14/2024 11:46	222740
Lithium	*	0.0015	0.0030		**0.0112**	mg/L	5	05/14/2024 11:46	222740
Thallium	NELAP	0.0010	0.0020		**0.0229**	mg/L	5	05/15/2024 14:26	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/15/2024 17:07	222741
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:25	222744
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/10/2024 14:25	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:25	222744
Boron	NELAP	0.250	1.00		**5.11**	mg/L	1	05/10/2024 14:25	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:25	222744
Chromium	NELAP	0.0034	0.010	J	**0.0049**	mg/L	1	05/10/2024 14:25	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:25	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:25	222744
Molybdenum	NELAP	0.0037	0.0100		**0.216**	mg/L	1	05/10/2024 14:25	222744
Selenium	NELAP	0.017	0.050	J	**0.030**	mg/L	1	05/10/2024 14:25	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0035**	mg/L	5	05/14/2024 12:49	222744
Lithium	*	0.0015	0.0030		**0.0033**	mg/L	5	05/14/2024 12:49	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 14:55	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:49	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-009
Client Sample ID: D2 19.5-21.5
Matrix: SOLID
Collection Date: 04/29/2024 9:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	61	100		**226**	mg/L	10	05/09/2024 16:20	R347057
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.20**	mg/L	1	05/10/2024 9:42	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**7**	mg/L	1	05/09/2024 16:14	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.25**		1	05/06/2024 11:21	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0505**	mg/L	1	05/10/2024 14:03	222742
Barium	NELAP	0.0150	0.0450		**0.556**	mg/L	1	05/10/2024 14:03	222742
Beryllium	NELAP	0.0002	0.0010		**0.0231**	mg/L	1	05/10/2024 14:03	222742
Boron	NELAP	0.250	1.00		**9.63**	mg/L	1	05/10/2024 14:03	222742
Cadmium	NELAP	0.0005	0.0020		**0.0638**	mg/L	1	05/10/2024 14:03	222742
Chromium	NELAP	0.0034	0.0100		**0.116**	mg/L	1	05/10/2024 14:03	222742
Cobalt	NELAP	0.0020	0.0060		**0.0182**	mg/L	1	05/10/2024 14:03	222742
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:03	222742
Molybdenum	NELAP	0.0037	0.0100		**0.0571**	mg/L	1	05/10/2024 14:03	222742
Selenium	NELAP	0.017	0.050	J	**0.017**	mg/L	1	05/10/2024 14:03	222742
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0163**	mg/L	5	05/14/2024 9:36	222742
Lithium	*	0.0015	0.0030		**0.0228**	mg/L	5	05/14/2024 9:36	222742
Thallium	NELAP	0.0010	0.0020		**0.0257**	mg/L	5	05/15/2024 12:11	222742
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/16/2024 7:24	222743
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:26	222744
Barium	NELAP	0.015	0.045	J	**0.021**	mg/L	1	05/10/2024 14:26	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:26	222744
Boron	NELAP	0.250	1.00		**4.20**	mg/L	1	05/10/2024 14:26	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:26	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:26	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:26	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:26	222744
Molybdenum	NELAP	0.0037	0.0100		**0.155**	mg/L	1	05/10/2024 14:26	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:26	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0141**	mg/L	5	05/14/2024 12:54	222744
Lithium	*	0.0015	0.0030		**0.0078**	mg/L	5	05/14/2024 12:54	222744
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/15/2024 15:00	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:54	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050346
Client Project: CWLP Borings
Report Date: 05-Jun-24
Lab ID: 24050346-010
Client Sample ID: D4 19.5-21.5
Matrix: SOLID
Collection Date: 04/30/2024 14:45

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	31	50		**70**	mg/L	5	05/10/2024 13:26	R347112
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10	J	**0.06**	mg/L	1	05/10/2024 9:52	R347102
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4	J	**2**	mg/L	1	05/09/2024 16:22	R347069
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**9.63**		1	05/06/2024 11:22	R346778
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 15:07	222740
Barium	NELAP	0.0150	0.0450		**0.238**	mg/L	1	05/10/2024 15:07	222740
Beryllium	NELAP	0.0002	0.0010		**0.0056**	mg/L	1	05/10/2024 15:07	222740
Boron	NELAP	0.500	2.00	S	**26.9**	mg/L	2	05/13/2024 11:34	222740
Cadmium	NELAP	0.0005	0.0020		**0.0422**	mg/L	1	05/10/2024 15:07	222740
Chromium	NELAP	0.0034	0.0100		**0.0151**	mg/L	1	05/10/2024 15:07	222740
Cobalt	NELAP	0.0020	0.0060		**0.0107**	mg/L	1	05/10/2024 15:07	222740
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 15:07	222740
Molybdenum	NELAP	0.0037	0.0100		**0.105**	mg/L	1	05/10/2024 15:07	222740
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 15:07	222740
Matrix spike control limits are not applicable due to high sample/spike ratio.									
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0395**	mg/L	5	05/14/2024 11:51	222740
Lithium	*	0.0015	0.0030		**0.0192**	mg/L	5	05/14/2024 11:51	222740
Thallium	NELAP	0.0010	0.0020		**0.0225**	mg/L	5	05/15/2024 13:55	222740
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**0.00029**	mg/L	1	05/15/2024 17:12	222741
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:26	222744
Barium	NELAP	0.0150	0.0450		**< 0.0450**	mg/L	1	05/10/2024 14:26	222744
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/10/2024 14:26	222744
Boron	NELAP	0.250	1.00		**3.77**	mg/L	1	05/10/2024 14:26	222744
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/10/2024 14:26	222744
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/10/2024 14:26	222744
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/10/2024 14:26	222744
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/10/2024 14:26	222744
Molybdenum	NELAP	0.0037	0.0100		**0.0495**	mg/L	1	05/10/2024 14:26	222744
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/10/2024 14:26	222744
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0034**	mg/L	5	05/14/2024 14:18	222744
Lithium	*	0.0015	0.0030		**0.0075**	mg/L	5	05/14/2024 14:18	222744
Thallium	NELAP	0.0010	0.0020	J	**0.0017**	mg/L	5	05/15/2024 16:15	222744
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 16:56	223131
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R348283

Teklab, Inc. Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050346
Report Date: 05-Jun-24

Carrier: Paul Reeves

Received By: LM

Completed by: Amber Dilallo
On: 03-May-24

Reviewed by: Ellie Hopkins
On: 03-May-24

Pages to follow: Chain of custody [1] Extra pages included [25]

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 3.3
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☐	No ☐	NA ☑	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

Samples requiring pH should be analyzed as soon as possible after collection. Samples submitted for pH analysis are analyzed as soon as practicable upon arrival at the laboratory. - amberdilallo - 5/3/2024 2:35:35 PM

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050346

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☐ No
Are these samples known to be hazardous? ☐ Yes ☐ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☐ Yes ☐ No

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 3.3 °C LT6475
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

TEKLAB

Client Comments:
TCLP & SPLP for all metals

Courier

email results to C. Grey and datamanagement@andrews-eng.com SAV 5/6/24
*Add'l volume for 24050235-003; use ID D3 9.5-11.5 per Steve Van Hook

PROJECT NAME/NUMBER: CWLP Borings
SAMPLE COLLECTOR'S NAME: S. Van Hook

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	TCLP & SPLP Sb, As, Ba, Be	TCLP & SPLP B, Cd, Cr, Co, Pb, Se, Tl	TCLP & SPLP Li, Mo	TCLP & SPLP Hg	Neutral Leach Cl, F+, SO4	pH
24050346 001	L4 10'-15.5'	5/2/24 8:15am	Soil	2									✓	✓	✓	✓	✓	✓	✓
002	L3 29.5-32'	5/2/24 11AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
003	L3 19.5-21.5	5/2/24 11:15AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
004	L1 24.5-31.5	5/2/24 3:30pm	Soil	2									✓	✓	✓	✓	✓	✓	✓
005	L1 14.5-21.5	5/2/24 2:50PM	Soil	2									✓	✓	✓	✓	✓	✓	✓
* 006	D3 9.5-29.5	4/30/24 10:15AM	Soil	2									✓	✓	✓	✓	✓	✓	✓ RAD ONLY SAV 5/6/24
007	D3 4.5-6.5	4/30/24 10:15AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
008	D1 19.5-21.5	4/29/24 3:00PM	Soil	2									✓	✓	✓	✓	✓	✓	✓
009	D2 19.5-21.5	4/29/24 9:30am	Soil	2									✓	✓	✓	✓	✓	✓	✓
010	D4 19.5-21.5	4/30/24 2:45pm	Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2															

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5/2/24 7:00pm	AEI Secure Storage	5/2/24 1900
AEI Secure Storage	5/3/24 07:28	[signature]	5/3/24 0728
[signature]	5/3/24 1350	[signature]	5/3/24 1350

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

NK 5/3

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

June 05, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050346

Dear Shelly Hennessy:

Order No.: 24050783

Summit Environmental Technologies, Inc. received 10 sample(s) on 5/9/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC.
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **24050783**
Date: **6/5/2024**

CLIENT: TEKLAB Inc,
Project: 24050346

WorkOrder Narrative:
24050783: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
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Qualifiers and Acronyms

WO#: **24050783**
Date: **6/5/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **24050783**

05-Jun-24

CLIENT: TEKLAB Inc,
Project: 24050346

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050783-001	24050346-001		5/2/2024 8:15:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-002	24050346-002		5/2/2024 11:00:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-003	24050346-003		5/2/2024 11:15:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-004	24050346-004		5/2/2024 3:30:00 PM	5/9/2024 11:40:00 AM	Solid
24050783-005	24050346-005		5/2/2024 2:50:00 PM	5/9/2024 11:40:00 AM	Solid
24050783-006	24050346-006		4/30/2024 10:15:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-007	24050346-007		4/30/2024 10:15:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-008	24050346-008		4/30/2024 3:00:00 PM	5/9/2024 11:40:00 AM	Solid
24050783-009	24050346-009		4/30/2024 9:30:00 AM	5/9/2024 11:40:00 AM	Solid
24050783-010	24050346-010		4/30/2024 2:45:00 PM	5/9/2024 11:40:00 AM	Solid

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DATES REPORT

WO#: **24050783**

05-Jun-24

Client: TEKLAB Inc,
Project: 24050346

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050783-001A	24050346-001	5/2/2024 8:15:00 AM	Solid	Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-002A	24050346-002	5/2/2024 11:00:00 AM		Radium-226 Analysis (9315)		5/28/2024 1:38:00 PM	6/3/2024 11:07:59 AM
				Radium-228 Analysis (9320)		5/28/2024 1:38:00 PM	5/31/2024 1:16:12 PM
24050783-003A	24050346-003	5/2/2024 11:15:00 AM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-004A	24050346-004	5/2/2024 3:30:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-005A	24050346-005	5/2/2024 2:50:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-006A	24050346-006	4/30/2024 10:15:00 AM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-007A	24050346-007			Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-008A	24050346-008	4/30/2024 3:00:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-009A	24050346-009	4/30/2024 9:30:00 AM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050783-010A	24050346-010	4/30/2024 2:45:00 PM		Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 8:15:00 AM
Project: 24050346
Lab ID: 24050783-001
Matrix: SOLID
Client Sample ID: 24050346-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315** **E903-904**		Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.0700	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320** **E903-904**		Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.290	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 11:00:00 AM

Project: 24050346

Lab ID: 24050783-002
Matrix: SOLID

Client Sample ID: 24050346-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315** **E903-904**		Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.0800	1	6/3/2024 11:07:59 AM
Yield	1.00					1	6/3/2024 11:07:59 AM
RADIUM-228 ANALYSIS (9320)					**SW9320** **E903-904**		Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.260	1	5/31/2024 1:16:12 PM
Yield	1.00					1	5/31/2024 1:16:12 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 11:15:00 AM
Project: 24050346
Lab ID: 24050783-003
Matrix: SOLID
Client Sample ID: 24050346-003

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.140	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.300	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 3:30:00 PM
Project: 24050346
Lab ID: 24050783-004
Matrix: SOLID
Client Sample ID: 24050346-004

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.100	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.250	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 2:50:00 PM
Project: 24050346
Lab ID: 24050783-005
Matrix: SOLID
Client Sample ID: 24050346-005

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.0800	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.210	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 10:15:00 AM
Project: 24050346
Lab ID: 24050783-006
Matrix: SOLID
Client Sample ID: 24050346-006

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.140	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.280	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 10:15:00 AM
Project: 24050346
Lab ID: 24050783-007
Matrix: SOLID
Client Sample ID: 24050346-007

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.100	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.380	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 3:00:00 PM
Project: 24050346
Lab ID: 24050783-008
Matrix: SOLID
Client Sample ID: 24050346-008

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.160	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.290	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 9:30:00 AM

Project: 24050346

Lab ID: 24050783-009
Matrix: SOLID

Client Sample ID: 24050346-009

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.120	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.290	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050783**

Date Reported: **6/5/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 2:45:00 PM

Project: 24050346

Lab ID: 24050783-010
Matrix: SOLID

Client Sample ID: 24050346-010

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)					**SW9315**	**E903-904**	Analyst: **SMZ**
Radium-226	ND	1.00		pCi/g	± 0.120	1	5/23/2024 10:51:41 AM
Yield	1.00					1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)					**SW9320**	**E903-904**	Analyst: **SMZ**
Radium-228	ND	2.00		pCi/g	± 0.280	1	5/22/2024 3:06:59 PM
Yield	1.00					1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050783**
05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75515**

Sample ID: **MB-75515**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **PBS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	2.00									
Yield	1.00										

Sample ID: **LCS-75515**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043899**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.62	2.00	5.000	0	72.4	50	130				

Sample ID: **LCSD-75515**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS02**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043900**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.01	2.00	5.000	0	60.2	50	130	3.620	18.4	20	

Sample ID: **24041932-001ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/g-dry**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **BatchQC**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050783**
05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186135**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9320** **E903-904** Analysis Date: **5/22/2024** SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	10.4	2.34	11.68	0	88.9	0	0	7.583	31.2	20	RS
Yield	1.17							1.168	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050783**
05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75515**

Sample ID: **MB-75515** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **PBS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044082**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-75515** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.20	1.00	5.000	0	124	70	130				

Sample ID: **LCSD-75515** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS02** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.76	1.00	5.000	0	115	60	140	6.200	7.36	40	

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050783**

05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	7.61	1.17						8.133	6.68	20	
Yield	1.17							1.168	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050783**
05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75738**

Sample ID: **MB-75738**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/28/2024**	RunNo: **186695**
Client ID: **PBS**	Batch ID: **75738**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/31/2024**	SeqNo: **5059001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	2.00									
Yield	1.00										

Sample ID: **LCS-75738**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/28/2024**	RunNo: **186695**
Client ID: **LCSS**	Batch ID: **75738**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/31/2024**	SeqNo: **5059002**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.33	2.00	5.000	0	66.6	50	130				

Sample ID: **LCSD-75738**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/28/2024**	RunNo: **186695**
Client ID: **LCSS02**	Batch ID: **75738**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/31/2024**	SeqNo: **5059003**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.40	2.00	5.000	0	68.0	50	130	3.330	2.08	20	

Sample ID: **24050783-002ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/28/2024**	RunNo: **186695**
Client ID: **24050346-002**	Batch ID: **75738**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/31/2024**	SeqNo: **5059008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050783**

05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75738**

Sample ID: **24050783-002ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186695**
Client ID: **24050346-002** Batch ID: **75738** TestNo: **SW9320** **E903-904** Analysis Date: **5/31/2024** SeqNo: **5059008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	2.00	10.00	0	0	0	0	0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050783**
05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75738**

Sample ID: **MB-75738** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186696**
Client ID: **PBS** Batch ID: **75738** TestNo: **SW9315** **E903-904** Analysis Date: **6/3/2024** SeqNo: **5059009**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-75738** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186696**
Client ID: **LCSS** Batch ID: **75738** TestNo: **SW9315** **E903-904** Analysis Date: **6/3/2024** SeqNo: **5059010**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.94	1.00	5.000	0	98.8	70	130				

Sample ID: **LCSD-75738** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186696**
Client ID: **LCSS02** Batch ID: **75738** TestNo: **SW9315** **E903-904** Analysis Date: **6/3/2024** SeqNo: **5059011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.81	1.00	5.000	0	96.2	60	140	4.940	2.67	40	

Sample ID: **24050783-002ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186696**
Client ID: **24050346-002** Batch ID: **75738** TestNo: **SW9315** **E903-904** Analysis Date: **6/3/2024** SeqNo: **5059016**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050783**

05-Jun-24

Client: TEKLAB Inc,
Project: 24050346 **BatchID:** **75738**

Sample ID: **24050783-002ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/28/2024** RunNo: **186696**
Client ID: **24050346-002** Batch ID: **75738** TestNo: **SW9315** **E903-904** Analysis Date: **6/3/2024** SeqNo: **5059016**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Pg 1 of 1

24050783

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

18.4-0.2= Cooler Temp: 18.2c Sampler: Client QC Level: 2

Fedex, Cooler

Project# 24050346

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36236 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228		CPM
	24050346-001	5/2/24 0815	Unpres	Soil	✔		24
	24050346-002	5/2/24 1100	Unpres	Soil	✔		36
	24050346-003	5/2/24 1115	Unpres	Soil	✔		24
	24050346-004	5/2/24 1530	Unpres	Soil	✔		24
	24050346-005	5/2/24 1450	Unpres	Soil	✔		28
	24050346-006	4/30/24 1015	Unpres	Soil	✔		20
	24050346-007	4/30/24 1015	Unpres	Soil	✔		30
	24050346-008	4/29/24 1500	Unpres	Soil	✔		24
	24050346-009	4/29/24 0930	Unpres	Soil	✔		38
	24050346-010	4/30/24 1445	Unpres	Soil	✔		34
			Other	Aqueous			

*Relinquished By	Date/Time	Received By	Date/Time
[signature]	5/9/24 1700	[signature]	5/9/24, 1140

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

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Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050783 RcptNo: 1

Logged by:	Tegan A. Richards	5/9/2024 11:40:00 AM	Tegan Richards
Completed By:	Tegan A. Richards	5/10/2024 12:09:39 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	5/10/2024 5:04:45 PM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
   No. Seal Date: Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	18.2	Good	Not Present			

Teklab, Inc.
Environmental Laboratory

http://www.teklabinc.com/

May 28, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050428

Dear Eric Staley:

TEKLAB, INC received 2 samples on 5/6/2024 12:00:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050428
Report Date: 28-May-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	9
Chain of Custody	Appended

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050428

Client Project: CWLP Borings
Report Date: 28-May-24

Abbr Definition

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050428
Client Project: CWLP Borings
Report Date: 28-May-24

Qualifiers

- Unknown hydrocarbon
B - Analyte detected in associated Method Blank
C - RL shown is a Client Requested Quantitation Limit
E - Value above quantitation range
H - Holding times exceeded
I - Associated internal standard was outside method criteria
J - Analyte detected below quantitation limits
M - Manual Integration used to determine area response
ND - Not Detected at the Reporting Limit
R - RPD outside accepted recovery limits
S - Spike Recovery outside recovery limits
T - TIC(Tentatively identified compound)
X - Value exceeds Maximum Contaminant Level

Teklab, Inc.
Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050428
Report Date: 28-May-24

Cooler Receipt Temp: 3.5 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050428
Client Project: CWLP Borings
Report Date: 28-May-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050428
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050428-001
Client Sample ID: L5 19.5-21.5
Matrix: SOLID
Collection Date: 05/03/2024 8:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	31	50		**67**	mg/L	5	05/15/2024 13:32	R347372
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10		**0.36**	mg/L	1	05/13/2024 9:06	R347147
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**6**	mg/L	1	05/14/2024 20:03	R347274
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.14**		1	05/07/2024 10:21	R346852
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0276**	mg/L	1	05/15/2024 12:27	222893
Barium	NELAP	0.0150	0.0450		**0.574**	mg/L	1	05/15/2024 12:27	222893
Beryllium	NELAP	0.0002	0.0010		**0.0049**	mg/L	1	05/15/2024 12:27	222893
Boron	NELAP	0.250	1.00		**2.32**	mg/L	1	05/21/2024 8:27	223096
Cadmium	NELAP	0.0005	0.0020		**0.149**	mg/L	1	05/15/2024 12:27	222893
Chromium	NELAP	0.0034	0.010	J	**0.0082**	mg/L	1	05/15/2024 12:27	222893
Cobalt	NELAP	0.0020	0.0060		**0.0218**	mg/L	1	05/15/2024 12:27	222893
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/15/2024 12:27	222893
Molybdenum	NELAP	0.0037	0.010	J	**0.0081**	mg/L	1	05/15/2024 12:27	222893
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/15/2024 12:27	222893
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0072**	mg/L	5	05/16/2024 18:27	222893
Lithium	*	0.0015	0.0030		**0.0153**	mg/L	5	05/16/2024 18:27	222893
Thallium	NELAP	0.0010	0.0020		**0.0199**	mg/L	5	05/16/2024 18:27	222893
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/18/2024 12:42	222892
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**0.0331**	mg/L	1	05/17/2024 17:00	222963
Barium	NELAP	0.0150	0.0450		**0.0596**	mg/L	1	05/17/2024 17:00	222963
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/17/2024 17:00	222963
Boron	NELAP	0.250	1.00		**1.05**	mg/L	1	05/17/2024 17:00	222963
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/17/2024 17:00	222963
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/17/2024 17:00	222963
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/17/2024 17:00	222963
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/17/2024 17:00	222963
Molybdenum	NELAP	0.0037	0.010	J	**0.0076**	mg/L	1	05/17/2024 17:00	222963
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/17/2024 17:00	222963
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0067**	mg/L	5	05/17/2024 9:22	222963
Lithium	*	0.0015	0.0030	J	**0.0027**	mg/L	5	05/16/2024 14:37	222963
Thallium	NELAP	0.0010	0.0020		**< 0.0020**	mg/L	5	05/16/2024 14:37	222963
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 14:08	222116
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050428
Client Project: CWLP Borings
Report Date: 28-May-24
Lab ID: 24050428-002
Client Sample ID: L5 32.5-35.2
Matrix: SOLID
Collection Date: 05/03/2024 9:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
ASTM D3987, SW-846 9036, IN SHAKE EXTRACT (TOTAL)									
Sulfate, SHAKE	*	31	50		**73**	mg/L	5	05/15/2024 13:35	R347372
ASTM D3987, SW-846 9214, IN SHAKE EXTRACT									
Fluoride	*	0.04	0.10	J	**0.08**	mg/L	1	05/13/2024 9:11	R347147
ASTM D3987, SW-846 9251, IN SHAKE EXTRACT									
Chloride, SHAKE	*	1	4		**11**	mg/L	1	05/14/2024 20:11	R347274
SW-846 9045C									
pH (1:1)	NELAP	0	1.00		**8.27**		1	05/07/2024 10:22	R346852
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/17/2024 17:06	222894
Barium	NELAP	0.0150	0.0450		**1.24**	mg/L	1	05/15/2024 12:38	222894
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/15/2024 12:38	222894
Boron	NELAP	0.250	1.00		**2.79**	mg/L	1	05/20/2024 9:22	223102
Cadmium	NELAP	0.0005	0.0020		**0.0022**	mg/L	1	05/15/2024 12:38	222894
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/15/2024 12:38	222894
Cobalt	NELAP	0.0020	0.0060	J	**0.0043**	mg/L	1	05/15/2024 12:38	222894
Lead	NELAP	0.0045	0.0075		**< 0.0075**	mg/L	1	05/15/2024 12:38	222894
Molybdenum	NELAP	0.0037	0.0100		**0.0375**	mg/L	1	05/15/2024 12:38	222894
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/15/2024 12:38	222894
SW-846 1311, 3010A, 6020A, METALS IN TCLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0004	0.0010		**0.0017**	mg/L	5	05/16/2024 18:07	222894
Lithium	*	0.0015	0.0030		**0.0183**	mg/L	5	05/16/2024 18:07	222894
Thallium	NELAP	0.0010	0.0020		**0.0021**	mg/L	5	05/16/2024 18:07	222894
SW-846 1311, 7470A IN TCLP EXTRACT									
Mercury	NELAP	0.00010	0.00020		**< 0.00020**	mg/L	1	05/18/2024 13:19	222895
SW-846 1312, 3005A, 6010B, METALS IN SPLP EXTRACT BY ICP									
Arsenic	NELAP	0.0087	0.0100		**< 0.0100**	mg/L	1	05/17/2024 17:02	222963
Barium	NELAP	0.015	0.045	J	**0.023**	mg/L	1	05/17/2024 17:02	222963
Beryllium	NELAP	0.0002	0.0010		**< 0.0010**	mg/L	1	05/17/2024 17:02	222963
Boron	NELAP	0.250	1.00		**2.15**	mg/L	1	05/17/2024 17:02	222963
Cadmium	NELAP	0.0005	0.0020		**< 0.0020**	mg/L	1	05/17/2024 17:02	222963
Chromium	NELAP	0.0034	0.0100		**< 0.0100**	mg/L	1	05/17/2024 17:02	222963
Cobalt	NELAP	0.0020	0.0060		**< 0.0060**	mg/L	1	05/17/2024 17:02	222963
Lead	NELAP	0.0040	0.0075		**< 0.0075**	mg/L	1	05/17/2024 17:02	222963
Molybdenum	NELAP	0.0037	0.0100		**0.0904**	mg/L	1	05/17/2024 17:02	222963
Selenium	NELAP	0.0170	0.0500		**< 0.0500**	mg/L	1	05/17/2024 17:02	222963
SW-846 1312, 3005A, 6020A, METALS IN SPLP EXTRACT BY ICPMS									
Antimony	NELAP	0.0005	0.0010		**0.0025**	mg/L	5	05/16/2024 14:21	222963
Lithium	*	0.0015	0.0030		**0.0033**	mg/L	5	05/16/2024 14:21	222963
Thallium	NELAP	0.0010	0.0020	J	**0.0019**	mg/L	5	05/16/2024 14:21	222963
SW-846 1312, 7470A IN SPLP EXTRACT									
Mercury	NELAP	0.00006	0.00020		**< 0.00020**	mg/L	1	05/18/2024 14:11	222116
EPA 903/904, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896
Radium-228	*	0	0		**See Attached**	pCi/Kg	1	05/22/2024 0:00	R347896

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050428
Report Date: 28-May-24

Carrier: Paul Reeves

Received By: NR

Completed by: Amber Dilallo
On: 06-May-24

Reviewed by: Ellie Hopkins
On: 06-May-24

Pages to follow: Chain of custody [1] Extra pages included [16]

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 3.5
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☐	No ☐	NA ☑	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

Samples requiring pH should be analyzed as soon as possible after collection. Samples submitted for pH analysis are analyzed as soon as practicable upon arrival at the laboratory. - amberdilallo - 5/6/2024 1:04:15 PM

Print PDF

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050424

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 3-5 °C CT6 #7
Preserved in: ☐ LAB ☐ FIELD
FOR LAB USE ONLY
LAB NOTES: TEKLAB

Courier

Client Comments:
TCLP & SPLP for all metals

email results to C. Grey and datamanagement@andrews-eng.com

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☐ No
Are these samples known to be hazardous? ☐ Yes ☐ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☐ Yes ☐ No

PROJECT NAME/NUMBER	SAMPLE COLLECTOR'S NAME
CWLP Borings	S. Van Hook

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	TCLP & SPLP Sb, As, Ba, Be	TCLP & SPLP B, Cd, Cr, Co, Pb, Se, Tl	TCLP & SPLP Li, Mo	TCLP & SPLP Hg	Neutral Leach Cl, F+, SO4	pH
24050424-001	LS 19.5 - 21.5	5/3/2024 8:30AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
002	LS 32.5 - 35.2	5/3/2024 9:00AM	Soil	2									✓	✓	✓	✓	✓	✓	✓
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															
			Soil	2															

Relinquished By	Date/Time	Received By	Date/Time
Steve Van Hook	5/3/2024 12:30pm	Paul Mix	5/6/24 0820
Paul Mix	5/6/24 1200	Mick Reed	5/6/24 1200

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

MR 5/6

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

May 28, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050428

Order No.: 24050795

Dear Shelly Hennessy:

Summit Environmental Technologies, Inc. received 2 sample(s) on 5/9/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC.
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **24050795**
Date: **5/28/2024**

CLIENT: TEKLAB Inc,
Project: 24050428

WorkOrder Narrative:
24050795: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, In
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-44
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **24050795**
Date: **5/28/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Workorder Sample Summary

WO#: **24050795**

28-May-24

CLIENT: TEKLAB Inc,
Project: 24050428

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050795-001	24050428-001		5/3/2024 8:30:00 AM	5/9/2024 11:40:00 AM	Solid
24050795-002	24050428-002		5/3/2024 9:00:00 AM	5/9/2024 11:40:00 AM	Solid

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC.
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **24050795**

28-May-24

Client: TEKLAB Inc,
Project: 24050428

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050795-001A	24050428-001	5/3/2024 8:30:00 AM	Solid	Percent Moisture by SM2540Mod			5/25/2024 3:45:00 PM
				Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM
24050795-002A	24050428-002	5/3/2024 9:00:00 AM		Percent Moisture by SM2540Mod			5/25/2024 3:45:00 PM
				Radium-226 Analysis (9315)		5/16/2024 11:10:22 AM	5/23/2024 10:51:41 AM
				Radium-228 Analysis (9320)		5/16/2024 11:10:22 AM	5/22/2024 3:06:59 PM

Original

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Analytical Report

(consolidated)

WO#: **24050795**

Date Reported: **5/28/2024**

CLIENT: TEKLAB Inc,

Collection Date: 5/3/2024 8:30:00 AM

Project: 24050428

Lab ID: 24050795-001

Matrix: SOLID

Client Sample ID: 24050428-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)				**SW9315**	**E903-904**		Analyst: **SMZ**
Radium-226	ND	1.66		pCi/g-dry	± 0.160	1	5/23/2024 10:51:41 AM
Yield	1.66			-dry		1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)				**SW9320**	**E903-904**		Analyst: **SMZ**
Radium-228	ND	3.31		pCi/g-dry	± 0.320	1	5/22/2024 3:06:59 PM
Yield	1.66			-dry		1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **24050795**

Date Reported: **5/28/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/3/2024 9:00:00 AM
Project: 24050428
Lab ID: 24050795-002
Matrix: SOLID
Client Sample ID: 24050428-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 ANALYSIS (9315)				**SW9315**	**E903-904**		Analyst: **SMZ**
Radium-226	ND	1.77		pCi/g-dry	± 0.0600	1	5/23/2024 10:51:41 AM
Yield	1.77			-dry		1	5/23/2024 10:51:41 AM
RADIUM-228 ANALYSIS (9320)				**SW9320**	**E903-904**		Analyst: **SMZ**
Radium-228	ND	3.55		pCi/g-dry	± 0.320	1	5/22/2024 3:06:59 PM
Yield	1.77			-dry		1	5/22/2024 3:06:59 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Website: http://www.settek.com

Analytical Report

(base report)

WO#: **24050795**

Date Reported: **5/28/2024**

CLIENT: TEKLAB Inc,
Matrix: SOLID
Lab ID: 24050795-001A
Project: 24050428
Client Sample ID 24050428-001

Tag Number:
Collection Date: 5/3/2024 8:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE BY SM2540MOD				**A2540B**		Analyst: **AAA**
Percent Moisture	39.6	0.500		%	1	5/25/2024 3:45:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Website: http://www.settek.com

Analytical Report

(base report)

WO#: **24050795**

Date Reported: **5/28/2024**

CLIENT: TEKLAB Inc,
Matrix: SOLID
Lab ID: 24050795-002A
Project: 24050428
Client Sample ID 24050428-002

Tag Number:
Collection Date: 5/3/2024 9:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE BY SM2540MOD				**A2540B**		Analyst: **AAA**
Percent Moisture	43.6	0.500		%	1	5/25/2024 3:45:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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QC SUMMARY REPORT

WO#: **24050795**
28-May-24

Client: TEKLAB Inc,
Project: 24050428 **BatchID:** **75515**

Sample ID: **MB-75515**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **PBS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	2.00									
Yield	1.00										

Sample ID: **LCS-75515**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043899**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.62	2.00	5.000	0	72.4	50	130				

Sample ID: **LCSD-75515**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/g**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **LCSS02**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043900**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.01	2.00	5.000	0	60.2	50	130	3.620	18.4	20	

Sample ID: **24041932-001ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/g-dry**	Prep Date: **5/16/2024**	RunNo: **186135**
Client ID: **BatchQC**	Batch ID: **75515**	TestNo: **SW9320**	**E903-904**	Analysis Date: **5/22/2024**	SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050795**
28-May-24

Client: TEKLAB Inc,
Project: 24050428 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186135**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9320** **E903-904** Analysis Date: **5/22/2024** SeqNo: **5043905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	10.4	2.34	11.68	0	88.9	0	0	7.583	31.2	20	RS
Yield	1.17							1.168	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050795**
28-May-24

Client: TEKLAB Inc,
Project: 24050428 **BatchID:** **75515**

Sample ID: **MB-75515** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **PBS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044082**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-75515** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.20	1.00	5.000	0	124	70	130				

Sample ID: **LCSD-75515** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/g** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **LCSS02** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.76	1.00	5.000	0	115	60	140	6.200	7.36	40	

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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QC SUMMARY REPORT

WO#: **24050795**
28-May-24

Client: TEKLAB Inc,
Project: 24050428 **BatchID:** **75515**

Sample ID: **24041932-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/g-dry** Prep Date: **5/16/2024** RunNo: **186145**
Client ID: **BatchQC** Batch ID: **75515** TestNo: **SW9315** **E903-904** Analysis Date: **5/23/2024** SeqNo: **5044089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	7.61	1.17						8.133	6.68	20	
Yield	1.17							1.168	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050795**

28-May-24

Client: TEKLAB Inc,
Project: 24050428 **BatchID:** **R186329**

Sample ID: **MB-R186329**	SampType: **MBLK**	TestCode: **PctMoist_S(2**	Units: **%**	Prep Date:	RunNo: **186329**
Client ID: **PBS**	Batch ID: **R186329**	TestNo: **A2540B**		Analysis Date: **5/25/2024**	SeqNo: **5049039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	ND	0.500									

Sample ID: **24051805-006ADUP**	SampType: **DUP**	TestCode: **PctMoist_S(2**	Units: **%**	Prep Date:	RunNo: **186329**
Client ID: **BatchQC**	Batch ID: **R186329**	TestNo: **A2540B**		Analysis Date: **5/25/2024**	SeqNo: **5049048**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.8	0.500						17.37	2.41	5	

Sample ID: **24051777-003ADUP**	SampType: **DUP**	TestCode: **PctMoist_S(2**	Units: **%**	Prep Date:	RunNo: **186329**
Client ID: **BatchQC**	Batch ID: **R186329**	TestNo: **A2540B**		Analysis Date: **5/25/2024**	SeqNo: **5049058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	7.92	0.500						7.909	0.187	5	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Pg ___ of ___ 24050795

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

18.4-0.2 = 18.2

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: 18.2 Sampler: Client QC Level: 2

Fedex, Cooler

Project# 24050428

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36234 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228		CPM									
	24050428-001	5/3/24 0830	Unpres	Soil	✔		32									
	24050428-002	5/3/24 0900	Unpres	Soil	✔		22									
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												

*Relinquished By	Date/Time	Received By	Date/Time
Omar Rivera	5/6/24 1700		5/9/24, 1140

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights,

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

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Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050795 RcptNo: 1

Logged by:	Tegan A. Richards	5/9/2024 11:40:00 AM	Tegan Richards
Completed By:	Tegan A. Richards	5/10/2024 12:25:27 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	5/10/2024 5:06:15 PM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
   No. Seal Date: Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	18.2	Good	Not Present			

Shallow Borehole Grab Sample Analyses

Teklab, Inc.
Environmental Laboratory

http://www.teklabinc.com/

May 29, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050236

Dear Eric Staley:

TEKLAB, INC received 4 samples on 5/2/2024 1:11:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050236
Report Date: 29-May-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	11
Chain of Custody	Appended

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power **Work Order:** 24050236

Client Project: CWLP Borings **Report Date:** 29-May-24

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Teklab, Inc.
Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050236
Report Date: 29-May-24

Cooler Receipt Temp: 5.9 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24
Lab ID: 24050236-001
Client Sample ID: D-2 20ft.
Matrix: GROUNDWATER
Collection Date: 04/29/2024 9:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**1720**	mg/L	50	05/09/2024 11:05	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**9.27**		1	05/03/2024 10:33	R346719
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.21**	mg/L	1	05/09/2024 12:19	R347045
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**236**	mg/L	10	05/07/2024 18:33	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.022	0.050	J	**0.024**	mg/L	250	05/10/2024 14:10	222410
Arsenic	NELAP	0.0200	0.0500		**0.279**	mg/L	250	05/10/2024 14:10	222410
Barium	NELAP	0.0350	0.0500		**1.13**	mg/L	250	05/10/2024 14:10	222410
Beryllium	NELAP	0.0125	0.0500		**0.0640**	mg/L	250	05/10/2024 14:10	222410
Boron	NELAP	0.462	1.25		**89.0**	mg/L	250	05/10/2024 14:10	222410
Cadmium	NELAP	0.0075	0.0500		**0.0541**	mg/L	250	05/13/2024 13:49	222410
Chromium	NELAP	0.0350	0.0750		**0.902**	mg/L	250	05/10/2024 14:10	222410
Cobalt	NELAP	0.0058	0.0500		**0.0579**	mg/L	250	05/13/2024 13:49	222410
Lead	NELAP	0.0300	0.0500		**0.199**	mg/L	250	05/10/2024 14:10	222410
Lithium	*	0.0725	0.150		**0.154**	mg/L	250	05/10/2024 14:10	222410
Molybdenum	NELAP	0.0300	0.0750		**8.04**	mg/L	250	05/15/2024 3:31	222410
Selenium	NELAP	0.0300	0.0500		**< 0.0500**	mg/L	250	05/10/2024 14:10	222410
Thallium	NELAP	0.048	0.10	J	**0.049**	mg/L	250	05/10/2024 14:10	222410
Elevated reporting limit due to matrix interference.									
Contamination present in the CCB for Sb. Sample results below the reporting limit are reportable per the TNI Standard.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00046**	mg/L	1	05/24/2024 12:57	223373
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24
Lab ID: 24050236-002
Client Sample ID: D-1 25ft.
Matrix: GROUNDWATER
Collection Date: 04/29/2024 15:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**1740**	mg/L	50	05/09/2024 11:08	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**9.85**		1	05/03/2024 10:34	R346719
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.32**	mg/L	1	05/09/2024 12:22	R347045
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**63**	mg/L	10	05/07/2024 18:41	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.060	0.10	J	**0.061**	mg/L	500	05/10/2024 13:02	222414
Arsenic	NELAP	0.0400	0.100		**1.17**	mg/L	500	05/10/2024 13:02	222414
Barium	NELAP	0.0700	0.100		**2.48**	mg/L	500	05/10/2024 13:02	222414
Beryllium	NELAP	0.0250	0.100		**0.254**	mg/L	500	05/10/2024 13:02	222414
Boron	NELAP	0.925	2.50		**78.6**	mg/L	500	05/10/2024 13:02	222414
Cadmium	NELAP	0.0150	0.100		**0.222**	mg/L	500	05/13/2024 17:43	222414
Chromium	NELAP	0.0700	0.150		**3.91**	mg/L	500	05/10/2024 13:02	222414
Cobalt	NELAP	0.0115	0.100		**0.241**	mg/L	500	05/13/2024 17:43	222414
Lead	NELAP	0.0600	0.100		**1.04**	mg/L	500	05/10/2024 13:02	222414
Lithium	*	0.145	0.300		**0.428**	mg/L	500	05/10/2024 13:02	222414
Molybdenum	NELAP	0.0600	0.150		**15.7**	mg/L	500	05/15/2024 5:53	222414
Selenium	NELAP	0.060	0.10	J	**0.10**	mg/L	500	05/10/2024 13:02	222414
Thallium	NELAP	0.095	0.20	J	**0.13**	mg/L	500	05/10/2024 13:02	222414
Elevated reporting limit due to matrix interference.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00562**	mg/L	1	05/14/2024 17:39	222568
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24
Lab ID: 24050236-003
Client Sample ID: D-3 20ft.
Matrix: GROUNDWATER
Collection Date: 04/30/2024 10:00

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**1000**	mg/L	50	05/09/2024 11:13	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**10.1**		1	05/03/2024 10:36	R346719
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.33**	mg/L	1	05/09/2024 12:23	R347045
SW-846 9251 (TOTAL)									
Chloride	NELAP	1	4		**41**	mg/L	1	05/07/2024 18:43	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.0650	0.100		**0.230**	mg/L	500	05/10/2024 10:39	222461
Arsenic	NELAP	0.0800	0.200		**2.33**	mg/L	1000	05/10/2024 9:43	222461
Barium	NELAP	0.0700	0.100		**3.51**	mg/L	500	05/10/2024 10:39	222461
Beryllium	NELAP	0.0250	0.100		**0.439**	mg/L	500	05/10/2024 10:39	222461
Boron	NELAP	0.925	2.50		**105**	mg/L	500	05/10/2024 10:39	222461
Cadmium	NELAP	0.0300	0.200		**0.492**	mg/L	1000	05/14/2024 15:24	222461
Chromium	NELAP	0.140	0.300		**6.25**	mg/L	1000	05/10/2024 9:43	222461
Cobalt	NELAP	0.0230	0.200		**0.323**	mg/L	1000	05/10/2024 9:43	222461
Lead	NELAP	0.0600	0.100		**1.46**	mg/L	500	05/10/2024 10:39	222461
Lithium	*	0.145	0.300		**0.571**	mg/L	500	05/10/2024 10:39	222461
Molybdenum	NELAP	0.140	0.300		**2.61**	mg/L	1000	05/16/2024 7:35	222461
Selenium	NELAP	0.12	0.20	J	**0.13**	mg/L	1000	05/10/2024 9:43	222461
Thallium	NELAP	0.0950	0.200		**0.274**	mg/L	500	05/10/2024 10:39	222461
Elevated reporting limit due to matrix interference.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00055	0.00200	H	**0.00685**	mg/L	10	05/29/2024 12:19	223513
Sample required re-analysis out of hold time.									
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050236
Client Project: CWLP Borings
Report Date: 29-May-24
Lab ID: 24050236-004
Client Sample ID: D-4 20ft.
Matrix: GROUNDWATER
Collection Date: 04/30/2024 14:45

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**2050**	mg/L	50	05/09/2024 11:16	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**9.10**		1	05/03/2024 10:37	R346719
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.43**	mg/L	1	05/09/2024 12:25	R347045
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**139**	mg/L	10	05/07/2024 18:57	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.0180	0.0400		**0.0812**	mg/L	200	05/15/2024 10:35	222764
Arsenic	NELAP	0.0400	0.100		**0.378**	mg/L	500	05/15/2024 10:29	222764
Barium	NELAP	0.0350	0.0500		**0.975**	mg/L	250	05/16/2024 9:42	222764
Beryllium	NELAP	0.0002	0.0010		**0.0674**	mg/L	5	05/14/2024 23:46	222764
Boron	NELAP	0.462	1.25		**73.1**	mg/L	250	05/16/2024 9:42	222764
Cadmium	NELAP	0.015	0.10	J	**0.068**	mg/L	500	05/15/2024 10:29	222764
Chromium	NELAP	0.0700	0.150		**1.03**	mg/L	500	05/15/2024 10:29	222764
Cobalt	NELAP	0.012	0.10	J	**0.061**	mg/L	500	05/15/2024 10:29	222764
Lead	NELAP	0.0240	0.0400		**0.266**	mg/L	200	05/15/2024 10:35	222764
Lithium	*	0.0725	0.150		**0.228**	mg/L	250	05/16/2024 9:42	222764
Molybdenum	NELAP	0.0600	0.150		**2.30**	mg/L	500	05/15/2024 10:29	222764
Selenium	NELAP	0.060	0.10	J	**0.090**	mg/L	500	05/15/2024 10:29	222764
Thallium	NELAP	0.038	0.080	J	**0.066**	mg/L	200	05/15/2024 10:35	222764
Elevated reporting limit due to sample composition.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00717**	mg/L	1	05/14/2024 17:44	222568
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050236
Report Date: 29-May-24

Carrier: Paul Reeves

Received By: NR

Completed by: Amber Dilallo
On: 02-May-24

Reviewed by: Ellie Hopkins
On: 02-May-24

Pages to follow: Chain of custody 1 Extra pages included 18

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 5.9
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☐	No ☑		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☐	No ☑		
Reported field parameters measured:	Field ☐	Lab ☑	NA ☐	

Sample analyses to be measured in the field and/or within 15 minutes of collection were analyzed in the lab as soon as practicable. These analyses include Chlorine (demand, free and/or residual), Carbon Dioxide, Dissolved Oxygen, Ferrous Iron, pH, and Sulfite.

Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Any No responses must be detailed below or on the COC.

Samples were preserved with Nitric Acid (97606) upon arrival at the laboratory. - amberdilallo - 5/2/2024 3:15:00 PM

pH strip #96651. - amberdilallo - 5/2/2024 3:15:13 PM

D-1 25ft. labeled as collected at 1430 rather than 1500. Collen Grey was notified of this error via work order summary. - amberdilallo - 5/2/2024 3:15:45 PM

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050236

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 5.9 °C #7
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO3(97600) to all um 5/2 @ 14:30 on container (UNP) 96057

Client Comments:
email results to C. Grey and datamanagement@andrews-eng.com

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [ ] No
Are these samples known to be hazardous? [ ] Yes [ ] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [ ] Yes [ ] No

PROJECT NAME/NUMBER	SAMPLE COLLECTOR'S NAME
CWLP Borings	S. Van Hook

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	Sb, As, Ba, Be	B, Cd, Cr, Co, Pb, Se, Tl	Li, Mo	Hg	Cl, F+, SO4	pH
24050236-001	D-2 20ft.	4/29/24 9:30am	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
002	D-1 25 ft.	4/29/24 3pm*	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
003	D-3 20 ft.	4/30/24 10am	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
004	D-4 20ft.	4/30/24 2:45pm	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
Steven Van Hook	4/30/24 5:30pm	ASI Secure Storage	4/30/24 17:30
eurofins Custody Seal #1697609			
ASI Secure Storage cmg	5/2/24 7:40	Paul M Vt	5-2-24 0746
Paul M Vt	5-2-24 1311	Mark Reed	5/2/24 1311

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

May 22, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050236

Order No.: 24050483

Dear Shelly Hennessy:

Summit Environmental Technologies, Inc. received 4 sample(s) on 5/6/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

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Website: http://www.settek.com

Case Narrative

WO#: **24050483**
Date: **5/22/2024**

CLIENT: TEKLAB Inc,
Project: 24050236

WorkOrder Narrative:
24050483: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Sample Fraction:
Per Chain of Custody note: Analyze Aqueous layer only.

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Qualifiers and Acronyms

WO#: **24050483**
Date: **5/22/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **24050483**

22-May-24

CLIENT: TEKLAB Inc,
Project: 24050236

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050483-001	24050236-001		4/29/2024 9:30:00 AM	5/6/2024 10:00:00 AM	Non-Potable Water
24050483-002	24050236-002		4/29/2024 3:00:00 PM	5/6/2024 10:00:00 AM	Non-Potable Water
24050483-003	24050236-003		4/30/2024 10:00:00 AM	5/6/2024 10:00:00 AM	Non-Potable Water
24050483-004	24050236-004		4/30/2024 2:45:00 PM	5/6/2024 10:00:00 AM	Non-Potable Water

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DATES REPORT

WO#: **24050483**

22-May-24

Client: TEKLAB Inc,
Project: 24050236

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050483-001A	24050236-001	4/29/2024 9:30:00 AM	Non-Potable Water	Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM
24050483-002A	24050236-002	4/29/2024 3:00:00 PM		Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM
24050483-003A	24050236-003	4/30/2024 10:00:00 AM		Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM
24050483-004A	24050236-004	4/30/2024 2:45:00 PM		Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM

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Analytical Report

(consolidated)

WO#: **24050483**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,

Collection Date: 4/29/2024 9:30:00 AM

Project: 24050236

Lab ID: 24050483-001

Matrix: NON-POTABLE WATER

Client Sample ID: 24050236-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	4.63	1.67		pCi/L	± 0.590	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	2.18	1.67		pCi/L	± 0.800	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **24050483**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/29/2024 3:00:00 PM
Project: 24050236
Lab ID: 24050483-002
Matrix: NON-POTABLE WATER
Client Sample ID: 24050236-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	ND	1.43		pCi/L	± 0.250	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	ND	1.43		pCi/L	± 0.570	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **24050483**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 10:00:00 AM
Project: 24050236
Lab ID: 24050483-003
Matrix: NON-POTABLE WATER
Client Sample ID: 24050236-003

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	ND	2.50		pCi/L	± 0.470	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	ND	2.50		pCi/L	± 0.800	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **24050483**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,
Collection Date: 4/30/2024 2:45:00 PM

Project: 24050236

Lab ID: 24050483-004
Matrix: NON-POTABLE WATER

Client Sample ID: 24050236-004

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	ND	3.34		pCi/L	± 0.580	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	ND	3.34		pCi/L	± 1.24	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **24050495-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	30	R
Yield	1.00			0	0			1.000	0		

Sample ID: **24050495-002ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	30	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **MB-75217** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **PBW** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040004**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-75217** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **LCSW** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040005**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.36	1.00	5.000	0	67.2	50	130				QLR
Yield	1.00			0	0						

Sample ID: **LCSD-75217** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **LCSS02** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040006**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	5.00	1.00	5.000	0	100	50	130	3.360	39.2	20	R
Yield	0.960			0	0			1.000	4.08		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **RLC-75217**	SampType: **RLC**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185962**
Client ID: **BatchQC**	Batch ID: **75217**	TestNo: **E904.0**	**E903-904**	Analysis Date: **5/20/2024**	SeqNo: **5040008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	1.14	1.00	1.000	0	114	50	150				
Yield	1.00			0	0						

Sample ID: **RLCD-75217**	SampType: **RLC**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185962**
Client ID: **BatchQC**	Batch ID: **75217**	TestNo: **E904.0**	**E903-904**	Analysis Date: **5/20/2024**	SeqNo: **5040009**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00	1.000	0	87.0	50	150				
Yield	1.00			0	0						

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **24050495-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185975**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E903.0** **E903-904** Analysis Date: **5/21/2024** SeqNo: **5040150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	
Yield	1.00							1.000	0	0	

Sample ID: **24050495-002ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185975**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E903.0** **E903-904** Analysis Date: **5/21/2024** SeqNo: **5040152**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **MB-75217**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **PBW**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	0.980										

Sample ID: **LCS-75217**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **LCSW**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.38	1.00	5.000	0	87.6	70	130				

Sample ID: **LCSD-75217**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **LCSS02**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040145**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.67	1.00	5.000	0	93.4	70	130	4.380	6.41	20	

Sample ID: **RLC-75217**	SampType: **RLC**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **BatchQC**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040147**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050483**
22-May-24

Client: TEKLAB Inc,
Project: 24050236 **BatchID:** **75217**

Sample ID: **RLC-75217**	SampType: **RLC**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **BatchQC**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040147**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00	1.000	0	95.0	50	150				

Sample ID: **RLCD-75217**	SampType: **RLC**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **BatchQC**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040148**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00	1.000	0	99.0	50	150				

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Pg ___ of 24050483

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: 19.5 19.7 0.2 Sampler: Client QC Level: 2

Fedex, Cooler

Project# 24050236

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site. Analyze aqueous layers only.

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36223 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228												
						CDM					PH						
	24050236-001	4/29/24 0930	HNO3	Groundwater	✔	42, 22					1,3						
	24050236-002	4/29/24 1500	HNO3	Groundwater	✔	34, 88					1,2						
	24050236-003	4/30/24 1000	HNO3	Groundwater	✔	16, ~~3~~ TR 5/7/24					4,						
	24050236-004	4/30/24 1445	HNO3	Groundwater	✔	34, ~~32~~					4,5						
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													

*Relinquished By	Date/Time	Received By	Date/Time
Amber Villalpando	5/2/24 1700		5/6/24 1000

One container - 003 arrived broken

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws.. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

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Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050483 RcptNo: 1

Logged by:	Tegan A. Richards	5/6/2024 10:00:00 AM	Tegan Richards
Completed By:	Tegan A. Richards	5/7/2024 5:18:50 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	5/8/2024 10:44:21 AM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
   No. Seal Date: Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☐ No ☑
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☑ No ☐
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

18. Additional remarks:

pH for all but 2 containers >2, one container -003 received broken

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
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Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050483 RcptNo: 1

Teklab, Inc.
Environmental Laboratory
http://www.teklabinc.com/

May 23, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050347

Dear Eric Staley:

TEKLAB, INC received 3 samples on 5/3/2024 1:50:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	10
Chain of Custody	Appended

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power **Work Order:** 24050347

Client Project: CWLP Borings **Report Date:** 23-May-24

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24

Qualifiers

- Unknown hydrocarbon
B - Analyte detected in associated Method Blank
C - RL shown is a Client Requested Quantitation Limit
E - Value above quantitation range
H - Holding times exceeded
I - Associated internal standard was outside method criteria
J - Analyte detected below quantitation limits
M - Manual Integration used to determine area response
ND - Not Detected at the Reporting Limit
R - RPD outside accepted recovery limits
S - Spike Recovery outside recovery limits
T - TIC(Tentatively identified compound)
X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050347
Report Date: 23-May-24

Cooler Receipt Temp: 3.7 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24
Lab ID: 24050347-001
Client Sample ID: L4 18ft.
Matrix: GROUNDWATER
Collection Date: 05/02/2024 8:40

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**1050**	mg/L	50	05/09/2024 11:21	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**7.35**		1	05/06/2024 14:09	R346778
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**1.19**	mg/L	1	05/10/2024 14:31	R347102
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**154**	mg/L	10	05/07/2024 19:05	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.0004	0.0010		**0.0020**	mg/L	5	05/16/2024 10:42	222862
Arsenic	NELAP	0.0004	0.0010		**0.0512**	mg/L	5	05/08/2024 20:10	222470
Barium	NELAP	0.0008	0.0010		**0.308**	mg/L	5	05/08/2024 20:10	222470
Beryllium	NELAP	0.0002	0.0010		**0.0024**	mg/L	5	05/08/2024 20:10	222470
Boron	NELAP	0.0092	0.0250		**2.15**	mg/L	5	05/08/2024 20:10	222470
Cadmium	NELAP	0.0002	0.0010		**0.0019**	mg/L	5	05/14/2024 4:27	222470
Chromium	NELAP	0.0009	0.0015		**0.0632**	mg/L	5	05/08/2024 20:10	222470
Cobalt	NELAP	0.0002	0.0010		**0.0213**	mg/L	5	05/08/2024 20:10	222470
Lead	NELAP	0.0006	0.0010		**0.0526**	mg/L	5	05/15/2024 14:55	222862
Lithium	*	0.0015	0.0030		**0.0288**	mg/L	5	05/08/2024 20:10	222470
Molybdenum	NELAP	0.0006	0.0015		**0.0218**	mg/L	5	05/10/2024 18:38	222470
Selenium	NELAP	0.0006	0.0010		**0.0066**	mg/L	5	05/08/2024 20:10	222470
Thallium	NELAP	0.0010	0.0020	J	**0.0012**	mg/L	5	05/08/2024 20:10	222470
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00050**	mg/L	1	05/20/2024 14:24	223152
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24
Lab ID: 24050347-002
Client Sample ID: L3-20ft.
Matrix: GROUNDWATER
Collection Date: 05/02/2024 10:15

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	614	1000		**2660**	mg/L	100	05/10/2024 12:35	R347112
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**8.10**		1	05/06/2024 14:10	R346778
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**1.07**	mg/L	1	05/10/2024 10:26	R347102
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**269**	mg/L	10	05/07/2024 19:26	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.0180	0.0400	B	**0.0655**	mg/L	200	05/14/2024 15:36	222470
Arsenic	NELAP	0.0080	0.0200		**2.43**	mg/L	100	05/10/2024 19:03	222470
Barium	NELAP	0.0140	0.0200		**1.49**	mg/L	100	05/10/2024 19:03	222470
Beryllium	NELAP	0.0050	0.0200		**0.102**	mg/L	100	05/14/2024 4:33	222470
Boron	NELAP	0.370	1.00		**25.8**	mg/L	200	05/14/2024 15:36	222470
Cadmium	NELAP	0.0060	0.0400		**0.260**	mg/L	200	05/17/2024 13:03	222470
Chromium	NELAP	0.0280	0.0600		**2.08**	mg/L	200	05/17/2024 13:03	222470
Cobalt	NELAP	0.0046	0.0400		**0.336**	mg/L	200	05/17/2024 13:03	222470
Lead	NELAP	0.0120	0.0200	B	**3.40**	mg/L	100	05/10/2024 19:03	222470
Lithium	*	0.0290	0.0600		**0.621**	mg/L	100	05/14/2024 4:33	222470
Molybdenum	NELAP	0.0240	0.0600		**0.218**	mg/L	200	05/17/2024 13:03	222470
Selenium	NELAP	0.0120	0.0200		**0.158**	mg/L	100	05/10/2024 19:03	222470
Thallium	NELAP	0.0190	0.0400		**0.0433**	mg/L	100	05/10/2024 19:03	222470
Sample result for Sb exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.									
Sample result for Pb exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.									
SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00926**	mg/L	1	05/20/2024 15:07	223152
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050347
Client Project: CWLP Borings
Report Date: 23-May-24
Lab ID: 24050347-003
Client Sample ID: L1-20ft.
Matrix: GROUNDWATER
Collection Date: 05/02/2024 14:50

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	307	500		**1080**	mg/L	50	05/09/2024 11:29	R347057
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**7.86**		1	05/06/2024 14:12	R346778
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**0.50**	mg/L	1	05/10/2024 10:28	R347102
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**122**	mg/L	10	05/07/2024 19:34	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.018	0.040	BJ	**0.027**	mg/L	200	05/14/2024 15:42	222470
Arsenic	NELAP	0.0080	0.0200		**0.717**	mg/L	100	05/10/2024 19:09	222470
Barium	NELAP	0.0140	0.0200		**3.48**	mg/L	100	05/10/2024 19:09	222470
Beryllium	NELAP	0.0050	0.0200		**0.0542**	mg/L	100	05/14/2024 4:39	222470
Boron	NELAP	0.370	1.00		**4.91**	mg/L	200	05/14/2024 15:42	222470
Cadmium	NELAP	0.0060	0.0400		**0.0776**	mg/L	200	05/14/2024 15:42	222470
Chromium	NELAP	0.0280	0.0600		**0.993**	mg/L	200	05/14/2024 15:42	222470
Cobalt	NELAP	0.0046	0.0400		**0.154**	mg/L	200	05/14/2024 15:42	222470
Lead	NELAP	0.0120	0.0200	B	**0.655**	mg/L	100	05/10/2024 19:09	222470
Lithium	*	0.0290	0.0600		**0.172**	mg/L	100	05/14/2024 4:39	222470
Molybdenum	NELAP	0.0120	0.0300		**0.161**	mg/L	100	05/17/2024 12:28	222470
Selenium	NELAP	0.0120	0.0200		**0.0906**	mg/L	100	05/10/2024 19:09	222470
Thallium	NELAP	0.0190	0.0400		**< 0.0400**	mg/L	100	05/10/2024 19:09	222470

Elevated reporting limit for Sb & Tl due to matrix interference.
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.
Sample result for Pb exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.

SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00198**	mg/L	1	05/20/2024 15:09	223152
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715
Radium-228	*	0	0		**See Attached**	pci/L	1	05/20/2024 0:00	R347715

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050347
Report Date: 23-May-24

Carrier: Paul Reeves

Received By: LM

Completed by: Amber Dilallo
On: 03-May-24

Reviewed by: Ellie Hopkins
On: 03-May-24

Pages to follow: Chain of custody 1 Extra pages included 15

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	3.7	
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐	
Chain of custody present?	Yes ☑	No ☐				
Chain of custody signed when relinquished and received?	Yes ☑	No ☐				
Chain of custody agrees with sample labels?	Yes ☑	No ☐				
Samples in proper container/bottle?	Yes ☑	No ☐				
Sample containers intact?	Yes ☑	No ☐				
Sufficient sample volume for indicated test?	Yes ☑	No ☐				
All samples received within holding time?	Yes ☐	No ☑				
Reported field parameters measured:	Field ☐	Lab ☑	NA ☐			

Sample analyses to be measured in the field and/or within 15 minutes of collection were analyzed in the lab as soon as practicable. These analyses include Chlorine (demand, free and/or residual), Carbon Dioxide, Dissolved Oxygen, Ferrous Iron, pH, and Sulfite.

Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

pH strip #96651. - amberdilallo - 5/3/2024 2:40:59 PM

Samples were preserved with Nitric Acid (97606) upon arrival at the laboratory. - amberdilallo - 5/3/2024 2:47:30 PM

Print PDF

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050347

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 3.7 °C
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO_3 (97606) 96651

Client Comments:
email results to C. Grey and datamanagement@andrews-eng.com

TEKLAB
Courier

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [ ] No
Are these samples known to be hazardous? [ ] Yes [ ] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [ ] Yes [ ] No

PROJECT NAME/NUMBER	SAMPLE COLLECTOR'S NAME
CWLP Borings	S. Van Hook

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	Sb, As, Ba, Be	B, Cd, Cr, Co, Pb, Se, Tl	Li, Mo	Hg	Cl, F+, SO4	pH
24050347-001	L4 18ft.	5/2/24 8:40am	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
002	L3-20ft	5/2/24 10:15am	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
003	L1-20ft	5/2/24 2:50pm	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														

Relinquished By	Date/Time	Received By	Date/Time
S. Van Hook	5/2/24 7:00pm	AEI Secure Storage	5/2/24 19:00
AEI Secure Storage	5/3/24 07:28	[illegible]	5.3.24 0728
[illegible]	5.3.24 1350	[illegible]	5/3/24 1350

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

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Website: http://www.settek.com

May 22, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050347

Order No.: 24050485

Dear Shelly Hennessy:

Summit Environmental Technologies, Inc. received 3 sample(s) on 5/7/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

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Case Narrative

WO#: **24050485**
Date: **5/22/2024**

CLIENT: TEKLAB Inc,
Project: 24050347

WorkOrder Narrative:
24050485: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence QC Notes:
LCS/LCSD-75217 Radium-228_DW(904.0): LCS and LCSD exhibited a high RPD, individually each LCS/LCSD meets the required criteria.

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Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **24050485**
Date: **5/22/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **24050485**

22-May-24

CLIENT: TEKLAB Inc,
Project: 24050347

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050485-001	24050347-001		5/2/2024 8:40:00 AM	5/7/2024 11:30:00 AM	Non-Potable Water
24050485-002	24050347-002		5/2/2024 10:15:00 AM	5/7/2024 11:30:00 AM	Non-Potable Water
24050485-003	24050347-003		5/2/2024 2:50:00 PM	5/7/2024 11:30:00 AM	Non-Potable Water

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DATES REPORT

WO#: **24050485**

22-May-24

Client: TEKLAB Inc,
Project: 24050347

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050485-001A	24050347-001	5/2/2024 8:40:00 AM	Non-Potable Water	Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM
24050485-002A	24050347-002	5/2/2024 10:15:00 AM		Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM
24050485-003A	24050347-003	5/2/2024 2:50:00 PM		Radium-226 (EPA 903.0)		5/9/2024 12:47:56 PM	5/21/2024 10:28:00 AM
				Radium-228 (EPA 904.0)		5/9/2024 12:47:56 PM	5/20/2024 3:04:00 PM

Original

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Analytical Report

(consolidated)

WO#: **24050485**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 8:40:00 AM

Project: 24050347

Lab ID: 24050485-001
Matrix: NON-POTABLE WATER

Client Sample ID: 24050347-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	ND	1.00		pCi/L	± 0.170	1	5/21/2024 10:28:00 AM
Yield	0.980					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	1.05	1.00		pCi/L	± 0.400	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **24050485**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,

Collection Date: 5/2/2024 10:15:00 AM

Project: 24050347

Lab ID: 24050485-002

Matrix: NON-POTABLE WATER

Client Sample ID: 24050347-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	2.50	2.00		pCi/L	± 0.480	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	ND	2.00		pCi/L	± 0.720	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **24050485**

Date Reported: **5/22/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/2/2024 2:50:00 PM
Project: 24050347
Lab ID: 24050485-003
Matrix: NON-POTABLE WATER
Client Sample ID: 24050347-003

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **DHF**
Radium-226	ND	1.25		pCi/L	± 0.230	1	5/21/2024 10:28:00 AM
Yield	1.00					1	5/21/2024 10:28:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **DHF**
Radium-228	ND	1.25		pCi/L	± 0.380	1	5/20/2024 3:04:00 PM
Yield	1.00					1	5/20/2024 3:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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QC SUMMARY REPORT

WO#: **24050485**
22-May-24

Client: TEKLAB Inc,
Project: 24050347 **BatchID:** **75217**

Sample ID: **24050495-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	30	R
Yield	1.00			0	0			1.000	0		

Sample ID: **24050495-002ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	30	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050485**
22-May-24

Client: TEKLAB Inc,
Project: 24050347 **BatchID:** **75217**

Sample ID: **MB-75217** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **PBW** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040004**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-75217** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **LCSW** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040005**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.36	1.00	5.000	0	67.2	50	130				QLR
Yield	1.00			0	0						

Sample ID: **LCSD-75217** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185962**
Client ID: **LCSS02** Batch ID: **75217** TestNo: **E904.0** **E903-904** Analysis Date: **5/20/2024** SeqNo: **5040006**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	5.00	1.00	5.000	0	100	50	130	3.360	39.2	20	R
Yield	0.960			0	0			1.000	4.08		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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QC SUMMARY REPORT

WO#: **24050485**
22-May-24

Client: TEKLAB Inc,
Project: 24050347 **BatchID:** **75217**

Sample ID: **24050495-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185975**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E903.0** **E903-904** Analysis Date: **5/21/2024** SeqNo: **5040150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	
Yield	1.00							1.000	0	0	

Sample ID: **24050495-002ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **5/9/2024** RunNo: **185975**
Client ID: **BatchQC** Batch ID: **75217** TestNo: **E903.0** **E903-904** Analysis Date: **5/21/2024** SeqNo: **5040152**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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QC SUMMARY REPORT

WO#: **24050485**
22-May-24

Client: TEKLAB Inc,
Project: 24050347 **BatchID:** **75217**

Sample ID: **MB-75217**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **PBW**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	0.980										

Sample ID: **LCS-75217**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **LCSW**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.38	1.00	5.000	0	87.6	70	130				

Sample ID: **LCSD-75217**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **5/9/2024**	RunNo: **185975**
Client ID: **LCSS02**	Batch ID: **75217**	TestNo: **E903.0**	**E903-904**	Analysis Date: **5/21/2024**	SeqNo: **5040145**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.67	1.00	5.000	0	93.4	70	130	4.380	6.41	20	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Pg ___ of ___

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Client QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Project# 24050347

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36229 Phone: (618) 344-1004 ext. 43

24050485

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228	COM	pH									
	24050347-001	05/02/2024 0840	HNO3	Groundwater	✔	32	4									
	24050347-002	05/02/2024 1015	HNO3	Groundwater	✔	20	7.7									
	24050347-003	05/02/2024 1450	HNO3	Groundwater	✔	20	5									
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												

*Relinquished By	Date/Time	Received By	Date/Time
	5/3/24		
		5/7/24 1130 FedEx ground cooler, no ice 19.9-0.2=19.7	

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights.

SubCocRevA

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050485 RcptNo: 1

Logged by:	Christina N. Gemma	5/7/2024 11:30:00 AM	C. Gemma
Completed By:	Christina N. Gemma	5/7/2024 5:22:56 PM	C. Gemma
Reviewed By:	Jennifer Woolf	5/8/2024 10:54:58 AM	Jennifer Woolf

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	FedEx		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date: Signed By:			
5.	Was an attempt made to cool the samples?	Yes ☐	No ☑	NA ☐
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☑	No ☐	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

pH received >2, one of two containers of 003 received broken (no volume remains).

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050485 RcptNo: 1

Teklab, Inc.
Environmental Laboratory

http://www.teklabinc.com/

June 18, 2024

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: CWLP Borings **WorkOrder:** 24050429

Dear Eric Staley:

TEKLAB, INC received 1 sample on 5/6/2024 12:00:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050429
Report Date: 18-Jun-24

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	8
Chain of Custody	Appended

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power **Work Order:** 24050429

Client Project: CWLP Borings **Report Date:** 18-Jun-24

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050429
Client Project: CWLP Borings
Report Date: 18-Jun-24

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Teklab, Inc.
Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050429
Report Date: 18-Jun-24

Cooler Receipt Temp: 3.5 °C

Radium-226 and Radium-228 analysis was performed by Summit Environmental Technologies, Inc. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Accreditations

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050429
Client Project: CWLP Borings
Report Date: 18-Jun-24

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2025	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2025	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2025	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	UST	0073		1/31/2025	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 24050429
Client Project: CWLP Borings
Report Date: 18-Jun-24
Lab ID: 24050429-001
Client Sample ID: L5 20ft.
Matrix: GROUNDWATER
Collection Date: 05/03/2024 8:30

Analyses	Certification	MDL	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 9036 (TOTAL)									
Sulfate	NELAP	614	1000		**2620**	mg/L	100	05/10/2024 12:38	R347112
SW-846 9040B, LABORATORY ANALYZED									
Lab pH	NELAP	0	1.00	H	**7.62**		1	05/07/2024 13:01	R346852
SW-846 9214 (TOTAL)									
Fluoride	NELAP	0.04	0.10		**1.32**	mg/L	1	05/10/2024 11:43	R347102
SW-846 9251 (TOTAL)									
Chloride	NELAP	5	40		**202**	mg/L	10	05/07/2024 19:42	R346935
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)									
Antimony	NELAP	0.0450	0.100	B	**< 0.100**	mg/L	500	05/14/2024 4:45	222636
Arsenic	NELAP	0.0400	0.100		**2.58**	mg/L	500	05/14/2024 4:45	222636
Barium	NELAP	0.0350	0.0500		**1.60**	mg/L	250	05/14/2024 4:51	222636
Beryllium	NELAP	0.0125	0.0500		**0.0911**	mg/L	250	05/14/2024 4:51	222636
Boron	NELAP	0.925	2.50		**28.9**	mg/L	500	05/14/2024 15:30	222636
Cadmium	*	0.0150	0.100		**0.296**	mg/L	500	05/14/2024 4:45	222636
Chromium	NELAP	0.0750	0.150		**1.81**	mg/L	500	05/14/2024 4:45	222636
Cobalt	NELAP	0.0115	0.100		**0.296**	mg/L	500	05/14/2024 4:45	222636
Lead	NELAP	0.0300	0.0500		**2.78**	mg/L	250	05/14/2024 4:51	222636
Lithium	*	0.145	0.300		**0.613**	mg/L	500	05/14/2024 15:30	222636
Molybdenum	NELAP	0.0600	0.150		**0.282**	mg/L	500	05/14/2024 4:45	222636
Selenium	NELAP	0.0600	0.100		**0.205**	mg/L	500	05/14/2024 4:45	222636
Thallium	NELAP	0.0475	0.100		**< 0.100**	mg/L	250	05/14/2024 4:51	222636

Sample result for Sb exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.
LCS recovered outside upper control limits. Sample results are below the reporting limit. Data is reportable per the TNI Standard.

SW-846 7470A (TOTAL)									
Mercury	NELAP	0.00006	0.00020		**0.00559**	mg/L	1	05/15/2024 15:55	222725
EPA 903.0/904.0, RADIUM 226/228									
Radium-226	*	0	0		**See Attached**	pci/L	1	06/13/2024 0:00	R348957
Radium-228	*	0	0		**See Attached**	pci/L	1	06/13/2024 0:00	R348957

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: CWLP Borings

Work Order: 24050429
Report Date: 18-Jun-24

Carrier: Paul Reeves

Received By: NR

Completed by: Amber Dilallo
On: 06-May-24

Reviewed by: Ellie Hopkins
On: 06-May-24

Pages to follow: Chain of custody [1] Extra pages included [15]

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	3.5	
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐	
Chain of custody present?	Yes ☑	No ☐				
Chain of custody signed when relinquished and received?	Yes ☑	No ☐				
Chain of custody agrees with sample labels?	Yes ☑	No ☐				
Samples in proper container/bottle?	Yes ☑	No ☐				
Sample containers intact?	Yes ☑	No ☐				
Sufficient sample volume for indicated test?	Yes ☑	No ☐				
All samples received within holding time?	Yes ☐	No ☑				
Reported field parameters measured:	Field ☐	Lab ☑	NA ☐			

Sample analyses to be measured in the field and/or within 15 minutes of collection were analyzed in the lab as soon as practicable. These analyses include Chlorine (demand, free and/or residual), Carbon Dioxide, Dissolved Oxygen, Ferrous Iron, pH, and Sulfite.

Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

Sample was preserved with Nitric Acid (97606) upon arrival at the laboratory. - amberdilallo - 5/6/2024 1:07:35 PM

pH strip #96651. - amberdilallo - 5/6/2024 1:07:37 PM

Print PDF

CHAIN OF CUSTODY

Pg __ of __ Workorder # 24050429

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City, Water, Light & Power
Address: 3100 Stevenson Dr.
City/State/Zip: Springfield, IL 62712
Contact: Colleen Grey Phone: 217-787-2334
Email: cgrey@andrews-eng.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 3-5 °C LTG#7
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO3 (pH < 2) pH ✓ 9 vials. SM 5/6/24

TEKLAB

Client Comments: Courier
email results to C. Grey and datamanagement@andrews-eng.com

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [ ] No
Are these samples known to be hazardous? [ ] Yes [ ] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [ ] Yes [ ] No

PROJECT NAME/NUMBER	SAMPLE COLLECTOR'S NAME
CWLP Borings	S. Van Hook

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Rad 226 and 228	Sb, As, Ba, Be	B, Cd, Cr, Co, Pb, Se, Tl	Li, Mo	Hg	Cl, F+, SO4	pH
24050429-001	LS 20ft.	5/3/24 8:30AM	Groundwater	3	1								✓	✓	✓	✓	✓	✓	✓
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														
			Groundwater	3	1														

Relinquished By	Date/Time	Received By	Date/Time
Steve Van Fallmont, IL	5/3/2024 12:30 pm	Paul Mont IL	5.6.24 0820
	5.6.24 1200	Mitch Reed	5/6/24 1200

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

MC 5/6

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

June 18, 2024

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 24050429

Dear Shelly Hennessy:

Order No.: 24050786

Summit Environmental Technologies, Inc. received 1 sample(s) on 5/9/2024 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC.
Analytical Laboratories

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **24050786**
Date: **6/18/2024**

CLIENT: TEKLAB Inc,
Project: 24050429

WorkOrder Narrative:
24050786: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC
Analytical Laboratories

Summit Environmental Technologies, In
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-44
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **24050786**
Date: **6/18/2024**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **24050786**

18-Jun-24

CLIENT: TEKLAB Inc,
Project: 24050429

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
24050786-001	24050429-001		5/3/2024 8:30:00 AM	5/9/2024 11:40:00 AM	Non-Potable Water

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DATES REPORT

WO#: **24050786**

18-Jun-24

Client: TEKLAB Inc,
Project: 24050429

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
24050786-001A	24050429-001	5/3/2024 8:30:00 AM	Non-Potable Water	Radium-226 (EPA 903.0)		6/10/2024 3:03:24 PM	6/14/2024 11:38:39 AM
				Radium-226 (EPA 903.0)		5/29/2024 12:23:00 PM	6/5/2024 10:01:00 AM
				Radium-228 (EPA 904.0)		6/10/2024 3:03:24 PM	6/13/2024 2:27:54 PM
				Radium-228 (EPA 904.0)		5/29/2024 12:23:00 PM	6/4/2024 2:54:00 PM

Original

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Analytical Report

(consolidated)

WO#: **24050786**

Date Reported: **6/18/2024**

CLIENT: TEKLAB Inc,
Collection Date: 5/3/2024 8:30:00 AM
Project: 24050429
Lab ID: 24050786-001
Matrix: NON-POTABLE WATER
Client Sample ID: 24050429-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SMZ**
Radium-226	12.3	5.00	*	pCi/L	± 1.15	1	6/14/2024 11:38:39 AM
Yield	1.00					1	6/14/2024 11:38:39 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SMZ**
Radium-228	5.44	5.00	*	pCi/L	± 3.56	1	6/13/2024 2:27:54 PM
Yield	0.580					1	6/13/2024 2:27:54 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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QC SUMMARY REPORT

WO#: **24050786**
18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **MB-75975** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **PBW** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-75975** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **LCSW** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081627**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.51	1.00	5.000	0	70.2	50	130				
Yield	1.00			0	0						

Sample ID: **LCSD-75975** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **LCSS02** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.55	1.00	5.000	0	71.0	50	130	3.510	1.13	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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QC SUMMARY REPORT

WO#: **24050786**
18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **RLC-75975** SampType: **RLC** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081630**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	1.97	1.00	1.000	0	197	50	150				S

Sample ID: **RLCD-75975** SampType: **RLC** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081631**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00	1.000	0	0	50	150				S

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050786**

18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **24060255-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187502**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E904.0** **E903-904** Analysis Date: **6/13/2024** SeqNo: **5081633**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **24050786**
18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **MB-75975** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **PBW** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-75975** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **LCSW** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081732**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.85	1.00	5.000	0	97.0	70	130				

Sample ID: **LCSD-75975** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **LCSS02** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081733**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.36	1.00	5.000	0	107	70	130	4.850	9.99	20	

Sample ID: **RLC-75975** SampType: **RLC** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081735**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded
PL	Permit Limit
S	Spike Recovery outside accepted recovery limits
M	Manual Integration used to determine area response
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
ND	Not Detected
RL	Reporting Detection Limit

Original

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QC SUMMARY REPORT

WO#: **24050786**
18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **RLC-75975**	SampType: **RLC**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **6/10/2024**	RunNo: **187509**
Client ID: **BatchQC**	Batch ID: **75975**	TestNo: **E903.0**	**E903-904**	Analysis Date: **6/14/2024**	SeqNo: **5081735**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	1.10	1.00	1.000	0	110	50	150				

Sample ID: **RLCD-75975**	SampType: **RLC**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **6/10/2024**	RunNo: **187509**
Client ID: **BatchQC**	Batch ID: **75975**	TestNo: **E903.0**	**E903-904**	Analysis Date: **6/14/2024**	SeqNo: **5081736**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	1.07	1.00	1.000	0	107	50	150				

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **24050786**

18-Jun-24

Client: TEKLAB Inc,
Project: 24050429 **BatchID:** **75975**

Sample ID: **24060255-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081738**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **24060255-002ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **6/10/2024** RunNo: **187509**
Client ID: **BatchQC** Batch ID: **75975** TestNo: **E903.0** **E903-904** Analysis Date: **6/14/2024** SeqNo: **5081740**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

240507866

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

18.4-0.2= Cooler Temp: 18.2 Sampler: Client QC Level: 2

Fedex, cooler

Project# 24050429

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 36235 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228											
							cpm				pH					
	24050429-001	5/3/24 0830	Unpres	Groundwater	✔		32.40				1.1					
			Unpres	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												
			Other	Aqueous												

*Relinquished By	Date/Time	Received By	Date/Time
Umbe. Ovalle	5/4/24 1200		5/9/24, 1140

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

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Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050786 RcptNo: 1

Logged by:	Tegan A. Richards	5/9/2024 11:40:00 AM	Tegan Richards
Completed By:	Tegan A. Richards	5/10/2024 12:21:48 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	5/10/2024 2:48:57 PM	Jennifer Woolf

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☐	No ☑	Not Present ☐
2.	How was the sample delivered?	FedEx		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☑	NA ☐
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Containers are preserved, CoC states unpreserved

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

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Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 24050786 RcptNo: 1

APPENDIX C

Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures

(September 2024)

City Water, Light & Power
Coal Combustion Residuals Surface Impoundments
Springfield, Sangamon County, Illinois

Hydrogeologic Report, Groundwater Monitoring Program and Statistical Procedures

September 2024

Prepared for:
City Water, Light & Power
201 E. Lake Shore Drive
Springfield, Illinois

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

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1. INTRODUCTION

City Water, Light and Power (CWLP) owns two (2) existing coal combustion residual (CCR) surface impoundments and intends to comply with the rules promulgated by the Illinois Environmental Protection Agency (IEPA) pertaining to Disposal of CCR from Electric Utilities published in 35 Ill. Adm. Code Part 845 on April 21, 2021 in R20-19.

1.1 Site Description

The CWLP CCR surface impoundments are located north and east of the former Lakeside Power Generating Station and Dallman Power Generating Station in the Eastern ½ of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1). These CCR surface impoundments are identified as the Lakeside Ash Pond and the Dallman Ash Pond (see Figure 2).

The former Lakeside Power Generating Station and Dallman Power Generating Station are situated on the northwestern bank of Lake Springfield in Springfield, Illinois. The Lakeside Ash Pond is immediately north of Spaulding Dam at the northern end of Lake Springfield. The Dallman Ash Pond is immediately northwest of the Lakeside Ash Pond.

1.2 Regulations

The two (2) CCR surface impoundments are regulated by Illinois EPA CCR rule 35 Ill. Adm. Code 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments. As indicated above, the hydrogeologic site characterization, groundwater monitoring and statistical procedures requirements of Illinois EPA CCR rules 35 Ill. Adm. Code 845 Subpart F apply to both impoundments.

This Hydrogeologic Report and Groundwater Monitoring Program was prepared to meet the hydrogeologic site characterization, groundwater monitoring and statistical procedures requirements of the Illinois EPA CCR surface impoundment rules 35 Ill. Adm. Code 845 Subpart F.

This document is subject to periodic revision as circumstances and/or new regulations dictate. A qualified professional engineer must approve revisions to this groundwater monitoring program and statistical procedures before placed in effect. The current version of the groundwater monitoring program and statistical procedures shall be kept in the Operating Records for use by CWLP and subcontractor personnel.

1.3 Site Development

Sugar Creek historically meandered across the site, generally from the west to east with an overall flow direction to the north (see Figure 3). During the construction of the ash ponds, the creek was abandoned and relocated to the west of the site. The old creek bed was filled with different types of soil, ranging from cohesive soils characterized as silty clays, to granular fill characterized as poorly graded silty to clayey sands.

Placed into service prior to 1958, the Lakeside Ash Pond is primarily a diked embankment. The Lakeside Ash Pond consists of four separate ponds (i.e., three ponds formerly used for storage of lime sludge and the settling pond) totaling approximately 35 acres. The three lime sludge ponds were taken out of service in September 2023 with the completion of the construction of the new lime sludge-processing area. The Lakeside Ash Pond ceased receiving ash in 2009.

The Dallman Ash Pond was placed into service in approximately 1976 and is also a diked embankment. The Dallman Ash Pond is approximately 34.5 acres and ceased receiving ash in 2021. As of October 13, 2023, all CCR and non-CCR waste streams ceased flowing into the Lakeside Ash Pond and Dallman Ash Pond.

The most recent change made to the CCR surface impoundments was a vertical expansion to the Lakeside Ash Pond system completed in 1988. The vertical expansion consisted of berms built on top and inside of the existing embankments in such a way that the toe of the outer slope of the expansion berms matches up with the top of the inner slope of the existing embankments, also known as upstream construction. The vertical expansion berms are approximately ten feet in height.

2. SITE GEOLOGY

Subsurface conditions of the area in and surrounding the CCR surface impoundments have been characterized pursuant to Section § 845.620 through multiple subsurface investigations, including the hydrogeologic investigation at the permitted Subtitle D CCR landfill located north of the Lakeside Ash Pond and immediately adjacent to the east of the Dallman Ash Pond. These investigations were as follows:

- Professional Service Industries (PSI), June 1989. This investigation consisted of five soil borings within the east section of the south cell (Cell 1).
- Andrews Environmental Engineering, Inc., February 1990. This investigation was performed for Cell 2 and consisted of 13 soil borings. The drilling and testing were completed by PSI.
- Andrews Environmental Engineering, Inc., March 1990. This investigation was performed to install six wells at the Facility. The drilling and testing were completed by PSI.

- Patrick Engineering, Inc. (PEI), July 1992. This investigation was performed to further characterize the hydrogeology of the landfill setting. Approximately 44 soil borings and piezometers were installed by PEI.
- Stabilize, Inc. (SI), December 2008. This investigation installed three new monitoring wells as part of an assessment program for the landfill. The drilling, soil testing, and well construction were performed by Reynolds Well Drilling.
- City Water, Light and Power (CWLP), April 2010. This investigation was performed to install four piezometers on the west side of the CCR surface impoundments along Sugar Creek. The drilling and testing were completed by PSI.
- Stabilize, Inc. (SI), May 2011. This investigation installed four new monitoring wells to further the characterization of the CCR surface impoundments. The drilling, soil testing, and well construction were performed by PSI.
- Andrews Engineering, Inc., January 2012. This investigation was performed to replace CCR surface impoundment wells and install an additional background well. The drilling and well installation were completed by TerraDrill.
- Andrews Engineering, Inc., July 2017. This project included drilling peripheral to the Dallman Ash Pond.
- Andrews Engineering, Inc., June 2019. This investigation advanced 7 direct push borings peripheral to the Dallman Ash Pond and included the installation 2 new monitoring wells as part of an assessment program for the CCR ash impoundments.
- Andrews Engineering, Inc., October 2023. This investigation consisted of 34 borings adjacent to and within Dallman and Lakeside Ash Ponds and 4 next to Landfill Unit 1 to investigate the CCR ash surface impoundment berm construction materials, as well as the installation of 29 vibrating wire piezometers to characterize the stability of the containment berms.
- Andrews Engineering, Inc., February 2024. This investigation consisted of 14 borings using a cone penetrometer adjacent to and within Dallman and Lakeside Ash Ponds.
- Andrews Engineering, Inc., April and May 2024. This investigation consisted of a total of 14 borings. Five of these borings were advanced in hydraulically downgradient locations across Sugar Creek opposite of the CCR ash impoundments. Groundwater monitoring wells were installed at these locations for purposes of an alternate source demonstration and/or determination of the nature and extent of concentrations exceeding approved limits. Four borings were advanced within the limits of the Lakeside Ash Pond and four were advanced within the limits of the Dallman Ash Pond. Wells were installed in these borings to allow the collection of pore water at the base of each impoundment. Soil samples were obtained via Shelby tubes from each of the 8 impoundment borings and analyzed for vertical hydraulic conductivity, particle size (including hydrometer) and Atterberg limits. In addition, one boring was located immediately north of the Dallman Ash Pond, which was advanced to 110 feet below ground surface to characterize the permeability of bedrock formations below the CCR surface impoundments (§ 845.620(b)(13)).

The summary discussion below of the subsurface conditions is presented in context of Sections § 845.600-680. Emphasis is placed on characterizing the existing wells and hydrogeologic conditions of the uppermost aquifer and underlying confining aquitard. The uppermost aquifer is the required unit for groundwater quality monitoring under the CCR rule. Boring logs and well completion as part of the investigations outlined above are included as Appendix A.

The occurrence of the deposits discussed below is highly variable due to the meandering nature of Sugar Creek prior to the development of Lake Springfield and Spaulding Dam. The meandering creek has resulted in sequential erosion and deposition (scour and fill) throughout much of the creek drainage system, both laterally and vertically.

During the October 2023 and the April and May 2024 geotechnical investigation, undisturbed soil samples were collected by the use of Shelby tubes and packer testing of the bedrock deposits was completed. These samples were submitted to a geotechnical laboratory for testing of the following parameters:

- Moisture Content (%)
- Wet density (PCF)
- Dry density (PCF)
- Torvane (TSF)
- Gradation less than 200 (%)
- Silt/Clay (%)
- Atterberg (%, LL/PL)
- Vertical Hydraulic Conductivity (cm/sec); and
- USCS Visual Description

Appendix B contains a table summarizing the geotechnical laboratory test results and copies of the geotechnical laboratory liquid and plastic limits test reports, particle size distribution reports, and permeability test reports. The packer test data are provided in Appendix C. The geotechnical and packer test results are discussed below where applicable.

In addition to the results of geotechnical testing, data gathered from the recent investigations have been used to construct geologic cross-sections for the site. The geologic cross-sections depict the vertical and lateral extent of the hydrologically significant unconsolidated surficial and bedrock deposits present at the site. The geologic cross-sections are included in Appendix D and described where applicable below.

2.1 Uppermost Bedrock

The bedrock at the project site consists of Pennsylvanian shales, which are gray in color. The bedrock surface elevation varies from approximately 490 feet mean sea level (msl) in the eastern

portion of Unit 2 (i.e., 1992 boring B-1) to approximately 554 feet msl southeast of Unit 1 landfill (i.e., 1992 boring B-14). Bedrock in the area of the CCR surface impoundments was encountered at approximately 500 feet msl. In general, the bedrock surface slopes from the east and west towards the center of the landfill area, which is representative of the historical Sugar Creek drainageway.

Rock Quality Designation (RQD) measurements were performed on all core samples taken from the landfill area. RQDs measured from core samples collected during this investigation range from 80 to 100 percent. The RQD values indicate that the bedrock is not highly fractured. Two in situ hydraulic conductivity tests were performed to determine the hydraulic conductivity of the upper portions of the bedrock. Test results indicate hydraulic conductivity values of 1.8×10^{-7} cm/sec and 1.3×10^{-6} cm/sec. This shows that the bedrock encountered at the project site contains low hydraulic conductivities.

Packer testing was performed on boring (B100). Located immediately north of the Dallman Ash Pond on the river terrace adjacent to Sugar Creek, boring B100 was advanced to 103.5 feet below ground surface (bgs) to comply with Section § 845.620(b)(13). Bedrock at this location was encountered at 32.3 feet bgs (500.7 feet msl). A summary sheet of the packer testing is provided in Appendix C. Packer testing was completed at seven intervals (i.e., 93 to 103.5 feet bgs, 82.5 to 93 feet bgs, 72 to 82.5 feet bgs, 61.5 to 72 feet bgs, and 51 to 61.5 feet bgs with the final two intervals overlapping 40.5 to 51 and 38.5 to 49 feet bgs). Test results indicate hydraulic conductivity below 482 feet msl is less than 1×10^{-9} cm/sec. The results for the intervals tested above 482 feet msl are invalid as a result of hydraulic fracturing of the bedrock and the resultant inability to establish a seal within the shallow bedrock portion of the borehole. The results confirm that bedrock below the weathered zone is relatively impermeable; however, the shallow weathered bedrock may have higher hydraulic conductivities and in direct hydraulic communication with the overlying basal sand such that the interface of the unconsolidated deposits and bedrock comprise the uppermost aquifer.

There is good correlation between the lithology of the rocks tested and the hydraulic conductivity values obtained. The upper bedrock beneath the impoundments is expected to exhibit the same characteristics as encountered at the landfill.

2.2 Surficial Deposits

The shallow stratigraphy and lithology at the CCR surface impoundments include approximately 20 to 50 feet of Pleistocene sediments, dependent upon location. In ascending order, these materials are identified as basal sand, lower cohesive deposit, shallow sand, upper cohesive deposit and fill material.

The overall tendency is for the finer-grained materials (clays, silty clays and silts) to overlie the coarser-grained materials (sands and gravels). This coarsening downward is present throughout much of the site. At the majority of the borehole locations, the coarser materials rest directly on top of the weathered bedrock surface. It is this coarser material, the basal sand, that is characterized as the uppermost aquifer.

2.2.1 Basal Sand

The basal sand generally overlies the bedrock surface and underlies the lower cohesive deposit and is the lowermost unconsolidated deposit. There are some pockets of very hard, fine-grained silty clay to clay overlying bedrock in a few areas. The basal sand is present above these pockets of clayey deposits, thought to be weathered bedrock.

The basal sand is a gray colored, poorly graded, silty to clayey fine sand to well graded sand with minor amounts of fine gravel. This unit was encountered in a medium dense to dense condition. Across the CWLP facility (includes the Dallman and Lakeside Ash Ponds), the top elevation of the basal sand varies from 491 to 513 feet msl and is as much as 12.3 feet thick; however; at some locations it is absent likely due to excessive erosion of the creek bottom. Along the downgradient (northern) edge of the Dallman Ash Pond area, the basal sand was found to range from 3 to 11.5 feet in thickness, and have an average thickness of 7.3 feet. The extent of the basal sand is depicted on the geologic cross-sections provided in Appendix D.

The basal sand generally consists of 0- to 34-percent gravel, 50- to 91-percent sand, and 6- to 44-percent silt/clay; and exhibits a horizontal hydraulic conductivity of ranging from 6.4 x 10^{-4} to 7.64 x 10^{-2} cm/sec. The geometric mean hydraulic conductivity is 6.75 x 10^{-3} cm/sec. The basal sand was saturated in all locations where it was encountered.

Geotechnical and slug test data for the basal sand is included in Appendix B. Geologic cross-sections have been prepared depicting the vertical and lateral extent of the basal sand with respect to the CCR ash impoundments (see Appendix D).

2.2.2 Lower Cohesive Deposit

The lower cohesive deposit overlies the basal sand and consists of brown, gray, and brownish gray silty clays, clayey silts, and clays, having very soft to stiff consistency. Across the CWLP facility, the lower cohesive deposit is as much as 22 feet thick with an average thickness of about 15 feet. However, along the downgradient (northern) edge of the Dallman Ash Pond the thickness of the lower cohesive deposit was found to range from 12.6 to 26.3 feet and have an average thickness of 19.4 feet. The deposit was not encountered in isolated areas along the abandoned creek possibly due to excessive erosion of the creek bottom in these areas. The bottom of the CCR surface impoundments rest directly on top of the lower cohesive deposit.

Where the shallow sand is present, it overlies the lower cohesive deposit. The lower cohesive deposit is generally underlain by the basal sand. However, within the abandoned creek area, the lower cohesive deposit was encountered directly below the creek fill. In some areas, the basal sand is not present and the lower cohesive deposit directly overlies the bedrock.

The lower cohesive deposit consists of 0-percent gravel, 5- to 48-percent sand, and 52- to 95-percent silt/clay; and has a relatively low hydraulic conductivity. The vertical hydraulic conductivity ranges from 1.3 x 10^{-8} to 1.8 x 10^{-6} cm/sec (triaxial permeameter). The horizontal hydraulic conductivity ranges from 4.9 x 10^{-5} to 7.6 x 10^{-5} cm/sec (field slug tests).

Geotechnical and slug test data for the lower cohesive deposit are included in Appendix B. Geologic cross-sections have been prepared depicting the vertical and lateral extent of the lower cohesive deposit with respect to the CCR ash impoundments (see Appendix D).

2.2.3 Shallow Sand

The shallow sand, where present, overlies the lower cohesive deposit and underlies the upper cohesive deposit. The unit consists of a brown to gray silty to clayey fine sand. It contains small lenses of silty clay and clayey silt. This unit is not continuous over the entire site. Where encountered, the thickness ranges from one to three feet. The shallow sand appears to be present beneath a small portion of the northeast corner of the Dallman Ash Pond (see geologic cross-sections in Appendix D). The shallow sand does not continuously underlay the CCR surface impoundment.

Laboratory tests performed on representative samples collected from the shallow sand unit during previous investigations indicate the shallow sand contains 0% gravel, 50% to 52% sand, and 48% to 50% silt/clay. Two landfill piezometers were screened in the shallow sand unit to obtain groundwater surface information and conduct field hydraulic conductivity tests. The hydraulic conductivity of this unit based on the slug test results ranges from 3.6 x 10^{-3} to 2.9 x 10^{-2} cm/sec.

Geotechnical and slug test data for the shallow sand encountered in a few of the borings advanced on the eastern portion of the site is included in Appendix B. Geologic cross-sections have been prepared depicting the vertical and lateral extent of the shallow sand with respect to the CCR ash impoundments (see Appendix D).

2.2.4 Upper Cohesive Deposit

The upper cohesive deposit has a relatively low hydraulic conductivity in the vertical direction as determined by laboratory triaxial hydraulic conductivity tests from borings taken from the landfill investigation and the more recent CCR impoundment investigations. The hydraulic conductivity values determined from the laboratory tests from the landfill investigation ranged from 1.6 x 10^{-8} cm/sec to 5.2 x 10^{-7} cm/sec. From the more recent investigation, the laboratory determined

hydraulic conductivity values ranged from 9.4 x 10^{-9} cm/sec to 8.24 x 10^{-6} cm/sec. The geometric mean of the combined hydraulic conductivity data is 3.29 x 10^{-7} cm/sec.

Geotechnical and slug test data for the upper cohesive deposit is included in Appendix B. Geologic cross-sections have been prepared depicting the vertical and lateral extent of the upper cohesive deposit with respect to the CCR ash impoundments (see Appendix D).

2.2.5 Undifferentiated Fill Material

Undifferentiated fill material (disturbed/backfill) has been used at various locations and depths beneath and adjacent to the CCR surface impoundments and the permitted FGDS disposal area. Historical operations have resulted in the use of fill material for both the infilling of the former Sugar Creek channel and for use as berm construction material.

Where used for infilling of the Sugar Creek channel, undifferentiated fill was placed at similar elevations as the basal sand. The undifferentiated fill, characterized as cohesive soils, was encountered in the borings advanced within the limits of the former Sugar Creek channel. The location of the former Sugar Creek channel is depicted on the August 13, 1976 Grading Plan drawing from Burns & McDonnell (Drawing Y29 – Rev. 4) (see Figure 3). Borings conducted along the abandoned creek locations indicate that the creek fill materials consist of variable soils ranging from silty clays to silty sands. In some areas, the cohesive fill materials extended down to the top of bedrock. Where encountered, the granular fill materials are typically poorly graded silty to clayey sands and contain organics or wood fragments. In some areas, the granular fill materials also extended down to the top of bedrock.

The undifferentiated fill material placed in the former creek channel and used to construct the berms contains 0-percent gravel, 1.4- to 48-percent sand, and 52- to 98-percent silt/clay. The vertical hydraulic conductivity of the undifferentiated fill placed in the former creek channels ranges from 7.6 x 10^{-8} cm/sec to 2.1 x 10^{-5} cm/sec. The granular fill materials contain 0- to 2-percent gravel, 55- to 65-percent sand and 33- to 45-percent silt/clay.

Based on one laboratory hydraulic conductivity test performed on a Shelby tube sample obtained from berm fill in 1992 and the 2023/2024 Shelby tubes collected from the most recent investigations, the hydraulic conductivity of the undifferentiated berm fill material ranges from 3.13 x 10^{-9} cm/sec to 2.1 x 10^{-6} cm/sec, with a geometric mean of 4.67 x 10^{-8} cm/sec.

The creek fill materials identified during the previous landfill investigations have an effect on the site hydrogeologic conditions. In some areas the till materials, consisting of either granular soils or organic silty clays, extend from existing grade to the bedrock surface and locally intersect each of the stratigraphic deposits. The upper and lower cohesive deposits are considered to act as

aquitards (where present) which restrict vertical flow into the water bearing units. The shale bedrock is considered to be an aquitard.

Fill materials encountered in the landfill borings range from silty clays and organic silty clays to silty sands and clayey sands. Potentiometric surface measurements from varying piezometers/wells indicate that groundwater movement within the creek fill materials is complicated because of the highly variable hydraulic characteristics of the fill materials and their random placement.

Four landfill piezometers were screened in the fill materials. Of these, one piezometer was installed into cohesive fill material and the other piezometers were installed in granular till materials. The hydraulic conductivity of the granular fill materials is based on one field test resulting in a value of 6.1 x 10^{-2} cm/sec. The hydraulic conductivity of the cohesive fill material ranged from 7.1 x 10^{-5} cm/sec to 1.1 x 10^{-4} cm/sec. These values represent the hydraulic conductivity in the horizontal direction.

Laboratory hydraulic conductivity test performed on landfill cohesive fill materials ranged from 3.3 x 10^{-8} cm/sec to 2.1 x 10^{-3} cm/sec. The higher hydraulic conductivity values are believed to be typical of soils which contain organic matter (e.g., wood fragments). The hydraulic conductivity values based on laboratory tests are generally considered to be representative of the coefficient of hydraulic conductivity in the vertical direction because of the sample configuration during testing. However, because of the randomness of the fill, it is more likely that the hydraulic conductivity is within the range of 10^{-5} to 10^{-4} cm/sec.

Geotechnical and slug test data for the undifferentiated fill is included in Appendix B. Geologic cross-sections have been prepared depicting the vertical and lateral extent of the undifferentiated fill with respect to the CCR ash impoundments (see Appendix D).

3. SITE HYDROGEOLOGY

The uppermost aquifer and underlying confining unit control groundwater movement and the potential for CCR impacted groundwater migration at the site. A description of the uppermost aquifer and the underlying confining unit follows:

3.1 Uppermost Aquifer

The uppermost aquifer is characterized as the basal sand overlying the shale bedrock. In some locations the creek fill materials, ranging from silty clays and organic silty clays to silty sands and clayey sands, were found to be in direct hydraulic communication with the basal sand that directly overlies the bedrock surface.

As indicated above, the hydraulic conductivity of the basal sand ranges from 6.4 x 10^{-4} to 7.64 x 10^{-2} cm/sec and has a geometric mean of 6.75 x 10^{-3}. The groundwater in the basal sand appears to be under confined, semi-confined, or unconfined conditions dependent upon location. The upper limit of the uppermost aquifer is dependent upon the seasonally fluctuating potentiometric surface. The potentiometric surface of the basal sand varies from approximately 570 feet msl at upgradient locations, south of the Lakeside Ash Pond, to approximately 523 feet msl at downgradient locations near Sugar Creek, north of the Dallman Ash Pond. As a result, the saturated thickness is variably dependent upon the location and the seasonal variation in the groundwater table. A summary table of groundwater elevations is provided as Table 1. Groundwater movement is described in Section 3.5. FGDS Landfill well G120 groundwater elevations and well construction were included in Table 1 and Table 2, respectively, to support the Darcy velocity calculation for the uppermost aquifer.

3.2 Lower Confining Unit

The uppermost bedrock at the project site is primarily Pennsylvanian age shale with isolated thin coal layers. The Pennsylvanian shale functions as a lower confining unit due to its low permeability and effective porosity. The lower confining unit represents a natural hydrogeologic barrier (i.e., aquitard) to the vertical movement of groundwater.

In situ hydraulic conductivity test (slug tests) indicate that the horizontal hydraulic conductivity for the weathered upper portion of bedrock ranges from 1.8 x 10^{-7} to 1.3 x 10^{-6} cm/sec. Straddle-packer testing was completed to test the deeper portions of bedrock. Straddle-packer testing uses two or more inflatable packers to isolate a section of borehole (the test interval) for testing horizontal hydraulic conductivity. The packer test results of the unweathered portions of bedrock indicate horizontal hydraulic conductivities less than 1 x 10^{-9} cm/sec. There appears to be good correlation between the rock lithology and the measured values of hydraulic conductivity. The bedrock will act as an aquitard and prevent the downward movement of groundwater.

3.3 Groundwater Classification

Pursuant to 35 Ill. Adm. Code, Part 620, groundwater in Illinois is designated as one of four classes. Based on the criteria provided in Part 620, the groundwater classifications for the geologic deposits at the facility include Class I and Class II. This in no way implies each of the geologic deposits meet the definition of an aquifer as presented in § 620.110.

Class I: Potable Resource Groundwater can be presently used as a source of potable water or could potentially be developed as a source of potable water. Specifically, it is defined (§ 620.210) as:

a) Groundwater located 10 feet or more below the land surface andwithin:
   1) The minimum setback zone of a well which serves as a potable water supply and to the bottom of such well;

2) Unconsolidated sand, gravel or sand and gravel which is 5 feet or more in thickness and that contains 12 percent or less of fines (i.e., fines which pass through a No. 200 sieve tested according to ASTM Standard Practice D2487-06, incorporated by reference at Section 620.125);

3) Sandstone which is 10 feet or more in thickness, or fractured carbonate which is 15 feet or more in thickness; or

4) Any geologic material which is capable of a:

A) Sustained groundwater yield, from up to a 12 inch borehole, of 150 gallons per day or more from a thickness of 15 feet or less; or Hydraulic conductivity of 1 x 10^{-4} cm/sec or greater using one of the following test methods or its equivalent:

i) Permeameter;

ii) Slug test; or

iii) Pump test.

b) Any groundwater which is determined by the Board pursuant to petition procedures set forth in Section 620.260, to be capable of potable use.

Class II: General Resource Groundwater (§ 620.220) is groundwater which is not readily available for use due to lower hydraulic conductivities, insufficient yield, quality or otherwise does not meet the definition of a Class I, III or IV groundwater.

Class III: General Resource Groundwater (§ 620.230) may contribute to varying ecological systems. Specifically it is defined as:

a) Groundwater that is determined by the Board, pursuant to the procedures set forth in Section § 620.260, to be:

1) Demonstrably unique (e.g., irreplaceable sources of groundwater) and suitable for application of a water quality standard more stringent than the otherwise applicable water quality standard specified in Subpart D; or

2) Vital for a particularly sensitive ecological system.

b) Groundwater that contributes to a dedicated nature preserve that is listed by the Agency …

Class IV groundwater is other groundwater as determined by 1) the natural characteristics of the groundwater, 2) designation as Class IV by the IEPA in a facility specific permit or other regulatory activity, 3) designation as Class IV by the Illinois Pollution Control Board, or 4) as a result of certain surface or underground mining activities. Specifically, it is defined (§ 620.240) as:

a) Groundwater within a zone of attenuation as provided in 35 Ill. Adm. Code 811 and 814;

b) Groundwater within a point of compliance as provided in 35 Ill. Adm. Code 724, but not to exceed a distance of 200 feet from a potential primary or secondary source.

c) Groundwater that naturally contains more than 10,000 mg/L of total dissolved solids;

d) Groundwater which has been designated by the Board as an exempt aquifer pursuant to 35 Ill. Adm. Code 730.104; or

e) Groundwater which underlies a potential primary or secondary source, in which contaminants may be present from a release, if the owner or operator of such source notifies the Agency in writing and the following conditions are met …

f) Groundwater which underlies a coal mine refuse disposal area not contained within an area from which overburden has been removed, a coal combustion waste disposal area at a surface coal mine authorized under Section 21(s) of the Act, or an impoundment that contains sludge, slurry, or precipitated process material at a coal preparation plant, in which contaminants may be present, if such area or impoundment was placed into operation after February 1, 1983, if the owner and operator notifies the Agency in writing, and if the following conditions are met …

g) Groundwater within a previously mined area, unless monitoring demonstrates that the groundwater is capable of consistently meeting the standards of Sections 620.410 or 620.420. If such capability is determined, groundwater within the previously mined area shall not be Class IV.

Pursuant to § 620.250, impaired groundwater may exist within a groundwater management zone established by the Illinois EPA. A groundwater management zone is defined as:

a) Within any class of groundwater, a groundwater management zone may be established as a three dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site:

   1) That is subject to a corrective action process approved by the Agency; or

   2) For which the owner or operator undertakes an adequate corrective action in a timely and appropriate manner and provides a written confirmation to the Agency. such confirmation must be provided in the form as prescribed by the Agency.

Based on laboratory soils analyses and field testing (slug tests) from wells and piezometers, the following groundwater classifications have been determined.

<u>Shallow Sand</u>

The hydraulic conductivities of the slug test results in wells screened in the shallow sand (3.6 x 10^{-3} to 2.9 x 10^{-2} cm/sec) is greater than 1x10^{-4} cm/sec as defined in § 620.210(a)(4)(B). Therefore, groundwater within the shallow sand deposit is considered Class I. However, due to the limited extent of the shallow sand, a sustained yield of 150 gallons per day over an extended period is questionable.

Upper Cohesive Soil

The hydraulic conductivities of triaxial permeameter test results in Shelby tube samples from the upper cohesive deposit range from 9.4 x 10^{-9} cm/sec to 8.24 x 10^{-6} cm/sec with a geometric mean of 3.29 x 10^{-7} cm/sec. The values are significantly less than 1x10^{-4} cm/sec as defined in § 620.210(a)(4)(B). Therefore, groundwater within the upper cohesive soils is considered Class II.

Lower Cohesive Soils

The vertical hydraulic conductivity ranges from 1.3 x 10^{-8} to 1.8 x 10^{-6} cm/sec (triaxial permeameter). The horizontal hydraulic conductivity ranges from 4.9 x 10^{-5} to 7.6 x 10^{-5} cm/sec (field slug tests) The values are significantly less than 1x10^{-4} cm/sec as defined in § 620.210(a)(4)(B). Therefore, groundwater within the lower cohesive soils is considered Class II.

Upper-Most Aquifer

As described in Section 3.1 above, the uppermost aquifer is characterized as the basal sand overlying the shale bedrock. In some locations the creek fill materials, ranging from silty clays and organic silty clays to silty sands and clayey sands, were found to be in direct hydraulic communication with the basal sand that directly overlies the bedrock surface.

As indicated above, the hydraulic conductivity of the basal sand ranges from 6.4 x 10^{-4} to 7.64 x 10^{-2} cm/sec and has a geometric mean of 6.75 x 10^{-3}. The referenced values are in exceedance of 1x10^{-4} cm/sec as defined in § 620.210(a)(4)(B). Therefore groundwater in the basal sand is defined as Class I groundwater.

Undifferentiated Soils

As stated in Section 2.2.5 above, development and construction activities at the facility created disturbed soils consisting of a composite of deposits underlying the site. As such, characteristics of the undifferentiated soils varied. However, slug test results from wells screened in the soils as well as laboratory testing of the hydraulic conductivities resulted in values less than 1x10^{-4} cm/sec. Four landfill piezometers were screened in the fill materials. Of these, one piezometer was installed into cohesive fill material and the other piezometers were installed in granular till materials. The hydraulic conductivity of the granular fill materials is based on one field test resulting in a value of 6.1 x 10^{-2} cm/sec. Laboratory hydraulic conductivity tests performed on fill materials ranged from 2.1 x 10^{-3} cm/sec to 3.3 x 10^{-8} cm/sec. The higher hydraulic conductivity values are believed to be typical of soils which contain organic matter (e.g., wood fragments). The hydraulic conductivity values based on laboratory tests are generally considered to be representative of the coefficient of hydraulic conductivity in the vertical direction because of the sample configuration during testing. Given that the majority of the hydraulic conductivities are less than 1x10^{-4} cm/sec, any groundwater present within the pore space of the material is considered Class II.

3.4 Surface Water

The nearest surface water bodies are Lake Springfield, located upgradient to the CCR surface impoundments, and Sugar Creek located adjacent to the western and northern perimeter of the CCR surface impoundments (see Appendix E).

- Lake Springfield
- Sugar Creek

3.4.1 Surface Water Intakes

There are two surface water intakes located near the CCR surface impoundments facility (see Appendix E). These intakes are identified as:

- Intake No. 52140 – Lake Springfield 1 Intake 2
- Intake No. 52141 – South Fork Horse Creek Intake

Both of these intakes are located along Lake Springfield and supply water to the Springfield public water supply system (IL1671200). These intakes are upgradient of the CCR surface impoundments and completely disassociated with the impoundments.

3.5 Community Water Supply Wells

A potable water well survey was completed in the vicinity of the Dallman and Lakeside Ash Ponds. The survey was conducted using the Illinois EPA's web-based Geographic Information System (GIS) database[1] in the Source Water Assessment Program (SWAP) for potable water wells downgradient of the CCR impoundments.

The Illinois EPA's SWAP GIS database system identifies community water supply wells and other potable wells (private, semi-private and non-community water supply wells) include data from the following sources:

- Illinois EPA, Division of Public Water Supplies;
- Illinois State Geological Survey (ISGS);
- Illinois State Water Survey; and
- Illinois Department of Public Health.

Based on groundwater elevation data from numerous monitoring wells and piezometers located between and adjacent to the CWLP CCR impoundments, groundwater movement in the vicinity of the CCR impoundments is generally from the south-southwest to the north-northeast, approximately paralleling the Sugar Creek basin. The search extended to the first water well encountered hydraulically downgradient of the impoundments, located near Illinois Route 29 at a

[1] (http://illinois-epa.maps.arcgis.com/apps/webappviewer/index.html?id=4d37a05f5ba441f1b30dab54ccb81fc8)

distance of approximately 3,400 feet. The results of the IEPA SWAP query are provided in Appendix E.

There is no reason to believe that potable wells exist within 2,500-feet of the CCR impoundments that were not identified as part of this potable water well survey.

3.6 Groundwater Movement

Groundwater movement is controlled by recharge along topographic highs and discharge along the original stream valley. The pre-surface impoundment flow direction in the uppermost aquifer was dominantly horizontal from the adjacent banks toward the natural convergence along Sugar Creek, which formerly drained the site. This was overall from south to north with local deviations. This dominant flow pattern persists under present day conditions but with localized variation introduced by the hydrologic discontinuity created upon construction of the CCR surface impoundments.

Existing wells at the site, including wells from the Flue Gas Desulfurization Systems (FGDS) Landfill, were used to derive groundwater surface maps. As shown, overall groundwater movement is from south to north (see Appendix F) with localized flow diverging from the CCR surface impoundments and converging on the undeveloped portion of the Unit 2 FGDS Landfill. The east perimeter of the Lakeside Ash Pond is largely upgradient, and the west side is largely downgradient where groundwater movement is perpendicular to the perimeter. Excavated areas within the landfill boundary act as a groundwater sink along the east side of the Dallman Ash Pond. Groundwater generally moves northward from the Dallman Ash Pond but also moves easterly towards the FGDS Landfill and westerly towards Sugar Creek.

As characterized above in the discussion of the basal sand, the hydraulic conductivity (K) of the basal sand (uppermost aquifer) ranges from 6.4 x 10^{-4} to 7.64 x 10^{-2} cm/sec. The geometric mean hydraulic conductivity is 6.75 x 10^{-3} cm/sec.

Well	**P-1D**	**P-3D**	**P-4**	**P-5D**	**P-6D**	**P-7D**
K, cm/sec	0.00084	0.012	0.0025	0.0044	0.034	0.0058
Well	**P-8D**	**P-9D**	**AP-4**	**AP-3**	**AP-2**	**AP-1**
K, cm/sec	0.026	0.00064	0.0764	0.023	0.0121	0.00115
			K, cm/sec (geom mean)			**0.00675**

The horizontal hydraulic gradient of the basal sand was calculated based on groundwater movement from the FGDS landfill well G120 to well RW-3. Using these wells, horizontal hydraulic gradients were calculated for eight consecutive quarterly measurements dating from second

quarter 2022 to first quarter 2024. As presented below, the horizontal hydraulic gradients within the basal sand ranges from 0.00825 to 0.0128. The average horizontal hydraulic gradient is 0.011.

Well	2nd Qtr 2022	3rd Qtr 2022	4th Qtr 2022	1st Qtr 2023	2nd Qtr 2023	3rd Qtr 2023	4th Qtr 2023	1st Qtr 2024
RW-3	530.3	529.72	528.71	530.2	530.76	528.51	527.71	530.4
G120	536.92	535.11	537.06	537.85	538.17	535.54	534.49	538.47
Hyd Grad RW-3 to G120	0.0128	0.0117	0.0113	0.0108	0.0104	0.0124	0.0101	0.00825
							i_{avg}	**0.011**

The effective porosity, as defined by Fetter (1980) is “the amount of interconnected pore space through which fluids can pass, expressed as a percent of bulk volume.” The effective porosity parameter is used to calculate the seepage velocity of a geologic unit. The specific yield or the “drainable water” approximates the effective porosity (Bear, 1972). The saturation water content of a soil, which is the total water drained by gravity from a saturated soil, provides a reasonable approximation of the effective porosity of a soil. The effective porosity of the basal sand is based on the saturation water content data of sand. The range provided is from 37 to 49 percent (Sharp-Hansen et al., 1990). A mean effective porosity value of 43 percent is assumed.

With the effective porosity (n_e), hydraulic conductivity (K) and hydraulic gradient (i) characterized, the Darcy equation may be used to determine the horizontal component of the average linear velocity of ground water. This will provide a good estimate of the time of travel for most soluble constituents in ground water and may be used to determine a sampling interval or frequency. Applying this equation to the values uppermost aquifer yields a groundwater velocity as follows:

$$v = \frac{(Ki)}{n_e} = \frac{(0.00675\frac{cm}{sec}.0.011)}{0.43} = 0.000173\ cm/\sec = 0.49\ ft/day$$

3.7 Designated Nature Preserves

The nearest designated nature preserve (DNP), as approved by the Illinois EPA Groundwater Section of the Bureau of Water pursuant to 35 Ill. Adm. Code 620.230 are the Thomas W and Elizabeth Moews Dore Seep, located approximately 100 miles north-northeast and Stemler Cave located approximately 100 miles south-southwest of the subject facility. Moews Dore Seep is situated in Putnam county (Section 34, T32N R2W 3PM), Hennepin Township, along the Illinois River bluffs about 1 mile west of State Route 26 and is a 26-acre seep and seep-related wetland community. It is within the Hennepin and Hopper Lakes Project area and it is the largest identified seep area in the Illinois River Section of the Upper Mississippi River and Illinois River Bottomlands. Stemler Cave in St. Clair county (Sections 12, 13 and 14, T1S R10W 3PM), Sugar Loaf Township, on the karst highlands approximately 2 miles east of Columbia, Illinois.

3.8 Underground Mines

Pursuant to 35 Ill. Adm. Code 845.620(b)(14) the initial permit application must include a map displaying any known underground mines beneath a CCR surface impoundment. Using the ISGS ILMINES GIS coverage[2] a map displaying the extent of underground mines within the limits of the CCR surface impoundments has been prepared. Included as Appendix E, the map shows the presence of an underground coal mine beneath the location of the Dallman Ash Pond. There are no underground mines located beneath the Lakeside Ash Pond.

It is noted from historical mine location maps that, during the period of 1901 to 1938, the Dallman Ash Pond was partially undermined, by various coal companies operating in the region, using the room and pillar panel method. Brewerton Coal Company operated the mine during the final year. The main shaft was located in what is now a commercial/residential area at the north end of Fox Bridge Road, off of Adlai Stevenson Drive (Section 11, T15N R5W 3PM, 650 FSL, 440 FWL). The Springfield (No.5) Coal was mined from a 5 to 6 foot thick seam at a depth of 235 feet (Bargh et al, 2009).

A Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments (Andrews Engineering, Inc., 2024) was prepared and submitted to further document the impact of the underground mining. As discussed in the geotechnical investigation report, the Illinois Mines Map appears to show areas of mined out coal beneath the Dallman Ash Pond. A 100-foot boring was conducted at the northwestern corner of Dallman Ash Pond. Within the 100-foot boring was approximately 32-1/2 feet of overburden with primarily shale and claystone bedrock. An Unstable Areas Demonstration has been conducted and is provided in the Geotechnical Investigation Report. The Unstable Areas Demonstration provides the breakthrough, pillar and floor failure analysis. These analyses resulted in factors of safety exceeding 1.5.

There is no evidence (i.e., subsidence, altered groundwater flow patterns, bedrock fracturing) that the presence of these underground mines have structurally compromised the Dallman Ash Pond or the Lakeside Ash Pond.

4. GROUNDWATER MONITORING SYSTEM

The regulation for Groundwater Monitoring System (GMS) is a performance standard (§ 845.630(a)), where the system must consist of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that: (1) accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit, and (2) accurately represent the quality of groundwater passing the

[2]https://prairie-research.maps.arcgis.com/apps/webappviewer

impoundment boundary of the CCR unit to monitor potential contaminant pathways in the uppermost aquifer.

Under § 845.630(b-c) the number, spacing, and depths of the groundwater monitoring wells have been determined based upon site-specific technical information to meet the rule's performance standard, including the subsurface conditions observed at the site as summarized in Section 2 of this document. This includes a characterization of the uppermost aquifer.

The monitoring well locations take into consideration the natural (pre-surface impoundment) and current convergence of groundwater flow paths. The wells are located as close as feasible to the downgradient CCR surface impoundments based on topography, surface impoundment construction, and operations. The existing monitor well network (number of wells, locations, and screen interval) was installed pursuant to recommendations of the Illinois EPA Bureau of Water. The network consists of ten monitor wells screening the silt, sand, and gravel at the bedrock interface. The direction of groundwater movement, as described above, is to the west-northwest; therefore, the northern and western boundaries of the impoundments will be downgradient, and the southern and eastern boundaries will be upgradient. The monitoring network includes two upgradient wells (wells AP-4 and AP-5) and eight downgradient wells (AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10, AP-14, and RW-3). The well locations are depicted in Figure 2. Table 2 provides a summary of well construction and the approximate screened intervals. Appendix A contains the boring logs and well completion reports. FGDS Landfill well G120 well construction was included in Table 2 to support the Darcy velocity calculation for the uppermost aquifer.

Pursuant to § 845.630(e), the monitoring wells are constructed in a manner that maintains the integrity of the monitoring well and borehole. All wells were installed pursuant to the Illinois Department of Public Health Water Well Construction Code (77 IAC 920) for monitoring well construction standards. All drilling and groundwater monitoring well construction was completed under the direct supervision of an Illinois Licensed Professional Geologist.

4.1 Background Monitoring Wells

Two (2) groundwater monitoring wells are representative of background (ambient) groundwater quality conditions of the uppermost aquifer. These wells are identified as AP-4 and AP-5. Background concentrations are chemical concentrations or parameter values that represent naturally-occurring groundwater and/or that has not been impacted by the surface impoundment or other facility activities.

Monitoring well AP-4 is located southwest of the CCR surface impoundments, along the eastern bank of Sugar Creek and immediately north of Lake Springfield dam. This location is downgradient of the former lime ponds, and upgradient to the Lakeside and Dallman CCR surface impoundments. The well screen elevation is approximately 494.9 to 504.9 feet msl at the surface

of the Pennsylvanian shale, screening the basal sand. This well is not upgradient of the subject CCR surface impoundments in a hydrologic sense but it is located on available CWLP property where it provides representative background groundwater quality, as allowed under § 845.630(a).

Monitoring well AP-5 is located upgradient, southeast of the CCR surface impoundments and in a topographically slightly higher location of the facility. The well screen elevation is approximately 554.44 to 563.78 feet msl. The screened section of AP-5 is also located at the top of Pennsylvanian shale and screened across the basal sand at this location. This well monitors the upgradient groundwater quality of the uppermost aquifer at this location.

Background concentrations for AP-4 and AP-5 were developed from samples collected for eight consecutive quarters, allowing the statistical method employed to account for seasonal/temporal variability. The chemical constituents include only those monitoring parameters listed in § 845.600(a)(1), total calcium and turbidity.

The background concentrations are statistically analyzed to establish site-specific upper confidence limits for each chemical or parameter. The statistical methodology utilized for derivation of the background concentrations is provided in Appendix G. The data, calculations and resulting background concentrations are provided in Appendix H. Laboratory analytical reports for the data used to calculate background are provided in Appendix I.

Results from the background wells (AP-4 and AP-5) will be continually evaluated. If the groundwater quality significantly changes, it will become necessary to revise the background concentrations. In such an event, the statistical method contained in Appendix G will be utilized for such revision. Details for any revision will be placed in the facility record.

4.2 Downgradient Monitoring Wells

Eight (8) groundwater wells allow monitoring of the downgradient groundwater quality conditions in the uppermost aquifer. These wells are identified as AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10, AP-14 and RW-3. The locations and depths of these wells accurately represent the quality of groundwater passing the impoundment boundaries of the CCR units and reasonably make possible the detection of geochemical changes in the uppermost aquifer. These groundwater monitoring wells are all screened at the top of the weathered bedrock surface. Monitoring wells AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10, AP-14, and RW-3 are located along the toe of the CCR surface impoundments and adjacent to Sugar Creek. Further details are listed below:

- AP-1R is screened from approximately 504.63 to 514.01 feet msl. The screened zone consists of sand and shallow weathered Pennsylvanian shale.
- AP-2A is screened from approximately 515.54 to 525.19 feet msl. The screened zone consists of clayey sand to sand and shallow weathered Pennsylvanian shale.

- AP-3 is screened from approximately 514.7 to 524.7 feet msl. The screened zone consists of clayey silt and shallow weathered Pennsylvanian shale.
- AP-6 is screened from approximately 498.87 to 508.64 feet msl. The screened zone consists of clayey sand and shallow weathered Pennsylvanian shale.
- AP-8 is screened from approximately 498.02 to 508.6 feet msl. The screened zone consists of silty clay, clayey silt and shallow weathered Pennsylvanian shale.
- AP-10 is screened from approximately 499.9 to 509.7 feet msl. The screened zone consists of silty clay and weathered Pennsylvanian shale.
- AP-14 is screened from approximately 509.75 to 519.45 feet msl. The screened zone consists of silty clay and coarse grained sand and shallow weathered Pennsylvanian shale.
- RW-3 is screened from approximately 496.32 to 506.32 feet msl. The screened zone consists of silt and silty sand overlying the surface of the Pennsylvanian shale.

In addition to the 8 downgradient wells, there are 10 temporary assessment wells (AP-7, AP-9, AP-11, AP-12, AP-13, T1, T2, T4, T5, and T6). These wells have been installed to evaluate rate and extent of exceedances of § 845.600(a)(1) groundwater quality standards. These borings were advanced at locations downgradient of the CCR surface impoundments and across Sugar Creek to permit the installation of temporary wells across the uppermost aquifer (i.e., the unconsolidated material/bedrock interface). These wells assist in further evaluating the groundwater quality pursuant to § 845.650(d).

- AP-7 is screened from approximately 497.76 to 507.46 feet msl. The screened zone consists of clayey sand overlying a clayey silt and shallow weathered Pennsylvanian shale.
- AP-9 is screened from approximately 502.24 to 512 feet msl. The screened zone consists of silty clay, clay, clayey silt, sand and gravel and weathered Pennsylvanian shale.
- AP-11 is screened from approximately 515.58 to 525.28 feet msl. The screened zone consists of silty clay, clayey sand, sand and gravel and weathered Pennsylvanian shale.
- AP-12 is screened from approximately 510.88 to 520.8 feet msl. The screened zone consists of sandy clay, clayey sand, sand and gravel and weathered Pennsylvanian shale.
- AP-13 is screened from approximately 511.47 to 522.08 feet msl. The screened zone consists of clayey silt, sand and gravel and weathered Pennsylvanian shale.
- T1 is screened from approximately 516.27 to 525.77 feet msl. The screened zone consists of silty clay, sand and gravel and weathered Pennsylvanian sandstone.
- T2 is screened from approximately 512.96 to 522.46 feet msl. The screened zone consists of silty clay and weathered Pennsylvanian shale.
- T4 is screened from approximately 521.94 to 531.43 feet msl. The screened zone consists of clayey silt, silty clay and weathered Pennsylvanian shale.
- T5 is screened from approximately 518.72 to 528.22 feet msl. The screened zone consists of sand, clayey silt and weathered Pennsylvanian shale.

- T6 is screened from approximately 494.2 to 503.92 feet msl. The screened zone consists of silt, silty sand and weathered Pennsylvanian shale.

4.3 Groundwater Sampling and Analysis Requirements

Pursuant to § 845.640(a), the Groundwater Monitoring Program includes consistent sampling and analysis procedures to provide accurate representation of groundwater quality. The activities include sample collection, preservation and shipment, analytical procedures, chain of custody, and quality assurance and quality control as outlined in the Groundwater Sampling and Analysis Procedures (Appendix J).

Pursuant to § 845.640(b), the groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure constituents and other monitoring parameters in groundwater samples. Groundwater is sampled for the constituents listed in § 845.600(a)(1), calcium and turbidity. The § 845.600(a)(1) constituents include antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chloride, fluoride, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, pH, selenium, sulfate, thallium, total dissolved solids, and radium 226 & 228 combined. The groundwater samples are not field filtered, the constituents are analyzed as total recoverable.

4.3.1 Sample Collection

Pursuant to § 845.640(c), groundwater levels will be measured in each monitoring well immediately prior to purging, and each time groundwater is sampled. Other wells may be retained as water level measurement points. Levels will be measured to the nearest 0.01 feet (1/100) and used to determine rate and direction of groundwater movement each time groundwater is sampled. In addition, a water table map/potentiometric surface map for the uppermost aquifer will be generated using the measured water levels obtained from each detection monitoring event. The contours on these maps will allow for a quantitative assessment of flow rate and direction. Measurements of well depths will also be obtained during each sampling event to verify that the wells are physically intact and not filling with sediment, except where such measurements are not possible due to the presence of dedicated sampling equipment in the well. In addition to the collection of groundwater elevation measurements at each of the groundwater monitoring well, surface water elevations in the adjacent surface water bodies will be collected each time groundwater elevations are measured. These surface water bodies include the following – Lake Springfield, Sugar Creek and the Clarification Pond. Historically, the Lakeside Ash Pond and the Dallman Ash Pond have exhibited the presence of surface water. However, as of October 13, 2023, all CCR and non-CCR waste streams ceased flowing into the Lakeside Ash Pond and Dallman Ash Pond and the surface water levels have significantly declined. At present, rainwater is the only water entering the CCR surface impoundments.

Most of the monitoring wells are equipped with dedicated, down-hole bladder pumps. For these wells an air compressor and air flow controller will be used to extract the groundwater samples at the slowest pumping rate achievable to keep drawdown at 0.3 feet or less. An in-line flow through cell will be connected to the bladder pump discharge tubing and will be used during the well purging process to measure field parameters (turbidity, temperature, pH, and specific conductance). Field measurements will be recorded on the sampling log and purging will continue until it is determined the field measurements have stabilized as indicated by three consecutive readings. Once stabilized, the flow through cell will be removed and sample collection will begin. Groundwater from the bladder pump discharge will be collected directly into laboratory provided bottles.

For wells without dedicated down-hole bladder pumps installed, the purging and sampling process will be completed with a peristaltic pump or other type of appropriate pump. Bailers may be used as necessary. All purging and sampling shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

With either type of sampling system, if a well were to become dry during the stabilization of the field parameters it will be allowed to recharge for 24-hours. After 24-hours, sample collection will begin without additional purging.

4.3.2 Equipment Decontamination

The only equipment anticipated to be used between wells is a water level indicator. The water level indicator will be rinsed with deionized water between wells, or cleaned with Alconox® or other equivalent solution and rinsed with deionized water as necessary. Equipment decontamination shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.3.3 Sample Preservation and Shipment

Groundwater samples will be collected into laboratory provided containers with the proper chemical preservative already in the containers. Additionally, all samples shall be stored on ice upon collection and until received by the analytical laboratory.

Under most circumstances, samples will be delivered directly to the laboratory by the field sampling crew. In the event samples must be shipped, the overnight service of FedEx, UPS, or other similar courier will be used. Sample preservation and shipment shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.3.4 Chain of Custody Control

A chain-of-custody document will be created by the laboratory and will accompany the sample bottles at all times. The chain-of-custody will include the project identification, project location,

sample matrix, analysis requested and name of sample collector. As samples are collected, the date and time of collection shall be recorded on the chain-of-custody. The chain-of-custody will be delivered to the analytical laboratory along with the groundwater samples. Anytime the samples are transferred from custody of one person to another the chain-of-custody must note the time, date and by whom the samples are being relinquished. Likewise, the chain-of-custody shall note the time, date and by whom the samples are being received. Chain-of-custody shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.3.5 Analytical Procedures

Laboratory analysis shall only be conducted by a National Environmental Laboratory Accreditation Program certified laboratory using SW-846, EPA 903/904 and other approved analytical methods. The Lower Limit of Quantitation (LLOQ) (or reporting limit) of the analytical method shall be at or below the groundwater protection standard as established pursuant to §845.600. Individual sample detection limits may vary due to matrix interference, required dilution or constituent concentration. Laboratory analysis shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.3.6 Laboratory Quality Assurance/Quality Control

The contracted laboratory will have the National Environmental Laboratory Accreditation Program accreditation and will operate under their established Quality Assurance/Quality Control program which will be made available upon request. Standard Level 2 reporting packages will be used for all sampling events. The laboratory may be asked to provide Level 3 or even 4 reporting package as necessary for additional data validation/evaluation. Laboratory Quality Assurance and Quality Control shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.3.7 Field Quality Assurance/Quality Control

All field calibrations, field checks and sampling logs will be provided with the analytical report for review. Additional field Quality Assurance/Quality Control methods, such as duplicate sampling may be used to ensure proper field sampling methods and laboratory analysis methods. Field Quality Assurance and Quality Control shall be completed as described in the Groundwater Sampling and Analysis Procedures (Appendix J).

4.4 Statistical Methods

The number of samples collected will be consistent with the statistical procedures selected under § 845.640(f) and the performance standard under § 845.640 (g). The sampling procedures are consistent with that specified under § 845.640 (a) through (e)

Pursuant to § 845.640(f), the background groundwater quality has been established for each of the constituents listed in § 845.600(a)(1), calcium and turbidity by using the upgradient and background wells, as applicable monitoring requirements. The upgradient and background wells include AP-4 and AP-5 pursuant to § 845.640(d).

Pursuant to § 845.640(f), the selected statistical method to be used during detection monitoring in evaluating groundwater monitoring data for each constituent is the Prediction Interval Procedure under § 845.640(f)(1)(C). For this procedure, an interval for each constituent is established from the distribution of the background data and then the level of each constituent in each compliance well (i.e., well/constituent) is compared to the upper prediction limit to assess if a statistically significant increase (SSI) over background has occurred.

The selected method to evaluate concentrations obtained as part of the detection monitoring program is appropriate to determine the occurrence of statistically significant changes in the groundwater quality data and complies with the performance standards under § 845.640(g), including:

1. § 845.640(g)(1) addressing the distribution of constituents where normal distributions will use parametric methods and non-normal distributions will use non-parametric methods.
2. § 845.640(g)(4) addressing the effectiveness of this approach by considering the number of samples in the background database, the data distribution, and the range of concentrations values for each constituent of concern.
3. § 845.640(g)(5) establishing the practical quantitation limit as the lowest concentration level that can be reliably achieved during routine laboratory operating conditions.
4. § 845.640(g)(6) allowing for the correction of seasonal and spatial variability as well as temporal correlation in the data.

The methodology to screen background data and establish background constituent levels is provided in Appendix G. This selected statistical approach will be effective in detecting changes in groundwater quality based on the use of interwell prediction limits (EPA, Unified Guidance, 2009). The statistically calculated interwell prediction limits (Appendix H) will be used during detection monitoring to statistically analyze detected inorganic constituents at each monitoring well (i.e., well/constituents) to determine under § 845.640(h) whether or not there is a statistically significant increase (SSI) over background values. The SSI determination(s) will be completed within 60 days of completing sampling and analysis.

Given the variability of the groundwater chemistry within the facility area, confirmation sampling may be conducted within 90 days of the observation of the SSI. This aids in preventing false positives and prematurely implementing an assessment of corrective measure program. If resampling occurs due to a SSI, then the SSI will be recorded in the facility record noting that resampling will occur. Within 90 days of the initial observed SSI, the results of the resample event

must be placed in the facility record. If the SSI is not confirmed, groundwater monitoring will continue.

4.5 Groundwater Monitoring Program

Pursuant to § 845.650(a) the Groundwater Monitoring Program includes, at a minimum, groundwater monitoring for all constituents listed in § 845.600(a)(1), calcium, and turbidity. The long-term monitoring frequency for these constituents under § 845.650(b)(1) will be quarterly during the active life of the CCR unit and the post closure period.

Pursuant to § 845.650(b)(1) eight (8) independent samples were collected from each background and downgradient well and analyzed for the constituents listed in § 845.600(a)(1), calcium and turbidity. Eight (8) independent sampling events were completed over the first quarter 2016 through fourth quarter 2017 for the following parameters:

- Arsenic, total
- Barium, total
- Beryllium, total
- Boron, total
- Cadmium, total
- Calcium, total
- Chloride, total
- Chromium, total
- Fluoride, total
- Mercury, total
- Molybdenum, total
- pH
- Radium 226 & Radium 228
- Selenium, total
- Sulfate, total
- Total Dissolved Solids

For the parameters antimony, cobalt, lead, lithium and thallium, eight (8) independent samples were collected over the first quarter 2020 through fourth quarter 2021. Laboratory analyses of total arsenic and total lead used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. Additional groundwater samples are being collected for recalculation of the background concentrations for these parameters and will be provided to the Illinois EPA. Until such time that background concentrations for these parameters have been approved by the Illinois EPA, the groundwater protection standards for total arsenic and total lead provided in 35 IAC 845.600(a) shall be used to determine compliance.

Details for derivation of the background concentrations were discussed in Section 3.2 above. The number of samples collected and analyzed are consistent with the sampling and statistical procedures referenced in § 845.640 and account for any unique characteristics of the site (§ 845.650(c)). The sampling schedule allowed the collection of groundwater samples that capture seasonal variability in quality and groundwater flow conditions.

Pursuant to § 845.600(b)(4) an alternative monitoring frequency may be implemented for repeated sampling and analyses for constituents listed in § 845.600(a)(1), calcium and turbidity during the active life and the post-closure period based on the availability of groundwater. No alternative monitoring frequency is sought at this time.

If one or more constituents are detected, and confirmed by an immediate resample, to be in exceedance of the groundwater protection standards in § 845.600 in any sampling event, the owner or operator must notify the Agency which constituent exceeded the groundwater protection standard and place the notification in the facility's operating record as required by § 845.800(d)(16). The owner or operator of the facility must also:

- Install additional monitoring wells necessary to define the contaminant plume;
- Collect data on the nature and extent of the quantity of material released;
- Install at least one additional monitoring well in the direction of the contaminant migration and sample in accordance with § 845.660(a) and (b); and
- Sample all wells in accordance with § 845.660(a) and (b).

Pursuant to with § 845.650(e) the owner or operator of a CCR surface impoundment may, within 60 days after the detected exceedance of the groundwater protection standard, submit an Alternative Source Demonstration (ASD) to the Agency that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the groundwater protection standard resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction. Either type of ASD must include a report that contains the factual or evidentiary basis for any conclusions and a certification of accuracy by a qualified professional engineer. In addition, the owner or operator must place the ASD on the facility's publicly accessible Internet site (CCR website) under Section 845.810 within 24 hours after the submission to the Agency.

If the Agency concurs with the ASD, the owner or operator must continue monitoring as required by § 845.650. The owner or operator must also include the ASD in the annual groundwater monitoring and corrective action report required by § 845.610(e). If the Agency does not concur with the ASD, the owner or operator must initiate the assessment of corrective measures under § 845.660.

Alternatively, if the Agency does not concur with the ASD, the owner or operator may petition the Board for review of the Agency's non-concurrence under 35 Ill. Adm. Code 105. The filing of a petition for review under § 845.650 (e)(7) does not automatically stay any requirements of this Part as to the owner or operator, including the 90-day deadline to initiate an assessment of corrective measures (Section 845.660(a)(1)).

4.6 Assessment of Corrective Measures

Within 90 days of determining that an SSI has occurred for any constituent listed in § 845.600 has been detected at a SSL exceeding the GWPS, or immediately upon detection of a release, the facility must initiate an assessment of corrective measures to prevent further releases, to

remediate releases, and to restore the affected area to original conditions (§ 845.660(a)). The assessment must be completed within 90 days unless a time extension of not more than 60 days is needed to complete the assessment, as demonstrated by the facility. The facility will include any such demonstration in the annual groundwater monitoring and corrective action report required under § 845.610 (e). The CCR unit will continue to monitor groundwater in accordance with the Assessment Monitoring Program during the assessment of corrective measures.

The assessment of corrective measures will evaluate the effectiveness of potential corrective measures in meeting the requirements and objectives of the remedy as described under § 845.670, including performance, reliability, ease of implementation, impacts, exposure, time required, permitting, etc. (§ 845.660(c)).

The completed assessment of corrective measures will be placed in the operating record; discussed at a public meeting at least 30 days prior to the selection of a remedy under § 845.670; and recordkeeping, notification, and internet requirements will be met.

4.7 Corrective Action Plan

Based on the results of the assessment of corrective measures, a remedy will be selected as soon as feasible that meets the standards listed in § 845.670(d), including being protective of human health and environment, attain the GWPS, control the source(s) of release so as to reduce or eliminate, to the extent feasible, further releases of constituents in § 845.600, remove from the environment as much of the contaminated material as feasible, and comply with standards for management of wastes under § 845.680(d). In selecting the remedy, the facility will consider the requirements of § 845.670(e) and establish a schedule for implementing and completing remedial activities under § 845.670(f).

4.8 Implementation of the Corrective Action Program

Pursuant to § 845.680(a), within 90 days of selecting the remedy, the facility will initiate remedial activities. Based on the schedule provided under § 845.670(f) for implementation of remedial activities, the facility must establish and implement a corrective action groundwater monitoring program that meets the requirements of the monitoring program under § 845.650, implement the corrective action remedy selected under § 845.670, and address any interim measures that might be needed to reduce the contaminants leaching from the CCR unit. If at any time the facility determines that compliance with the requirements of §845.670(d) is not being achieved through the remedy selected, other methods or techniques that could feasibly achieve compliance should be evaluated and implemented (§845.680(b)).

Pursuant to § 845.680(c), the remedy will be considered complete when compliance with the GWPS has been achieved at all points within the plume of contamination that lie beyond the groundwater monitoring well system and concentrations of constituents listed in § 845.600 have

not exceeded the GWPS for a period of three consecutive years. When the entire interval is determined to be below the standard under § 845.680(c) for three consecutive years, that well/constituent pair will be declared to be in compliance, and inorganic well/constituent pairs will be moved back into regular groundwater monitoring and appropriate limit-based statistics will resume.

All CCR units that are managed pursuant to a remedy required under § 845.670 will be managed in a manner that complies with Part 845 requirements (§845.680(d)). Pursuant to § 845.680(e), upon completion of the remedy the facility will prepare a notification stating that the remedy has been completed and obtain a certification from a qualified professional engineer.

5. RECORDKEEPING, NOTIFICATION, AND POSTING OF INFORMATION

5.1 Facility Operating Record

Unless specified otherwise, CWLP, as owner of an existing CCR unit, shall retain files in its operating record as required under § 845.800 for at least three years past the date the Agency approved the owner's or operator's request to terminate post-closure care, when closure is with a final cover system, or the completion of groundwater monitoring under Section 845.740(b), when closure is by removal.

Unless otherwise required, the owner or operator of a CCR surface impoundment must place in the facility's operating record the information listed at § 845.800 (d) as it becomes available.

5.2 Publicly Accessible Internet Site Requirements

CWLP will maintain a publicly accessible Internet site (CCR website) containing the information specified in § 845.800 (d).

https://www.cwlp.com/IllinoisCCRCompliance.aspx

6. REFERENCES CITED

Andrews Engineering, Inc. (2024), Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments.

Bargh, M.H., C.A. Chenowith and C. G. Treworgy. (2009), Directory of Coal Mines in Illinois: 7.5-Minute Quadrangle Series, Springfield East & West Quadrangles, Sangamon County. Illinois State Geological Survey, Urbana, Illinois.

Bear, J. (1972), Dynamics of Fluids in Porous Media. American Elsevier Publishing Company, New York, 764 p.

Fetter, C.W. (1980), “Applied Hydrogeology,” Charles E. Merrill Publishing Company, Amherst.

Illinois Environmental Protection Agency (IEPA). (2021), Title 35: Environmental Protection, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter J: Coal Combustion Waste Surface Impoundments, Part 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments. 140p.

Sharp-Hansen, S., Travers, C. and Allison, T. (1990), "Subtitle D Landfill Application Manual for the Multimedia Exposure Assessment Model (Multimed)", Report (Contract Number 68-03-3513), Environmental Research Laboratory, United States Environmental Protection Agency, Athens, Georgia.

U.S. Environmental Protection Agency (EPA), March 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Resource Conservation and Recovery Program Implementation and Information Division, U.S. Environmental Protection Agency, Washington, DC.

7. ENGINEERING CERTIFICATION

The owner or operator of a coal combustion residual (CCR) unit must obtain a certification from a qualified professional engineer that the groundwater monitoring system at the CCR unit has been designed and constructed to meet the requirements of 35 Ill. Adm. Code 845.630 and that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR management area pursuant to 35 Ill. Adm. Code 845.640(f).

The engineering certification for the selected statistical method is included in Appendix G. The engineering certification for the groundwater monitoring system follows.

Professional Engineer Certification – Groundwater Monitoring Program

35 I.A.C. § 845.630(g) Groundwater Monitoring System Certification

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.), Part 845, Subpart F, Section 845.630(g) the owner or operator of a coal combustion residuals (CCR) unit must obtain certification from a qualified professional engineer stating that the groundwater monitoring system at the CCR unit has been designed and constructed to meet the requirements of 35 I.A.C. § 845.630.

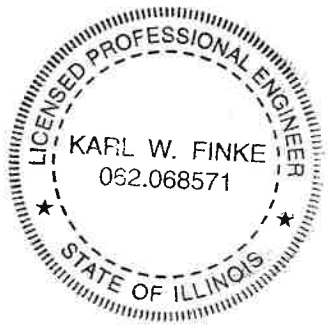
The groundwater monitoring system designed and constructed for the City Water, Light, and Power (CWLP) CCR surface impoundments – Lakeside Ash Pond and Dallman Ash Pond includes more than the minimum number of wells specified in 35 I.A.C. § 845.630(c)(1). The undersigned has been given access to documentation regarding the design, installation, development, and decommissioning of monitoring wells, piezometers and other measurement, sampling, and analytical devices concerning the CWLP CCR surface impoundments.

I, Karl W. Finke, a qualified professional engineer in good standing in the State of Illinois, certify that the groundwater monitoring system at the CWLP CCR surface impoundments has been designed and constructed to meet the requirements of 35 I.A.C. § 845.630.

Signature: Karl Finke

Illinois P.E. No: 062.068571

Date: 09/06/24



TABLES

TABLE 1:
GROUNDWATER ELEVATION SUMMARY

Table 1: Groundwater Elevation Summary

Well ID	2022-Q2	2022-Q3	2022-Q4	2023-Q1	2023-Q2	2023-Q3	2023-Q4	2024-Q1
AP-1R	525.69	525.04	525.27	525.48	525.45	525.18	523.95	526.89
AP-2A	528.14	527.23	528.24	529.2	528.86	527.53	527.4	528.99
AP-3	525.76	524.39	525.64	525.93	525.77	524.69	525.31	526.08
AP-4	550.12	550.35	550.38	549.23	546.08	546.65	544.81	546.56
AP-5	573.85	569.55	572.2	569.03	570.85	569.82	565.73	567.95
AP-6	530.02	528.6	528.62	529.87	530.39	528.34	527.76	529.97
AP-8	532.17	529.9	530.55	532	532.85	530.46	529.13	532.72
AP-10	533.88	533.85	532.94	534.82	534.45	532.54	530.93	534.68
AP-14	537.8	536.91	537.59	538.58	537.2	538.12	535.88	537.88
RW-3	530.3	529.72	528.71	530.2	530.76	528.51	527.71	530.4
G120	536.92	535.11	537.06	537.85	538.17	535.54	534.49	538.47

Note: Well G120 is part of the FGDS Landfill monitoring program and was used here for flow evaluation purposes only.

TABLE 2:
WELL CONSTRUCTION SUMMARY

Table 2: Well Construction Summary

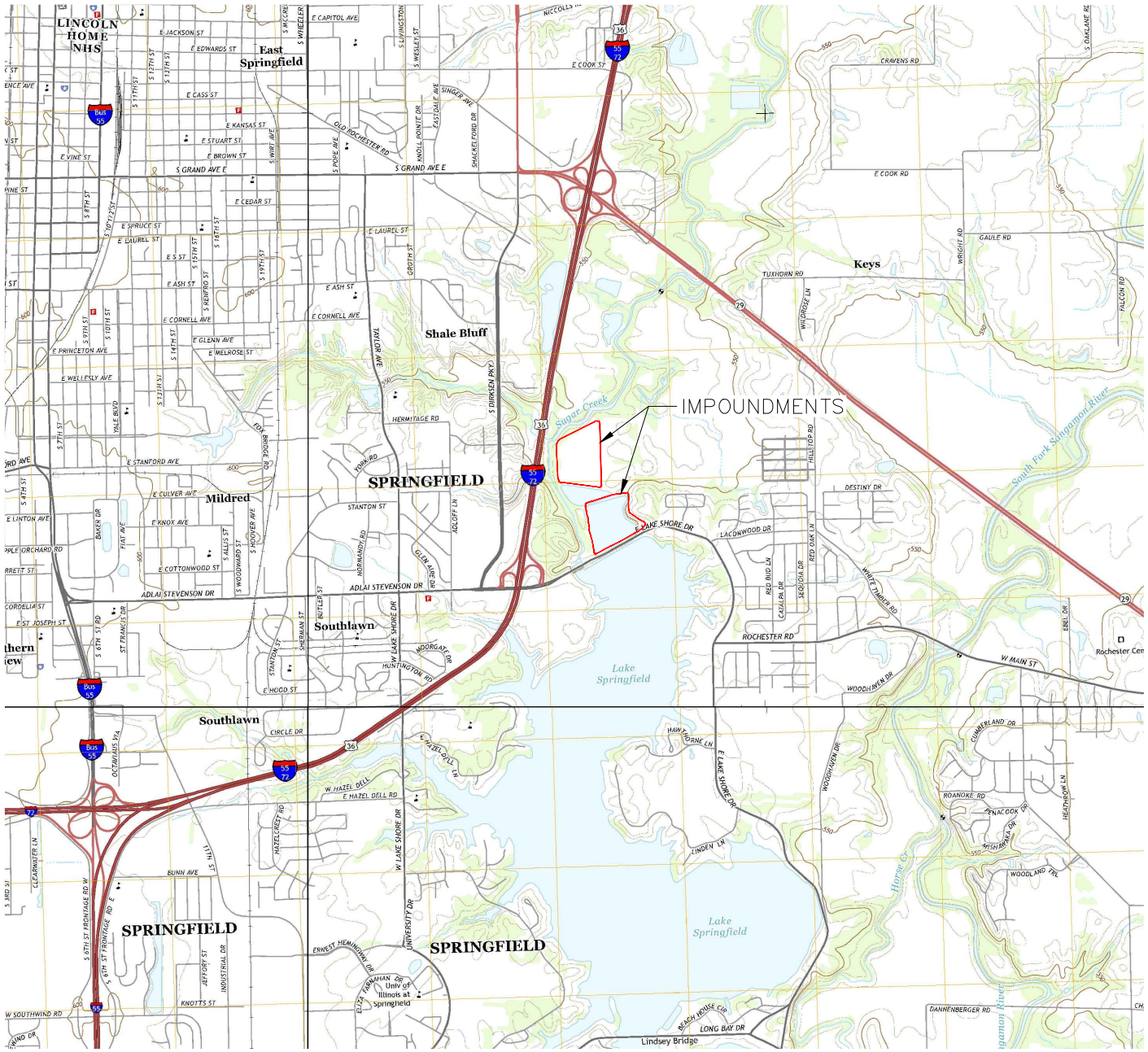
Well ID	Monitoring Position	Material Screened	Top of Casing (feet MSL)	Ground Surface (feet MSL)	Top of Screen (feet MSL)	Bottom of Screen (feet MSL)
AP-1R	Downgradient	Bedrock/Unconsolidated Interface	535.37	533.1	514.01	504.63
AP-2A	Downgradient	Bedrock/Unconsolidated Interface	536.1	533.6	525.19	515.54
AP-3	Downgradient	Bedrock/Unconsolidated Interface	535.4	533.7	524.7	514.7
AP-4	Upgradient	Bedrock/Unconsolidated Interface	555.6	552.46	504.9	494.9
AP-5	Upgradient	Bedrock/Unconsolidated Interface	583.9	581.6	563.78	554.44
AP-6	Downgradient	Bedrock/Unconsolidated Interface	536.46	533.92	508.64	498.87
AP-8	Downgradient	Bedrock/Unconsolidated Interface	540.3	537.2	508.6	498.02
AP-10	Downgradient	Bedrock/Unconsolidated Interface	537.5	534.4	509.7	499.9
AP-14	Downgradient	Bedrock/Unconsolidated Interface	539.6	536.8	519.45	509.75
RW-3	Downgradient	Bedrock/Unconsolidated Interface	538.42	535.65	506.32	496.32
G120	Downgradient	Bedrock/Unconsolidated Interface	551.74	551.78	509.3	503.3

Note: Well G120 is part of the FGDS Landfill monitoring program and was used here for flow evaluation purposes only.

FIGURES

FIGURE 1:
SITE LOCATION

J:\S\Springfield CWLP\CWLP\dwg\2021\Site Map.dwg Tab: Layout1



NOTE:
BACKGROUND IMAGE COURTESY OF UNITED STATES GEOLOGICAL SURVEY.

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: BJH | DESIGNED BY: BJH | DRAWN BY: MPN

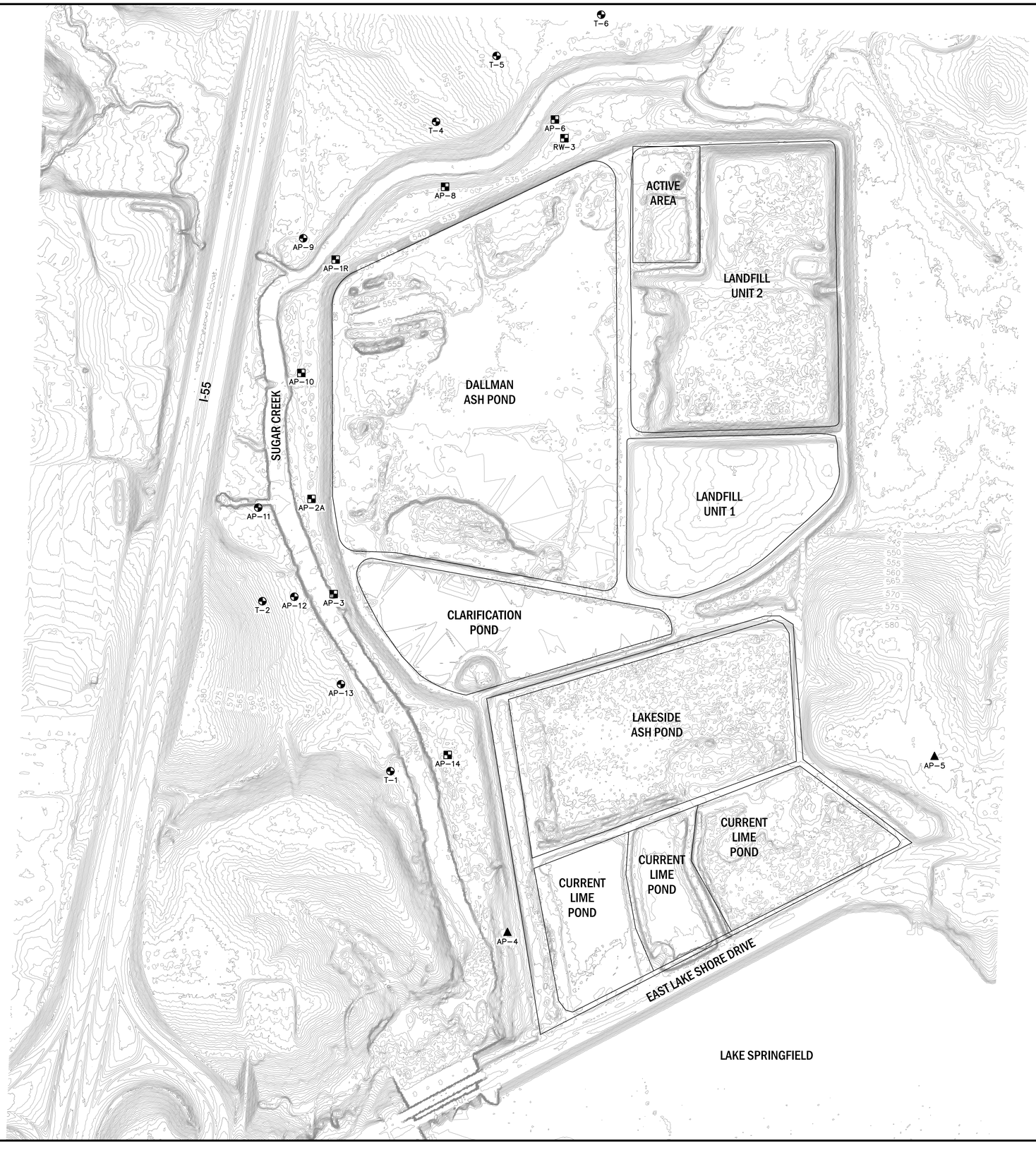
SITE LOCATION

PLANS PREPARED FOR
CITY, WATER, LIGHT & POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2023
PROJECT ID: 200387/0026
SHEET NUMBER:
FIGURE 1

© 2023 Andrews Engineering, Inc.

FIGURE 2:
SITE DETAILS



LEGEND

- ▲ UPGRADIENT WELL
- ■ DOWNGRADIENT WELL
- ● TEMPORARY ASSESSMENT WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. WELL G120 IS PART OF THE FGDS LANDFILL MONITORING PROGRAM AND WAS USED HERE FOR FLOW EVALUATION PURPOSES ONLY.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
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PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: BJH

SITE DETAILS MAP

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 220408/0032

SHEET NUMBER:

FIG 2

© 2024 Andrews Engineering, Inc.

Tab: SITE DETAILS MAP Last Saved: September 4, 2024, by Mike Nguyen Plotted: Wednesday, September 4, 2024 5:40:35 PM
C:\Civil 3D Projects\Springfield CWLP\DWG\2024\Potentiometric Surface Maps FIG 2.dwg

FIGURE 3:
1976 SITE SURVEY

NO.	DATE	BY	REVISION
1	12-7-76	TKP	(M,T) Added 6" topsoil to dike. (L,B) Removed Bench Mark and note 8.
	12-10-76	LNB	ISSUED
2	4-27-77	MGH	Changed Dike Access Rd. and exist. dike alignments. Removed 300' pipe. Moved exist. pipe.
	4-27-77	LNB	ISSUED
3	5-26-77	DBJ	Revised dike alignment along So. side of Ash Pond.
	5-31-77	LNB	ISSUED
4	2-1-79	DLM	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT NO. 3333
ASH POND

V.Y. DALLMAN POWER STATION - UNIT 33

SPRINGFIELD, ILLINOIS

GRADING PLAN

Burns & McDonnell
Engineers - Architects - Consultants
KANSAS CITY, MISSOURI

DATE	AUG. 13, 1976	DRAWING NO.	Y29 — 4
DESIGNED	LNB	REV.	
DETAILED	TRP	PROJECT	73-008-1
CHECKED		SHEET	OF SHEETS

Notes:

1. Two 36" Corregated Metal Pipe, 16 gauge, Bituminous coated, 2 2/3" x 1/2" corrugations, with 2 end sections required.
2. Excavate for Relocated Sugar Creek from Sta 2+00 to Sta 19+00 leaving excavation isolated from Sugar Creek waters until excavation and Rip Rap is completed between the above mentioned stations.
3. Area is suseptable to Flooding
4. Over excavate at least 4.0 feet under dike below exist. channel banks and bottom. (See cross sections) Fill with cohesive material and compact to at least 90%
5. Form a greenbelt on both sides of Relocated Sugar Creek. Areas within Greenbelt which are cleared or disturbed during construction, shall be topsoiled & seeded. Plant trees on 25ctr. On ground above el. 540.0 10 trees shall be Hard Maple the rest shall be Sycamore. On ground that is below El. 540.0 10 trees shall be Pin Oak the rest shall be Sycamore. Do not plant trees on ash pond dike
6. Clearing Limits as shown outside of Purchaces property lines. Within Purchaces propriety clear as necessary for const. keep clearing limits as close to work as possible
7. Waste area is north of Green Belt. Grade waste area to drain and to present a neat appearance. Seed and mulch Waste Area.
8. Borrow material for the Ash Pond Dikes shall come from center of pond and Relocated Sugar Creek. If in the opinion of the engineer material taken from the pond area is too wet to dry in a reasonable length of time the contractor will be permitted to borrow from the area directly north of Relocated Sugar Creek as long as the borrow area is topsoiled, seeded, and mulched, and graded to drain as directed by engineer.

0 120 240 480
SCALE: IN FEET

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DESIGNED BY: MTH | DRAWN BY: MPN | APPROVED BY: BJH

1976 SITE SURVEY

PLANS PREPARED FOR
CITY, WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2021

PROJECT ID: 200325/0003

SHEET NUMBER:

FIG. 3

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Tab: Layout1 Last Saved: August 23, 2021, by Mike Nguyen Plotted: Monday, August 23, 2021 10:07:43 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2021\1974 Site Survey.dwg

APPENDIX A:
Boring Logs and Well Completion Reports

Tab: ALL BORINGS – NO X SECTIONS Last Saved: August 29, 2024, by Ben Karpus Plotted: Thursday, August 29, 2024 9:28:34 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\PROFILES Updated.dwg

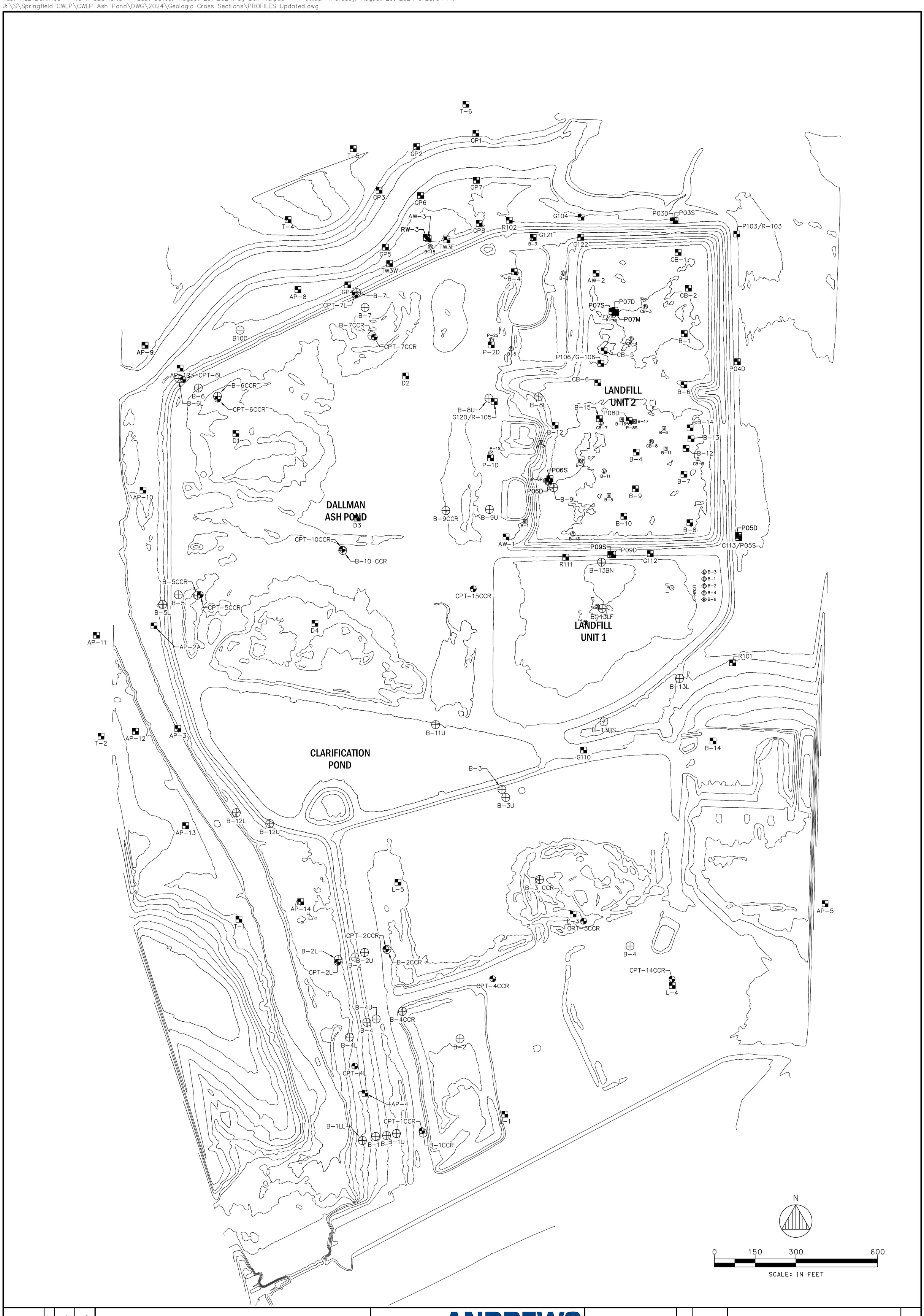

FIG. 1

GEOLOGIC BORINGS AND WELL LOCATION MAP

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

NO.	DATE	REVISION DESCRIPTION	BY

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PATRICK ENGINEERING INC.

BORING NUMBER **B-1** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,260.5 E 2,685.6**

LOGGED BY **KRR**
GROUND ELEVATION **523.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
523.2	0.0		Brown silty clay, trace coarse to fine sand, stiff to very stiff, medium plasticity, wet CL	AU-1 0.0-2.0		27.3	
				SS-2 2.0-4.0 24"R	2 3 3 3	✳ 25.6	
				SS-3 4.0-6.0 24"R	2 3 3 4	✳ 28.8	
				3T-4 6.0-8.0 4"R		23.0	Low recovery.
515.2	8.0		Gray silty clay, trace to little fine sand, soft, medium plasticity, wet CL 1" fine sand lense at 9.5'	SS-5 8.0-10.0 24"R	1 1 1 1	✳ 26.7	
512.8	10.4		Gray clayey sand and silt, very loose, poorly graded, saturated SC	SS-6 10.0-12.0 24"R	WOH 1 1 1	19.5	Water level at 10.0' during drilling.
				SS-7 12.0-14.0 24"R	WOH WOH WOH WOH	20.0	SS-7: Gravel = 0% Sand = 50% Silt or Clay = 50%
509.2	14.0		Gray silty clay to clayey silt, trace fine sand, very soft to soft, low to medium plasticity, moist to wet CL/CL-ML Lense of fine sand at 15.0'	SS-8 14.0-16.0 24"R	1 1 1 1	✳ 24.8	
				SS-9 16.0-18.0 24"R	WOH WOH 1 1	✳ 25.4	SS-9: LL = 25 PL = 22 PI = 3
503.7	19.5			SS-10A B 18.0-20.0 24"R	WOH WOH 2 2	✳ 23.4	
503.2	20.0		Gray clayey fine sand, little silt, loose,			22.8	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/1/92** ENDED **8/1/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **10.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-1** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,260.5 E 2,685.6**

LOGGED BY **KRR**
GROUND ELEVATION **523.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 3 4 5)	NOTES & TEST RESULTS
503.2	20.0		poorly graded, saturated SC	SS-11AB 20.0-22.0 14"R	WOH WOH WOH WOH	✳ 22.8 ○ 24.9 ○ 23.7 ○	
501.7	21.5		Gray fine sand, little silt, very loose, poorly graded, saturated SP-SM/SM				
			Gray silty clay, trace to little fine sand, soft, medium plasticity, moist CL	SS-12 22.0-24.0 2"R	WOH WOH WOH WOH		Blow-in at 26.0'.
499.2	24.0						
			Gray coarse to fine sand, trace to little fine gravel, little silt, dense, well graded, saturated SW-SM/SM	SS-13 24.0-26.0 24"R	3 8 11 13	15.5 ○	
				SS-14 26.0-28.0 0"R			SS-14 could not be obtained due to blow-in.
			Gray fine sand, trace silt from 28.0'-29.0'	SS-15AB 28.0-30.0 20"R	7 24 76 100+/3"	14.4 ○ 14.0 ○ ✳	
494.2	29.0		Gray silty clay to clay, hard, medium to high plasticity, moist to dry CL/CH				
490.2	33.0		Gray shale, massive, excellent	PQ-16 33.0-38.0 60"R			Hard clay; drilled to 33.0'. Auger refusal at 33.0'; switched to coring. RQD = 100%
485.2	38.0		End of Boring at 38.0'.				Borehole was tremie grouted immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/1/92** ENDED **8/1/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **10.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-2** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,482.9 E 2,241.0**

LOGGED BY **KRR**
GROUND ELEVATION **526.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
526.7	0.0		Brown mottled silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet CL	AU-1 0.0-2.0		23.8	
				SS-2 2.0-4.0 20"R	3 2 2 3	✳ 24.6	
				SS-3 4.0-6.0 24"R	2 2 3 3	✳ 25.4	
				SS-4 6.0-8.0 24"R	3 3 3 3	✳ 23.7	
517.7	9.0		Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL	3T-5 8.0-10.0 24"R		✳	
				SS-6 10.0-12.0 24"R	1 1 2 3	✳ 25.7	
				SS-7AB 12.0-14.0 24"R	2 2 2 3	✳ 27.3	
512.7	14.0		Little fine sand and trace shells in SS-7A 6" long wood in SS-7B				
			Gray fine sand, little to some silt, loose, poorly graded, saturated SM	SS-8 14.0-16.0 24"R	1 1 2 4	21.7	Water level at 14.0' during drilling.
510.7	16.0		Dark gray silty clay, trace fine sand, trace organics, medium stiff, medium plasticity, wet CL/OL	SS-9 16.0-18.0 24"R	2 2 2 4	✳ 36.9	
508.7	18.0		Gray silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-10 18.0-20.0 24"R	3 3 5 5	✳ 21.1	
506.7	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6 1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/29/92** ENDED **7/29/92**

REMARKS

WATER LEVEL (ft.)
▽ **14.0'** during drilling
▽ **14.2'** within augers prior to coring
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-2** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,482.9 E 2,241.0**

LOGGED BY **KRR**
GROUND ELEVATION **526.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
506.7	20.0		Gray silty clay, trace fine sand, medium stiff, low to medium plasticity, moist to wet CL	SS-11 20.0-22.0 18"R	3 4 4 5	✳ 22.2 ○	
				SS-12 22.0-24.0 24"R	2 2 2 2	✳ 26.8 ○	
				SS-13 24.0-26.0 24"R	1 2 2 2	✳ 17.6 ○	
				3T-14 26.0-28.0 14"R			
			Clayey silt at 27.0'				
498.7	28.0		Gray clayey silt to silt, extremely dense, dry CL-ML/ML	SS-15 28.0-30.0 24"R	2 13 23 72	9.6 ○	
496.7	30.0		Gray shale, soft	SS-16 30.0-31.0 9"R	80 120+ /3"	12.9 ○	Water level within augers at 14.2' prior to coring. Auger refusal at 31.0'. Switched to PQ rock coring.
				PQ-17 31.0-35.0 48"R			
491.7	35.0		End of Boring at 35.0'.				Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6 1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/29/92** ENDED **7/29/92**

REMARKS

WATER LEVEL (ft.)
▽ **14.0'** during drilling
▽ **14.2'** within augers prior to coring
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-3** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION

LOGGED BY **SAS**
GROUND ELEVATION **553.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
553.0	0.0		Brown silty clay, trace fine sand, very stiff to hard, low plasticity, dry to moist, fill CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 6"R	3 4 5 8
			Dark gray streaks at 3.0'		
			Brown and dark gray from 4.0'	SS-3 4.0-6.0 12"R	5 8 5 8
				SS-4 6.0-8.0 18"R	- - 5 8
			Dark gray at 8.0', trace fine gravel	SS-5 8.0-10.0 16"R	3 5 6 8
				SS-6 10.0-12.0 14"R	3 7 8 8
			Dark gray, trace organic	SS-7 12.0-14.0 12"R	3 5 6 7
539.0	14.0		Gray silty clay, trace fine sand, very stiff, medium plasticity, moist to wet, fill	3T-8 14.0-16.0 20"R	
				SS-9 16.0-18.0 18"R	- 13 13 15
			Dark gray, trace organics at 18.0'	SS-10 18.0-20.0 18"R	3 5 7 12
533.0	20.0				

Water Content
PL □ - - - ○ - - - △ LL
10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳
1 2 3 4 5

11.8
12.7
18.3
18.8
19.5
17.6
18.8
20.3

NOTES & TEST RESULTS

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/24/92** ENDED **7/24/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **48'** during drilling
▽ **33.1'** end of drilling
▼

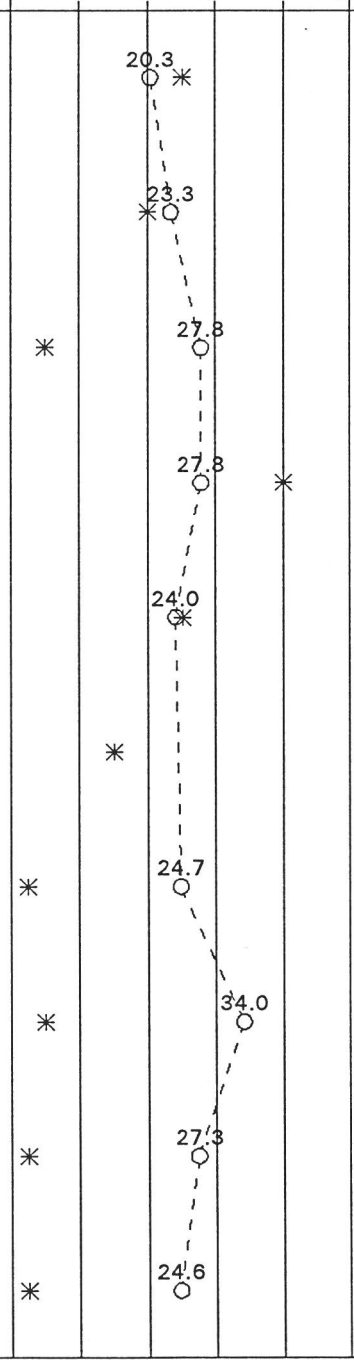
PATRICK ENGINEERING INC.

BORING NUMBER **B-3** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION

LOGGED BY **SAS**
GROUND ELEVATION **553.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
533.0	20.0		Light gray, mottled silty clay, trace fine sand, very stiff, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	- 3 6 7
531.0	22.0		Brown mottled silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-12 22.0-24.0 24"R	- 3 5 7
528.3	24.7		Light brown silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-13 24.0-26.0 24"R	1 2 3 5
526.5	26.5		Gray silty clay, trace fine sand, stiff to hard, medium plasticity, wet CL	SS-14 26.0-28.0 24"R	- 3 5 9
			Sand Lenses	SS-15 28.0-30.0 24"R	3 4 5 5
				3T-16 30.0-32.0 24"R	
				SS-17 32.0-34.0 24"R	1 1 2 2
519.9	33.1		Gray sandy clay, soft, medium plasticity, moist SC		
519.0	34.0		Dark gray to brown silty clay, trace fine sand, very soft to soft, medium plasticity, wet CL	SS-18 34.0-36.0 24"R	3 2 2 3
				SS-19 36.0-38.0 24"R	- 1 1 2
				3T-20 38.0-40.0 24"R	
513.0	40.0				

Water Content: PL ☐ - - - ○ - - - △ LL; 10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳; 1 2 3 4 5



NOTES & TEST RESULTS

3T-20:
Dry
Dens. = 104.2pcf
k = 8.2E-08 cm/s

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/24/92** ENDED **7/24/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **48'** during drilling
▽ **33.1'** end of drilling
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-3** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION

LOGGED BY **SAS**
GROUND ELEVATION **553.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
513.0	40.0		Dark gray to brown silty clay, trace fine sand, very soft to soft, medium plasticity, wet CL Sand Lense at 40.8', very soft	SS-21 40.0-42.0 16"R	WOH WOH WOH WOH	20.8	
510.7	42.3		Gray silty clay to clayey silt, little to some sand, soft to stiff, medium plasticity, moist to wet CL Sand Lense at 43.3' and 43.6'	SS-22 42.0-44.0 24"R	1 1 2 2	18.2	
				SS-23 44.0-46.0 24"R	2 4 4 3	16.9	
				3T-24 46.0-48.0 24"R			
505.0	48.0		Gray clayey fine sand, some silt, very loose, saturated SC	SS-25 48.0-50.0 12"R	WOH WOH WOH WOH	25.7	Rod weight pushed sample.
				SS-26 50.0-52.0 24"R	WOH WOH WOH WOH	20.4	
501.0	52.0		Gray fine sand, trace coarse to medium sand, trace silt, very loose, poorly graded, saturated SP/SP-SM	SS-27 52.0-54.0 3"R	WOH WOH WOH WOH		
499.0	54.0						
498.5	54.5		Gray coarse to fine sand, little silt, trace fine gravel, loose, poorly graded, saturated SM	SS-26AB 54.0-56.0 9"R	2 80+/ 5"	9.5	Borehole was tremie grouted using Volclay grout immediately after drilling.
498.2	54.8		Gray shale End of Boring at 54.8'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/24/92** ENDED **7/24/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **48'** during drilling
▽ **33.1'** end of drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-4** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,488.2 E 2,060.4**

LOGGED BY **KRR**
GROUND ELEVATION **530.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
530.1	0.0		Brown mottled silty clay, trace fine sand, very stiff, medium plasticity, wet CL	AU-1 0.0-2.0		23.1	
				SS-2 2.0-4.0 24"R	5 5 5 4	22.1	
				SS-3 4.0-6.0 24"R	3 4 5 7	20.3	
				3T-4 6.0-8.0 24"R		28.0	3T-4: Dry Dens. = 99pcf K = 4.7 E--8cm/s
			Brown at 8.0'	SS-5AB 8.0-10.0 24"R	2 4 5 6	27.4 33.5	
520.6	9.5		Gray silty clay, trace fine sand, medium stiff to stiff, medium to high plasticity, wet CL/CH	SS-6 10.0-12.0 24"R	1 2 1 1	45.4	Soft clay from 10.5' to 11.0'.
				3T-7 12.0-14.0 24"R			
516.1	14.0		Dark gray silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet CL	SS-8 14.0-16.0 24"R	1 1 1 1	29.1	SS-8: LL = 32 PL = 20 PI = 12 Gravel = 0% Sand = 8% Silt or Clay = 92%
				SS-9 16.0-18.0 24"R	WOH 1 1 2	24.2	
				3T-10 18.0-20.0 24"R			
510.1	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/23/92** ENDED **7/23/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **31.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-4** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,488.2 E 2,060.4**

LOGGED BY **KRR**
GROUND ELEVATION **530.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
510.1	20.0		Dark gray silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	1 2 1 1
				SS-12 22.0-24.0 24"R	2 2 3 4
505.6	24.5		Gray clayey fine sand, some silt, very loose to loose, poorly graded, moist to saturated SC	SS-13 24.0-26.0 24"R	1 2 1 1
				SS-14 26.0-28.0 24"R	1 3 2 2
				SS-15 28.0-30.0 24"R	1 1 2 2
				SS-16 30.0-32.0 24"R	1 1 1 1
498.1	32.0		Gray coarse to fine sand, trace silt, trace fine gravel, medium dense, poorly graded, saturated SP	SS-17AB 32.0-34.0 24"R	8 10 13 126
496.6	33.5		Gray siltstone/shale	SS-18	82
495.6	34.5		End or Boring at 34.5'.	34.0-34.5 0"R	100+/- 1"

Water Content: PL 10 20 30 40 LL 50
Unconfined Compressive Strength (TSF): 1 2 3 4 5

Plotted values: 21.1, 18.9, 19.7, 17.7, 19.6, 20.4, 14.5

NOTES & TEST RESULTS

SS-14:
Gravel = 0%
Sand = 56%
Silt or Clay = 44%

Water level at 31.0' during drilling.
Water level was observed to rise rapidly after retrieving SS-17.

Blow-in at 34.0'

Water level within augers at 6.0' one hour after completion of drilling.

Borehole was termie grouted using Volclay grout.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/23/92** ENDED **7/23/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **31.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-5** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,204.3 E 2,049.3**

LOGGED BY **KRR**
GROUND ELEVATION **529.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
529.5	0.0		Brown silty clay, trace coarse to fine sand, soft to very stiff, low to medium plasticity, moist to wet CL	AU-1 0.0-2.0		13.4	
				SS-2 2.0-4.0 12"R	4 3 4 4	13.5 ✳	
			Mottled brown from 4.0'	SS-3 4.0-6.0 18"R	3 2 4 3	✳ 25.3	
				SS-4 6.0-8.0 20"R	3 4 4 4	✳ 22.9	
				SS-5 8.0-10.0 24"R	2 1 2 2	✳ 24.9	
			Little fine sand at 9.5'				
				SS-6 10.0-12.0 20"R	2 2 2 2	✳ 23.1	
517.2	12.3		Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL	SS-7 12.0-14.0 22"R	2 1 1 2	✳ 28.3	
514.5	15.0		Gray fine sand, trace coarse to medium sand, trace silt, very loose, poorly graded, saturated SP	3T-8 14.0-16.0 24"R			Water level at 14.0' during drilling.
				SS-9AB 16.0-18.0 24"R	1 2 1 2	✳ 30.3	
512.5	17.0		Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-10 18.0-20.0 24"R	1 1 1 1	✳ 25.8	
509.5	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/24/92** ENDED **7/24/92**

REMARKS

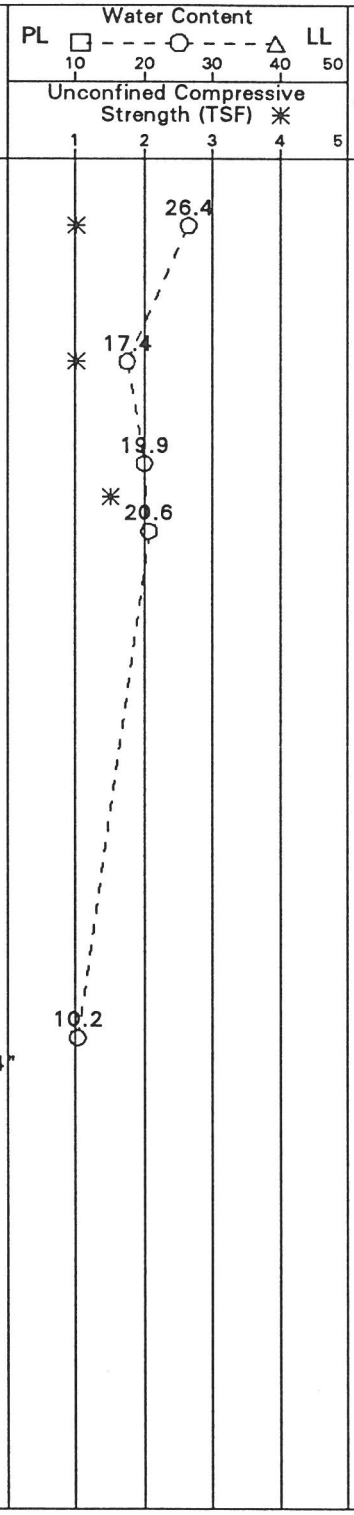
WATER LEVEL (ft.)
▽ **14.0'** during drilling
▽ **6.8'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-5** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,204.3 E 2,049.3**

LOGGED BY **KRR**
GROUND ELEVATION **529.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
509.5	20.0		Gray silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	3 2 2 2
507.5	22.0		Gray clayey silt to silty clay, little fine sand, stiff, low plasticity, moist to wet CL-ML/CL	SS-12 22.0-24.0 24"R	1 2 3 2
				SS-13AB 24.0-26.0 24"R	2 2 3 2
504.3	25.2		Gray clayey sand, some silt, loose, poorly graded, saturated SC	SS-14 26.0-28.0 24"R	2 2 3 4
			Trace coarse to medium sand at 27.0'		
501.0	28.5		Gray coarse to fine sand, little to some silt, trace fine gravel, loose to medium dense, poorly graded, saturated SP	SS-15 28.0-30.0 24"R	3 4 4 6
				SS-16 30.0-32.0 24"R	3 3 4 4
497.5	32.0		Gray fine sand, trace silt, loose to dense, poorly graded, saturated SP	SS-17 32.0-34.0 24"R	4 14 45 120/4"
496.0	33.5		Gray shale, massive, good		
				PQ-18 37.0-39.0 24"R	
490.5	39.0		End of Boring at 39.0'.		



NOTES & TEST RESULTS

Water level at 6.8' immediately after drilling prior to coring.
Auger refusal at 34.0'. Changed to rock coring. Could not core from 34.0' to 37.0' due to problems with core barrel.
RQD = 80%

Borehole was tremie grouted using Volclay immediately after drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/24/92** ENDED **7/24/92**

REMARKS

WATER LEVEL (ft.)
▽ **14.0'** during drilling
▼ **6.8'** after drilling

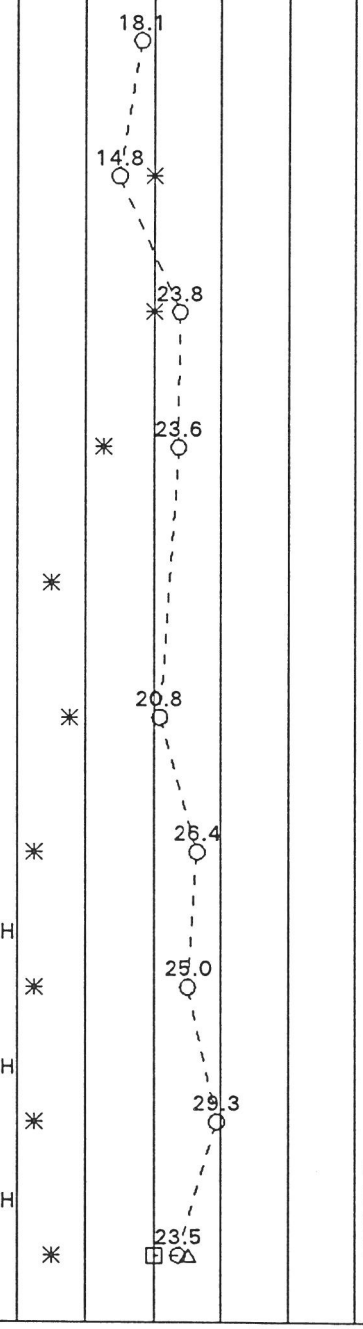
PATRICK ENGINEERING INC.

BORING NUMBER B-6 SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill-Hydrogeo. Invest. - 496B
LOCATION N 5,072.9 E 2,588.6

LOGGED BY KRR
GROUND ELEVATION 530.8

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
530.8	0.0		Brown silty clay, trace coarse to fine sand, stiff, low plasticity, moist CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 10"R	3 4 4 4
526.8	4.0		Dark gray silty clay, trace coarse to fine sand, stiff, medium plasticity, wet CL	SS-3 4.0-6.0 10"R	1 3 4 5
				SS-4 6.0-8.0 24"R	2 2 2 3
521.8	9.0		Brown silty clay, trace to little fine sand, soft to medium stiff, medium plasticity, wet CL	3T-5 8.0-10.0 20"R	
			Lenses of fine sand in SS-6	SS-6 10.0-12.0 24"R	
			Lenses of fine sand in SS-7	SS-7 12.0-14.0 24"R	1 2 1 1
				SS-8 14.0-16.0 24"R	WOH 1 1 2
514.8	16.0		Gray silty clay, trace coarse to fine sand, soft, low to medium plasticity, wet CL	SS-9 16.0-18.0 24"R	WOH 1 1 1
				SS-10 18.0-20.0 24"R	WOH 1 1 2
510.8	20.0				

Water Content: PL ☐ - - - ○ - - - △ LL; 10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳; 1 2 3 4 5



NOTES & TEST RESULTS

SS-10:
LL = 25
PL = 20
PI = 5

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 4-1/4" I.D. HSA.
DRILLING EQUIPMENT CME-55/ATV
DRILLING STARTED 8/3/92 ENDED 8/3/92

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ 22.0' during drilling.
▼ 9.0' after drilling.

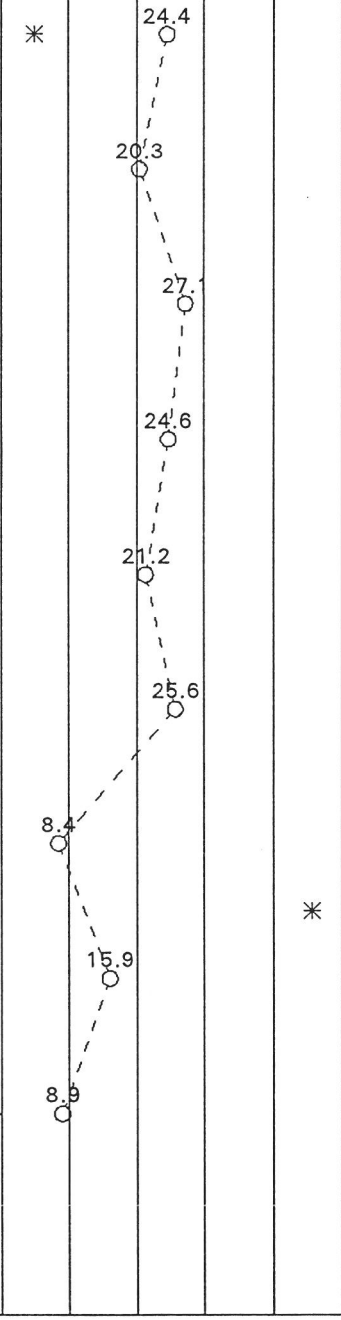
PATRICK ENGINEERING INC.

BORING NUMBER **B-6** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,072.9 E 2,588.6**

LOGGED BY **KRR**
GROUND ELEVATION **530.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
510.8	20.0		Gray silty clay, trace coarse to fine sand, soft, low to medium plasticity, wet, fill CL	SS-11 20.0-22.0 24"R	WOH 1 1 1	PI = 5
508.3	22.5		Gray clayey silt to clayey sand, very loose, poorly graded, saturated CL-ML/SC	SS-12 22.0-24.0 24"R	WOH WOH 1 2	Water level at 22.0' during drilling.
				SS-13 24.0-26.0 24"R	1 1 1 1	
				SS-14 26.0-28.0 24"R	1 1 1 1	SS-14 Gravel = 0% Sand = 44% Silt or clay = 56%
				SS-15 28.0-30.0 24"R	WOH 1 1 1	
500.8	30.0		Gray fine sand, trace coarse to medium sand, trace fine gravel, very loose, poorly graded, saturated SP	SS-16 30.0-32.0 24"R	1 1 1 1	
498.8	32.0		Gray coarse to fine sand, trace to little coarse to fine gravel, trace silt, medium dense to dense, well graded, saturated SW/SW-SM	SS-17 32.0-34.0 24"R	10 16 15 15	Blow-in at 32.0'.
496.3	34.5		Gray silty clay to clay, hard, medium to high plasticity, moist to dry CL/CH	SS-18 34.0-36.0 24"R	6 8 20 41	
				SS-19 36.0-38.0 14"R	40 62 100+ /2"	Hard drilling. Water level at 9.0' after drilling.
493.3	37.5					
492.8	38.0		Gray shale			Borehole was tremie grouted using Volclay grout immediately after drilling.
			End of Boring at 38.0'.			

Water Content: PL ☐ - - - ○ - - - △ LL; 10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳: 1 2 3 4 5



DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/3/92** ENDED **8/3/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **22.0'** during drilling.
▽ **9.0'** after drilling.
▽

PATRICK ENGINEERING INC.

BORING NUMBER B-7 SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill - Hydrogeo Invest. - 496B
LOCATION N 4,743.9 E 2,684.2

LOGGED BY KRR
GROUND ELEVATION 523.3

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
523.3	0.0		Brownish-gray to brown silty clay, trace coarse to fine sand, trace roots, very soft, medium plasticity, wet, fill CL	AU-1 0.0-2.0		
522.1	1.2		Gray silty clay, trace to little fine sand, very soft, medium plasticity, wet, fill CL	SS-2AB 2.0-4.0 24"R	WOH	
519.8	3.5		Gray clayey fine sand, little silt, very loose, poorly graded, saturated, fill SC	SS-3 4.0-6.0 4"R	WOH	
518.3	5.0		Gray silty clay, trace to little fine sand, very soft, mucky, medium plasticity, wet, fill. CL	SS-4 6.0-8.0 24"R	WOH	SS-4 Gravel = 0% Sand = 33% Silt or clay = 67%
				SS-5 8.0-10.0 18"R	WOH	
			Lenses of fine sand and wood fragments in SS-6.	SS-6 10.0-12.0 18"R	WOH WOH WOH 6	
510.8	12.5		Gray silty clay, trace to little fine sand, stiff, medium plasticity, wet CL	SS-7 12.0-14.0 20"R	WOH WOH 2 2	Water level at 12.0' during drilling.
508.3	15.0		Gray clayey silt and fine sand, loose, nonplastic, saturated CL-ML	SS-8 14.0-16.0 24"R	WOH WOH 2 3	
				SS-9 16.0-18.0 24"R	2 2 2 2	SS-9 Gravel = 0% Sand = 38% Silt or clay = 62%
				SS-10 18.0-20.0 24"R	1 2 1 2	
503.3	20.0					

Water Content: PL ☐ - - - ○ - - - △ LL; 10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳: 1 2 3 4 5

Unconfined Compressive Strength (TSF) ✳ values: 25.9, 27.3, 22.8, 36.7, 24.4, 28.1, 29.9, 24.1, 21.0, 18.2, 20.2

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 6-1/4" I.D. HSA.
DRILLING EQUIPMENT CME-55/ATV
DRILLING STARTED 8/5/92 ENDED 8/5/92

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ 12.0' during drilling.
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-7** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,743.9 E 2,684.2**

LOGGED BY **KRR**
GROUND ELEVATION **523.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ ---○--- △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
503.3	20.0		Gray clayey silt and fine sand, loose, nonplastic, saturated CL-ML/SC	SS-11 20.0-22.0 24"R	1 1 1 1	21.7	
				3T-12 22.0-24.0 20"R			Gray fine sand at bottom of Shelby tube.
499.8	23.5		Gray fine sand, trace silt, medium dense to dense, poorly graded, saturated SP	SS-13 24.0-26.0 24"R	10 14 14 22		Artesian conditions.
496.8	26.5		Gray coarse to fine sand, trace coarse to fine gravel, trace silt, loose, well graded, saturated SW	SS-14 26.0-28.0 24"R	WOH		
494.8	28.5		Gray shale, massive, good	SS-15AB 28.0-30.0 16"R	10 52 100+ /"4	12.3	Drilled to 30.0' then, switched to PQ coring.
				PQ-16 30.0-35.0 60"R			RQD = 80%
488.3	35.0		End of Boring at 35.0'.				Borehole was grouted using Volclay grout after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/5/92** ENDED **8/5/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **12.0'** during drilling.
▽
▽

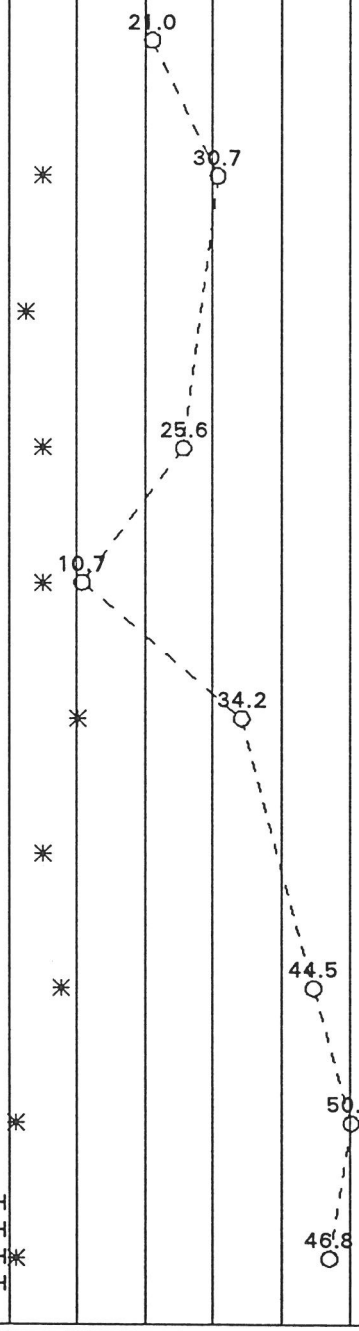
PATRICK ENGINEERING INC.

BORING NUMBER **B-8** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,565.9 E 2,706.2**

LOGGED BY **KRR**
GROUND ELEVATION **523.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
523.8	0.0		Brown silty clay, trace fine sand, soft, medium plasticity, wet CL	AU-1 0.0-2.0		
				SS-2 2.0-4.0 24"R	1 1 2 2	
				3T-3 4.0-6.0 24"R		
				SS-4 6.0-8.0 24"R	1 2 2 3	
			Fine sand lenses in SS-4			Water Level at 6.0' during drilling.
				SS-5 8.0-10.0 24"R	1 2 2 3	
			Trace coarse to fine sand and trace coal in SS-5			
513.3	10.5			SS-6 10.0-12.0 24"R	2 3 3 4	
			Gray and olive silty clay to clay, trace fine sand very soft to medium stiff, medium to high plasticity, wet CL/CH	3T-7 12.0-14.0 24"R		
				SS-8 14.0-16.0 24"R	1 1 1 3	
			Mucky at 16.0'	SS-9 16.0-18.0 24"R	2 1 1 1	
			Mucky at 18.0'	SS-10 18.0-20.0 24"R	WOH WOH WOH WOH	
503.8	20.0					

Water Content: PL 10 20 30 40 50 LL
Unconfined Compressive Strength (TSF): 1 2 3 4 5



DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/15/92** ENDED **8/15/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **6.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-8** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,565.9 E 2,706.2**

LOGGED BY **KRR**
GROUND ELEVATION **523.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
503.8	20.0		Gray clay, trace silt, very soft, medium to high plasticity, wet CL/CH	SS-11 20.0-22.0 24"R	WOH WOH WOH WOH		
501.8	22.0						
501.2	22.6		Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-12ABC 22.0-24.0 24"R	WOH 5 6 15	✳ 34.5 58.4 12.6	
500.6	23.2		Gray fine sand, little silt, medium to dense, poorly graded, saturated SM	SS-13 24.0-26.0 24"R	3 11 18 22	10.3	
			Gray coarse to fine sand, trace coarse to fine gravel, trace to little silt, medium dense to dense, well graded, saturated SW-SM/SM	SS-14 26.0-28.0 24"R	6 9 19 17	12.2	Artesian conditions.
494.8	29.0		Gray shale, soft	SS-15AB 28.0-30.0 24"R	5 12 23 100+	11.4	
493.8	30.0		End of Boring at 30.0'				Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/15/92** ENDED **8/15/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **6.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER B-9 SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill-Hydrogeo. Invest. - 496B
LOCATION N 4,690.7 E 2,506.0

LOGGED BY KRR
GROUND ELEVATION 522.7

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
522.7	0.0		Brown silty clay, trace fine sand, soft, medium plasticity, wet CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 24"R	1 1 1 2
				SS-3AB 4.0-6.0 24"R	WOH 1 2 1
517.7	5.0		Brown silty clay to clayey fine sand, soft, low plasticity, wet CL/SC		
516.7	6.0		Brown and tan silty clay trace coarse to fine sand, soft, medium plasticity, wet CL	SS-4 6.0-8.0 24"R	2 3 2 4
515.7	7.0		Gray silty clay to clayey silt, trace fine sand, medium soft, medium plasticity, wet CL	SS-5 8.0-10.0 24"R	WOH 1 1 2
513.9	8.8		Gray fine sand, some silt, wood fragments present, very loose, poorly graded, saturated SM	SS-6 10.0-12.0 24"R	WOH 1 1 2
512.7	10.0		Gray clayey sand, little silt, very loose, poorly graded, saturated SC		
510.3	12.4		Trace shells and fine gravel at 12.0' Gray silty clay, trace to little fine sand, soft, medium plasticity, wet CL	SS-7 12.0-14.0 24"R	WOH 1 1 1
				SS-8 14.0-16.0 24"R	WOH WOH WOH WOH
				3T-9 16.0-18.0 24"R	
			Fine sand lenses	SS-10 18.0-20.0 24"R	WOH WOH WOH WOH

Water Content: PL □ - - - ○ - - - △ LL; 10 20 30 40 50
Unconfined Compressive Strength (TSF) ✳: 1 2 3 4 5

Water Content values: 19.8, 25.6, 26.4, 24.6, 26.1, 27.7, 45.9, 22.4, 26.2, 24.6, 22.9

NOTES & TEST RESULTS
SS-8: CEC = 10.7 meq/100gm

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 4-1/4" I.D. HSA
DRILLING EQUIPMENT CME 55/ATV
DRILLING STARTED 8/14/92 ENDED 8/14/92

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ 9.0' after drilling
▽
▼

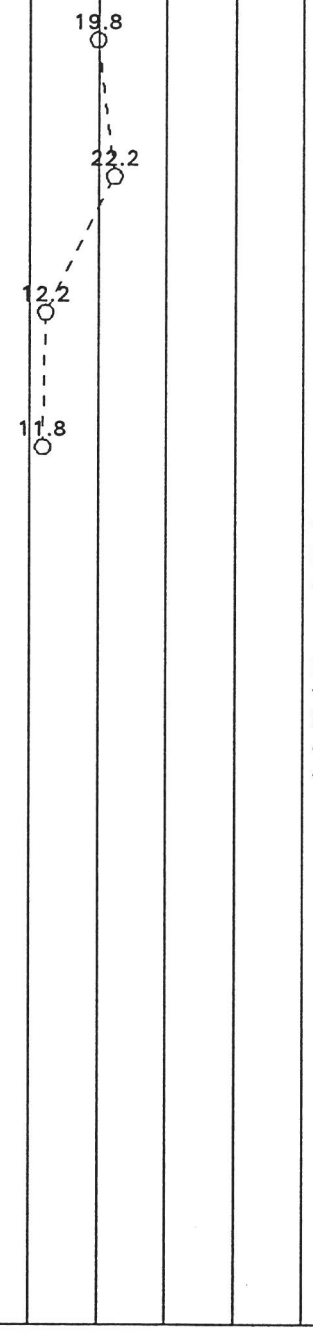
PATRICK ENGINEERING INC.

BORING NUMBER **B-9** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,690.7 E 2,506.0**

LOGGED BY **KRR**
GROUND ELEVATION **522.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
502.7	20.0		Gray silty clay, some fine sand, soft, medium plasticity, wet	SS-11 20.0-22.0 24"R	WOH 1 1 2
502.2	20.5		CL		
			Gray clayey fine sand and silt, very loose, poorly graded, saturated	SS-12 22.0-24.0 24"R	WOH WOH 1 2
			SC		
			Wood fragments and trace organics present in SS-12		
498.2	24.5		Gray coarse to fine sand, trace coarse to fine gravel, trace silt, medium dense, well graded, saturated	SS-13 24.0-26.0 24"R	WOH WOH 13 5
			SW-SM		
495.7	27.0		Gray shale	SS-14 26.0-28.0 24"R	3 4 40 73
494.7	28.0		End of Boring at 28.0'		

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)



NOTES & TEST RESULTS

Water level at 9.0' immediately after drilling.

Borehole was tremie grouted immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/14/92** ENDED **8/14/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **9.0'** after drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-10** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,589.2 E 2,463.3**

LOGGED BY **KRR**
GROUND ELEVATION **523.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
523.6	0.0		Brown silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet CL	AU-1 0.0-2.0		24.3	
				SS-2 2.0-4.0 24"R	2 2 2 2	✳ 24.7	
				SS-3 4.0-6.0 24"R	1 2 3 3	✳ 25.7	
				3T-4 6.0-8.0 24"R		✳	
516.1	7.5		Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-5 8.0-10.0 24"R	WOH 1 2 2	✳ 27.2	
			1" lense of fine sand at 9.0'	SS-6 10.0-12.0 24"R	WOH 1 2 1	✳ 25.1	
				SS-7 12.0-14.0 24"R	1 1 1 1	✳ 27.2	Water level at 12.0' during drilling.
			Mucky at 14.0'	SS-8 14.0-16.0 24"R	WOH 1 1 1	✳ 24.1	
				SS-9 16.0-18.0 24"R	WOH WOH WOH 1	✳ 25.5	
				SS-10 18.0-20.0 24"R	WOH 1 1 2	23.8	
503.6	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/15/92** ENDED **8/15/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **12.0'** during drilling
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-10** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,589.2 E 2,463.3**

LOGGED BY **KRR**
GROUND ELEVATION **523.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
503.6	20.0		Gray silty clay, trace to little fine sand, soft, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	WOH 1 1 2
				SS-12 22.0-24.0 24"R	WOH 1 1 3
499.4	24.2		Gray coarse to fine sand, trace coarse to fine gravel, trace silt, loose to medium dense, well graded, saturated SW-SM/SM	SS-13AB 24.0-26.0 24"R	6 7 4 4
498.1	25.5		Gray shale, soft Hard at 26.5'	SS-14 26.0-27.0 13"R	11 43 100+ /1"
496.6	27.0		End of Boring 27.0'		

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)
Plotted values: 23.4, 20.8, 20.0, 10.5

NOTES & TEST RESULTS

Artesian conditions immediately after drilling.

Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/15/92** ENDED **8/15/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **12.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-11** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,775.2 E 2,391.2**
LOGGED BY **KRR**
GROUND ELEVATION **523.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
523.6	0.0		Brown silty clay, trace fine sand, soft to stiff, medium plasticity, wet CL	AU-1 0.0-2.0		21.4	
			Mottled at 2.0'	SS-2 2.0-4.0 24"R	2 1 2 3	✳ 21.9	
			Tan at 4.0'	SS-3 4.0-6.0 24"R	2 2 2 3	✳ 24.0	
				3T-4 6.0-8.0 22"R		✳	
515.2	8.4		Gray silty clay, trace fine sand, soft, medium plasticity, moist CL	SS-5 8.0-10.0 24"R	1 1 1 2	✳ 29.3	
				SS-6 10.0-12.0 24"R	1 2 2 2	✳ 26.8	
				3T-7 12.0-14.0 22"R		✳	
				SS-8 14.0-16.0 24"R	WOH 1 1 1	✳ 24.7	
				SS-9 16.0-18.0 24"R	WOH 1 2 2	✳ 23.7	Water level at 16.0' during drilling.
			Fine sand pockets in SS-10	SS-10 18.0-20.0 24"R	WOH 1 1 2	✳ 21.7	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/14/92** ENDED **8/14/92**

REMARKS
WOH = Weight of Hammer

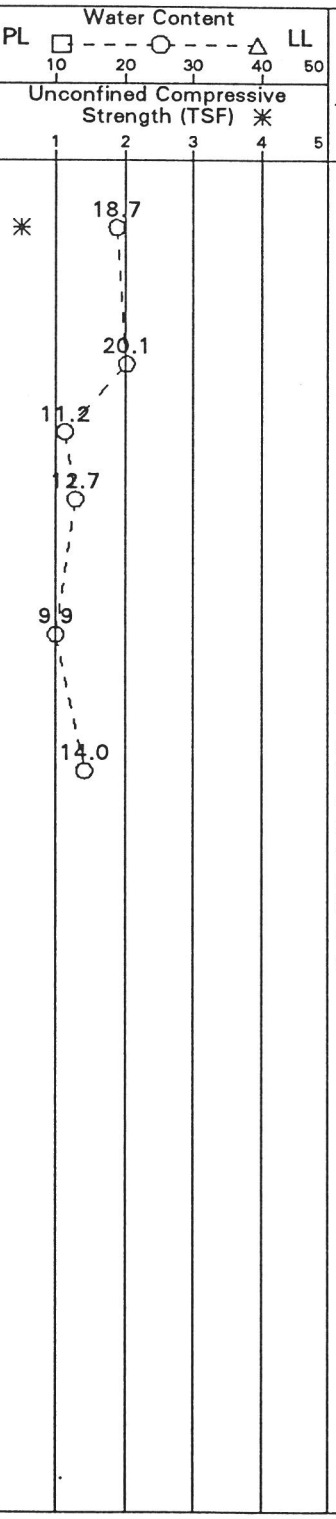
WATER LEVEL (ft.)
▽ **16.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-11** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,775.2 E 2,391.2**

LOGGED BY **KRR**
GROUND ELEVATION **523.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
503.6	20.0		Gray silty clay, trace to little fine sand, soft, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	1 2 2 3
501.8	21.8		Gray fine sand and silty, loose to medium dense, poorly graded, saturated SM	SS-12AB 22.0-24.0 24"R	1 3 8 11
500.4	23.2		Gray coarse to fine sand, little coarse to fine gravel, trace silt, medium dense, well graded, saturated SW-SM/SM	SS-13 24.0-26.0 24"R	14 13 15 15
			Clayey at 26.0'	SS-14 26.0-28.0 24"R	5 6 16 12
495.4	28.2		Gray shale, soft	SS-15 28.0-29.2 14"R	8 18 100+ /2"
494.4	29.2		End of Boring at 29.2'		



NOTES & TEST RESULTS

Water level at ground surface immediately after drilling.
Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/14/92** ENDED **8/14/92**

REMARKS
WOH = Weight of Hammer

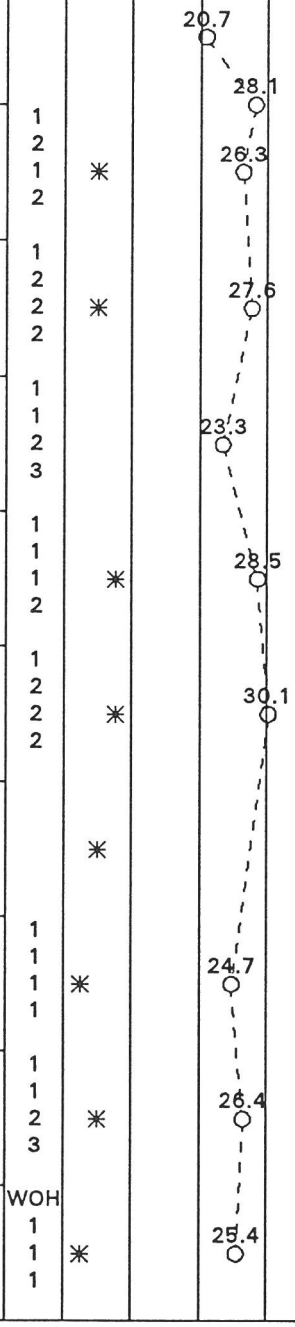
WATER LEVEL (ft.)
▽ **16.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-12** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,924.2 E 2,210.8**
LOGGED BY **KRR**
GROUND ELEVATION **524.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
524.9	0.0		Brown silty clay, trace fine sand, soft, medium plasticity, wet CL	AU-1 0.0-2.0	
522.6	2.3			SS-2AB 2.0-4.0 24"R	1 2 1 2
521.9	3.0		Brown clayey silt to silty sand, loose, poorly graded, saturated CL-ML/SM		
			Brown and tan silty clay, trace to little fine sand, soft, medium plasticity, wet CL	SS-3 4.0-6.0 22"R	1 2 2 2
518.9	6.0		Brown and tan clayey fine sand, little silt, very loose, poorly graded, saturated SC	SS-4 6.0-8.0 12"R	1 1 2 3
517.4	7.5		Gray silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet CL	SS-5 8.0-10.0 22"R	1 1 1 2
			Lenses of fine sand in SS-5	SS-6 10.0-12.0 24"R	1 2 2 2
			Trace wood fragments in SS-6	3T-7 12.0-14.0 24"R	
				SS-8 14.0-16.0 24"R	1 1 1 1
				SS-9 16.0-18.0 24"R	1 1 2 3
				SS-10 18.0-20.0 24"R	WOH 1 1 1

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)



NOTES & TEST RESULTS
Water level at 3.0' during drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D.**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/14/92** ENDED **8/14/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **3.0'** during drilling
▼ **4.3'** immediately after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **B-12** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,924.2 E 2,210.8**

LOGGED BY **KRR**
GROUND ELEVATION **524.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
504.9	20.0		Gray, silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	WOH 1 1 2
			Little to some fine sand from 23.0'	SS-12 22.0-24.0 24"R	WOH 1 1 2
500.4	24.5		Gray fine sand, some silt, very loose, poorly graded, saturated SM	SS-13 24.0-26.0 24"R	WOH WOH 1 2
498.9	26.0		Gray coarse to fine sand, trace to little coarse to fine gravel, trace silt, loose to medium dense, well graded, saturated SW-SM	SS-14 26.0-28.0 24"R	2 3 3 3
				SS-15 28.0-30.0 24"R	2 3 11 11
494.9	30.0		Gray shale, soft	SS-16 30.0-31.0 12"R	22 100+
493.9	31.0		End of Boring at 31.0'		

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

	Unconfined Compressive Strength (TSF)	Water Content
504.9	✳	23.1
500.4		22.0
498.9		23.7
494.9		18.7
		15.9
493.9		16.9

NOTES & TEST RESULTS

Water level at 4.3' immediately after drilling.

Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D.**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/14/92** ENDED **8/14/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **3.0'** during drilling
▽ **4.3'** immediately after drilling
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-13** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,524.7 E 2,275.9**

LOGGED BY **KRR**
GROUND ELEVATION **523.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
523.8	0.0		Brown silty clay, trace coarse to fine sand, soft to medium stiff, medium plasticity, wet CL	AU-1 0.0-2.0		22.0	
			Brown and tan from 2.0'	SS-2 2.0-4.0 24"R	1 2 2 3	✳ 26.0	
				SS-3 4.0-6.0 24'R	2 1 2 2	✳ 24.9	
			Little fine sand in SS-3	3T-4 6.0-8.0 24"R		✳	Water level at 7.0' during drilling.
516.8	7.0		Gray silty clay, trace coarse to fine sand, medium stiff, medium plasticity, wet CL	SS-5 8.0-10.0 24"R	2 2 2 2	✳ 24.9	
				SS-6 10.0-12.0 24"R	WOH 1 2 3	✳ 30.5	
				3T-7 12.0-14.0 24"R		✳	
509.8	14.0		Gray silty clay, trace to little fine sand, very soft to soft, medium plasticity, wet CL	SS-8 14.0-16.0 24"R	WOH 1 1 1	✳ 22.5	
				SS-9 16.0-18.0 24"R	WOH WOH WOH WOH	✳ 23.2	
				SS-10 18.0-20.0 24"R	WOH WOH 1 1	✳ 24.6	
503.8	20.0					✳	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/4/92** ENDED **8/4/92**

REMARKS
WOH = Weight of Hammer

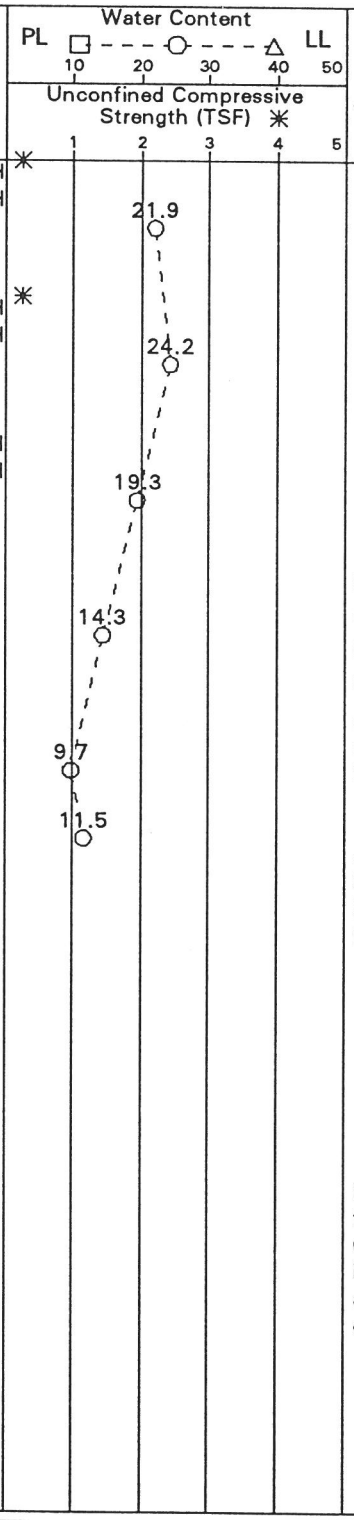
WATER LEVEL (ft.)
▽ **7.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-13** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,524.7 E 2,275.9**

LOGGED BY **KRR**
GROUND ELEVATION **523.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
503.8	20.0		Gray silty clay, trace little fine sand, very soft to soft, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	WOH WOH 1 1
				SS-12 22.0-24.0 24"R	WOH WOH 1 1
499.3	24.5		Gray clayey fine sand, some silt, very loose, poorly graded, saturated SC	SS-13 24.0-26.0 24"R	WOH WOH 1 2
497.8	26.0		Gray coarse to fine sand, little coarse to fine gravel, little silt, medium dense to dense, well graded, saturated SM	SS-14 26.0-28.0 24"R	4 4 12 19
				SS-15AB 28.0-30.0 24"R	15 22 42 58
494.5	29.3		Gray shale, massive, excellent	PQ-16 30.0-35.0 60"R	
488.8	35.0		End of Boring at 35.0'		



NOTES & TEST RESULTS

SS-14:
Gravel = 16%
Sand = 65%
Silt or clay = 19%
Artesian conditions. Water found to overflow.

Auger refusal at 30.0'. Switched to PQ coring.
RQD = 100%

Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/4/92** ENDED **8/4/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **7.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-14** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 3,763.9 E 2,791.1**

LOGGED BY **KRR**
GROUND ELEVATION **572.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
572.7	0.0		Brown silty clay, trace fine sand, very stiff, low to medium plasticity, moist to wet CL	AU-1 0.0-2.0		17.5	
				SS-2 2.0-4.0 22"R	3 4 4 6	14.2 ✳	
			Trace coarse to medium sand, trace fine gravel from 4.0'	SS-3 4.0-6.0 24"R	4 6 9 11	20.4 ✳	
				SS-4 6.0-8.0 24"R	5 6 7 7	20.3 ✳	
				3T-5 8.0-10.0 24"R			
			Silty sand at 10.0'	SS-6 10.0-12.0 24"R	4 6 6 4	12.4 ✳	
			Little to some sand in SS-6				
560.2	12.5		Dark gray to black organic silty clay, trace fine sand, very stiff, medium plasticity, wet OL	SS-7 12.0-14.0 24"R	4 7 9 15	✳ 40.5	
558.2	14.5		Coal	SS-8 14.0-16.0 24"R	7 18 32 34	49.8	
				SS-9 16.0-18.0 18"R	22 39 50+	22.7	SS-9 driven 18" only.
553.7	19.0		Gray shale	SS-10AB 18.0-20.0 24"R	12 10 16 18	16.4	
552.7	20.0					13.4	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/17/92** ENDED **8/17/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-14** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 3,763.9 E 2,791.1**

LOGGED BY **KRR**
GROUND ELEVATION **572.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
552.7	20.0		Gray shale.	SS-11 20.0-22.0 2"R	10 11 15 24		Auger refusal of 22.1'. Water was not encountered during or immediately after drilling. Borehole was grouted using Volclay grout immediately after completion of drilling.
550.7	22.0		End of Boring at 22.1'.	SS-12 22.0-22.1 2"R	100 +/2"		

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/17/92** ENDED **8/17/92**

REMARKS

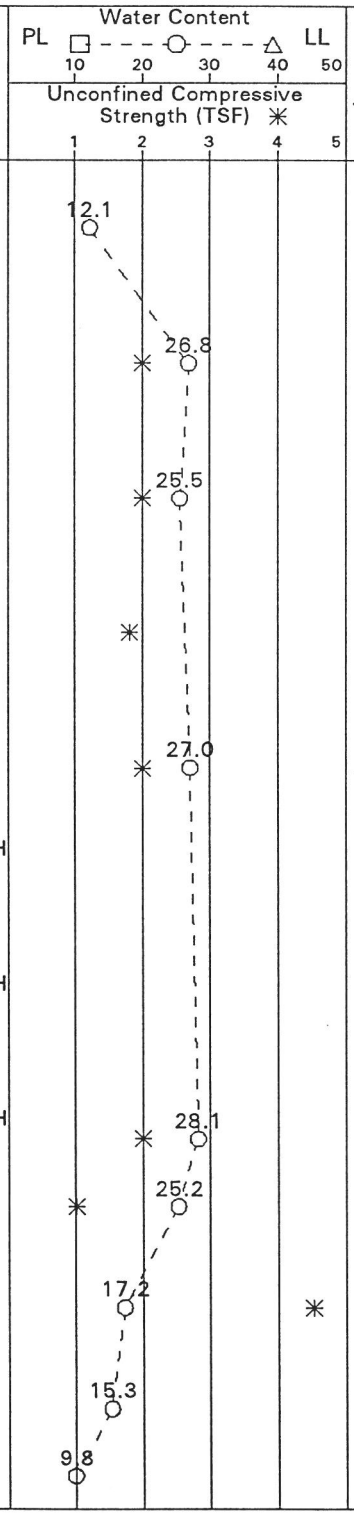
WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-15** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,579.6 E 1,752.7**

LOGGED BY **KRR**
GROUND ELEVATION **536.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
536.7	0.0		Brown silty clay, trace coarse to fine sand, stiff, medium plasticity, wet CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 14"R	7 6 8 9
				SS-3 4.0-6.0 24"R	4 6 6 9
				3T-4 6.0-8.0 14"R	
			Brown and olive at 8.0'.	SS-5AB 8.0-10.0 24"R	2 2 4 5
527.7	9.0		Brown fine sand, trace silt, loose, poorly graded, saturated SP-SM/SM	SS-6 10.0-12.0 18"R	WOH 2 2 2
				SS-7A/B 12.0-14.0 24"R	WOH 2 2 2
523.7	13.0		Dark gray and gray silty clay, trace organics, trace coarse to fine sand, soft, medium plasticity, wet CL/OL	SS-8AB 14.0-16.0 24"R	WOH 1 2 5
521.7	15.0		Organics present in SS-8A.		
520.2	16.5		Brown and olive silty clay, trace coarse to fine sand, very stiff, low plasticity, moist CL	SS-9 16.0-18.0 24"R	5 6 6 4
			Brown and olive silty clay to clayey silt, trace to fine sand, hard, low plasticity, moist CL	SS-10AB 18.0-20.0 24"R	2 7 20 32
516.7	20.0		Changed to brown from 19.0'.		



NOTES & TEST RESULTS

Water level at 9.0' during drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/21/92** ENDED **8/21/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **9.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-15** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,579.6 E 1,752.7**

LOGGED BY **KRR**
GROUND ELEVATION **536.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
516.7	20.0		Brown shale, soft.	SS-11 20.0-22.0 8"R	80 100 +/2"	9.7 ○	
				SS-12 22.0-24.0 7"R	31 100 +/1"	7.8 ○	
512.7	24.0		End of Boring at 24.5'.				Auger refusal at 24.5'. Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/21/92** ENDED **8/21/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **9.0'** during drilling.
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **CB-1** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,559.1 E 2,663.1**

LOGGED BY **KRR**
GROUND ELEVATION **527.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
527.3	0.0		Dark gray silty clay, trace coarse to fine sand, very stiff, medium plasticity, wet, fill CL	AU-1 0.0-2.0		20.1	Grass and weeds at the surface.
				SS-2 2.0-4.0 16"R	6 4 4 5	19.2 ✳	
			Mottled at 4.0'	SS-3 4.0-6.0 20"R	3 4 8 15	✳ 30.3	
522.3	5.0		Dark gray organic silty clay, trace fine sand, trace roots and wood fragments, soft to stiff, medium plasticity, wet, fill OL	SS-4 6.0-8.0 24"R	1 1 2 2	✳ 30.2	
				3T-5 8.0-10.0 24"R		✳ □ 29.4 - ○ - - - △	3T-5: Dry Den. = 94pcf qu = 0.6tsf LL = 41 PL = 23 k = 1.5 E-07 cm/s
				SS-6 10.0-12.0 18"R	1 2 2 2	✳	
514.5	12.8			SS-7ABC 12.0-14.0 24"R	1 1 2 2	✳ 29.9 21.2 ✳	
513.8	13.5		Gray clayey fine sand, trace coarse to medium sand, trace fine gravel, loose, poorly graded, saturated, fill SC				
513.1	14.2		Dark gray to black organic silty clay, trace coarse to fine sand, wood fragments present, soft, medium plasticity, wet, fill OL	SS-8 14.0-16.0 24"R	1 2 1 1	35.4	
				SS-9 16.0-18.0 24"R	1 1 1 1	36.3	
509.3	18.0		Dark gray clayey fine sand, trace coarse to medium sand, trace organics, wood fragments present, very loose, poorly graded, saturated, fill SC				
508.3	19.0		Gray coarse to fine sand, trace silt, trace organics, very loose, poorly graded, saturated, fill SP-SM	SS-10AB 18.0-20.0 24"R	1 1 2 1	56.2	
507.3	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/23/92** ENDED **7/23/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **17.0'** during drilling
▽ **15.5'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **CB-1** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,559.1 E 2,663.1**

LOGGED BY **KRR**
GROUND ELEVATION **527.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
507.3	20.0		Dark to black organic silty clay, wood fragments present, soft, medium dense, wet, fill OL	SS-11 20.0-22.0 24"R	1 1 2 1		
505.3	22.0		Gray fine sand, trace coarse to medium sand, little to some silt, very loose, poorly graded, saturated SP-SM/SM	SS-12 22.0-24.0 24"R	1 2 1 2		
			Gray silty sand, little clay, very loose, poorly graded, saturated SM	SS-13 24.0-26.0 24"R	1 1 1 2		SS-13: Gravel = 0% Sand = 69% Silt or clay = 31%
				SS-14 26.0-28.0 24"R	WOH 1 1 2		
499.3	28.0		Gray fine sand, trace coarse to medium sand, trace silt, trace coarse to fine gravel, loose, poorly graded, saturated SP/SP-SM	SS-15 28.0-30.0 24"R	WOH 1 3 5		
			Little to some silt, little coarse to medium sand in SS-16	SS-16 30.0-32.0 24"R	3 3 4 6		
495.3	32.0						
495.0	32.3		Gray coarse to fine sand, trace coarse to fine gravel, dense, well graded, saturated SW	SS-17 32.0-34.0	28 100/ 1"	12.9 ○	Auger refusal at 32.5'.
494.8	32.5		Gray shale				
			End of Boring at 32.5'.				Borehole was tremie grouted immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/23/92** ENDED **7/23/92**

REMARKS
WOH = Weight of Hammer

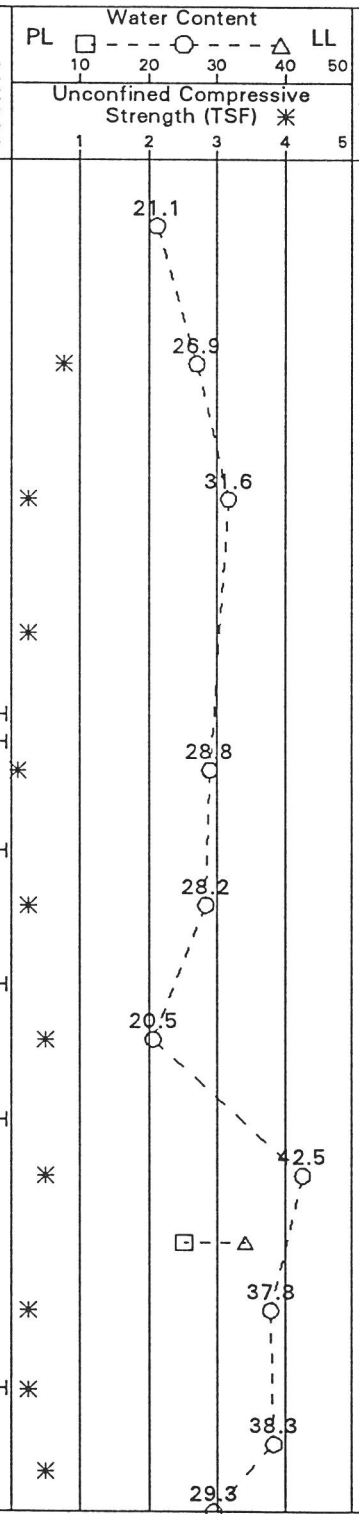
WATER LEVEL (ft.)
▽ **17.0'** during drilling
▽ **15.5'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER CB-2 SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill-Hydrogeo. Invest. - 496B
LOCATION N 5,427.5 E 2,700.9

LOGGED BY KRR
GROUND ELEVATION 526.2

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
526.2	0.0		Brownish-gray silty clay, trace coarse to fine sand, medium stiff, medium plasticity, wet, fill CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 24"R	2 2 3 3
522.2	4.0		Dark gray silty clay, trace to little fine sand and very soft to soft, medium plasticity, wet to saturated, fill CL	SS-3 4.0-6.0 24"R	1 1 2 2
				3T-4 6.0-8.0 18"R	
				SS-5 8.0-10.0 24"R	WOH WOH 1 2
				SS-6 10.0-12.0 24"R	WOH 1 1 2
				SS-7 12.0-14.0 24"R	WOH 1 2 2
			Trace organics at 13.0'.		
				SS-8 14.0-16.0 24"R	WOH 1 2 2
			Wood fragments in SS-8		
				3T-9 16.0-18.0 20"R	
			Organics and wood traces at 18.3'	SS-10AB 18.0-20.0 24"R	WOH
506.7	19.5		Gray and olive silty clay to clay, trace		



NOTES & TEST RESULTS

Water level at 10.0' during drilling.

3T-9:
LL = 34
PL = 25
PI = 9
Dry dens. = 80pcf
k = 2.4 E-07 cm/s

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/2/92** ENDED **8/2/92**

REMARKS
WOH = Weight of Hammer

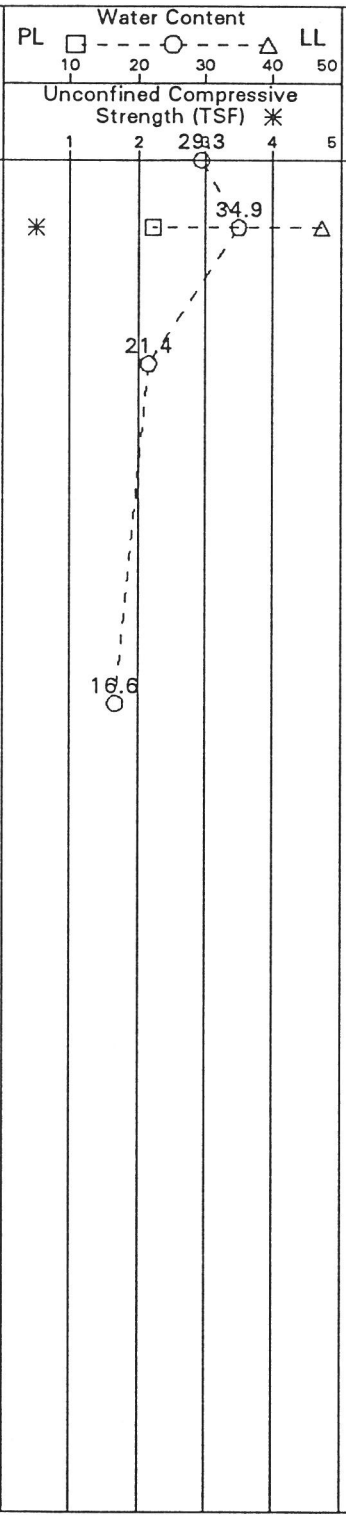
WATER LEVEL (ft.)
▽ **10.0'** during drilling.
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER CB-2 SHEET 2 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill-Hydrogeo. Invest. - 496B
LOCATION N 5,427.5 E 2,700.9

LOGGED BY KRR
GROUND ELEVATION 526.2

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
506.2	20.0		fine sand, soft, medium to high plasticity, moist CL/CH	SS-11 20.0-22.0 24"R	WOH 1 1 2
503.7	22.5		Gray clayey fine sand, little silt, very loose, poorly graded, saturated SC	SS-12 22.0-24.0 24"R	2 1 1 WOH
501.7	24.5		Gray coarse to fine sand, trace fine gravel, trace to little silt, medium dense, poorly graded, saturated SP-SM/SM	SS-13 24.0-26.0 24"R	1 2 7 15
499.2	27.0		Gray silty clay to clay, trace fine sand, hard, medium to high plasticity, dry to moist CL	26.0-27.5 SS-14 27.5-29.5 24"R	3 8 22 32
496.7	29.5		End of Boring at 29.5'		



NOTES & TEST RESULTS

SS-11:
LL = 47
PL = 22
PI = 25

Blow-in at 24.0' water level rose to approximately 3' below ground surface.

Boring was tremie grouted using Volclay grout immediately after drilling completed.

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 4-1/4" I.D. HSA.
DRILLING EQUIPMENT CME-55/ATV
DRILLING STARTED 8/2/92 ENDED 8/2/92

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ 10.0' during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **CB-3** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,359.4 E 2,542.3**

LOGGED BY **KRR**
GROUND ELEVATION **525.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
525.8	0.0		Brown silty clay, trace coarse to fine sand, stiff, medium plasticity, wet, fill CL	AU-1 0.0-2.0			
				SS-2 2.0-4.0 20"R	2 2 3 4		
				SS-3 4.0-6.0 14"R	2 2 3 5		
			Dark gray at 4.0'				
519.8	6.0		Brown and tan clayey silt and fine sand, very loose, poorly graded, wet to saturated, fill CL-ML	SS-4 6.0-8.0 24"R	2 2 1 1		SS-4: Gravel = 0% Sand = 48% Silt or Clay = 52%
				SS-5 8.0-10.0 14"R	WOH 1 2 2		
515.5	10.3		Olive at 10.0'				
			Dark gray to black organic silty clay, trace coarse to fine sand, wood fragments present, soft, medium plasticity, wet OL	SS-6AB 10.0-12.0 18"R	2 2 2 3		
513.8	12.0		Gray clayey silt and fine sand, very loose, poorly graded, saturated CL-ML	SS-7 12.0-14.0 24"R	WOH WOH WOH WOH		
			Gray silty sand from 15.0' to 15.5'	SS-8AB 14.0-16.0 24"R	WOH 1 2 3		Water level at 14.0' during drilling.
				SS-9 16.0-18.0 24"R	WOH 1 1 1		SS-9: Gravel = 0% Sand = 33% Silt or Clay = 67%
				SS-10 18.0-20.0 24"R	WOH WOH WOH WOH		
505.8	20.0						

21.5 22.7 26.3 20.5 22.5 24.9 33.7 23.3 21.9 22.6 27.1 23.5

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/2/92** ENDED **8/2/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **14.0'** during drilling.
▽
▽

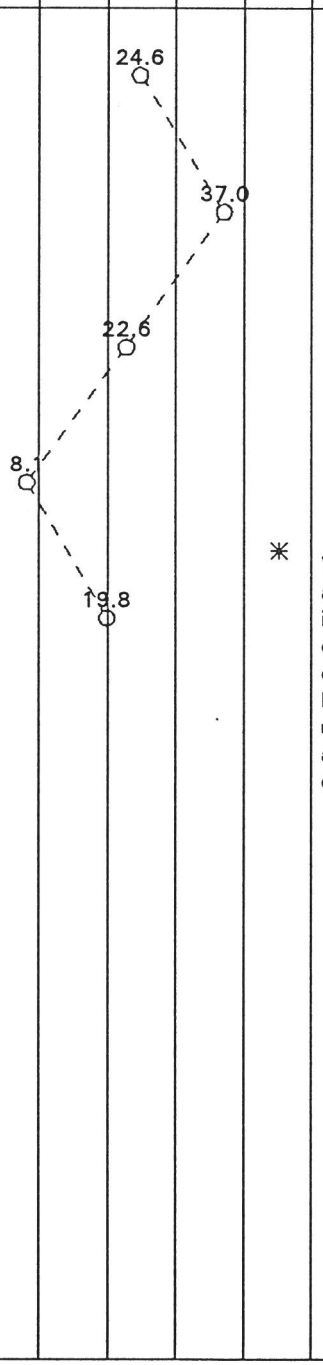
PATRICK ENGINEERING INC.

BORING NUMBER **CB-3** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,359.4 E 2,542.3**

LOGGED BY **KRR**
GROUND ELEVATION **525.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
505.8	20.0		Gray clayey silt and fine sand, very loose, poorly graded, saturated CL-ML/SC	SS-11 20.0-22.0 24"R	WOH 1 1 2
				SS-12 22.0-24.0 24"R	WOH WOH WOH WOH
				SS-13 24.0-26.0 24"R	WOH 1 2 2
				SS-14 26.0-28.0 24"R	WOH WOH 12 21
498.8	27.0		Gray coarse to fine sand, trace coarse to fine gravel, trace to little silt, medium dense to dense, well graded, saturated SW-SM	SS-15 28.0-30.0 24"R	4 4 14 29
496.8	29.0		Gray silty clay to clay, trace fine sand, hard, medium to high plasticity, dry to moist CL/CH		
495.8	30.0		End of Boring at 30.0'.		

Water Content: PL □ ---○--- △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)



NOTES & TEST RESULTS

Water level in augers at 4.7' immediately after completion of drilling.
Boring was grouted using Volclay grout after drilling completed.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/2/92** ENDED **8/2/92**

REMARKS
WOH = Weight of Hammer

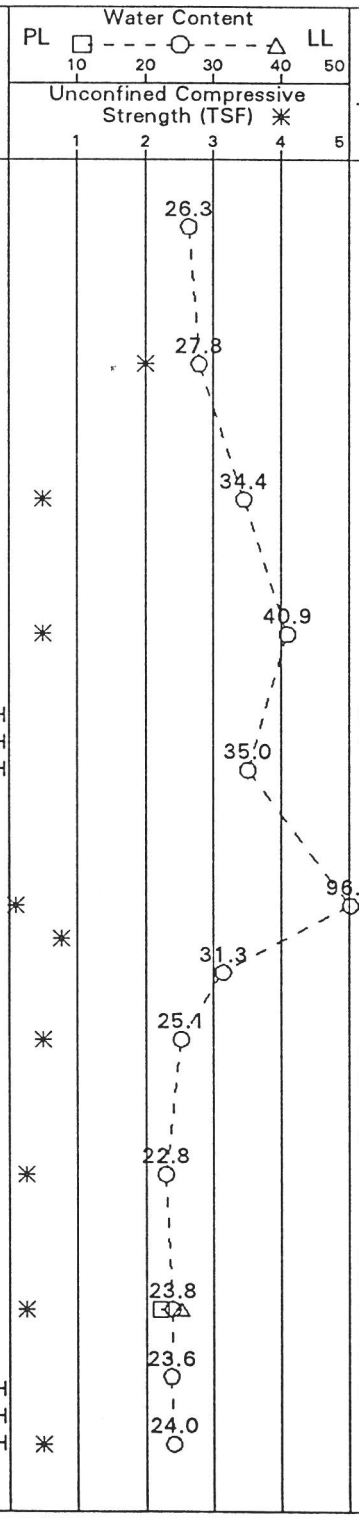
WATER LEVEL (ft.)
▽ **14.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER CB-4 SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill-Hydrogeo. Invest. - 496B
LOCATION N 5,240.9 E 2,490.4

LOGGED BY KRR
GROUND ELEVATION 525.1

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
525.1	0.0		Dark gray silty clay, trace coarse to fine sand, roots present, trace organics, stiff, medium plasticity, wet, fill CL	AU-1 0.0-2.0		
				SS-2 2.0-4.0 12"R	3 3 4 4	
521.1	4.0		Dark gray to black organic silty clay, trace fine sand, soft, medium to high plasticity, wet to saturated, fill OL/OH	SS-3 4.0-6.0 "R	1 2 3 4	
				SS-4 6.0-8.0 10"R	1 2 2 2	
			Wood fragments in SS-4			
			Wood fragments in SS-5	SS-5 8.0-10.0 4"R	WOH WOH WOH 2	SS-5 driven on wood.
			Wood fragments in SS-6A	SS-6AB 10.0-12.0 10"R	1 1 1 1	
513.3	11.8		Gray silty clay to clayey silt, trace fine sand, soft to medium stiff, low to medium plasticity, wet CL/CL-ML	SS-7 12.0-14.0 24"R	1 1 1 1	Sample slipped from tube. Obtained a jar sample.
				3T-8 14.0-16.0 10"R		
				3T-9 16.0-18.0 24"R		3T-9: LL = 25 PL = 22 PI = 3 Dry dens. = 103pcf k = 4.3 E-07 cm/s
				SS-10 18.0-20.0 24"R	WOH WOH WOH 2	
505.1	20.0		1" fine sand lense at 19.5'			



DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 4-1/4" I.D. HSA.
DRILLING EQUIPMENT CME-55/ATV
DRILLING STARTED 8/3/92 ENDED 8/3/92

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **CB-4** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,240.9 E 2,490.4**

LOGGED BY **KRR**
GROUND ELEVATION **525.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
505.1	20.0		Gray silty clay to clayey silt, trace fine sand, soft, low to medium plasticity, wet. CL/CL-ML	SS-11 20.0-22.0 24"R	WOH WOH WOH 2	✳ ○ 23.9	Water was not encountered during drilling.
503.1	22.0		End of Boring at 22.0'.				Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/3/92** ENDED **8/3/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **CB-5** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,197.4 E 2,390.9**

LOGGED BY **KRR**
GROUND ELEVATION **523.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
523.4	0.0		Brown and dark gray silty clay, trace coarse to fine sand, medium stiff, low plasticity, moist CL	AU-1 0.0-2.0		18.7	
				SS-2 2.0-4.0 10"R	3 3 3 4	✳	
520.4	3.0		Brown silty clay, trace fine sand, medium stiff, medium plasticity, wet CL			20.8	
				SS-3 4.0-6.0 20"R	2 2 2 3	✳	
						24.0	
				SS-4 6.0-8.0 24"R	2 2 2 3	✳	
515.6	7.8					23.7	
515.2	8.2		Brown silty sand, loose, poorly graded, saturated SM	SS-5AB 8.0-10.0 24"R	2 2 2 2	✳	Water level at 8.0' during drilling.
			Brown, gray and olive silty clay, trace fine sand, stiff, medium plasticity, wet CL			26.3	
				SS-6AB 10.0-12.0 24"R	2 3 2 3	✳ 24.4	
512.4	11.0					✳ 28.2	
			Gray and olive silty clay, trace fine sand, stiff, medium to high plasticity, wet CL/CH				
511.4	12.0					✳ 38.9	
			Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	3T-7 12.0-14.0 24"R			
				SS-8 14.0-16.0 24"R	1 2 2 2	✳ 25.0	
507.4	16.0		End of Boring at 16.0'.				Borehole was tremie grouted using Volclay grout immediately after drilling completed.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/3/92** ENDED **8/3/92**

REMARKS

WATER LEVEL (ft.)
▽ **8.0'** during drilling.
▽ ~~No water level after drilling.~~
▽

PATRICK ENGINEERING INC.

BORING NUMBER **CB-6** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,079.8 E 2,367.5**

LOGGED BY **KRR**
GROUND ELEVATION **527.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
527.0	0.0		Dark gray silty clay, trace coarse to fine sand, roots present, low plasticity, moist	AU-1 0.0-2.0		16.7	
526.0	1.0		CL				
			Brown and dark gray silty clay, trace coarse to fine sand, very stiff, medium plasticity, wet to saturated	SS-2 2.0-4.0 18"R	4 5 6 5	18.4 ✳	
			CL				
			Dark gray and trace organics from 4.0'	SS-3 4.0-6.0 20"R	6 4 5 7	22.5 ✳	
				SS-4 6.0-8.0 8"R	3 2 4 4	34.0	
518.8	8.2						
518.0	9.0		Gray coarse to fine sand, trace fine gravel, little silt, trace coal, very loose, well graded, saturated	SS-5AB 8.0-10.0 18"R	2 1 1 1	✳ 24.4	Water level at 8.0' during drilling
			SM				
			Gray to light gray silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet	SS-6 10.0-12.0 24"R	WOH 1 1 1	✳ 25.0	
			CL				
			Trace organics and little fine sand in SS-5B	3T-7 12.0-14.0 24"R		✳ 26.4	3T-7: dry dens. = 99pcf qu = 1.4 tsf k = 5.3 E-7 cm/s
				SS-8 14.0-16.0 24"R	WOH 1 1 2	✳ 27.0	
				SS-9 16.0-18.0 24"R	WOH 1 1 1	✳ 25.1	
				SS-10 18.0-20.0 24"R	1 1 1 1	✳ 27.0	
507.0	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **8.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **CB-6** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,079.8 E 2,367.5**

LOGGED BY **KRR**
GROUND ELEVATION **527.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
507.0	20.0		Gray silty clay, trace coarse to fine sand, soft, medium plasticity, wet CL	3T-11 20.0-22.0 24"R		✳	
505.5	21.5		Gray silty clay to clayey silt, trace to little fine sand, soft, low plasticity, wet CL/CL-ML	SS-12 22.0-24.0 24"R	1 1 1 1	✳ 23.6	SS-12: LL = 23 PL = 20 PI = 3
				SS-13 24.0-26.0 24"R	1 1 1 2	✳ 21.9	
501.0	26.0		Gray clayey sand, some silt, very loose, poorly graded, saturated SC	SS-14 26.0-28.0 24"R	1 1 1 1	26.1	SS-14: Gravel = 0% Sand = 62% Silt or clay = 38%
499.0	28.0		Gray fine sand, some silt, loose, poorly graded, saturated SM	SS-15 28.0-30.0 24"R	2 3 4 4	14.6	
497.8	29.2		Gray coarse to fine sand, little fine gravel, little sand, loose, poorly graded, saturated SM	SS-16 30.0-32.0 24"R	6 6 8 8		
497.0	30.0		Gray fine sand, trace coarse to medium sand, trace silt, medium dense, poorly graded, saturated SP	SS-17 32.0-34.0 8"R	13 100+ /2"	11.3	
496.3	30.7		Gray coarse to fine sand, little fine gravel, trace silt, medium dense, well graded, saturated SW-SM				
494.5	32.5		Gray shale				
493.0	34.0		End of Boring at 34.0'.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **8.0'** during drilling
▽
▼

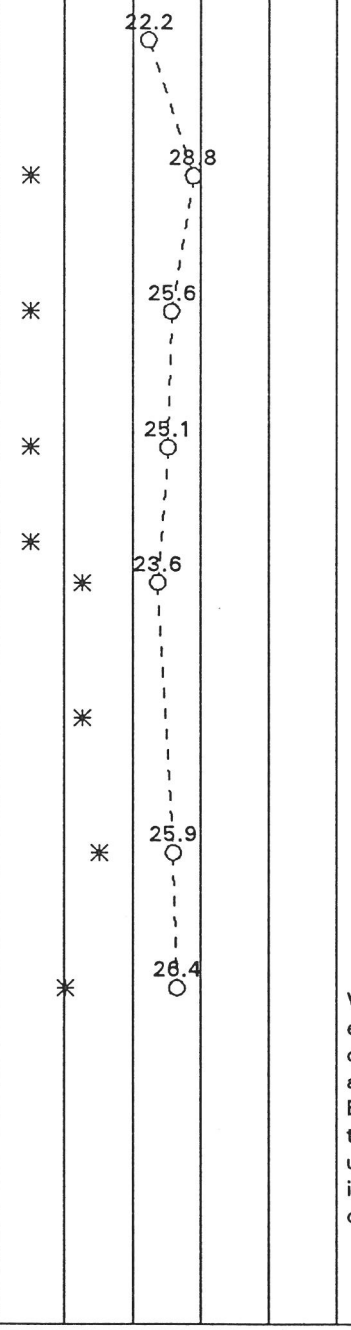
PATRICK ENGINEERING INC.

BORING NUMBER **CB-7** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,938.0 E 2,377.9**

LOGGED BY **KRR**
GROUND ELEVATION **523.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
523.8	0.0		Brown silty clay, trace fine sand, soft, medium plasticity, wet CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 10"R	2 3 3 2
			Mottled and tan from 4.0'	SS-3 4.0-6.0 12"R	1 2 3 4
				SS-4 6.0-8.0 20"R	2 2 3 3
515.0	8.8		Gray silty clay, trace coarse to fine sand, stiff, medium plasticity, wet CL	SS-5 8.0-10.0 24"R	WOH 2 3 2
			Trace fine sand only from 10.0'	3T-6 10.0-12.0 20"R	
				SS-7 12.0-14.0 24"R	WOH 1 2 2
				SS-8 14.0-16.0 24"R	1 1 2 2
507.8	16.0		End of Boring at 16.0'		

Water Content: PL □ ---○--- △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)



NOTES & TEST RESULTS

Water was not encountered during or immediately after drilling. Borehole was tremie grouted using Volcaly grout immediately after drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/13/92** ENDED **8/13/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **CB-8** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,862.3 E 2,564.6**

LOGGED BY **KRR**
GROUND ELEVATION **522.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
522.7	0.0		Dark gray to black silty organic clay to clay, trace fine sand, soft, medium to high plasticity, wet to saturated, fill OL/OH	AU-1 0.0-2.0		26.7 ○	
				SS-2 2.0-4.0 4"R	2 2 3 3	✳ 30.3 ○	
				SS-3 4.0-6.0 10"R	1 2 2 1	✳ □ - - ○ - - △ 31.4	SS-3: LL = 35 PL = 21 PI = 14
			Trace wood fragments in SS-4.	SS-4 6.0-8.0 4"R	1 1 1 2	29.0 ○	
				SS-5AB 8.0-10.0 20"R	1 1 1 2	27.7 ○ ✳ 28.1 ○	
512.9	9.8		Trace wood fragements in SS-5B. Gray clayey fine sand, trace coarse to medium sand, little silt, very loose, poorly graded, moist SC	SS-6 10.0-12.0 8"R	WOH 1 1 1	23.0 ○	
510.7	12.0		Gray silty fine sand, very loose, poorly graded, moist SM	SS-7 12.0-14.0 20"R	1 1 1 2	18.3 ○	
508.9	13.8		Gray silty clay to clayey silt, trace coarse to fine sand, soft, medium plasticity, wet CL/CL-ML	SS-8 14.0-16.0 20"R	1 1 1 2	✳ 22.0 ○	Tube pushed at 18.0' but no recovery. Then pushed split spoon. No water during drilling. W.L immediately after completion of drilling. Borehole was grouted using volclay grout immediately after drilling.
				SS-9 16.0-18.0 22"R	1 1 2 2	✳ 24.1 ○	
				SS-10 18.0-20.0 20"R		✳ 22.3 ○	
502.7	20.0		End of Boring at 20.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/12/92** ENDED **8/12/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **CB-9** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,799.8 E 2,736.2**

LOGGED BY **KRR**
GROUND ELEVATION **525.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
525.5	0.0		Brown and dark gray silty clay, trace coarse to fine sand, roots and wood fragments present, very stiff, medium plasticity, wet, fill — CL	AU-1 0.0-2.0		23.6	
				SS-2 2.0-4.0 14"R	7 8 11 12	22.1 ✳	
520.7	4.8		Dark gray to black organic silty clay, trace fine sand, wood fragments present, soft to medium stiff, medium plasticity, wet, fill. — OL	SS-3 4.0-6.0 6"R	4 3 2 3	✳ 29.9	SS-3: CEC = 18.1 meq/100g
				SS-4 6.0-8.0 6"R	2 3 3 4	✳ 30.7	
				SS-5 8.0-10.0 10"R	1 2 2 2	✳ 34.2	
				SS-6AB 10.0-12.0 20"R	1 1 1 1	29.2 ✳ 20.2	
513.9	11.6						
513.5	12.0		Gray fine sand, trace coarse to medium sand, little silt, trace shells, very loose, poorly graded, fill — SM	SS-7 12.0-14.0 24"R	WOH 1 2 2	✳ 29.9	
511.3	14.2		Dark gray organic silty clay, trace fine sand, wood fragments present, soft, medium plasticity, wet, saturated, fill — SC	SS-8 14.0-16.0 18"R	WOH 1 1 1	30.3	Water level at 14.0' during drilling,
509.3	16.2		Gray clayey fine sand, little silt, very loose, poorly graded, saturated, fill — SC	SS-9 16.0-18.0 20"R	WOH WOH 1 1	✳ 26.0	
			Gray silty clay, trace to little fine sand, soft, medium plasticity, wet — CL	SS-10 18.0-20.0 22"R	WOH 1 2 2	25.2	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55-ATV**
DRILLING STARTED **8/13/92** ENDED **8/13/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **14.0'** during drilling.
▼ **5.0'** after drilling.

PATRICK ENGINEERING INC.

BORING NUMBER **CB-9** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,799.8 E 2,736.2**

LOGGED BY **KRR**
GROUND ELEVATION **525.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
505.5	20.0		Gray silty clay, trace to little fine sand, medium stiff, medium plasticity, wet CL	3T-11 20.0-22.0 24"R		✳	
503.5	22.0		Gray silty fine sand, loose, poorly graded, saturated SM	SS-12 22.0-24.0 24"R	3 2 2 2		
501.0	24.5		Gray coarse to fine sand, trace fine gravel, trace to little silt, loose, poorly graded, saturated SP-SM/SM	SS-13 24.0-26.0 24"R	1 1 3 4	○ 21.8	Blow-in at 26.0'
499.5	26.0		End of Boring at 26.0'				Water level at 5.0' immediately after drilling.
							Borehole was tremie grouted using Volclay grout immediately after completion of drilling.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55-ATV**
DRILLING STARTED **8/13/92** ENDED **8/13/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **14.0'** during drilling
▽ **5.0'** after drilling
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-1D** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,806.1 E 1,973.1**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
553.4	0.0		Brown and dark gray silty clay, some coarse to fine sand, trace fine gravel, very stiff, medium plasticity, moist to wet, fill	AU-1 0.0-2.0		14.7	
			CL				
			Trace coarse to fine sand from 2.0'	SS-2 2.0-4.0 14"R	1 2 3 5	19.4	
			Trace roots in SS-2				
			Light olive at 4.0'	SS-3 4.0-6.0 16"R	2 4 6 10	20.5	
						21.6	
546.9	6.5			SS-4ABC 6.0-8.0 18"R	4 4 9 10	22.7	
			Dark gray to black organic silty clay, trace coarse to fine sand, very stiff, medium plasticity, moist to wet, fill				
			OL	SS-5 8.0-10.0 20"R	3 6 4 6	20.4	SS-5: LL = 46 PL = 20 PI = 26
				SS-6 10.0-12.0 20"R	3 3 5 6	25.3	
			Mottled at 11.0'				
541.4	12.0		Dark gray to black organic clay to silty clay, trace wood fragments and coal, trace fine sand, very stiff, medium plasticity, wet, fill	SS-7 12.0-14.0 24"R	2 3 5 6	26.1	
			OL				
				SS-8 14.0-16.0 24"R	3 3 5 6	22.3	
				SS-9 16.0-18.0 19"R	4 5 8 8	23.8	
535.2	18.2					22.7	
534.4	19.0		Brown silty clay, trace coarse to fine sand, trace fine gravel, stiff, medium plasticity, wet, fill	SS-10ABC 18.0-20.0 24"R	1 2 4 5	22.0	
533.4	20.0		CL			23.7	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/20/92** ENDED **7/20/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **39.0'** during driling
▼ **38.0'** after drilling
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-1D** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,806.1 E 1,973.1**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
533.4	20.0		Dark gray organic silty clay, trace wood and coal fragments, stiff, medium plasticity, wet OL	SS-11 20.0-22.0 24"R	2 7 7 9	20.7	
			Dark gray to black organic silty clay, trace fine sand, trace wood fragments and coal, stiff, medium plasticity, wet, fill OL	SS-12 22.0-24.0 24"R	2 6 7 9	22.0	
			Brownish-gray, olive and black from 23.0'-23.5' and 24.0'-25.0'	SS-13AB 24.0-26.0 24"R	3 3 6 7	20.9 26.4	
			Changed to dark gray and black from 25.0'	SS-14AB 26.0-28.0 24"R	4 5 8 8	31.6 35.7	
526.4	27.0		Trace wood fragments in SS-14A				
525.4	28.0		Black to dark gray organic silty clay to clayey silt, trace to little fine sand, medium dense, moist, fill OL/CL-ML	SS-15 28.0-30.0 2"R	1 2 3 3	72.8	Disturbed sample.
			Black to dark gray organic clay to silty clay, roots present, trace fine sand, medium stiff, medium to high plasticity, wet, fill OL/OH	SS-16 30.0-32.0 24"R	2 2 2 2	30.1	
				3T-17 32.0-34.0 24"R			
			Wood fragments in SS-18	SS-18 34.0-36.0 24"R	1 3 3 3	35.4	
			Wood fragments in SS-19	SS-19 36.0-38.0 24"R	1 2 3 3	25.8 22.4	
514.9	38.5			SS-20 38.0-40.0 24"R	2 2 2 3	31.2 22.4	Water level at 39.0' during drilling.
513.9	39.5		Brownish-gray and olive clayey sand, trace fine gravel, loose, well graded, saturated SC				
513.4	40.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/20/92** ENDED **7/20/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **39.0'** during drilling
▼ **38.0'** after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **P-1D** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,806.1 E 1,973.1**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
513.4	40.0		Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL	SS-21 40.0-42.0 24"R	WOH 1 2 2	
			Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL	SS-22 42.0-44.0 24"R	2 3 4 4	
			Gray and olive from 42.0'	SS-23 44.0-46.0 24"R	2 2 2 2	Ceased drilling on 07/20/92.
			Little fine sand in 3T-24	3T-24 46.0-48.0 24"R		Resumed drilling on 07/21/92.
504.4	49.0		Gray clayey fine sand, little silt, loose, poorly graded, saturated SC	SS-25AB 48.0-50.0 24"R	1 1 3 4	SS-25B: Gravel = 0% Sand = 64% Silt or clay = 36%
502.6	50.8		Gray fine sand, some silt, trace coarse to medium sand, trace coarse to fine gravel, very loose, poorly graded, saturated. SM	SS-26AB 50.0-52.0 24"R	WOH 2 2 1	
501.9	51.5					
501.4	52.0					
500.9	52.5		Gray coarse to fine sand, trace silt, very loose, poorly graded, saturated SP	SS-27 52.0-52.5 7"R	41 120/1"	Auger refusal at 52.5'.
			Gray Shale			Water level at 38.0' immediately after drilling.
			End of Boring at 52.5'.			Piezometer was installed after completion of drilling. See as-built diagram P-6D for more details.

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)
Plotted values: 22.1, 21.0, 21.8, 20.8, 11.2

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/20/92** ENDED **7/20/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **39.0'** during drilling
▽ **38.0'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-1S** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,821.3 E 1,973.9**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
553.4	0.0		Drilled to 36.0' without sampling (See Boring Log P-1D for soil conditions from 0' to 36')				

DRILLING CONTRACTOR **Patrick Drillling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/21/92** ENDED **7/21/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-1S** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,821.3 E 1,973.9**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
533.4	20.0		Drilled to 36.0' without sampling (See Boring Loag P-1D for soil conditions from 0' to 36')				
517.4	36.0		Black to dark gray organic silty clay, trace wood fragments, trace coarse to fine sand, stiff, medium plasticity, wet, fill	SS-1 36.0-38.0 20"R	2 3 3 5	✳ 32.2 ○	Water in SS-2A
515.4	38.0		OL				SS-2A: Gravel = 2% Sand = 65% Silt or clay = 33%
514.7	38.7		Gray clayey fine sand, little silt, trace coarse to medium sand, loose, poorly graded, saturated	SS-2AB 38.0-40.0 24"R	2 1 2 2	18.7 ○ ✳ 23.5 ○	
			SC				

DRILLING CONTRACTOR **Patrick Drillling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/21/92** ENDED **7/21/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-1S** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,821.3 E 1,973.9**

LOGGED BY **KRR**
GROUND ELEVATION **553.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
513.4	40.0		Gray silty clay, trace fine sand, medium stiff to stiff, medium plasticity, wet CL	SS-3 40.0-42.0 24"R	3 3 4 5	✳ at 1; ○ 22.6 at 2	No water immediately after drilling.
511.4	42.0		End of Boring at 42.0'.				Piezometer P-1S was installed after completion of drilling. Refer to as-built diagram P-1S for details.

DRILLING CONTRACTOR **Patrick Drillling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/21/92** ENDED **7/21/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER P-2D SHEET 1 OF 3
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill - Hydrogeo Invest. - 496B
LOCATION N 5,256.0 E 1,975.9

LOGGED BY KRR
GROUND ELEVATION 553.9

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL–LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) (1 2 3 4 5)	NOTES & TEST RESULTS
553.9	0.0		Brown coarse to fine sand, some silt, well graded, dry, fill	AU-1AB 0.0-2.0			
552.9	1.0		SM				
			Dark gray to black silty clay, trace fine sand, trace organics, very stiff, low plasticity, moist, fill	SS-2 2.0-4.0 10"R	5 7 9 9	4.8, 16.2, 16.7	
549.9	4.0		CL				
			Mottled brown silty clay, trace coarse to fine sand, trace fine gravel, very stiff, medium plasticity, wet, fill	SS-3 4.0-6.0 12"R	3 4 4 6	20.7	
			CL				
				SS-4 6.0-8.0 16"R	4 5 8 10	22.5	
545.9	8.0		Dark gray silty clay, trace organics, trace coarse to fine sand, very stiff, medium plasticity, wet, fill	SS-5 8.0-10.0 14"R	2 4 6 7	21.9	
			OL				
543.9	10.0		Brown and dark gray silty clay, trace coarse to fine sand, very stiff, medium plasticity, wet, fill	SS-6 10.0-12.0 14"R	3 4 6 7	20.5	
			CL				
			Brown and gray at 12.0'	SS-7 12.0-14.0 20"R	2 4 4 7	24.5	
			Mottled brown from 14.0'	3T-8 14.0-16.0 20"R			
				SS-9 16.0-18.0 22"R	4 6 9 10	23.9	
				SS-10 18.0-20.0 22"R	2 3 6 6	16.4	
			Dark brown from 19.0'				
533.9	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/22/92** ENDED **7/22/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **28.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-2D** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,256.0 E 1,975.9**

LOGGED BY **KRR**
GROUND ELEVATION **553.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
533.9	20.0		Dark brown silty clay, trace to little fine sand, very stiff, medium plasticity, wet, fill	SS-11 20.0-22.0 22"R	6 5 7 8
532.9	21.0		CL		
			Dark gray silty clay, trace fine sand, trace wood fragments and roots, very stiff, medium plasticity, wet, fill	SS-12 22.0-24.0 24"R	2 3 3 5
530.7	23.2		CL/OL		
			Changed to brownish-gray and olive at 22.0'	SS-13 24.0-26.0 24"R	2 2 2 3
			Dark brown silty clay, trace coarse to fine sand, soft to stiff, medium plasticity, wet, fill	SS-14 26.0-28.0 24"R	2 3 4 3
			CL	3T-15 28.0-30.0 24"R	
			Mottled from 25.0'	SS-16 30.0-32.0 24"R	WOH 1 1 1
			Mucky at 32.0'	SS-17 32.0-34.0 24"R	1 2 2 2
				SS-18 34.0-36.0 24"R	1 2 2 2
				SS-19ABC 36.0-38.0 24"R	2 2 3 4
516.9	37.0				
516.4	37.5		Brown clayey fine sand, some silt, loose, poorly graded, saturated	SS-20 38.0-40.0 24"R	2 2 3 6
			SC		
			Dark gray silty clay, trace coarse to fine sand, trace fine gravel, trace shells, very stiff, medium plasticity, wet		
513.9	40.0		CL		

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

Plotted values: 19.9, 22.7, 23.5, 26.4, 26.6, 25.9, 27.6, 25.6, 24.9, 24.0, 22.5, 27.3, 18.1

NOTES & TEST RESULTS

3T-15:
Dry Dens = 99.1 pcf
k = 7.3E-07 cm/s

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/22/92** ENDED **7/22/92**

REMARKS
WOH - Weight of Hammer.

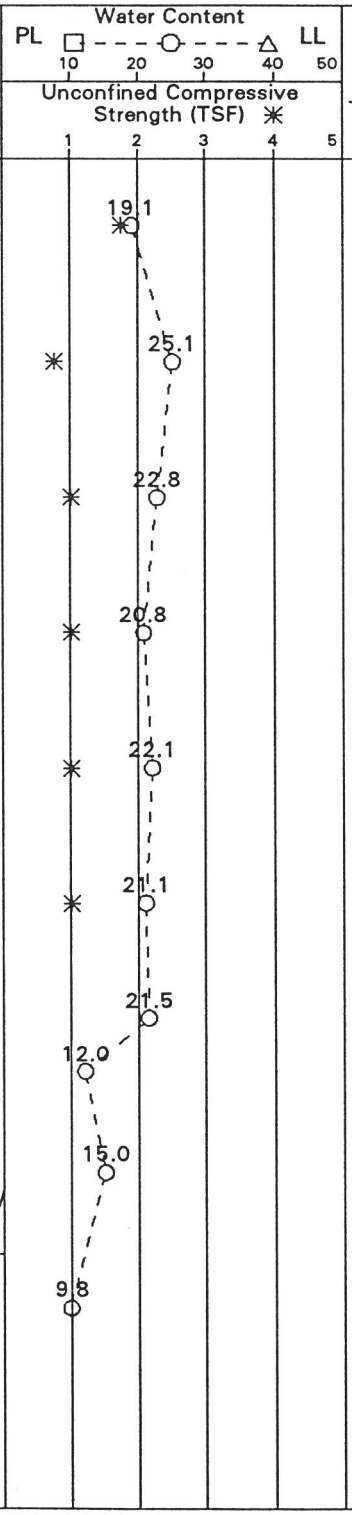
WATER LEVEL (ft.)
▽ **28.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-2D** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,226.0 E 1,975.9**

LOGGED BY **KRR**
GROUND ELEVATION **553.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
513.9	40.0		Dark gray to gray silty clay, trace fine sand, medium to stiff, medium plasticity, wet CL	SS-21 40.0-42.0 24"R	2 4 4 5
				SS-22 42.0-44.0 24"R	2 2 2 3
			Pockets of sand at 43.6' Light gray and olive from 44.0'	SS-23 44.0-46.0 24"R	WOH 1 3 3
				SS-24 46.0-48.0 24"R	2 1 4 4
			Little fine sand in SS-25 1" fine sand lense at 48.5	SS-25 48.0-50.0 24"R	1 2 2 2
				SS-26 50.0-52.0 24"R	WOH
			Gray and little to some fine sand from 51.0'	SS-27AB 52.0-54.0 24"R	5 8 8 8
500.9	53.0		Gray clayey coarse to fine sand, little silt, medium dense, well graded, saturated SC		
499.9	54.0			SS-28ABC 54.0-56.0 20"R	4 7 40 18+/ 2"
499.4	54.5		Gray coarse to fine sand, trace silt, medium dense, well graded, saturated SW		
498.9	55.0				
498.1	55.8		Gray coarse to fine sand, trace silt, medium dense, poorly graded, saturated SP/SP-SM		
497.4	56.5			SS-29 56.0-57.3 6"R	100+
			Gray clayey coarse to fine sand, little silt, trace coarse to fine gravel, dense, well graded, saturated SC		
			Gray siltstone/shale End of Boring at 56.5'.		



NOTES & TEST RESULTS

SS-28A:
Gravel = 3%
Sand = 91%
Silt or clay = 6%

Piezometer P-2D was installed after completion of drilling. Refer to as-built diagram P-2D for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/22/92** ENDED **7/22/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **28.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-2S** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,237.1 E 1,976.3**

LOGGED BY **KRR**
GROUND ELEVATION **533.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
533.9	0.0		Drilled to 26.0' without sampling. See Boring Log P-2D for details on soils encountered from 0' to 26'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/22/92** ENDED **7/22/92**

REMARKS

WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-2S** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,237.1 E 1,976.3**

LOGGED BY **KRR**
GROUND ELEVATION **533.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
513.9	20.0		Drilled to 26.0' without sampling. See Boring Log P-2d for details on soils encountered from 0' to 26'				
507.9	26.0		Brown silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-1 26.0-28.0 24"R	3 3 4 5	✳	25.9 ○
				SS-2 28.0-30.0 24"R	1 1 2 3	✳	27.0 ○
503.9	30.0		End of Boring at 30.0'.				

Piezometer P-2S was installed immediately after completion of drilling. Refer to as-built diagram P-2S for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/22/92** ENDED **7/22/92**

REMARKS

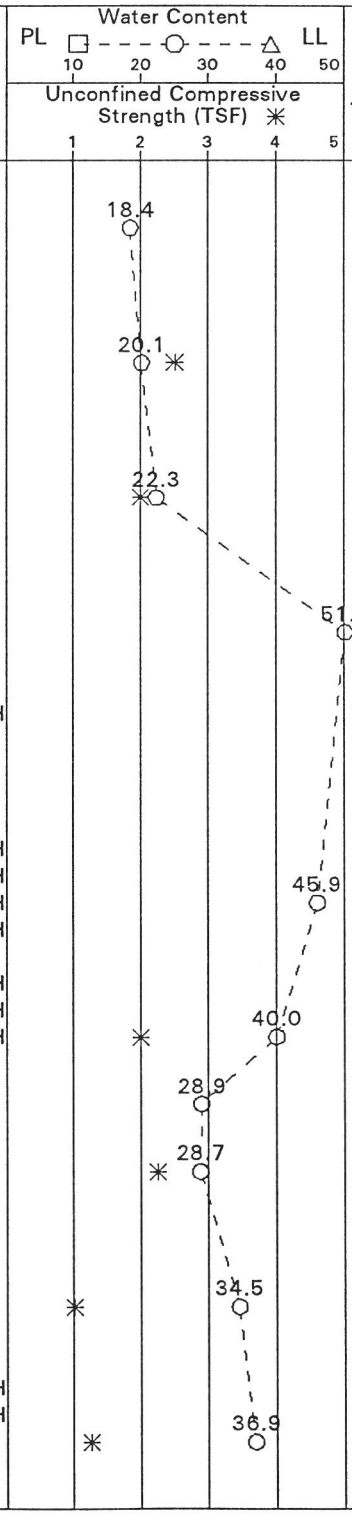
WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-3D** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,672.5 E 2,645.4**

LOGGED BY **KRR**
GROUND ELEVATION **530.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
530.5	0.0		Brownish gray silty clay, trace coarse to fine sand, very stiff, low plasticity, moist, fill CL	AU-1 0.0-2.0	
			Dark gray and brown at 3.0', trace fine gravel and coal in SS-2	SS-2 2.0-4.0 20"R	4 5 5 7
			Trace coal and organics in SS-3	SS-3 4.0-6.0 14"R	3 4 4 5
524.0	6.5		Dark gray to black clayey sand to silty sand, trace organics, loose, poorly graded, saturated, fill SC/SM	SS-4 6.0-8.0 8"R	2 2 3 3
				SS-5 8.0-10.0 0"R	WOH 1 1 1
				SS-6 10.0-12.0 6"R	WOH WOH WOH WOH
518.5	12.0		Dark gray organic silty clay, trace fine sand, wood fragments present, medium to high plasticity, wet to saturated, fill OL	SS-7AB 12.0-14.0 24"R	WOH WOH WOH 3
517.0	13.5		Brown to brownish gray silty clay, trace coarse to fine sand, stiff to very stiff, medium to high plasticity, wet CL	SS-8 14.0-16.0 24"R	2 3 3 4
				3T-9 16.0-18.0 20"R	
				SS-10 18.0-20.0 24"R	WOH WOH 2 2
510.5	20.0				



NOTES & TEST RESULTS

Water level at 8.0' while drilling.

3T-9:
Dry dens = 89.2 pcf
k = 1.3E-08 cm/s

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/17/92** ENDED **8/17/92**

REMARKS
WOH - Weight of Hammer.

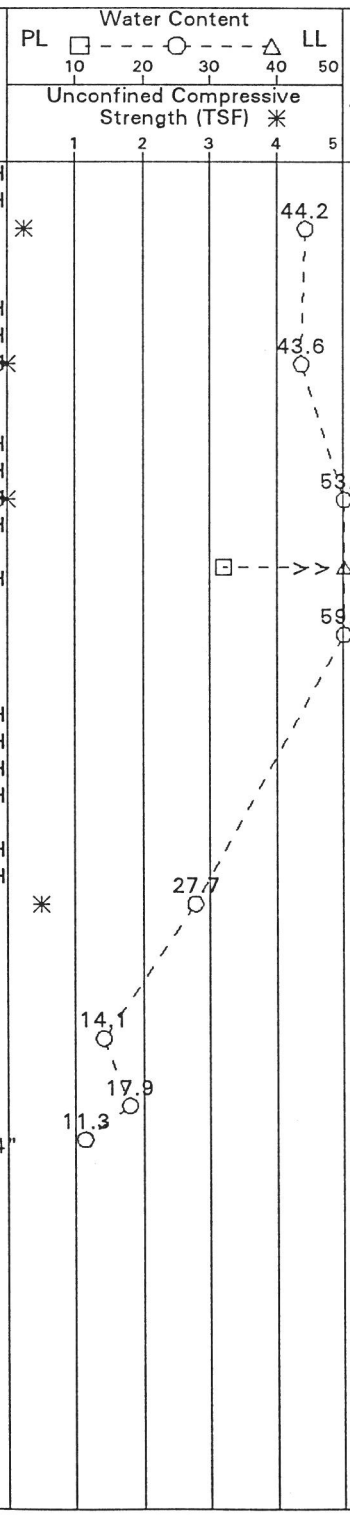
WATER LEVEL (ft.)
▽ **8.0'** during drilling
▽ **14.0'** after drilling
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-3D** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,672.5 E 2,645.4**

LOGGED BY **KRR**
GROUND ELEVATION **530.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
510.5	20.0		Brownish-gray silty clay, trace coarse to fine sand, stiff, medium plasticity, wet	SS-11 20.0-22.0 24"R	WOH WOH 2 2
509.5	21.0		CL		
			Gray clay to silty clay, trace fine sand, very soft to soft, mucky, medium to high plasticity, wet to saturated	SS-12 22.0-24.0 24"R	WOH WOH WOH 1
			CH	SS-13 24.0-26.0 24"R	WOH WOH WOH WOH
				SS-14 26.0-28.0 24"R	WOH 1 1 1
502.5	28.0		Gray silty fine sand, very loose, poorly graded, saturated	SS-15 28.0-30.0 24"R	WOH WOH WOH WOH
			SM		
500.5	30.0		Gray silty clay to clayey silt, little fine sand, soft, low to medium plasticity, wet	SS-16 30.0-32.0 24"R	WOH WOH 1 1
			CL/CL-ML		
498.5	32.0		Gray fine sand, little silt, very loose, poorly graded, saturated	SS-17AB 32.0-34.0 24"R	1 1 7 10
497.5	33.0		SM		
497.0	33.5		Gray coarse to fine sand and silt, trace coarse to fine gravel, medium dense, well graded, saturated	SS-18 34.0-35.0 10"R	42 100/4"
			SM		
495.5	35.0		Gray shale		
			End of Boring at 35.0'		



NOTES & TEST RESULTS

SS-13:
LL = 71
PL = 32
PI = 39

SS-17B:
Gravel = 0%
Sand = 58%
Silt or Clay = 42%

Water level at 14.0' immediately after drilling. Piezometer was installed immediatley after drilling. Refer to As-Built Diagram P-3D for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/17/92** ENDED **8/17/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **8.0'** during drilling
▼ **14.0'** after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **P-3S** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,672.5 E 2,651.4**

LOGGED BY **KRR**
GROUND ELEVATION **530.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
530.5	0.0		Drilled without sampling to 6.0'. Refer to Boring Log P-3D for soil conditions from 0' to 6'.				Soil conditions were consistent with soil conditions encountered in P-3D based on soil cuttings.
524.5	6.0		Brown and dark gray silty clay, trace coarse to fine sand, trace fine gravel, trace coal, trace organics, soft, medium plasticity, wet CL/OL	SS-1 6.0-8.0 14"R	2 2 2 3	23.8	
522.5	8.0		Dark gray to black silty sand, trace organics, wood fragments present, very loose, poorly graded, saturated SM	SS-2 8.0-10.0 24"R	WOH 1 1 1	58.5	
				SS-3 10.0-12.0 24"R	WOH WOH WOH WOH		SS-3: Gravel = 0% Sand = 55% Silt or Clay = 45%
518.5	12.0		Gray and olive silty clay, trace to fine sand, trace organics, soft, medium plasticity, wet CL	SS-4AB 12.0-14.0 24"R	WOH 1 2 3	27.3	Piezometer was installed immediately after drilling. Refer to As-Built Diagram P-3S for more details.
517.5	13.0						
516.5	14.0		Brown silty clay, trace to fine sand, stiff, medium plasticity, wet to saturated CL			36.8	
			End of Boring at 14.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/17/92** ENDED **8/17/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-4** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,156.3 E 2,880.7**

LOGGED BY **KRR**
GROUND ELEVATION **535.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
535.9	0.0		Brown silty clay, trace coarse to fine sand, stiff to very stiff, medium plasticity, wet CL	AU-1 0.0-2.0		25.3	
				SS-2 2.0-4.0 24"R	3 4 5 5	✳ 24.6	
			Mottled from 4.0'	SS-3 4.0-6.0 20"R	2 2 3 4	✳ 25.6	
				3T-4 6.0-8.0 24"R		✳	
				SS-5 8.0-10.0 24"R	3 3 4 8	20.5	
			Brownish gray at 10.0'	SS-6 10.0-12.0 24"R	3 4 6 10	25.5	
				SS-7 12.0-14.0 24"R	4 4 6 8	25.0 ✳	
				3T-8 14.0-16.0 24"R		✳	
519.9	16.0		Gray clay to silty clay, trace fine sand, very soft to stiff, medium to high plasticity, wet to saturated CH/CL	SS-9 16.0-18.0 24"R	4 4 5 7	✳ 33.9	
				SS-10 18.0-20.0 24"R	1 2 2 3	✳ ✳ 40.2	

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **34.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER P-4 SHEET 2 OF 3
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill - Hydrogeo Invest. - 496B
LOCATION N 5,156.3 E 2,880.7

LOGGED BY KRR
GROUND ELEVATION 535.9

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
515.9	20.0		Gray clay, trace silt, mucky, very soft, high plasticity, moist to wet CH	3T-11 20.0-22.0 24"R		✳	3T=11: Dry Dens.=78.2 pcf k=2.9 E-08cm/s
			Very mucky at 22.0'	SS-12 22.0-24.0 24"R	WOH WOH WOH ✳ 1	50.4	
				SS-13 24.0-26.0 24"R	WOH WOH WOH ✳ 2	34.4	
			Silty clay lenses at 26.0'	SS-14 26.0-28.0 24"R	WOH WOH WOH ✳ 1	46.6	
				SS-15 28.0-30.0 24"R	WOH WOH 1 ✳ 1	52.6	
				SS-16 30.0-32.0 24"R	WOH WOH WOH ✳ 1	52.6 □ - - - → △	SS-16: LL = 67 PL = 30 PI = 37
				SS-17 32.0-34.0 24"R	WOH WOH WOH ✳ 1	52.6	
501.9	34.0		Gray coarse to fine sand, some fine gravel, trace silt, trace coal, medium dense to dense, poorly graded, saturated SW-SM	SS-18 34.0-36.0 24"R	WOH 6 11 27		Water level at 34.0' during drilling.
				SS-19 36.0-38.0 24"R	7 8 7 7		Blow-in 36.0' washed off with water. SS-19: Gravel = 23% Sand = 69% Silt or Clay = 8%
				SS-20 38.0-40.0 24"R	8 7 7 8		

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **34.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-4** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,156.3 E 2,880.7**

LOGGED BY **KRR**
GROUND ELEVATION **535.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
495.9	40.0		Gray coarse to fine sand, some fine gravel, trace silt, medium dense, well graded, saturated SW-SM	SS-21 40.0-42.0 24"R	6 7 8 8	○ 15.1	Piezometer was installed immediately after completion of drilling. Refer to as-built diagram P-4 for more details.
493.6	42.3		Gray shale, soft	SS-22 42.0-43.0 10"R	11 100 +/4"		
492.9	43.0		End of Boring at 43.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer.

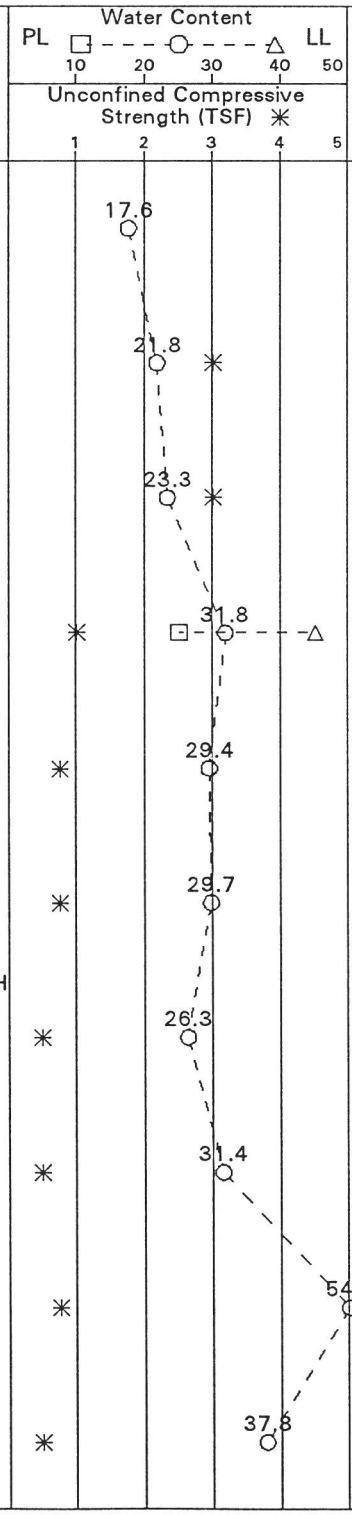
WATER LEVEL (ft.)
▽ **34.0'** during drilling
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-5D** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,516.7 E 2,885.0**

LOGGED BY **KRR**
GROUND ELEVATION **534.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
534.9	0.0		Brown silty clay, trace fine sand, soft, low plasticity, moist, fill CL	AU-1 0.0-2.0	
532.4	2.5		Dark gray to black organic silty clay, trace coarse to fine sand, trace roots, soft to very soft, medium to high plasticity, wet to saturated, fill OL	SS-2 2.0-4.0 20"R	3 4 6 9
				SS-3 4.0-6.0 24"R	3 6 11 12
				SS-4 6.0-8.0 24"R	3 4 5 5
				SS-5 8.0-10.0 24"R	2 3 2 4
				SS-6 10.0-12.0 24"R	2 3 3 2
			Changed from organic silty clay to organic clayey silt from 12.0'.	SS-7 12.0-14.0 24"R	WOH 2 3 2
				SS-8 14.0-16.0 22"R	1 2 2 3
			Wood fragments in SS-9	SS-9 16.0-18.0 24"R	2 2 2 3
				SS-10 18.0-20.0 18"R	1 1 2 2
514.9	20.0				



NOTES & TEST RESULTS

SS-4:
LL = 45
PL = 25
PI = 20

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer.

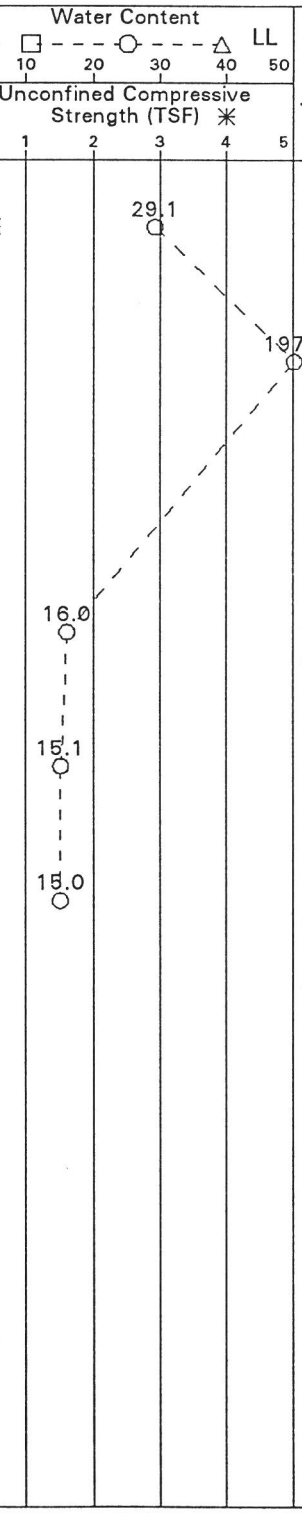
WATER LEVEL (ft.)
▽ **22.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-5D** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,516.7 E 2,885.0**

LOGGED BY **KRR**
GROUND ELEVATION **534.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
514.9	20.0		Dark gray to black organic silty clay, trace coarse to fine sand, soft, medium to high plasticity, wet to saturated, fill OL	SS-11 20.0-22.0 24"R	2 2 3 4
512.9	22.0		Little coarse to fine sand, trace fine gravel and wood fragments present in SS-11	SS-12AB 22.0-24.0 24"R	WOH 1 1 1
			Gray fine sand, little to some silt, very loose, poorly graded, saturated SM		
			Wood in SS-12B	SS-13 24.0-26.0 24"R	WOH 1 3 2
509.9	25.0		Gray coarse to fine sand, some fine gravel, little silt, loose, well graded, saturated SM	SS-14AB 26.0-28.0 24"R	1 3 5 6
507.6	27.3		Gray shale, soft	SS-15 28.0-30.0 20"R	10 12 14 15
				SS-16 30.0-32.0 22"R	16 18 22 26
502.9	32.0		End of Boring at 32.0'		



NOTES & TEST RESULTS

Water level at 22.0' during drilling.

SS-14A
Gravel = 29%
Sand = 54%
Silt or clay = 17%

Piezometer was installed immediately after completion of drilling. Refer to As-Built Diagram P-5D for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **22.0'** during drilling
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-5S** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,510.7 E 2,887.0**

LOGGED BY **KRR**
GROUND ELEVATION **534.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
534.9	0.0		Drilled to 8.0' without sampling. Refer to Boring Log P-5D for soil conditions from 0.0' to 8.0'.				Soil conditions are consistent with soil conditions encountered in P-5D based on soil cuttings.
526.9	8.0		Dark gray to black organic silty clay, trace fine sand, soft, medium to high plasticity, wet to saturated, fill OL	SS-1 8.0-10.0 10"R	2 2 2 3	✳ at 2 TSF	3T-2: Dry den. = 95.2 pcf k = 7.6 E-08 cm/s
				3T-2 10.0-12.0 16"R		✳ at 2 TSF; ○ at 3 TSF (26.0); ○ at 4 TSF (35.2)	
522.9	12.0		End of Boring at 12.0'				No water was found during or immediately after drilling. Piezometer was constructed immediately after drilling. Refer to As-Built Diagram P-5S for more details.

DRILLING CONTRACTOR **Patrick Engineering**
DRILLING METHOD **3-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/16/92** ENDED **8/16/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **P-6D** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,717.0 E 2,186.8**

LOGGED BY **KRR**
GROUND ELEVATION **524.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
524.8	0.0		Brown silty clay, trace to little fine sand, soft, medium plasticity, wet CL	AU-1 0.0-2.0		22.2	
			Mottled at 2.0'	SS-2 2.0-4.0 18"R	2 1 2 3	✳ 21.2	
				SS-3 4.0-6.0 20"R	1 1 2 2	✳ 21.7	
518.3	6.5			SS-4AB 6.0-8.0 18"R	1 2 2 2	✳ 22.0 25.4	Water level at 6.0' during drilling.
517.3	7.5		Brown, clayey, fine sand, little to some silt, loose, poorly graded, saturated SC				
			Brown mottled silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-5 8.0-10.0 10"R	1 1 2 2	✳ 21.7	Wood fragments in SS-5.
514.8	10.0		Gray silty clay, trace fine sand, soft to medium stiff, medium plasticity, wet CL	SS-6 10.0-12.0 20"R	3 1 1 1	✳ 29.8	
				SS-7 12.0-14.0 20"R	2 2 2 2	✳ 28.3	
				SS-8 14.0-16.0 22"R	1 2 4 3	✳ 24.1	
				SS-9 16.0-18.0 24"R	2 2 2 2	✳ 24.7	
				3T-10 18.0-20.0 24"R		✳	
504.8	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/12/92** ENDED **8/12/92**

REMARKS
WOH = Weight of Hammer

WATER LEVEL (ft.)
▽ **6.0'** during drilling
▽ **1.0'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-6D** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,717.0 E 2,186.8**

LOGGED BY **KRR**
GROUND ELEVATION **524.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
504.8	20.0		Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-11 20.0-22.0 24"R	1 2 2 1	✳ 23.3	
501.8	23.0		Little fine sand in SS-12	SS-12 22.0-24.0 24"R	WOH 1 2 1	✳ 22.7	
			Gray clayey silt, trace fine sand, loose, wet to saturated CL-ML/ML	SS-13 24.0-26.0 24"R	2 3 4 4	18.3	
				SS-14AB 26.0-28.0 24"R	4 4 7 10	19.5 15.9	
497.3	27.5						
496.8	28.0		Gray fine sand, trace coarse to medium sand, some silt, medium dense, poorly graded, saturated SM	SS-15 28.0-30.0 24"R	7 7 18 9	14.6	
			Gray coarse to fine sand, trace coarse to fine gravel, some silt, medium dense, well graded, saturated SM	SS-16AB 30.0-32.0 22"R	13 16 17 100 +	13.2 16.9	Water level at 1.0' immediately after drilling. Piezometer was installed immediatley after completion of drilling. Refer to As-Built Diagram P-6D for more information.
493.3	31.5						
492.8	32.0		Gray shale				
			End of Boring at 32.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/12/92** ENDED **8/12/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **6.0'** during drilling.
▼ **1.0'** after drilling.

PATRICK ENGINEERING INC.

BORING NUMBER **P-6S** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,725.7 E 2,191.4**

LOGGED BY **KRR**
GROUND ELEVATION **524.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL 10 20 30 40 LL 50 / Unconfined Compressive Strength (TSF) 1 2 3 4 5	NOTES & TEST RESULTS
524.9	0.0		Drilled to 4.0' without sampling. Refer to Boring Log P-6D for soil conditions from 0.0' to 4.0'.				Brown silty clay based on soil cuttings up to 4.0'.
520.9	4.0		Brown silty clay, trace to little fine sand, medium stiff, medium plasticity, wet CL	3T-1 4.0-6.0 14"R		✳	SS-2A: Gravel = 0% Sand = 14% Silt or clay = 86%
518.4	6.5		Gray clayey fine sand, some silt, loose, poorly graded, saturated SC	SS-2AB 6.0-8.0 24"R	2 1 1 2	✳ 23.4 22.6	Water level at 7.0' during drilling
515.4	9.5		Brown and tan silty clay to clayey silt, little fine sand, soft to medium stiff, medium plasticity, wet CL/CL-ML	SS-3AB 8.0-10.0 20"R	2 2 1 2	✳ 28.2 21.0	Water level at 3.0' immediately after drilling. Piezometer was installed immediately after completion of drilling. Refer to As-Built Diagram P-6S for more details.
514.9	10.0		2" fine sand lense at 8.5'			27.6	
			Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL				
			End of Boring at 10.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/12/92** ENDED **8/12/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **7.0'** during drilling.
▼ **3.0'** after drilling.

PATRICK ENGINEERING INC.

BORING NUMBER **P-6R** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,719.5 E 2,175.7**

LOGGED BY **KRR**
GROUND ELEVATION **524.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
524.8	0.0		Drilled to top of bedrock at 32.5 feet without sampling. Refer to Boring Log P-6D for soil conditions above top of bedrock.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/5/92** ENDED **8/6/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-6R** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,719.5 E 2,175.7**

LOGGED BY **KRR**
GROUND ELEVATION **524.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
504.8	20.0		Drilled to top of bedrock at 32.5 feet without sampling. Refer to Boring Log P-6D for soil conditions above top of bedrock.				Ceased drilling at 32.5' on 8/5/92. Switched to PQ coring and cored on 8/6/92.
492.3	32.5		Gray shale, massive, excellent	PQ-1 32.5-38.5 72"R			RQD = 100%
				PQ-2 38.5-42.5 48"R			RQD = 100%

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/5/92** ENDED **8/6/92**

REMARKS

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **P-6R** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,719.5 E 2,175.7**

LOGGED BY **KRR**
GROUND ELEVATION **524.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
484.8	40.0		Gray shale, massive, excellent				
482.3	42.5		End of Boring at 42.5'.				Piezometer P-6R was installed immediately after completion of drilling. Refer to as-built diagram P-6R for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **8/5/92** ENDED **8/6/92**

REMARKS

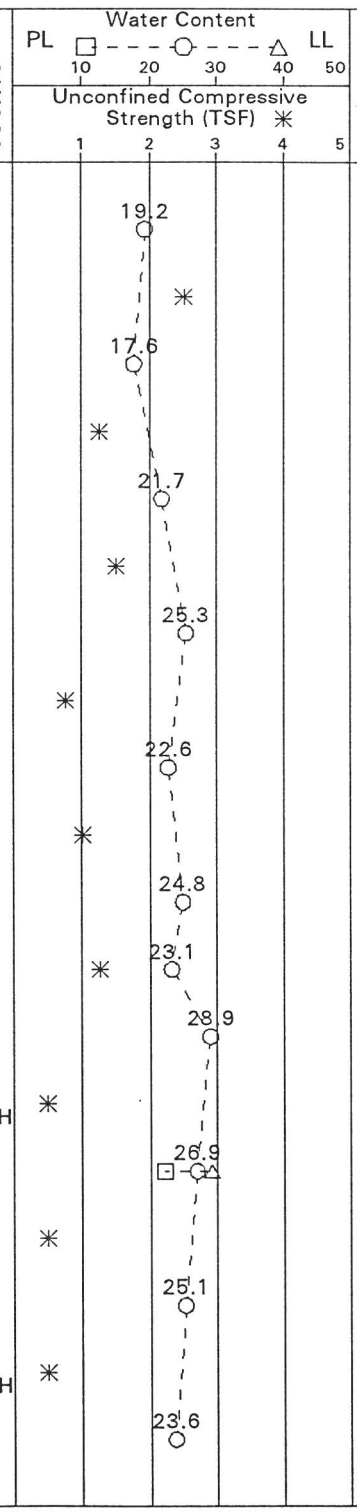
WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-7D** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,342.8 E 2,432.5**

LOGGED BY **KRR**
GROUND ELEVATION **526.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
526.5	0.0		Brown silty clay, trace fine sand, stiff to very stiff, medium plasticity, wet CL	AU-1 0.0-2.0		
			Mottled from 2.0'.	SS-2 2.0-4.0 24"R	3 3 4 5	SS-3: LL=33 PL=19 PI=14
				SS-3 4.0-6.0 24"R	2 3 4 4	
				SS-4 6.0-8.0 24"R	5 5 5 6	SS-4: CEC = 16.5 meq/100g
				3T-5 8.0-10.0 24"R		3T-5: Dry dens=101pcf k=2.0 E-07 cm/s
				SS-6AB 10.0-12.0 24"R	2 1 2 2	SS-6B: Gravel = 0% Sand = 52% Silt or Clay = 48%
515.0	11.5					
514.5	12.0		Brown clayey fine sand, little silt, loose, poorly graded, moist SC			
			Gray silty clay, trace fine sand, soft to stiff, low to medium plasticity, wet CL	SS-7 12.0-14.0 24"R	2 2 3 3	
				SS-8 14.0-16.0 24"R	WOH 1 1 1	SS-8: LL = 29 PL = 22 PI = 7
				SS-9 16.0-18.0 24"R	2 2 2 2	
				SS-10 18.0-20.0 24"R	WOH 1 1 1	
506.5	20.0					



DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/30/92** ENDED **7/30/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **20.0'** during drilling.

PATRICK ENGINEERING INC.

BORING NUMBER **P-7D** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 5,342.8 E 2,432.5**

LOGGED BY **KRR**
GROUND ELEVATION **526.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
506.5	20.0		Gray silty clay, trace fine sand, soft, low to medium plasticity, wet CL	SS-11 20.0-22.0 24"R	WOH 1 1 1
				3T-12 22.0-24.0 20"R	
502.5	24.0		Gray clayey silt, some fine sand, loose, poorly graded, saturated CL-ML	SS-13 24.0-26.0 24"R	1 2 1 3
500.5	26.0		Gray fine sand, some silt, very loose, poorly graded, saturated SM	SS-14 26.0-28.0 18"R	1 1 1 1
				SS-15 28.0-30.0 20"R	1 1 1 3
497.5	29.0		Gray coarse to fine sand, some coarse to fine gravel, little silt, loose, well graded, saturated SW-SM/SM	SS-16 30.0-32.0 20"R	2 2 4 11
495.5	31.0		Gray silty clay to clay, trace fine sand, very stiff to hard, medium to high plasticity, moist CL/CH	SS-17 32.0-34.0 15"R	28 115 200+ /3"
494.0	32.5				
493.3	33.2		Gray shale		
			End of Boring at 33.2'.		

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

22.6
24.3
19.1
10.9
24.2
13.3

NOTES & TEST RESULTS

Water level at 20.0' during drilling.

SS-13:
Gravel = 0%
Sand = 34%
Silt or Clay = 66%

SS-16:
Gravel = 27%
Sand = 59%
Silt or clay = 14%

Piezometer was installed immediately after completion of drilling.
Refer to as-built diagram P-7D for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/30/92** ENDED **7/30/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **20.0'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-7S** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,337.1 E 2,426.3**

LOGGED BY **KRR**
GROUND ELEVATION **526.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL 10 20 30 40 LL 50 / Unconfined Compressive Strength (TSF) 1 2 3 4 5	NOTES & TEST RESULTS
526.3	0.0		Drilled to 10.0' without sampling. Refer to Boring Log P-7D for soil conditions from 0' to 10'.				Soil conditions from 0' to 10' were consistent with the soil conditions encountered at P-7D based on soil cuttings.
516.3	10.0						
515.8	10.5		Brown mottled silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-1ABC 10.0-12.0 24"R	3 2 2 2		SS-1B: Gravel = 0% Sand = 43% Silt or Clay = 57%
515.3	11.0		Gray clayey silt to clayey sand, loose, poorly graded, moist SC/ML				
514.1	12.2		Brown silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-2 12.0-14.0 24"R	2 3 3 4	24.3 28.1	Water was not encountered during or immediately after drilling.
512.3	14.0		Gray silty clay, medium fine sand, stiff, medium plasticity, wet CL				Piezometer P-6S was installed after completion of drilling. Refer to as-built diagram P-6S for details.
			End of Boring at 14.0'.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/30/92** ENDED **7/30/92**

REMARKS

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **P-7M** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,337.0 E 2,432.8**

LOGGED BY **KRR**
GROUND ELEVATION **525.9**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
525.9	0.0		Drilled to 16.0' without sampling. Refer to Boring Log P-6D for soil conditions from 0' to 16'.				Soil conditions from 0' to 16' were consistent with soil conditions in P-6D based on soil cuttings.
							3T-2: Dry dens. = 101 pcf k = 1.5 E-07 cm/s
509.9	16.0		Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-1 16.0-18.0 24"R	1 1 1 2	✳	Piezometer P-7M was installed immediately after completion of drilling. Refer to as-built diagram P-7M for more details.
				3T-2 18.0-20.0 20"R		✳	
505.9	20.0		End of Boring at 20.0'.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/30/92** ENDED **7/30/92**

REMARKS

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **P-7R** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,326.9 E 2,424.5**

LOGGED BY **KRR**
GROUND ELEVATION **525.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
525.4	0.0		Drilled to 34.0' (auger refusal) without sampling. Refer to Boring Log P-7D for soil conditions from 0' to 34'.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/31/92** ENDED **7/31/92**

REMARKS

WATER LEVEL (ft.)
▽
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-7R** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,326.9 E 2,424.5**

LOGGED BY **KRR**
GROUND ELEVATION **525.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
505.4	20.0		Drilled to 34.0' (auger refusal) without sampling. Refer to Boring Log P-7D for soil conditions from 0' to 34'.				Soil conditions are consistent with soil conditions encountered at P-7D based on soil cuttings.
491.4	34.0		Gray shale, massive, strongly cemented, excellent	PQ-1 34.0-39.0 60"R			Changed to PQ coring from 34.0'. RQD = 100%
				PQ-2 39.0-44.0			

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/31/92** ENDED **7/31/92**

REMARKS

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **P-7R** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 5,326.9 E 2,424.5**

LOGGED BY **KRR**
GROUND ELEVATION **525.4**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
485.4	40.0		Gray shale, massive, stongly cemented, excellent	60"R			RQD = 100%
481.4	44.0		End of Boring at 44.0'.				Piezometer was installed immediately after completion of coring. Refer to as-built diagram P-7R for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **6-1/4" I.D. HSA.**
DRILLING EQUIPMENT **CME-55/ATV**
DRILLING STARTED **7/31/92** ENDED **7/31/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER P-8D SHEET 1 OF 2
CLIENT City of Springfield CWLP
PROJECT & NO. FGDS Landfill - Hydrogeo Invest. - 496B
LOCATION N 4,939.7 E 2,482.7

LOGGED BY KRR
GROUND ELEVATION 522.7

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
522.7	0.0		Brown to brownish-gray silty clay, trace fine sand, stiff, medium plasticity, wet, fill CL	AU-1 0.0-2.0	
				SS-2 2.0-4.0 8"R	2 2 3 3
518.2	4.5		Dark gray organic silty clay, trace fine sand, wood fragments present, soft, medium plasticity, wet to saturated, fill OL	SS-3 4.0-6.0 10"R	1 2 1 1
			Chunks of wood in SS-4	SS-4 6.0-8.0 8"R	1 2 1 1
514.7	8.0		Gray silty sand, little clay, loose, poorly graded, moist, fill SM	SS-5AB 8.0-10.0 24"R	2 1 2 2
513.9	8.8				
513.2	9.5		Gray clayey sand, little silt, loose, poorly graded, moist, fill SC	SS-6 10.0-12.0 20"R	1 1 1 2
			Dark gray to black organic silty clay, wood fragments present, medium to high plasticity, wet to saturated, fill OL/OH		
510.5	12.2		Chunks of wood and lenses of sand in SS-6	SS-7 12.0-14.0 24"R	1 1 2 1
			Gray silty clay, trace fine sand, soft, medium plasticity, wet CL	SS-8 14.0-16.0 24"R	1 1 1 1
				3T-9 16.0-18.0 20"R	
				3T-10 18.0-20.0 0"R	

Water Content: PL □ - - - ○ - - - △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

25.3 19.3 34.3 25.3 21.3 27.7 47.3 24.8 22.8

495.7

NOTES & TEST RESULTS

SS-4:
LL = 37
PL = 21
PI = 16

Water level at 10.0' during drilling.

Tube pushed but no recovery.

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 4-1/4" I.D. HSA
DRILLING EQUIPMENT CME 55/ATV
DRILLING STARTED 8/13/92 ENDED 8/13/92

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ 10.0' during drilling
▼ 8.0' after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **P-8D** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,939.7 E 2,482.7**

LOGGED BY **KRR**
GROUND ELEVATION **522.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
502.7	20.0		Gray silty clay, trace to little fine sand, soft, medium plasticity, wet CL	3T-11 20.0-22.0 14"R			
500.7	22.0						
499.9	22.8		Gray silty fine sand, very loose, poorly graded, saturated SM	SS-12AB 22.0-24.0 24"R	WOH WOH WOH		SS-13A Gravel = 34% Sand = 50% Silt or clay = 16%
			Gray coarse to fine sand and coarse to fine gravel, little silt, medium dense, well graded, saturated SW-SM/SM	SS-13AB 24.0-26.0 24"R	13 15 16 12 12	✳	
497.2	25.5		Gray silty clay, trace fine sand, hard, medium to high plasticity, moist CL/CH			18.2 ○	
496.2	26.5			SS-14 26.0-27.0 6"R	10 28 100+	/ 13.8 ○	
495.7	27.0		Gray shale				Auger refusal at 27'.
			End of Boring at 27.0'				Water level at 8.0' immediately after drillling. Piezometer was installed immediately after drilling. Refer to As-Built Diagram P-8D for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/13/92** ENDED **8/13/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽ **10.0'** during drilling
▽ **8.0'** after drilling
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-8S** SHEET **1** OF **1**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,933.1 E 2,486.0**

LOGGED BY **KRR**
GROUND ELEVATION **522.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
522.8	0.0		Drilled to 6.0' without sampling. Refer to Boring Log P-8D for soil conditions from 0.0' to 6.0'.				
516.8	6.0		Dark gray silty clay, trace fine sand, organics and wood fragments present, soft, medium plasticity, wet, fill OL	SS-1 6.0-8.0 8"R	1 1 1 1	27.6	
514.8	8.0		Gray clayey fine sand, little silt, loose, poorly graded, moist SC	SS-2AB 8.0-10.0 14"R	1 2 1 2	24.7	
513.3	9.5		Dark gray to black organic silty clay, trace medium to fine sand, wood fragments present, soft, medium plasticity, wet to saturated OL	SS-3 10.0-12.0 16"R	1 2 1 2	89.0 41.0	SS-3: Gravel = 0% Sand = 12% Silt or clay = 26%
510.8	12.0		End of Boring at 12.0'				Water was not encountered during or immediately after drilling. Piezometer was installed after completion of drilling. Refer to As-Built Diagram P-8S for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 55/ATV**
DRILLING STARTED **8/13/92** ENDED **8/13/92**

REMARKS
WOH - Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-9D** SHEET **1** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,446.3 E 2,422.4**

LOGGED BY **KRR**
GROUND ELEVATION **553.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
553.2	0.0		Dark brown silty clay, trace fine sand, low plasticity, moist, fill CL				
551.7	1.5		Brown mottled silty clay, trace fine sand, stiff to hard, medium plasticity, moist, fill CL	AU-1 1.0-1.5		14.8	
			Trace sulfur waste	SS-2 2.0-4.0 12"R	2 2 4 5	18.1	
				SS-3 4.0-6.0 12"R	3 4 5 7	16.1	
				SS-4 6.0-8.0 18"R	3 3 6 10	15.1	
				SS-5 8.0-10.0 18"R	4 5 6 8	15.4	
				SS-6 10.0-12.0 18"R	4 5 5 7	20.5	
				SS-7 12.0-14.0 4"R	2 2 4 5	16.4	
				3T-8 14.0-16.0 24"R			3T-8: Dry Den. = 102.3 pcf k = 1.3 E-08cm/s
				SS-9 16.0-18.0 18"R	3 4 6 6	19.5	
534.7	18.5		Dark brown silty clay, trace fine sand, very stiff, low to medium plasticity, moist to wet, fill	SS-10 18.0-20.0 12"R	4 6 9 11	18.7	
533.2	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **8/18/92** ENDED **8/18/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **32.5'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-9D** SHEET **2** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,446.3 E 2,422.4**

LOGGED BY **KRR**
GROUND ELEVATION **553.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
533.2	20.0		CL Dark brown silty clay, trace fine sand, very stiff, low to medium plasticity, moist to wet, fill	SS-11 20.0-22.0 18"R	7 10 14 16	19.9	
			CL	SS-12 22.0-24.0 12"R	3 3 4 8	22.7	
				SS-13 24.0-26.0 18"R	2 3 4 6	22.7	
526.9	26.3		Brown silty clay, trace fine sand, stiff, medium plasticity, wet CL	SS-14 26.0-28.0 20"R	2 3 3 4	25.0	
				SS-15 28.0-30.0 24"R	1 2k 2 3	24.6	
				SS-16 30.0-32.0 24"R	WOH WOH 2 3	25.6	
521.2	32.0		Gray silty clay, trace fine sand, medium stiff, medium plasticity, wet CL	SS-17 32.0-34.0 24"R	WOH WOH WOH WOH	28.3	Water level at 32.5 feet during drilling.
				SS-18 34.0-36.0 24"R	WOH WOH 1 3	23.9	
				SS-19 36.0-38.0 24"R	WOH WOH 1 2	26.9	
514.6	38.6			SS-20 38.0-40.0 24"R	WOH WOH 2 3	32.8	
513.2	40.0		Gray silty clay to clayey silt and medium to fine sand, very soft, medium plasticity, wet				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **8/18/92** ENDED **8/18/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **32.5'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-9D** SHEET **3** OF **3**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,446.3 E 2,422.4**

LOGGED BY **KRR**
GROUND ELEVATION **553.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
513.2	40.0		CL/CL-ML Gray silty clay to clayey silt and medium to fine sand, very soft, medium plasticity, wet CL/CL-ML	SS-21 40.0-42.0 24"R	WOH WOH WOH 1		
				SS-22 42.0-44.0 24"R	WOH WOH WOH ✳ 2		
				SS-23 44.0-46.0 24"R	WOH WOH WOH WOH		
				SS-24 46.0-48.0 24"R	WOH WOH WOH ✳ WOH		
				SS-25 48.0-50.0 24"R	WOH WOH 1 ✳ 2		
				SS-26 50.0-52.0 24"R	WOH WOH WOH ✳ WOH		SS-26: Gravel = 0% Sand = 33% Silt = 53% Clay = 14%
501.2	52.0		Gray silty sand, very loose, poorly graded, saturated SM	SS-27 52.0-54.0 24"R	WOH WOH 1 1		SS-29A Gravel = 22% Sand = 66% Silt or clay = 12%
497.9	55.3		Gray coarse to fine sand, some fine gravel, very loose to loose, poorly graded, saturated SP-SM/SM	SS-28 54.0-56.0 24"R	WOH WOH 3 7		
495.7	57.5			SS-29AB 56.0-58.0 24"R	6 9 17 32		
495.2	58.0		Gray shale				
			End of Boring at 58.0'				Piezometer was installed immediately after drilling. Refer to As-built Diagram P-9D for details.

Water Content: 29.6, 24.1, 24.9, 24.4, 21.3, 20.7

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **8/18/92** ENDED **8/18/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽ **32.5'** during drilling.
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **P-9S** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill-Hydrogeo. Invest. - 496B**
LOCATION **N 4,447.3 E 2,415.6**

LOGGED BY **SAS**
GROUND ELEVATION **553.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
553.1	0.0		Drilled to 34' without sampling. See Boring Log P-9D for details.				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" ID HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **8/19/92** ENDED **8/19/92**

REMARKS

WATER LEVEL (ft.)
▽
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **P-9S** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,447.3 E 2,415.6**

LOGGED BY **KRR**
GROUND ELEVATION **553.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
533.1	20.0						
519.1	34.0		Gray silty clay, trace fine sand, medium stiff, medium plasticity, moist to wet CL	3T-1 34.0-36.0 24"R		✳ at 1; ○ 24.1 at 2	3T-1: Dry dens. = 101.2 pcf k = 1.3 E-06cm/s
516.1	37.0		End of Boring at 37.0'				

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" ID HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **8/19/92** ENDED **8/19/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **LP-1** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,326.5 E 2,639.9**

LOGGED BY **JSV**
GROUND ELEVATION **564.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
564.6	0.0		Intermediate cover, fill				
563.6	1.0		Light gray sludge, fill				
551.6	13.0		Gray sludge, dry, fill	SS-1 13.0-15.0 19"R	4 7 8 6		
544.6	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **LP-1** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,326.5 E 2,639.9**

LOGGED BY **JSV**
GROUND ELEVATION **564.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
544.6	20.0		Dark gray sludge, saturated, fill	SS-2 20.0-22.0 22"R	6 10 7 6		
542.6	22.0		End of Boring at 22.0'.				Leachate piezometer was installed immediatelt after completion of drilling. Refer to as-built diagram LP-1 for details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **LP-2** SHEET **1** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,257.5 E 2,365.8**

LOGGED BY **JSV**
GROUND ELEVATION **568.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
568.2	0.0		Intermediate cover, fill				
567.2	1.0		Light gray sludge, fill				
555.2	13.0		Light gray sludge, dry, fill	SS-1 13.0-15.0 15"R	9 34 60		
548.2	20.0						

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER **LP-2** SHEET **2** OF **2**
CLIENT **City of Springfield CWLP**
PROJECT & NO. **FGDS Landfill - Hydrogeo Invest. - 496B**
LOCATION **N 4,257.5 E 2,365.8**

LOGGED BY **JSV**
GROUND ELEVATION **568.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
548.2	20.0		Light gray sludge, saturated, fill	SS-2 20.0-22.0 19"R	9 10 12 26		
546.2	22.0		End of Boring at 22.0'.				Leachate piezometer was installed immediately after completion of drilling. Refer to as-built diagram LP-2 for more details.

DRILLING CONTRACTOR **Patrick Drilling**
DRILLING METHOD **4-1/4" I.D. HSA**
DRILLING EQUIPMENT **CME-75/ATV**
DRILLING STARTED **7/25/92** ENDED **7/25/92**

REMARKS
WOH = Weight of Hammer.

WATER LEVEL (ft.)
▽
▽
▽

PROJECT CWLP Flue Gas Desulfurization Sludge Landfill

CLIENT Andrews Environmental Engineers, Inc.

BORING SA-3 DATE STARTED 11-16-93 DATE COMPLETED 11-16-93 JOB L - 30,161

ELEVATIONS

GROUND SURFACE 529.3

END OF BORING 498.6

N 5560 E 2673

WATER TABLE

▼ WHILE DRILLING Drilling Fluid

▽ AT END OF BORING Drilling Fluid

▼ 24 HOURS Grouted

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	C_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	1	SS	10	22.1	3.0*				Very stiff dark gray and dark brown silty CLAY, little sand (CL)
					2.15				
	2	SS	9	23.5	2.0*				
							4.0	525.3	
	3	SS	3	30.1		92.8			Soft to medium stiff gray silty CLAY, little sand, occasional wood fragments (CL)
	4	SS	3	30.5	0.50				
	A			27.9	0.55	95.0			LL = 28 PI = 13
	5	PS	Push				9.0	520.3	
	B			24.7	—				Loose gray silty SAND (SM)
							10.0	519.3	
	6	SS	2	28.0	0.21				Soft gray silty CLAY, little sand (CL)
	7	SS	2	25.2					
							14.0	515.3	
	8	SS	2	52.7		67.5			Soft gray ORGANIC CLAY, some sand, organic matter, wood fragments (OL)
				54.8	0.40				LL = 30 PI = 13
	9	PS	Push		–	71.4			
	A			84.9	–	49.0	16.0	513.3	
				–	–				Loose gray fine SAND, peat lens at 16.5' (SP)
	10B	SS	2	46.6	0.75*		17.5	511.8	
	C			31.6	–				Medium stiff ORGANIC CLAY, wood fragments (OL)
	A			39.6	0.37		19.0	510.3	
	11	SS	2						Soft gray silty CLAY, little sand (CL)
	B			22.8			20.5	508.8	
	12	SS	3						Loose gray silty SAND, (clayey at top) (SM)
	13	SS	3	22.8					
	14	SS	2						
							27.0	502.3	
	15	SS	17						
	A								Medium dense gray fine SAND (SP)
	16	SS	30/0.2						
	B						30.5	498.8	SHALE

End of Boring at 30.7'. Sampler refusal

Cu Indicates Undrained Shear Strength - ksf
x.xx = 1/2 Unconfined compressive strength;
x.xx = Torvane Value.
x.x* = 1/2 Calibrated Penetrometer Value

DRILL RIG NO. AEX

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light & Power - FGDS Development
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 5,612.8
Easting: 2,130.0

Weather:
Sunny, calm, warm (hi-80's)

Boring Information:
Boring No.: B96-1
Well No.: G-121
Surf. Elev.: 553.80

Depth Information:
Total: 56.70
Auger: 56.70
Core: 0.00

Dates:
Start: 05/17/96
Finish: 05/17/96

Drilling Contractor:
Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
0								Stickup = 1.87'				
								Concrete		Brown with 35% dark brown mottles, dry, firm, silty CLAY, trace sand.		
	1			5.0		2.25 / 2.25 / 3.25						550
5						2.75 / 3.00						
	2			5.0		2.25 / 2.75 / 3.00				Brown, moist, firm, silty CLAY, trace sand.		
										Dark brown with 10% greenish blue mottles, moist, firm, silty CLAY, trace sand.		
										Brown, moist, firm, silty CLAY, trace sand.		545
10										Dark brown, moist, firm, silty CLAY, trace sand.		
	3			5.0		4.5+ / 3.00 / 2.00 / 3.50		High-solids Bentonite Grout				540
15										Black, moist, firm, silty CLAY, trace sand.		
										Dark brown, moist, firm, silty CLAY, trace sand.		
	4			5.0		3.25 / 4.25 / 4.00 / 3.00				Very dark brown, dry, friable, silty CLAY, trace sand, trace roots. *topsoil*		535
20										Brown, moist, firm, silty CLAY, trace sand.		

NOTES:

Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light & Power - FGDS Development
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 5,612.8
Easting: 2,130.0

Weather:
Sunny, calm, warm (hi-80's)

Boring Information:
Boring No.: B96-1
Well No.: G-121
Surf. Elev.: 553.80

Depth Information:
Total: 56.70
Auger: 56.70
Core: 0.00

Dates:
Start: 05/17/96
Finish: 05/17/96

Drilling Contractor:
Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
						3.00		High-solids Bentonite Grout		Brown, moist, firm, silty CLAY, trace sand.		
	5			5.0		2.00						
						1.75				Brown with 40% greenish brown mottles, moist, soft, silty CLAY, trace sand, trace roots.		
						0.75				Greenish brown, very moist, soft, silty CLAY, trace sand.		530
25						<.50				Light brown with 15% greenish brown mottles, very moist, firm, silty CLAY, trace sand.		
	6			5.0		2.50						
						2.50						
						2.00						
						2.50						525
30						2.00						
						<.50				Light brown with 20% light gray mottles, very moist, soft, silty CLAY, trace sand.		
	7			5.0		1.25						
						1.75						
						3.75				Gray, moist, hard, silty CLAY, with sand.		520
35						1.00				Very dark brown, moist, soft, clayey SILT, trace plant fragments.		
						<.50				Dark gray, moist, soft, clayey SILT, trace plant fragements. *more clayey with depth*		
	8			5.0		<.50				Very dark gray, moist, soft, silty CLAY, with very fine-grained sand.		
						<.50						515
40						<.50						

NOTES:

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light & Power - FGDS Development
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 5,612.8
Easting: 2,130.0

Weather:
Sunny, calm, warm (hi-80's)

Boring Information:
Boring No.: B96-1
Well No.: G-121
Surf. Elev.: 553.80

Depth Information:
Total: 56.70
Auger: 56.70
Core: 0.00

Dates:
Start: 05/17/96
Finish: 05/17/96

Drilling Contractor:
Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tst)	% Moisture
	9			5.0		1.00	
						1.00	
						1.50	
						1.00	
45						1.00	
	10			5.0		1.00	
						1.00	
50							
	11		11A	5.0			
55					31		
	12			1.6	34 35 48	4.5+	
60							

Borehole Detail: High-solids Bentonite Grout; Bentonite Chips; Filter Pack

Lithology	Description/*Comments*	USC	Elev. (MSL)
	Very dark gray, moist, soft, silty CLAY, with very fine-grained sand.		
	Very dark gray, very moist, soft to firm, sandy/silty CLAY.		510
	Very dark gray, very moist, soft, silty CLAY, with very fine-grained sand.		
	Very dark gray, very moist, soft to firm, sandy/silty CLAY.		505
	Very dark gray, wet, soft, clayey, very fine- to fine-grained SAND.		
	Dark gray, very moist, soft, sandy CLAY.		
	Gray, wet, fine- to medium-grained SAND.		500
	Gray, moist, firm, clayey SILT, with sand and rock fragments.		
	Gray, dry, hard, SHALE.		
	Gray, dry, hard, fine-grained, SANDSTONE.		495

End of Boring = 56.70 feet (497.10' MSL)

NOTES:

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G121

Site Name: City Water, Light & Power – FGDS Development Borehole #: B96-1

Coordinates: X 2,481.5 Y 5,615.9 (or) Latitude: ° ' " Longitude: ° ' "

Surveyed by: Richard Davis, City Water, Light & Power IL Registration #: LS-2098

Drilling Contractor: AE Exploration Corp. Consulting Firm: Andrews Environmental Engineering, Inc.

Driller: A. Wiesenhofer Geologist: R. Hasenyager

Drilling Method: Hollow stem auger Logged by: R. Hasenyager

Drilling Fluids (type): n/a Report Form Completed by: R. Hasenyager

Date Well Started: 05/16/96 Date Well Finished: 05/16/96 Date Form Completed: 07/12/96

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: High-solids bentonite

Installation method: Tremi

Setting time: 24+ hours

Type of bentonite seal – ***Ganular***, Pellet, Slurry (circle one)

Installation method: Free drop

Setting time: 70 minutes

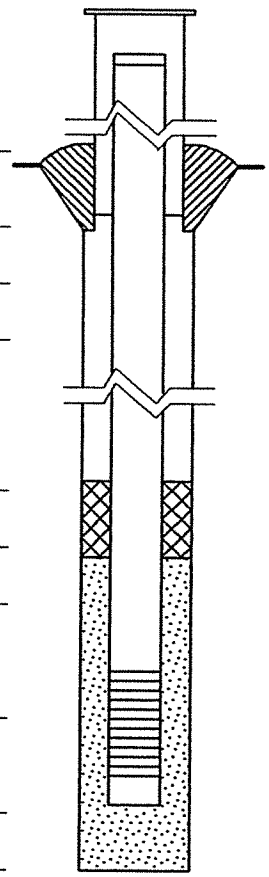
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)	
556.04	-2.24	Top of Protective Casing
555.67	-1.87	Top of Riser Pipe
553.80	.00	Ground Surface
552.30	1.50	Top of Annular Sealant
528.55	25.25	Static Water Level Measured on 5/24/96 (after completion)
506.60	47.20	Top of Seal
504.00	49.80	Top of Sandpack
501.93	51.87	Top of Screen
497.96	55.84	Bottom of Screen
496.86	56.94	Bottom of Well
497.10	56.70	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (–) values above GS

NOTES:

WELL CONSTRUCTION MATERIALS (circle one)

Protective Casing	SS304, SS316, PTFE, PVC or ***Other: Steel***
Riser Pipe Above W.T.	SS304, SS316, PTFE, ***PVC*** or Other:
Riser Pipe Below W.T.	SS304, SS316, PTFE, ***PVC*** or Other:
Screen	SS304, SS316, PTFE, ***PVC*** or Other:

(AE950315)

CASING MEASUREMENTS

Diameter of Borehole (in)	8.0
ID of Riser Pipe (in)	2.0
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	53.74
Bottom of Screen to End Cap (ft)	1.10
Screen Length [1st slot to last slot] (ft)	3.97
Total Length of Casing (ft)	58.81
Screen Slot Size‡	#10 (0.01")

‡Hand-slotted well screens are unacceptable.

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light & Power - FGDS Development
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 5,613.2
Easting: 2,305.1

Weather:
Sunny, calm, warm (hi-80's)

Boring Information:
Boring No.: B96-2
Well No.: G-122
Surf. Elev.: 552.70

Depth Information:
Total: 58.40
Auger: 58.40
Core: 0.00

Dates:
Start: 05/20/96
Finish: 05/20/96

Drilling Contractor:
Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: ▮ - Continuous Barrel ⊠ - Split Spoon ⧄ - Shelby Tube ▮ - Core ☐ - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
								Stickup = 1.74' Concrete		Brown, moist, firm, silty CLAY, trace sand.		
	1			4.7		3.50 3.00 3.00 4.5+				Very dark brown, moist, firm, silty CLAY, trace sand.		550
5						3.50 2.50				Brown, moist, hard to firm, silty CLAY, trace sand.		
	2			5.0		3.00 3.00 4.5+				Very dark brown with 40% brown mottles, moist, firm, silty CLAY, trace sand.		545
10						4.00 3.25				Brown, moist, firm, silty CLAY, trace sand.		
	3			5.0		2.25 2.50 1.25		High-solids Bentonite Grout		Dark brown with 50% brown mottles, moist, firm, silty CLAY, trace sand.		540
15						2.25 3.50				Very dark brown, firm, moist, silty CLAY, trace sand.		
	4			5.0		4.25 3.25				Brown, moist, soft, silty CLAY, trace sand.		
						3.00				Dark brown, moist, soft, silty CLAY, trace sand.		535
20	5					4.00				Very dark brown, dry, friable, clayey SILT, trace sand.		

NOTES:

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light & Power - FGDS Development
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 5,613.2
Easting: 2,305.1

Weather:
Sunny, calm, warm (hi-80's)

Boring Information:
Boring No.: B96-2
Well No.: G-122
Surf. Elev.: 552.70

Depth Information:
Total: 58.40
Auger: 58.40
Core: 0.00

Dates:
Start: 05/20/96
Finish: 05/20/96

Drilling Contractor:
Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Molsture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
						2.00		High-solids Bentonite Grout		Very dark brown, dry, friable, clayey SILT, trace sand.		
	5			5.0		2.50						
						3.00						530
						3.00						
25						2.75				Black, dry to slightly moist, friable, clayey SILT, trace sand.		
						2.25				Very dark brown, moist, firm to soft, silty CLAY, trace sand.		
	6			5.0		1.00						
						<.50						525
						<.50				Dark brown, very moist, soft, silty CLAY, trace sand.		
30						<.50						
						<.50				Brownish gray, very moist, soft, silty CLAY, trace sand.		
	7			5.0		<.50						
						1.00						520
						1.00				Gray with 25% reddish brown mottles, very moist, soft, silty CLAY, trace sand.		
35						1.00						
						1.50						
	8			5.0		<.50						
						1.25						515
						1.25						
40	9					1.00						

NOTES:

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

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Dates:
Start: 05/20/96
Finish: 05/20/96

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Name: AE Explortation Corp.
City: Springfield, IL
Equipment: CME 75 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personnel:
Geologist: R. Hasenyager
Driller: A. Wiesenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										Gray with 25% reddish brown mottles, very moist, soft, silty CLAY, trace sand.		
						1.25				Gray, very moist, soft, silty CLAY, with very fine-grained sand.		
	9			5.0		1.00						
						1.00				Gray, very moist, soft, sandy CLAY.		510
										Dark gray, moist, soft to firm, silty CLAY.		
						<.50				Gray, wet, soft, silty, very fine- to fine-grained SAND.		
45										Dark gray, moinst, soft, silty CLAY, trace sand.		
						1.50						
	10			5.0		2.00				Gray, moist, soft, clayey SILT, trace sand.		
			10A							Gray, wet, soft, fossiliferous, fine- to medium-grained SAND. *Small (3-7 mm.)* Bivalvia *and* Gastropoda.		505
50						1.00				Gray, very moist, soft, clayey SILT, trace sand.		
	11			3.0						Gray, wet, soft, fine- to very coarse-grained, SAND, with shell fragments.		
			11A							Gray, very moist, soft, clayey SILT, with sand.		
										Bluish gray, moist, soft, silty CLAY.		
										Gray, wet, soft, fine- to very coarse-grained, SAND, with shell fragments.		500
										Gray, wet, soft, fine- to medium-grained, SAND, with shell fragments.		
55					3							
	12		12A	2.0	10							
					12							
					10							
	13			1.7	0					Dark gray, moist, soft, silty CLAY, trace sand.		495
					3							
					4							
					23							
										Gray, dry, hard, SHALE.		
60										*End of Boring = 58.70 feet (494.00' MSL)*		

Borehole Detail: Bentonite Chips; High-solids Bentonite Grout; Filter Pack and/or Formation Sand

NOTES:

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G122

Site Name: City Water, Light & Power – FGDS Development Borehole #: B96-2

Coordinates: X 2,305.1 Y 5,613.2 (or) Latitude: ° ' " Longitude: ° ' "

Surveyed by: Richard Davis, City Water, Light & Power IL Registration #: LS-2098

Drilling Contractor: AE Exploration Corp. Consulting Firm: Andrews Environmental Engineering, Inc.

Driller: A. Wiesenhofer Geologist: R. Hasenyager

Drilling Method: Hollow stem auger Logged by: R. Hasenyager

Drilling Fluids (type): n/a Report Form Completed by: R. Hasenyager

Date Well Started: 05/20/96 Date Well Finished: 05/20/96 Date Form Completed: 07/12/96

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: High-solids bentonite

Installation method: Tremi

Setting time: 24+ hours

Type of bentonite seal – *Ganular*, Pellet, Slurry (circle one)

Installation method: Free drop

Setting time: 45 minutes

Type of sand pack: Quartz sand/formation sand

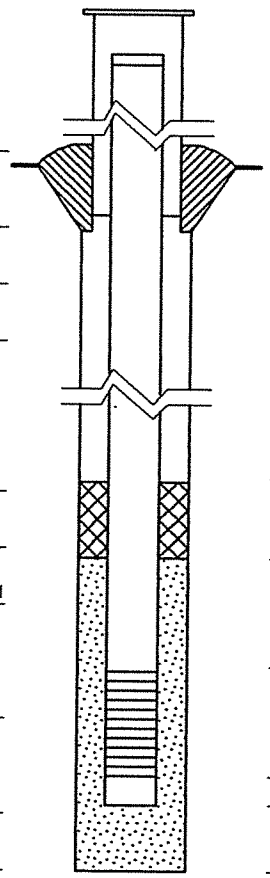
Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a

NOTES:



ELEVATION (MSL)*	DEPTH (BGS)*	(0.01 ft)
554.87	-2.17	Top of Protective Casing
554.44	-1.74	Top of Riser Pipe
552.70	.00	Ground Surface
551.70	1.00	Top of Annular Sealant
526.51	26.19	Static Water Level Measured on 5/24/96 (after completion)
507.20	45.50	Top of Seal
504.90	47.80	Top of Sandpack
501.07	51.63	Top of Screen
497.10	55.60	Bottom of Screen
496.00	56.70	Bottom of Well
494.00	58.70	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
◆ positive (+) values below GS, negitive (–) values above GS

CASING MEASUREMENTS

Diameter of Borehole (in)	8.0
ID of Riser Pipe (in)	2.0
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	53.37
Bottom of Screen to End Cap (ft)	1.10
Screen Length [1st slot to last slot] (ft)	3.97
Total Length of Casing (ft)	58.44
Screen Slot Size‡	#10 (0.01")

‡Hand-slotted well screens are unacceptable.

WELL CONSTRUCTION MATERIALS (circle one)

Protective Casing	SS304, SS316, PTFE, PVC or *Other: Steel*
Riser Pipe Above W.T.	SS304, SS316, PTFE, *PVC* or Other:
Riser Pipe Below W.T.	SS304, SS316, PTFE, *PVC* or Other:
Screen	SS304, SS316, PTFE, *PVC* or Other:

(AE950315)

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-1

Project Name: FGD Sludge Facility - South Cell Date of Boring: May 30, 1989

Site: Springfield, Illinois Project No.: 020-95020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE		1-AU	--	--	--	--	
Silty clay, trace sand, dark grey, stiff		2-SS	5	--	1.3	--	
	5	3-SS	4	--	1.0	--	
		4-SS	6	--	1.5	--	
	10	5-SS	5	--	0.8	--	
Silty clay, trace sand, light grey, firm to stiff		6-SS	4	--	0.8	--	
	15	7-SS	4	--	1.5	--	
		8-SS	4	--	1.0	--	
	20	9-SS	4	--	1.3	--	
End of boring							Dry upon completion

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-2

Project Name: FGD Sludge Facility - South Cell Date of Boring: May 30, 1989

Site: Springfield, Illinois Project No.: 020-95020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
		1-AU	--	--	--	--	
Silty clay, trace sand, grey, mottled brown, firm		2-SS	8	--	0.8	--	
	5	3-SS	9	--	1.8	--	
Silty clay, trace sand, grey, stiff		4-SS	7	--	1.8	--	
	10	5-SS	2	--	--	--	
		6-SS	4	--	1.5	--	
Clayey silt, trace sand, grey, stiff	15	7-SS	4	--	1.3	--	
		8-SS	6	--	1.3	--	▽ While drilling
	20	9-SS	7	--	1.5	--	
End of boring							

City Water Light and Power
June 12, 1989
Page seven of ten

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-3

Project Name: FGD Sludge Facility - South Cell Date of Boring: May 30, 1989

Site: Springfield, Illinois Project No.: 020-95020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, trace sand, grey, mottled brown, stiff		1-AU	--	--	--	--	
		2-SS	7	--	1.3	--	
	5	3-SS	4	--	1.5	--	
		4-SS	6	--	1.5	--	
	10	5-SS	4	--	1.3	--	
Clayey silt, trace sand, organics, grey, stiff		6-SS	5	--	0.8	--	
	15	7-SS	4	--	1.5	--	
		8-SS	5	--	1.0	--	While drilling ▽
	20	9-SS	4	--	1.3		
		10-SS	--	--	1.3	--	
	25	11-SS	9	--	--	--	
Sand, fine, some silt, grey, medium dense							*Note 1
Shale, grey, very stiff (weathered)	30	12-SS	50/6"	--	3.0	--	
End of boring							

*Note 1: Blow-in sand @27.5'

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-4

Project Name: FGD Sludge Facility - South Cell Date of Boring: May 30, 1989

Site: Springfield, Illinois Project No.: 020-95020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
		1-AU	--	--	--	--	
Silty clay, trace sand, organics, mottled brown, stiff		2-SS	4	--	1.7	--	
	5	3-SS	4	--	1.0	--	
		4-SS	7	--	2.0	--	
Silty clay, trace sand, dark grey, stiff	10	5-SS	11	--	2.5	--	
Silty clay, trace sand, mottled brown, very stiff							
		6-SS	7	--	1.0	--	While drilling ▽
Clayey silt, trace sand, grey, firm to stiff	15	7-SS	5	--	0.8	--	
		8-SS	9	--	1.5	--	
	20						
*Note 1		9-SS	7	--	--	--	
End of boring							

*Note 1: Silty sand, some gravel, slightly compact

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-6

Project Name: FGD Sludge Facility - South Cell Date of Boring: May 30, 1989

Site: Springfield, Illinois Project No.: 020-95020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, trace sand, brown, stiff		1-AU	--	--	--	--	
		2-SS	5	--	--	--	*Poor recovery on 2-SS
	5	3-SS	7	--	1.3	--	
		4-SS	8	--	1.5	--	
Silty clay, trace sand, mottled grey, stiff	10	5-SS	6	--	1.5	--	
		6-SS	6	--	1.0	--	
Clayey silt, trace sand, grey, stiff	15	7-SS	7	--	1.3	--	
		8-SS	7	--	1.8	--	▽ While drilling
	20	9-SS	9	--	1.8	--	

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-1

Project Name: Subsurface Exploration Date of Boring: September 28, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 525.36

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE						16	▽ 0 HR.
Clayey silt, trace sand, grey, mottled brown	5	1-SS (50%)				19	
						23	
	10	2-SS (20%)				16	
Silty clay, trace sand, gravel, some organics, dark brown, black	15	3-SS (10%)				19	
	20	4-SS (50%)				16	
		5-SS (40%0)				13	
Shale, grey							
End of Boring	25						

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-2

Project Name: Subsurface Exploration Date of Boring: September 28, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 525.28

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
*Note 1						14	
Silty clay, grey, mottled brown							
		1-SS (100%)				21	
Silty sand, fine to medium, brown	5					23	▽ 0 HR.
*Note 2							
		2-SS (50%)				25	
Silty sand, grey, brown	10	3-ST (30%)					
		4-SS (90%)					
Clayey silt, trace sand, grey	15	5-ST (100%)					
		6-SS (90%)				24	
	20					21	
		7-ST (80%)					
Sandy silt, grey							
		8-SS (90%)					
	25					18	
Shale, grey		9-SS (80%)					
	30						
End of Boring							

*Note 1: Silty clay, grey, mottled brown, some organics

*Note 2: 6.5'-6.8': Silt, grey, mottled brown
6.8'-7.0': Silty sand, brown, grey
7.0'-7.5': Clay, trace sand, brown, grey

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-3

Project Name: Subsurface Exploration Date of Boring: September 28, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 523.83

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, trace sand, grey, mottled brown						14	▽ 0 HR.
	5	1-SS (95%)				23	
						23	
		2-SS (90%)					
Silty dand, fine to medium, grey, brown	10					20	
Clayey silt, trace sand, gravel						25	
Sand, trace gravel, fine to coarse, grey		3-SS (10%)				18	
	15						
Sandy silt, grey							
		4-SS (90%)				19	
	20					20	
		5-SS (95%)				19	
Sand and gravel, fine to coarse, grey	25						
		6-SS (10%)					
	30						
End of Boring							

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-4

Project Name: Subsurface Exploration Date of Boring: September 29, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.61

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE						14	▽ 0 HR.
Silty clay with organics, black, dark brown	5	1-SS (5%)				23	
Silty clay, trace sand, grey, mottled brown		2-SS (90%)				22	
Silty clay to clayey silt, trace sand, grey	10						
	15	3-SS (90%)				21	
	20	4-SS (100%)				24	
Sand, fine, some silt, grey							
Silty clay, some sand, grey	25	5-SS (50%)				19	
		6-SS (30%)				12	
*Note 1							
End of Boring							

*Note 1: 27'-27.5' - Sand and gravel, grey
27.5'-28' - Shale, grey

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-5

Project Name: Subsurface Exploration Date of Boring: September 30, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 523.49

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Clayey silt, some organics, sand, brown, mottled grey	5	1-SS (80%)				19	
		2-ST (100%)				24	
	10	3-SS (95%)					
		4-ST (0%)					
Silty clay, trace sand, grey	15	5-SS (100%)				20	
		6-ST (0%)					
	20	7-SS (100%)				20	
		8-ST (0%)					
	25	9-SS (80%)					
Silty sand, grey		10-SS	28/52			9	
Sand with gravel, medium to coarse, grey		11-SS	35/42				
Shale, grey	30	12-SS	100/2"			9	
End of Boring							

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-6 (4' S. of 500+400)

Project Name: Subsurface Exploration Date of Boring: October 3, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.71

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, brown, black						17	
Silty clay, grey, mottled brown	5	1-SS (75%)				31	▽ 0 HR.
Silty clay, some organics, trace sand, grey	10	2-SS (50%)				27	
	15	3-SS (100%)				20	
	20	4-SS (75%)				24	
Sand, fine to medium, grey		5-SS (90%)					
Silty sand, fine to coarse, grey	25					22	
Shale, grey (Hard Drilling)							
End of Boring	30						

PSI A-100-9

NOTE:

Borings B-7 through B-10 were not drilled due to surface water and drill rig accessibility problems.

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-11

Project Name: Subsurface Exploration Date of Boring: September 29, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.49

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Clayey silt, some organics, black, dark brown						18	▽ 0 HR.
		1-SS (5%)				22	
	5						
Silty clay, trace sand, grey		2-SS (90%)					
	10					17	
		3-SS (100%)					
	15					19	
		4-SS (25%)					
	20					18	
Silty sand, grey		5-SS (15%)				22	
	25						
Sand with gravel, grey		6-SS	53/95-3"			21	
Shale, grey		7-SS				12	
End of Boring	30						

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-12 (Offset 36' west)

Project Name: Subsurface Exploration Date of Boring: October 3, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.22

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, trace sand, grey, brown							▽ 0 HR
Silty clay, trace sand, grey	5	1-SS (75%)				24	
		2-SS (100%)				26	
Silty clay, some organics, trace sand, gravel, grey	10	3-SS (100%)				25	
						21	
Silty clay to clayey silt, trace sand, grey	15	4-SS (50%)				23	
						21	
	20	5-SS (25%)				22	
						22	
	25					21	
Shale, grey		6-SS (50%)				9	
End of Boring	30						

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-13

Project Name: Subsurface Exploration Date of Boring: October 3, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.20

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay with organics, dark grey		1-SS (50%)				27	▽ 0 HR
	5	2-ST (50%)				37	
Silty clay, trace sand, grey		3-SS (25%)				38	
	10	4-ST (50%)				23	
Clayey silt with sand, fine, grey		5-SS (100%)				20	
	15	6-ST (60%)				27	
		7-SS (100%)				21	
	20	8-SS (40%)				18	
	25					21	
						17	
Shale, grey? (Hard Drilling)							
End of Boring							

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-14

Project Name: Subsurface Exploration Date of Boring: October 2, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.25

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, grey, mottled brown	5	1-SS (50%)				23	▽ 0 HR.
						20	
Silty clay to clayey silt, some sand, fine, grey	10	2-SS (15%)					▽ While Drilling
						18	
	15	3-SS (75%)				21	
	20	4-SS (75%)				19	
	25	5-SS (75%)				15	
Sand with gravel, fine to coarse, grey *Hard Drilling @28.5' (Shale?)		6-SS (80%)					
End of Boring	30						

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-15

Project Name: Subsurface Exploration Date of Boring: October 2, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 524.35

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, trace sand, grey, mottled brown						18	▽0 HR.
	5	1-SS (90%)					
		2-ST (100%)					
		3-SS (90%)				20	
	10					36	
		4-SS (100%)				25	
Silty clay to clayey silt, some sand, fine, grey	15					22	
		5-SS (100%)					
	20					21	
		6-SS (95%)				20	
						20	
	25					26	
		7-SS (50%)					
Sand with gravel, medium to coarse	30					15	
End of Boring							

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-16

Project Name: Subsurface Exploration Date of Boring: October 2, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 523.15

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, mottled brown						16	▽ 0 HR.
		1-SS (75%)					
Silty clay, trace sand, dark grey, black	5						
		2-ST (30%)					
Silty clay to clayey silt, some sand, fine, grey		3-SS (100%)					
	10	4-ST (100%)					
Sand, fine to coarse, grey		5-SS (50%)					
	15	6-ST (10%)				24	
Silty clay, trace sand, grey		7-SS (75%)				21	
	20						
		8-SS (50%)				17	
	25						
Sand with gravel, fine to coarse, grey							
Shale, grey (Hard Drilling @27.5')	30					16	
End of Boring							

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-17 (Offset 12' south of stake)

Project Name: Subsurface Exploration Date of Boring: October 2, 1989

Site: CWLP Ash Disposal Facility, Springfield, Illinois Project No.: 020-95039

Surface Elevation 522.50

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, brown, mottled black						17	▽ 0 HR.
	5	1-SS (25%)					
		2-SS (5%)				19	
	10						
Silty clay with organics, trace sand, grey		3-SS (95%)				30	
	15					21	
		4-SS (90%)				20	
Silty clay to clayey silt, sand, grey	20						
		5-SS (80%)				21	
	25						
Sand with gravel, fine to coarse, grey							
Shale, grey						14	
End of Boring							

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring R-101

Project Name: Monitoring Well Installations Date of Boring: January 15, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
*Note 1							
Silty clay to clayey silt, light brown, light grey	5	1-SS	35%				
		2-SS	100%				
	10						
13.0'-13.2': Brown sand, fine to medium		3-SS	75%				While Drilling
Silty clay, grey, mottled brown	15						
		4-SS	100%				
Silt to clayey silt, grey, brown, some sand, fine to medium	20						
		5-SS	100%				
	25						
		6-SS	100%				
	30						
Shale, grey, brown (weathered)		7-SS	100%				
End of Boring							
*Note 1: 0"-6" Brown silty clay with organics							

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring R-102

Project Name: Monitoring Will Installations Date of Boring: January 11, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
*Note 1							
Clayey silt, light brown, light grey	5	1-SS	100%				
		2-SS	80%				
Silty clay, grey, mottled brown	10						
		3-SS	100%				
Clayey silt to silt, dark grey, some sand, fine	15						
		4-SS	100%				
	20						
		5-SS	75%				▽ While Drilling
	25						
		6-SS	100%				
	30						
		7-SS	75%				
	35						
Sand, fine to medium, grey							
Shale, grey, weathered		8-SS	100%				
End of Boring							
*Note 1: Dark brown silty clay with organcis							

PSI A-100-2

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring R-103

Project Name: Monitoring Well Installations Date of Boring: January 13, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
*Note 1							
Clayey silt, light brown, light grey, with white streaks	5	1-SS	100%				
	10	2-SS	100%				
	15	3-SS	100%				While Drilling ▽
19'-19.5' - Grey sand, fine	20	4-SS	100%				
Silty clay, some sand, fine, organics, grey	25	5-SS	100%				
(Coal fragments from 22'-29')	30	6-SS	100%				
Shale, grey, weathered		7-SS	100%				
End of Boring							

*Note 1: Black silty clay with organcis

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring G-104

Project Name: Monitoring Well Installations Date of Boring: January 12, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Clayey silt with coal fragments, organics, mottled brown		1-SS	100%				
	5						
		2-SS	100%				
	10						
Silty clay, black to dark brown, some organics to 16'		3-SS	75%				
	15						
		4-SS	100%				▽ While Drilling
	20						
Grey sand, fine to coarse		5-SS	60%				
Silty clay, trace sand, grey	25						
		6-SS	100%				
Silty sand, grey, fine to medium	30						
		7-SS	60%				
	35						
Shale, grey, weathered		8-SS	100%				
End of Boring							

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring G-105

Project Name: Monitoring Well Installations Date of Boring: January 9, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay to clayey silt, trace organics, brown (fill)	5	1-SS	20%				
	10	2-SS	35%				
		3-SS	25%				
Silty clay, drak grey to black, some organics	15						
Silty clay to clay, grey, mottled brown, trace sand	20	4-SS	100%				
		5-SS	40%				
Silty clay with sand, fine to medium, brown	25	6-SS	35%				
	30						While Drilling ▽
	35	7-SS	40%				
		8-SS	100%				
Silty clay, trace sand, dark grey, fine	40	9-SS	100%				
	45						

PSI A-100-9

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring G-105 (Continued)

Project Name: Monitoring Well Installations Date of Boring: January 9, 1990

Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
Silty clay, some sand, fine, dark grey	45	10-SS	100%				
48'-48.7': Grey sand, fine to medium	50	11-SS	80%				
Shale, grey, weathered							
End of Boring							

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

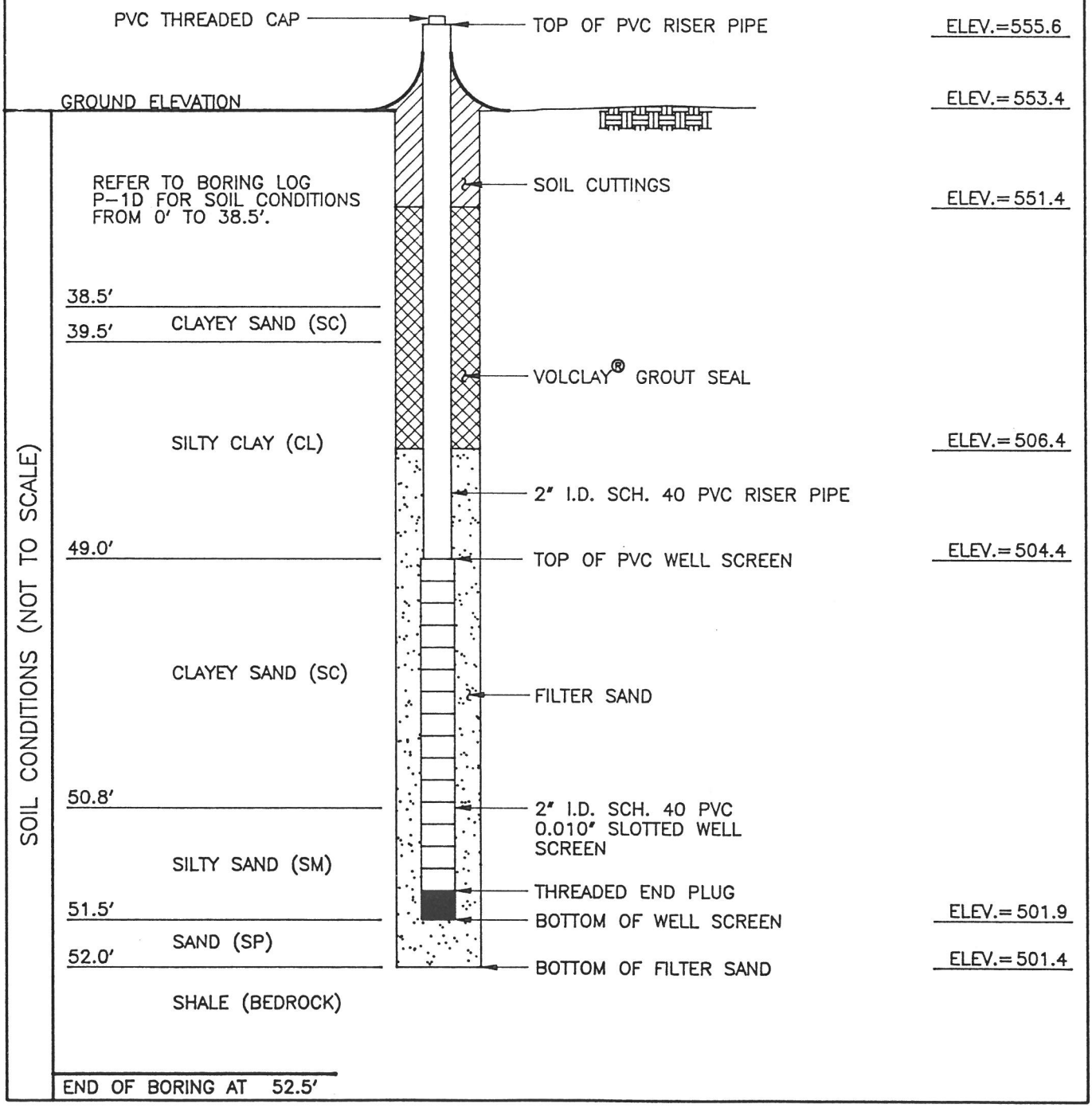
Boring G-106

Project Name: Monitoring Well Installations Date of Boring: February 23, 1990

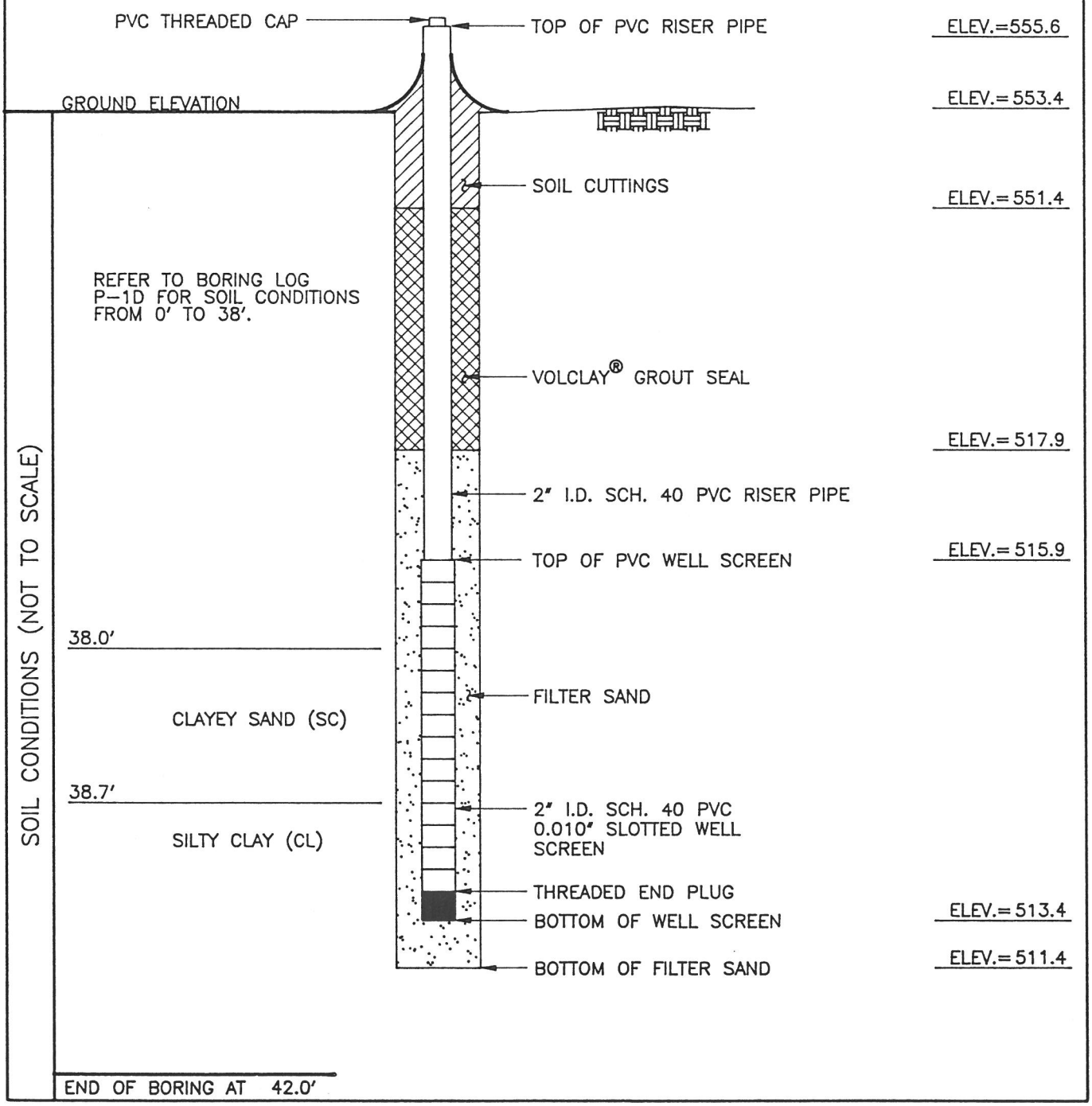
Site: CWLP Ash Disposal Facility Project No.: 020-05001

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Silty clay, brown, moist, trace organics	5	1-SS	75%			24	▽ 0 HR
Silty clay, grey, mottled brown		2-SS	100%			26	
Sand, fine to course, brown, wet	10						
		3-SS	100%			37	
Silty clay to clayey silt, grey, trace sand, fine	15					25	
		4-SS	100%			27	
	20						
		5-SS	100%			23	
	25						
Sand, fine to medium, trace silt, grey, wet		6-SS	70%				
	30						
		7-SS	50%				
Shale, grey, hard						9	
END OF BORING	35						

PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-1D PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-1D
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 4806.1
CLIENT CWL&P		E 1973.1
ENGINEER KRISHNA REDDY		INSTALLATION DATE 7/21/92
DRILLER KEVIN SHAMWAY		WEATHER CLOUDY, 70'S



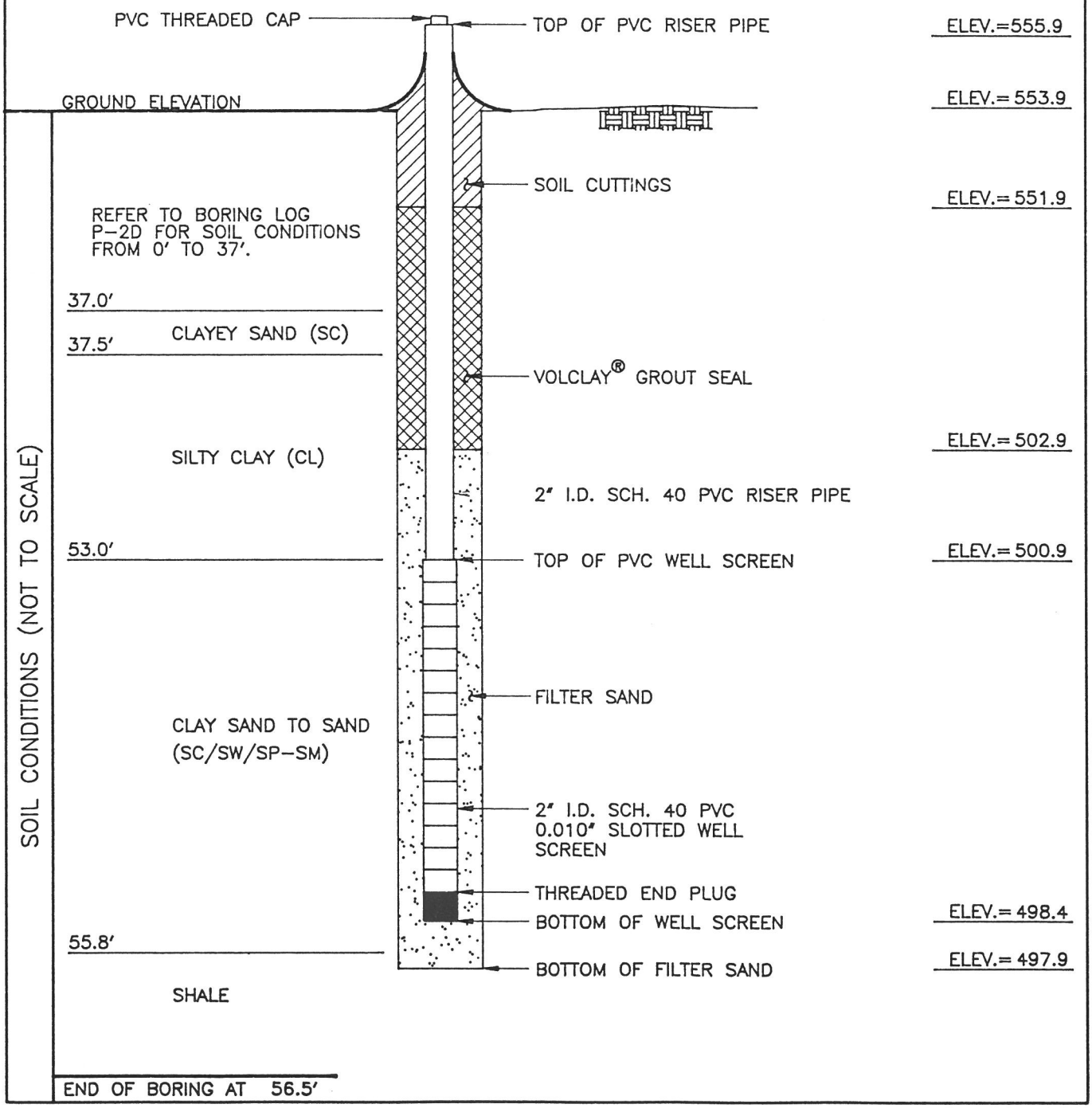
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-1S PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-1S LOCATION N 4821.3 E 1973.9 INSTALLATION DATE 7/21/92 WEATHER P. CLOUDY, 70'S



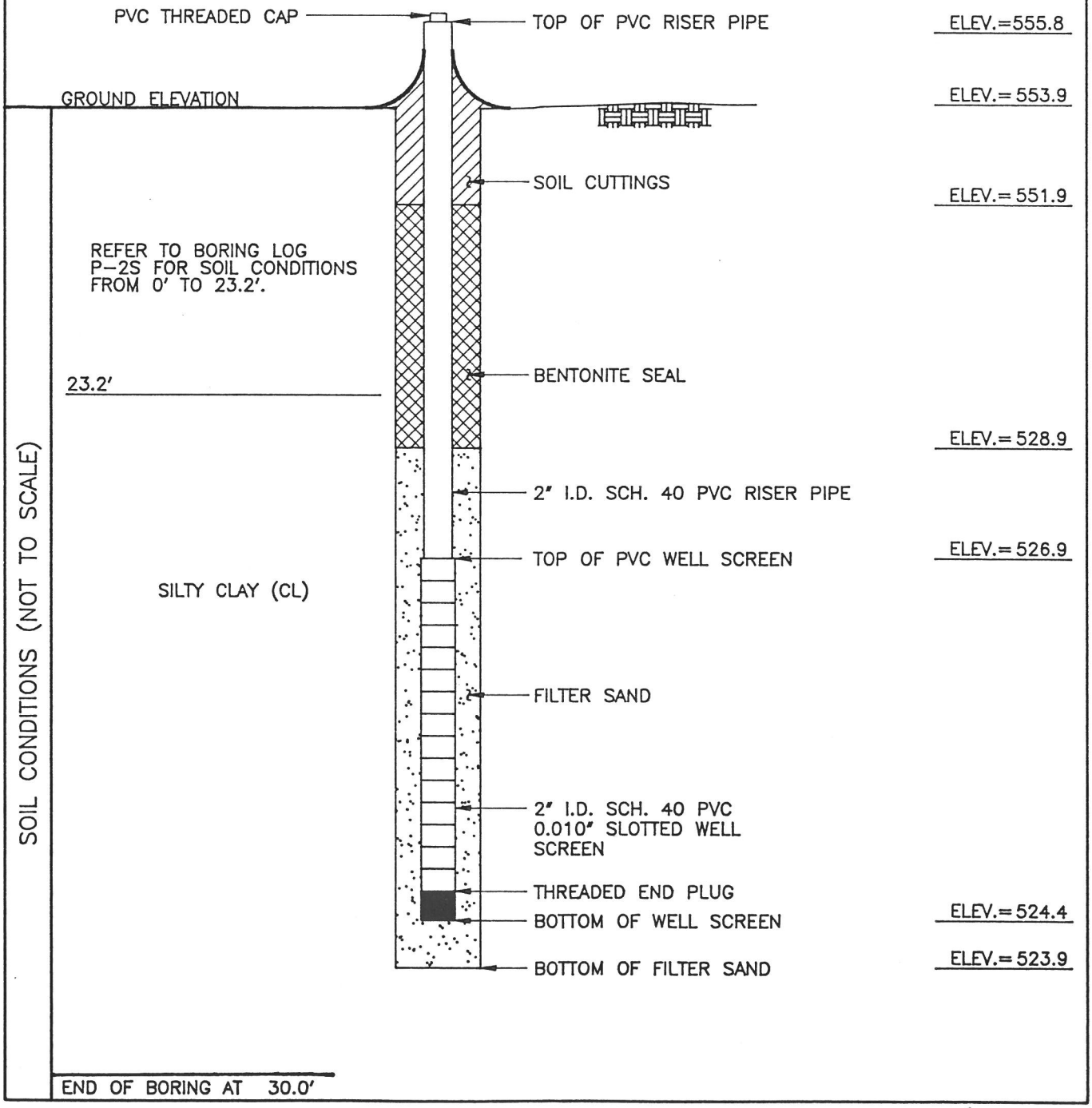
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-2D PROJ. NO. 496B

PROJECT FGDS LANDFILL
LOCATION SPRINGFIELD, ILLINOIS
CLIENT CWL&P
ENGINEER KRISHNA REDDY
DRILLER KEVIN SHAMWAY

BORING NO. P-2D
LOCATION N 5526.0
E 1975.9
INSTALLATION DATE 7/22/92
WEATHER CLOUDY, RAINY, 70'S



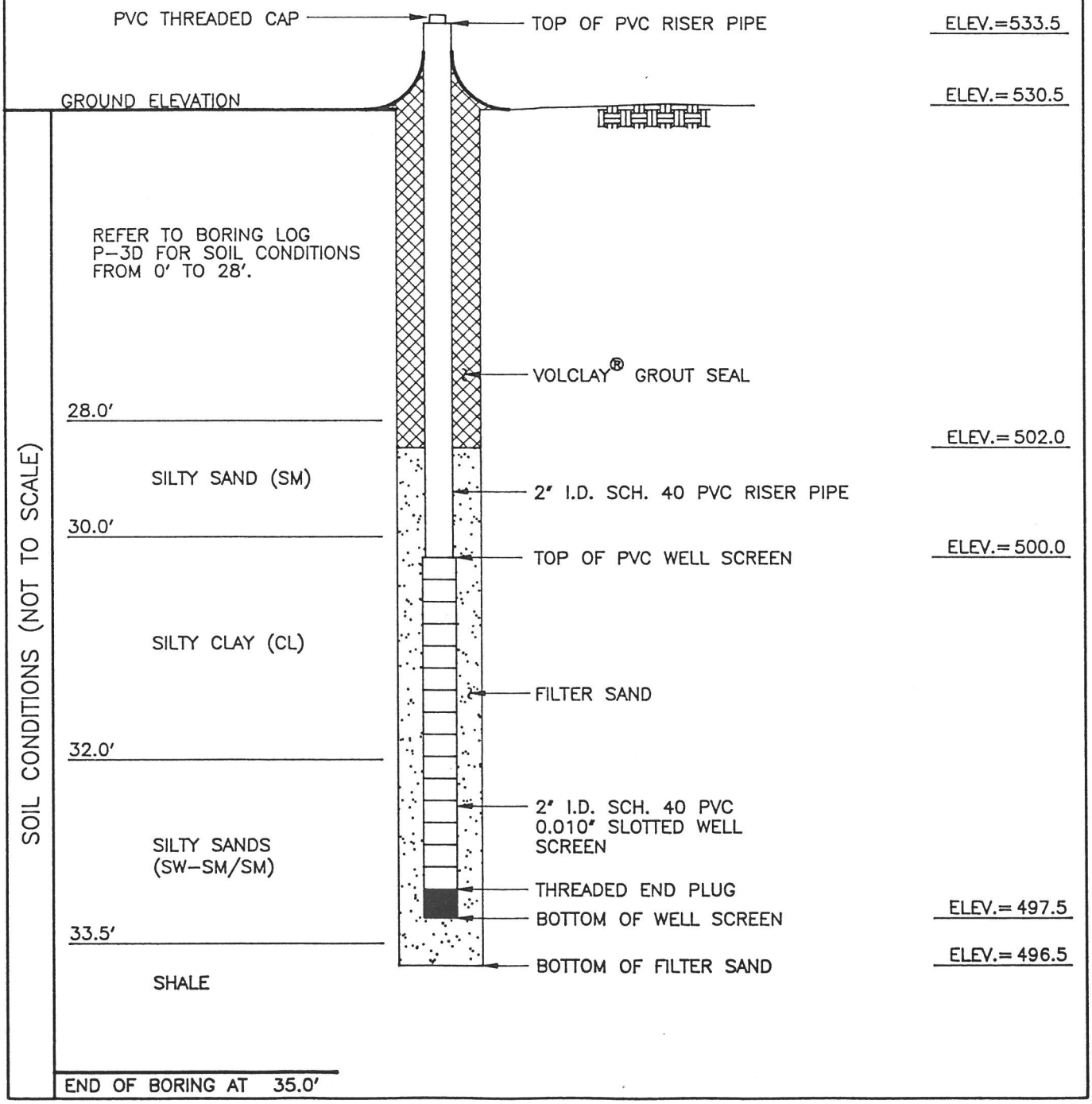
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-2S PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-2S
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 5237.1
CLIENT CWL&P		E 1976.3
ENGINEER KRISHNA REDDY		INSTALLATION DATE 7/22/92
DRILLER KEVIN SHAMWAY		WEATHER CLOUDY, RAINY, 70'S



PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-3D PROJ. NO. 496B

PROJECT FGDS LANDFILL
LOCATION SPRINGFIELD, ILLINOIS
CLIENT CWL&P
ENGINEER KRISHNA REDDY
DRILLER KEVIN SHAMWAY

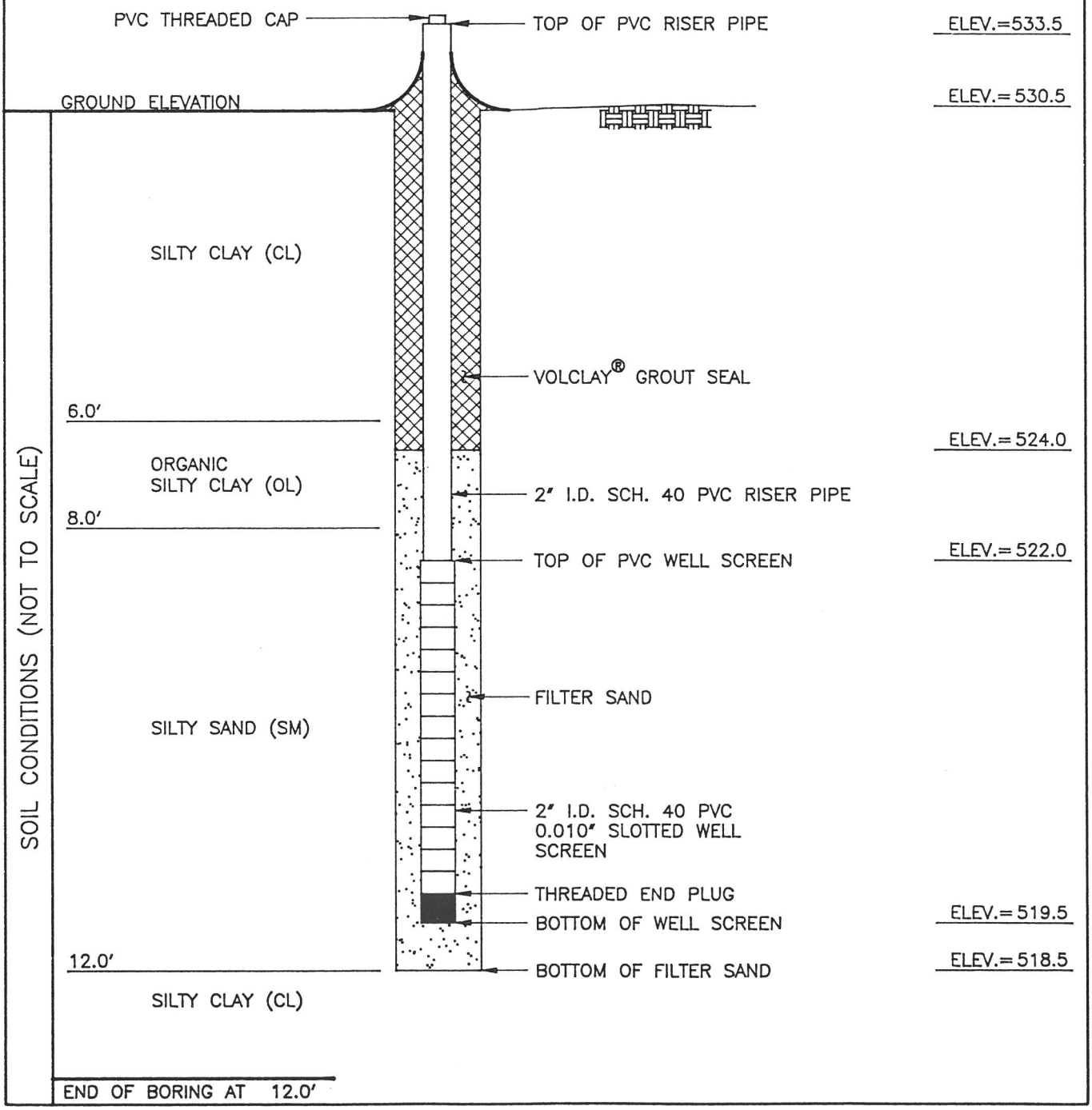
BORING NO. P-3D
LOCATION N 5672.5
E 2645.4
INSTALLATION DATE 8/17/92
WEATHER SUNNY, 70'S



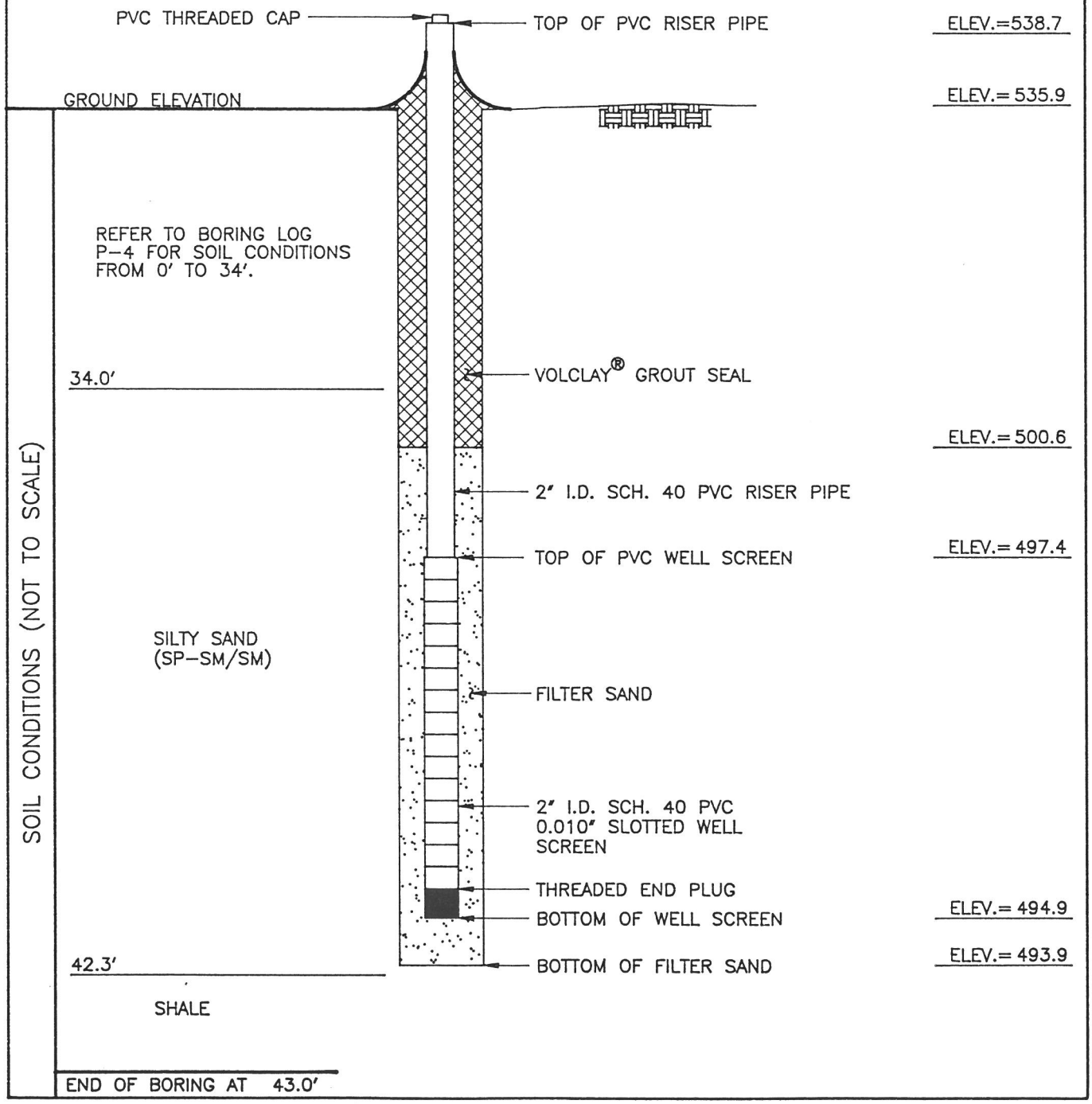
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-3S PROJ. NO. 496B

PROJECT FGDS LANDFILL
LOCATION SPRINGFIELD, ILLINOIS
CLIENT CWL&P
ENGINEER KRISHNA REDDY
DRILLER KEVIN SHAMWAY

BORING NO. P-3S
LOCATION N 5672.5
E 2651.4
INSTALLATION DATE 8/17/92
WEATHER SUNNY, 70'S



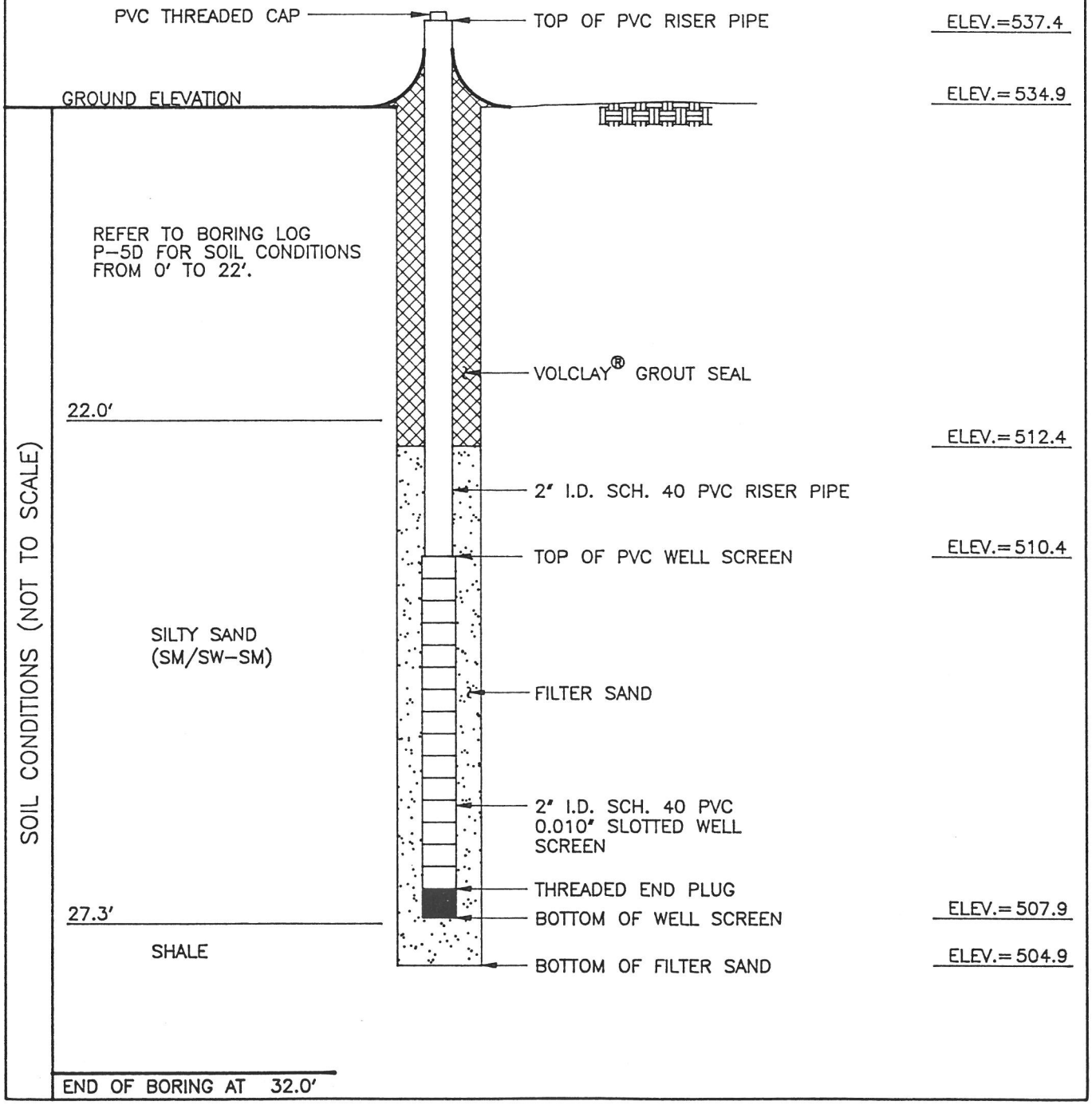
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-4 PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-4
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 5156.3
CLIENT CWL&P		E 2880.7
ENGINEER KRISHNA REDDY		INSTALLATION DATE 8/16/92
DRILLER KEVIN SHAMWAY		WEATHER SUNNY, 70'S



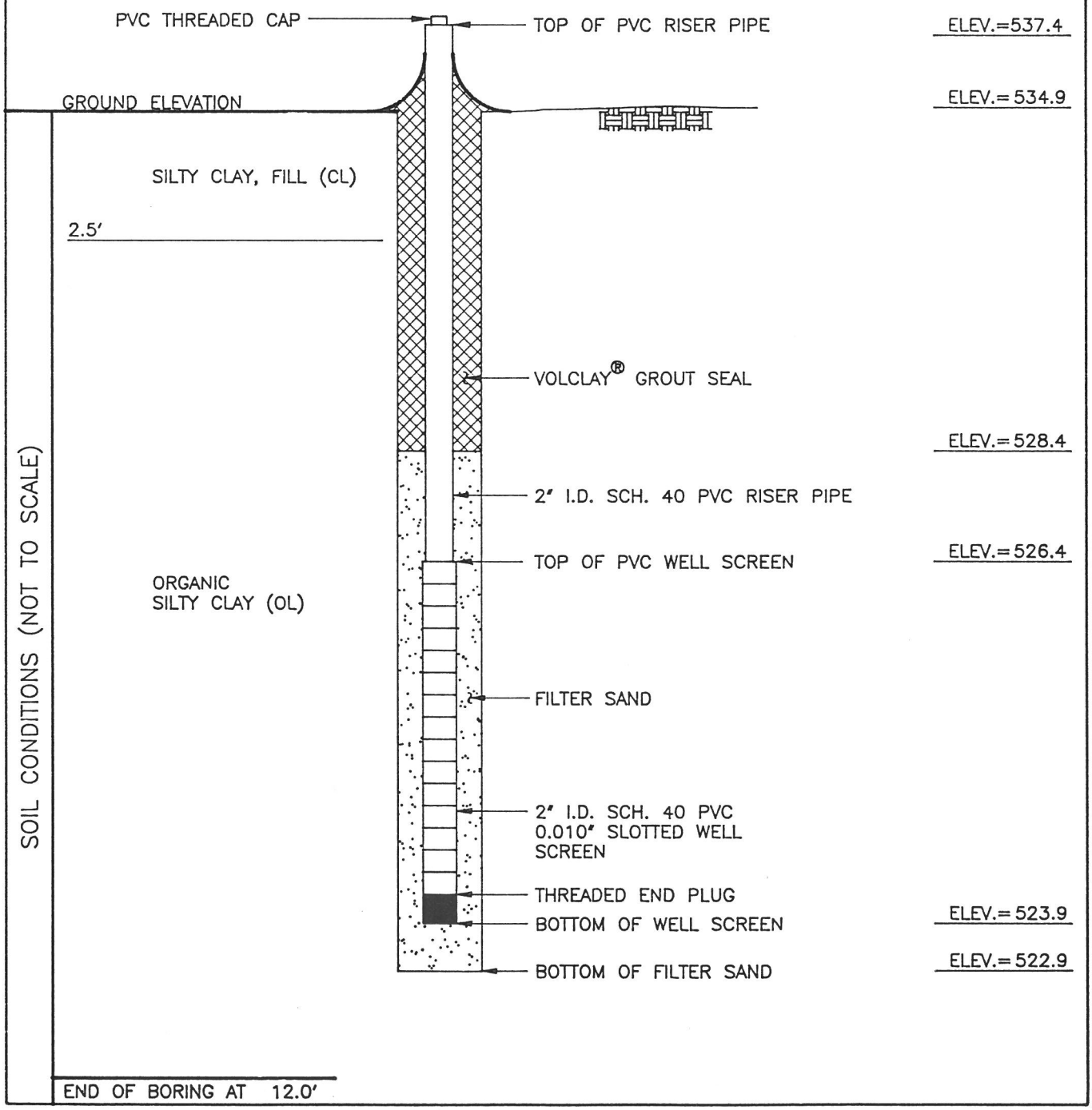
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-5D PROJ. NO. 496B

PROJECT FGDS LANDFILL
LOCATION SPRINGFIELD, ILLINOIS
CLIENT CWL&P
ENGINEER KRISHNA REDDY
DRILLER KEVIN SHAMWAY

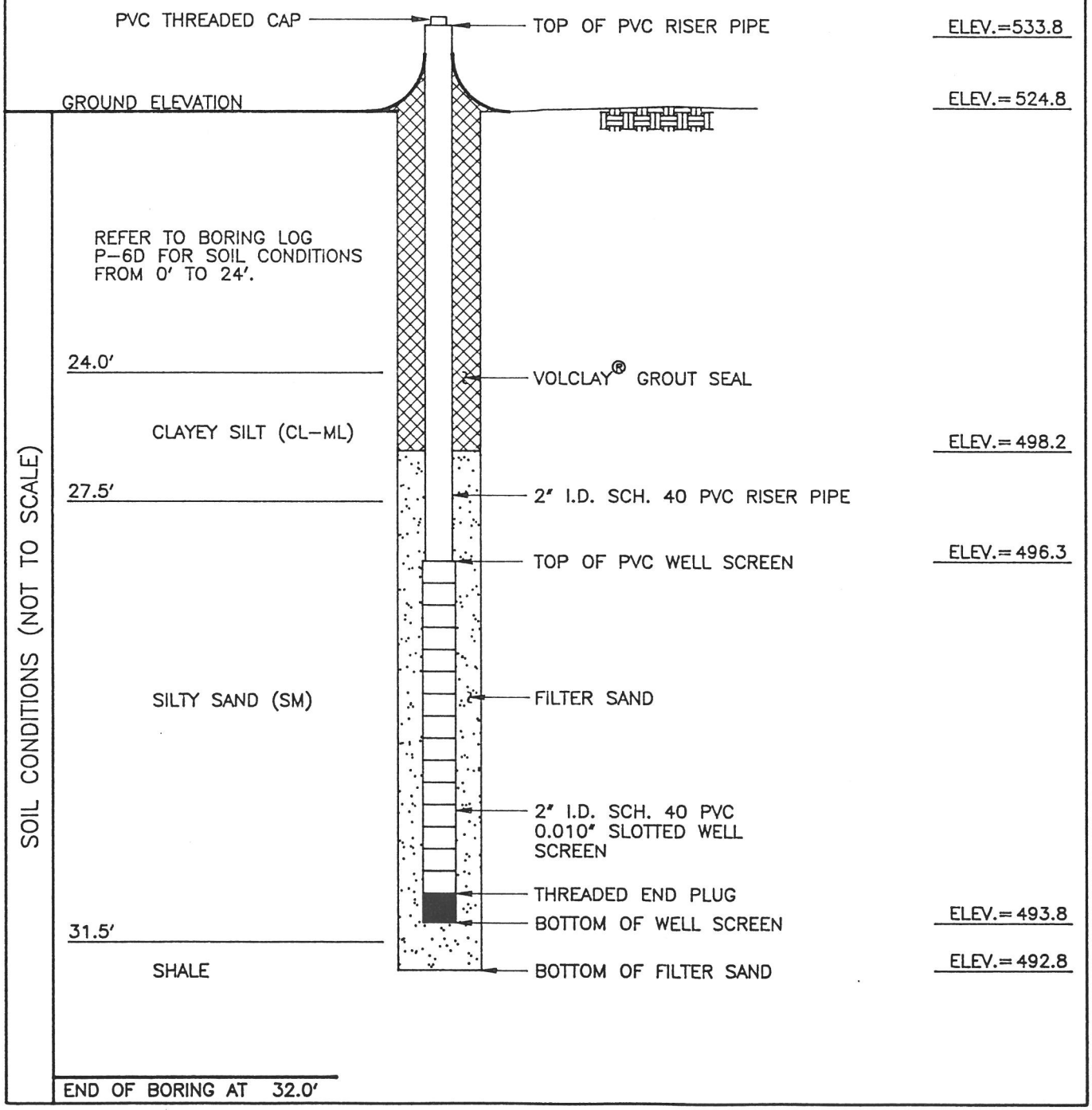
BORING NO. P-5D
LOCATION N 4516.7
E 2885.0
INSTALLATION DATE 8/16/92
WEATHER SUNNY, 70'S



PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-5S PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-5S LOCATION N 4510.7 E 2887.0 INSTALLATION DATE 8/16/92 WEATHER SUNNY, 70'S



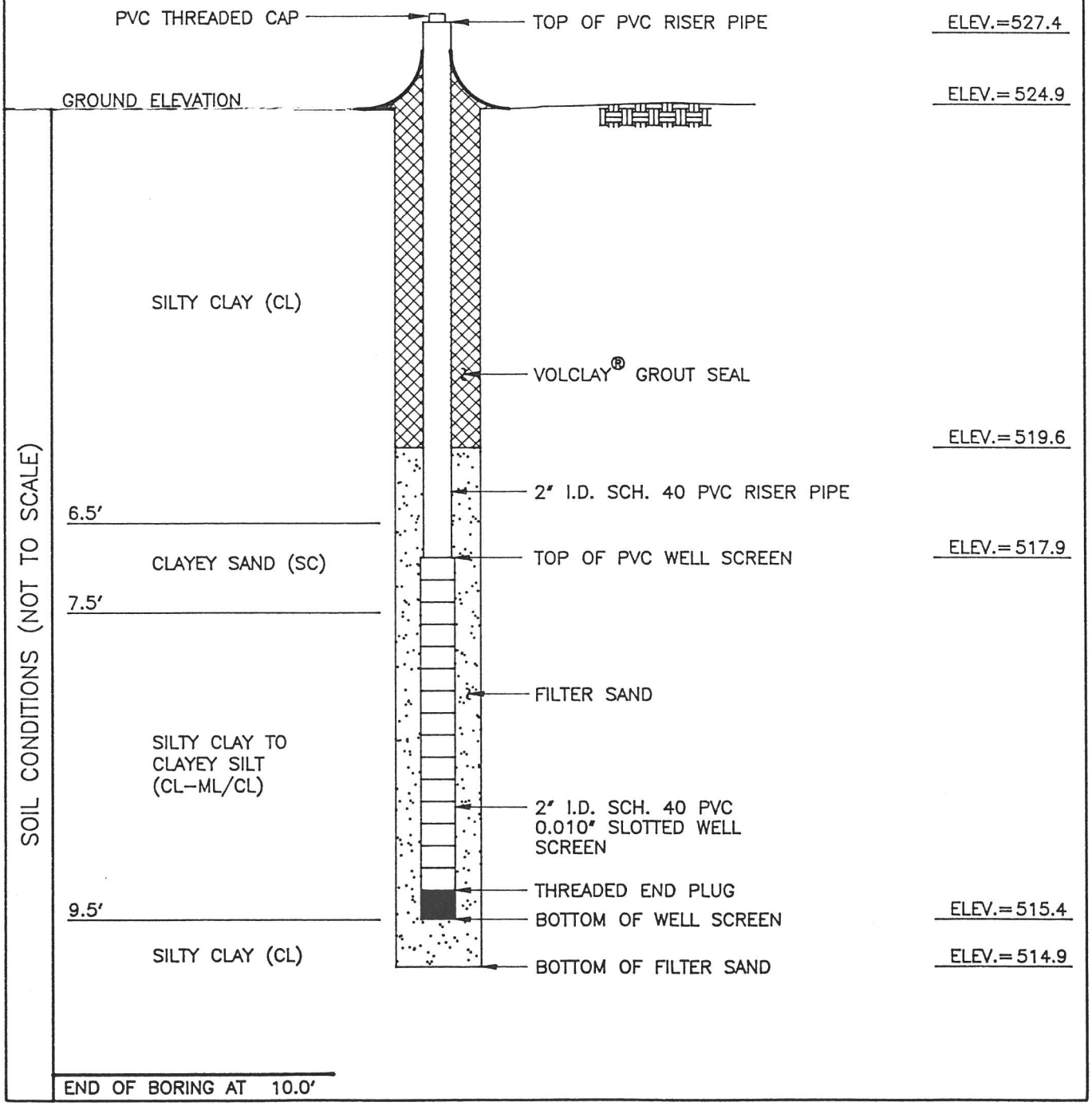
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-6D PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-6D LOCATION N 4717.0 E 2186.8 INSTALLATION DATE 8/12/92 WEATHER SUNNY, 70'S



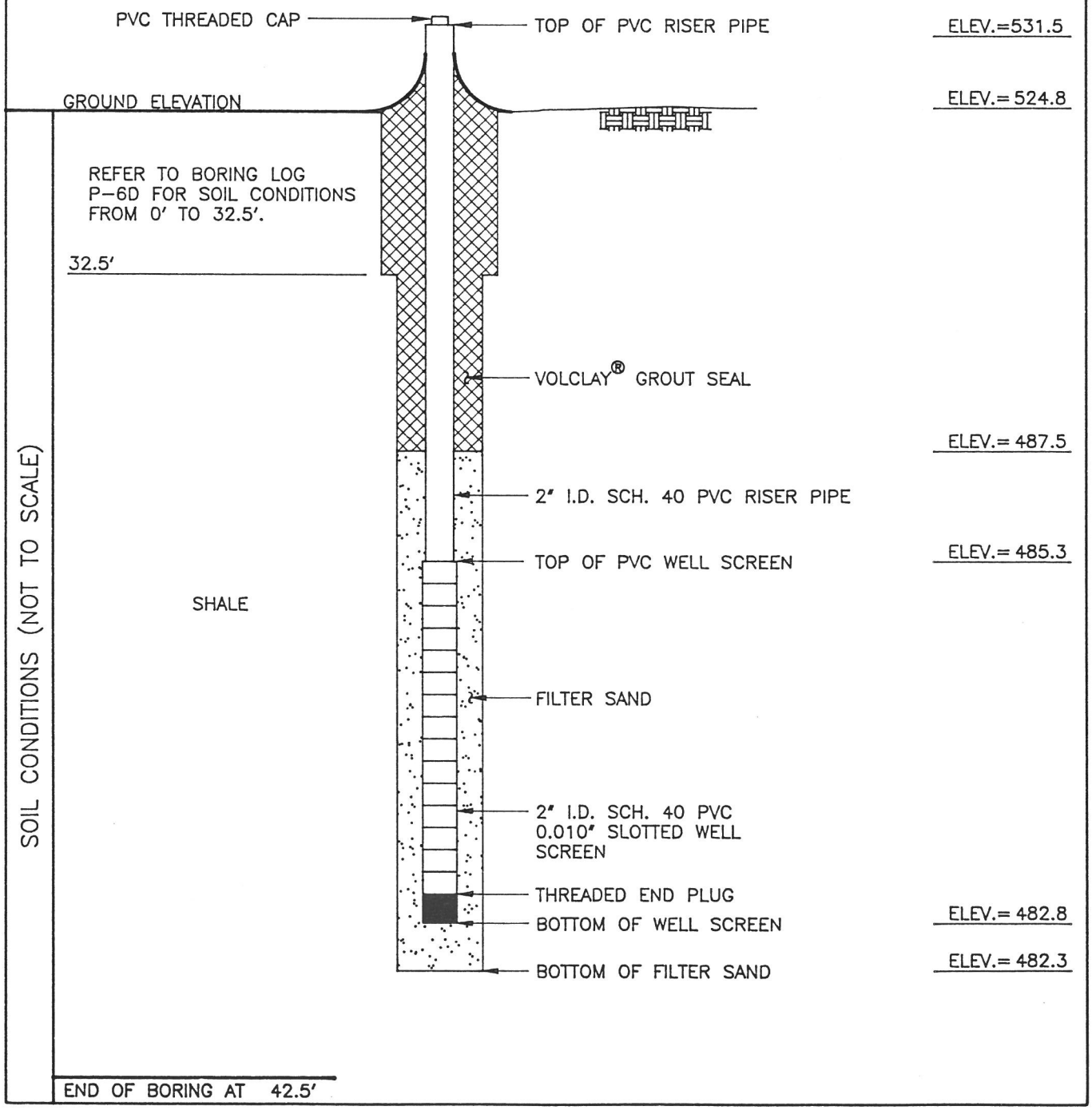
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-6S PROJ. NO. 496B

PROJECT FGDS LANDFILL
LOCATION SPRINGFIELD, ILLINOIS
CLIENT CWL&P
ENGINEER KRISHNA REDDY
DRILLER KEVIN SHAMWAY

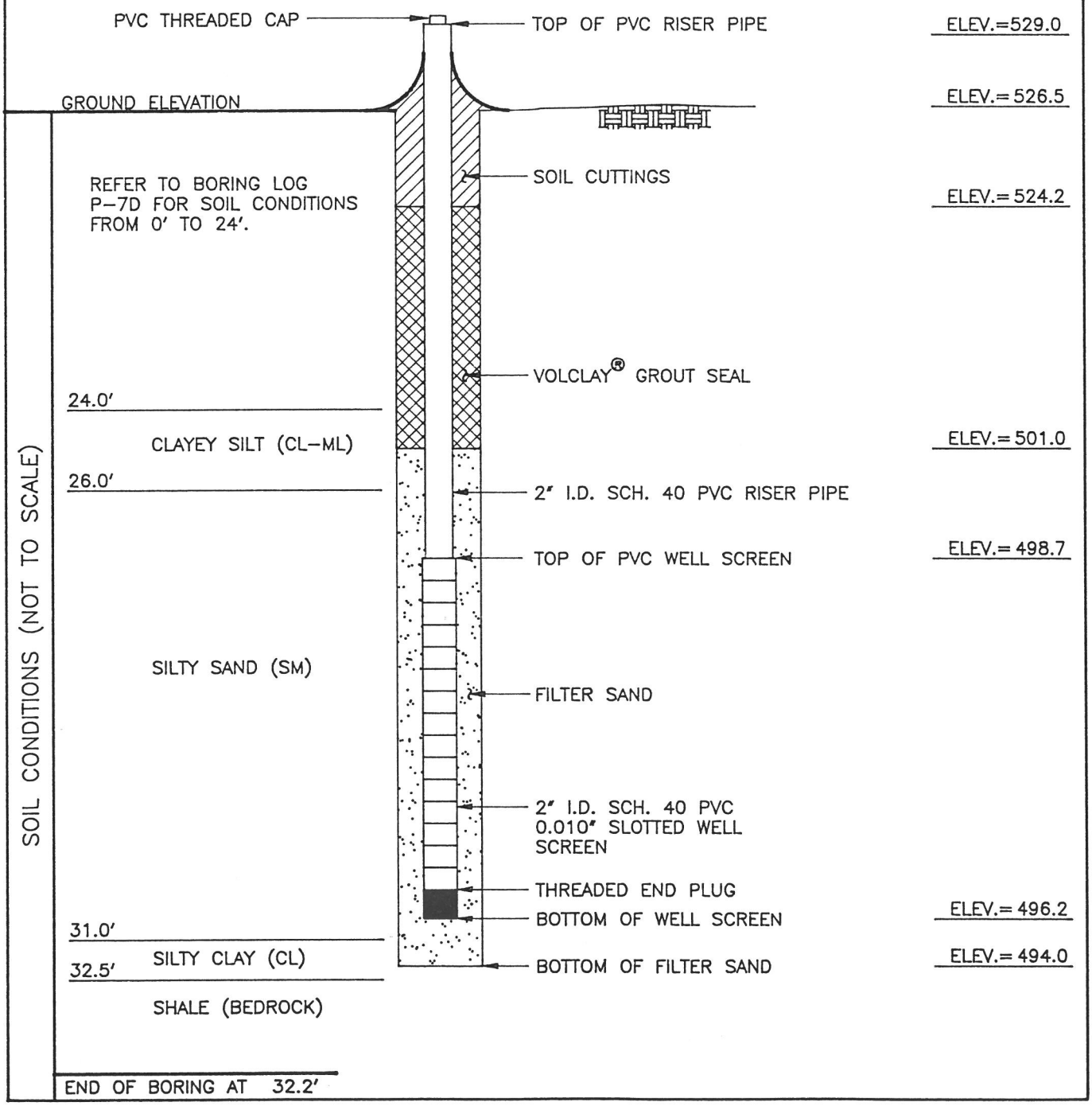
BORING NO. P-6S
LOCATION N 4725.7
E 2191.4
INSTALLATION DATE 8/12/92
WEATHER SUNNY, 70'S



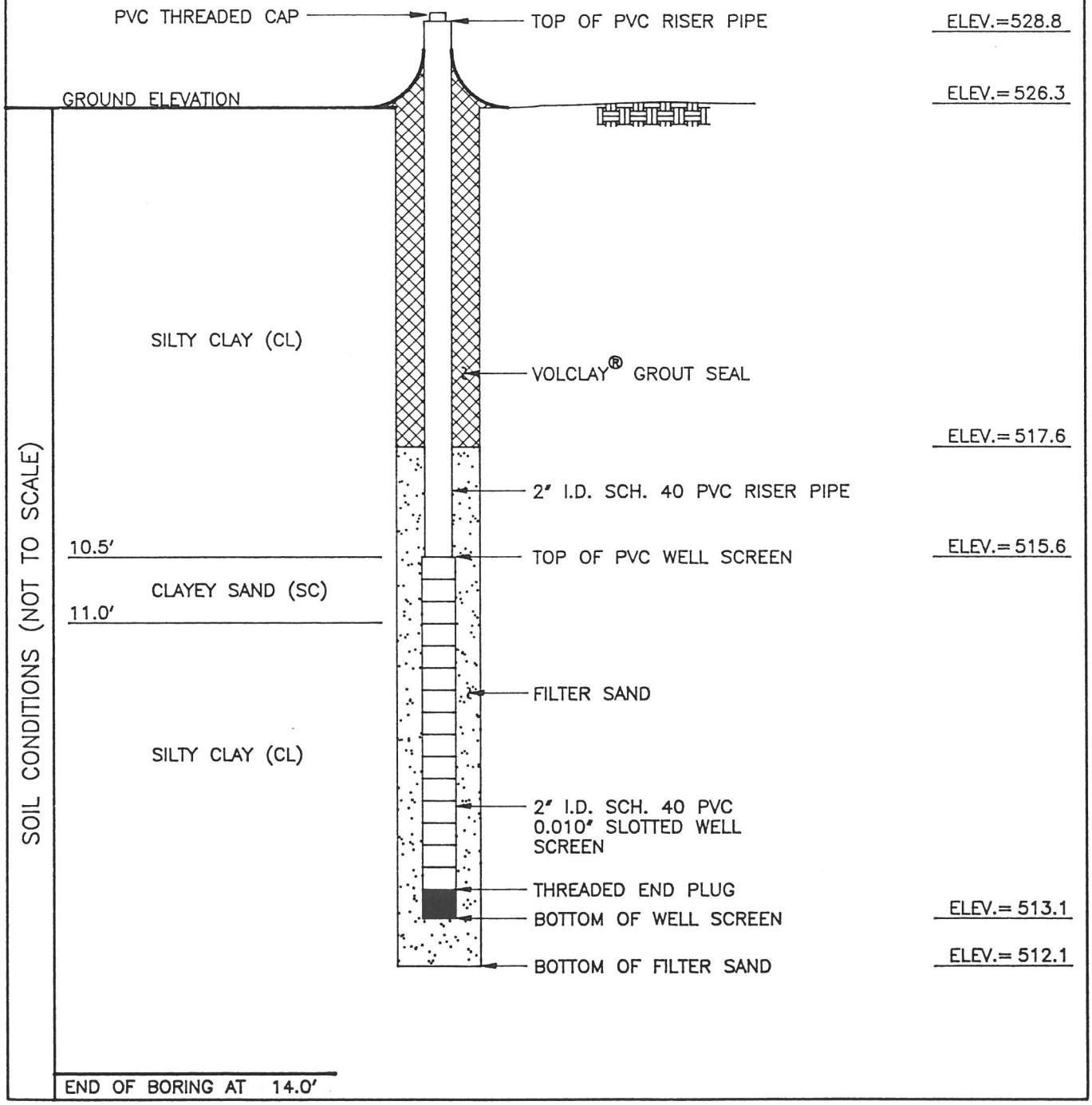
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-6R PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-6R LOCATION N 4719.5 E 2175.7 INSTALLATION DATE 8/6/92 WEATHER SUNNY, 70'S



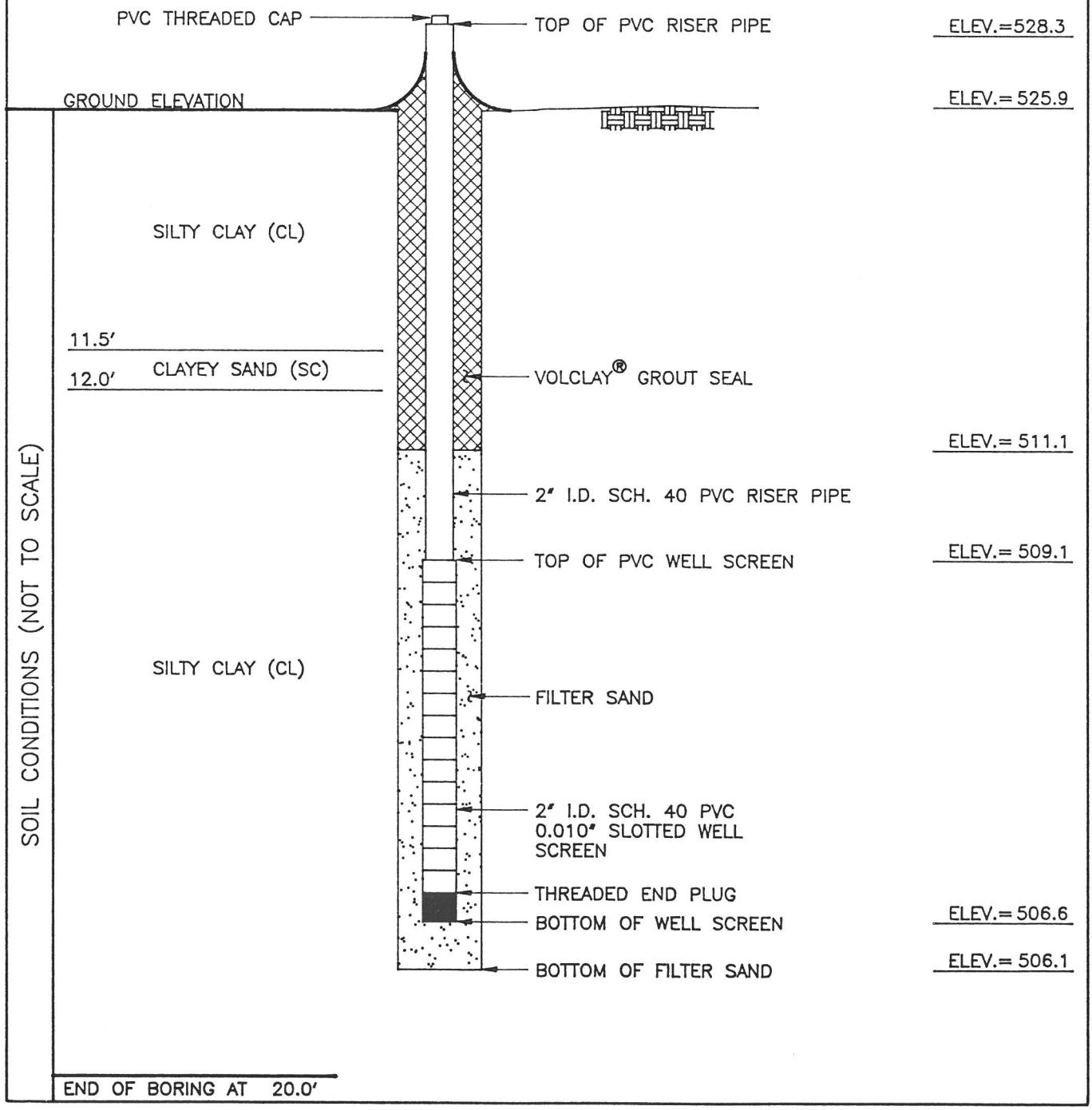
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-7D PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-7D LOCATION N 5345.8 E 2429.5 INSTALLATION DATE 7/30/92 WEATHER RAIN, WARM, 80'S



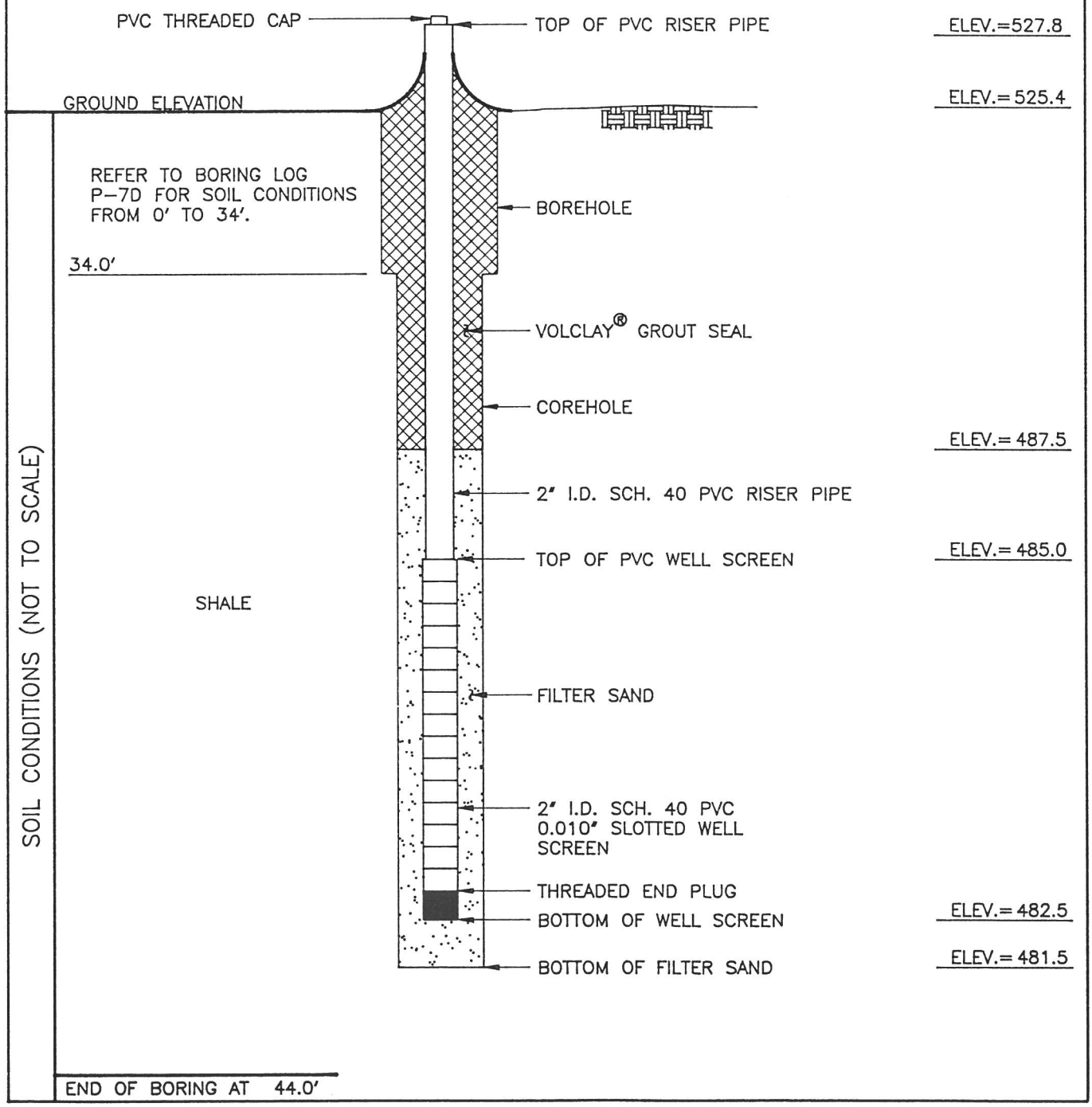
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-7S PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-7S
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 5337.1
CLIENT CWL&P		E 2426.3
ENGINEER KRISHNA REDDY		INSTALLATION DATE 7/30/92
DRILLER KEVIN SHAMWAY		WEATHER RAIN, WARM, 80'S



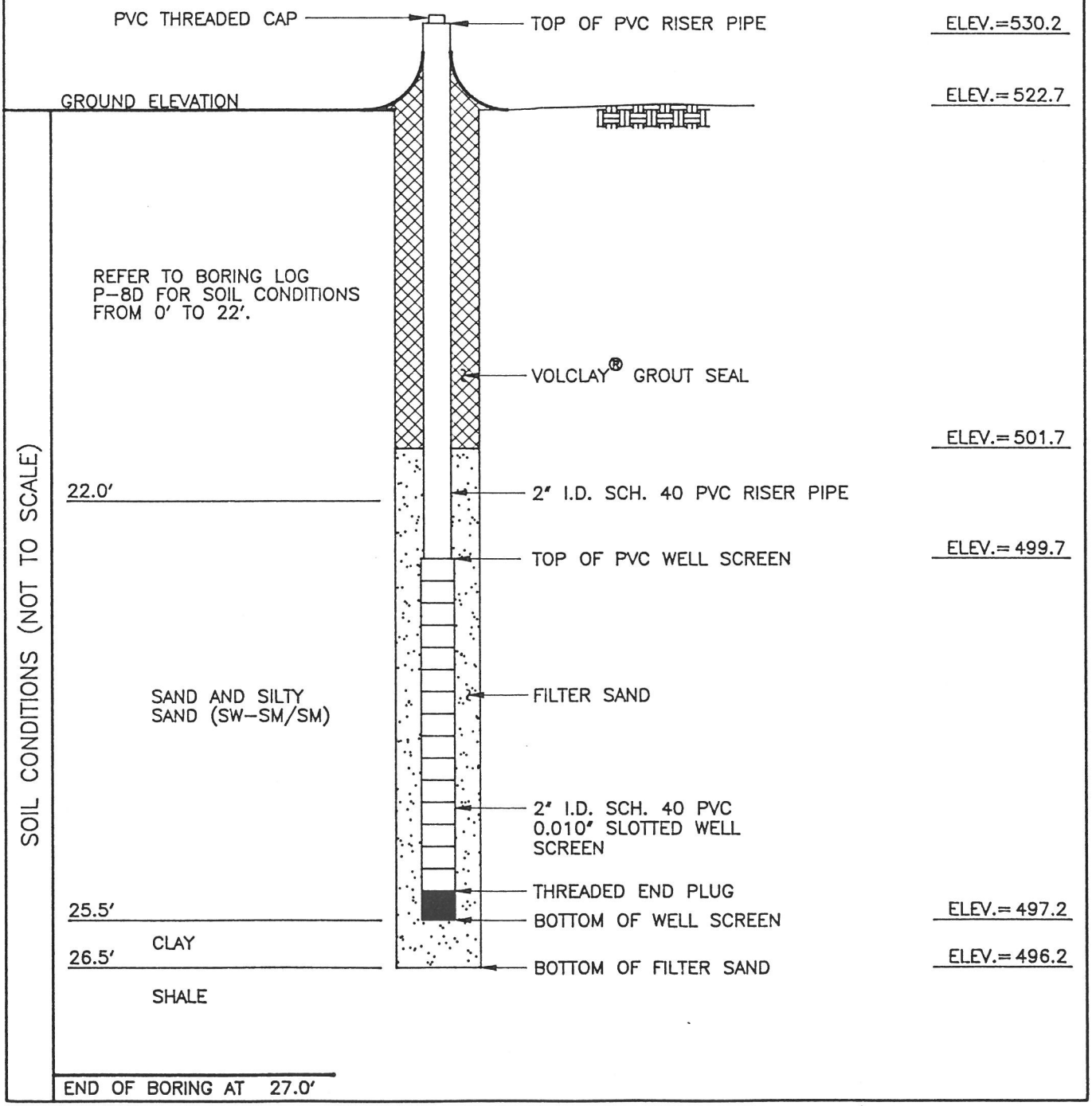
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-7M PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-7M LOCATION N 5337.0 E 2432.8 INSTALLATION DATE 7/30/92 WEATHER RAIN, WARM, 80'S



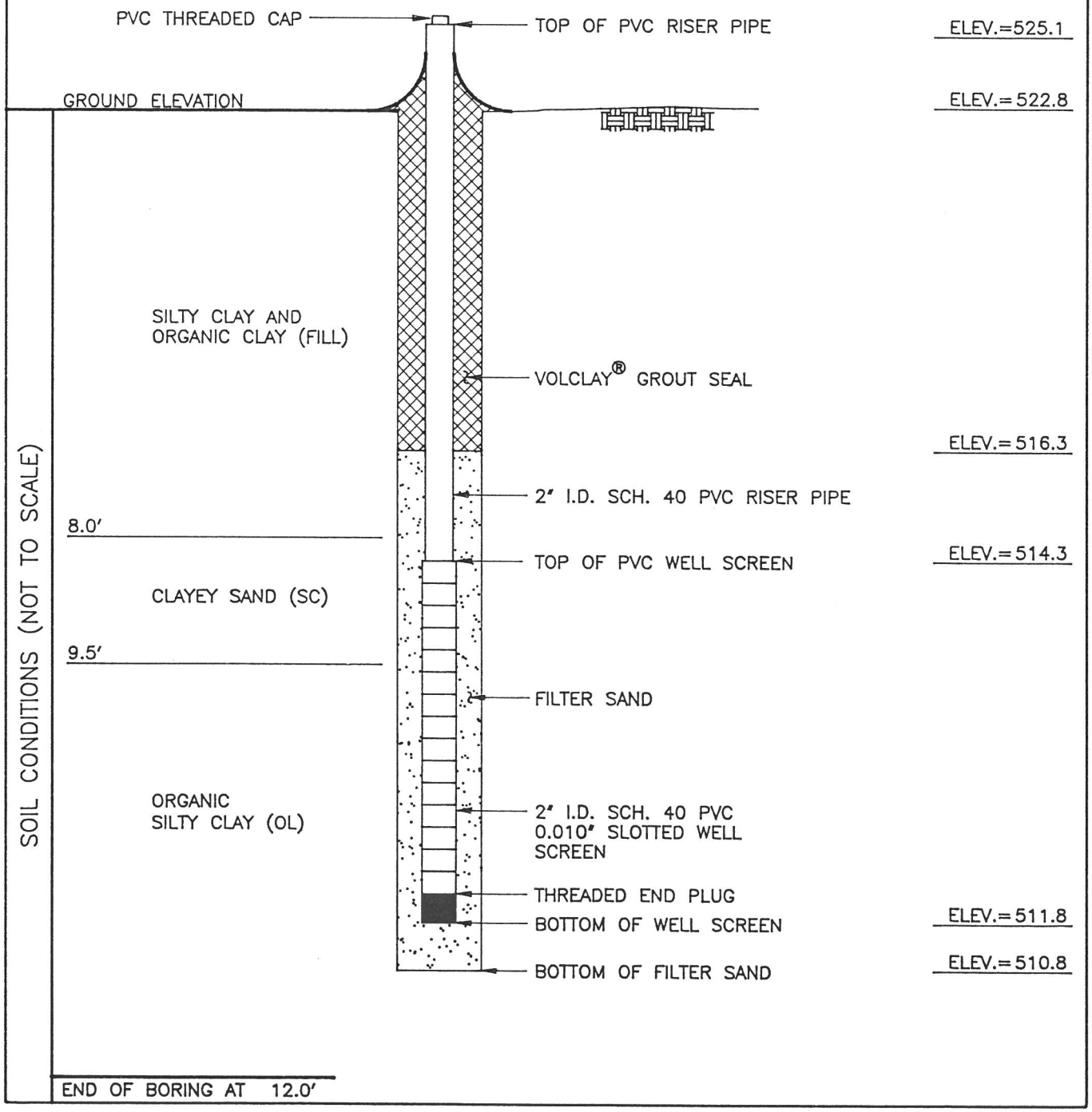
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-7R PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-7R LOCATION N 5326.9 E 2424.5 INSTALLATION DATE 7/31/92 WEATHER CLOUDY, DRIZZLE, 70'S



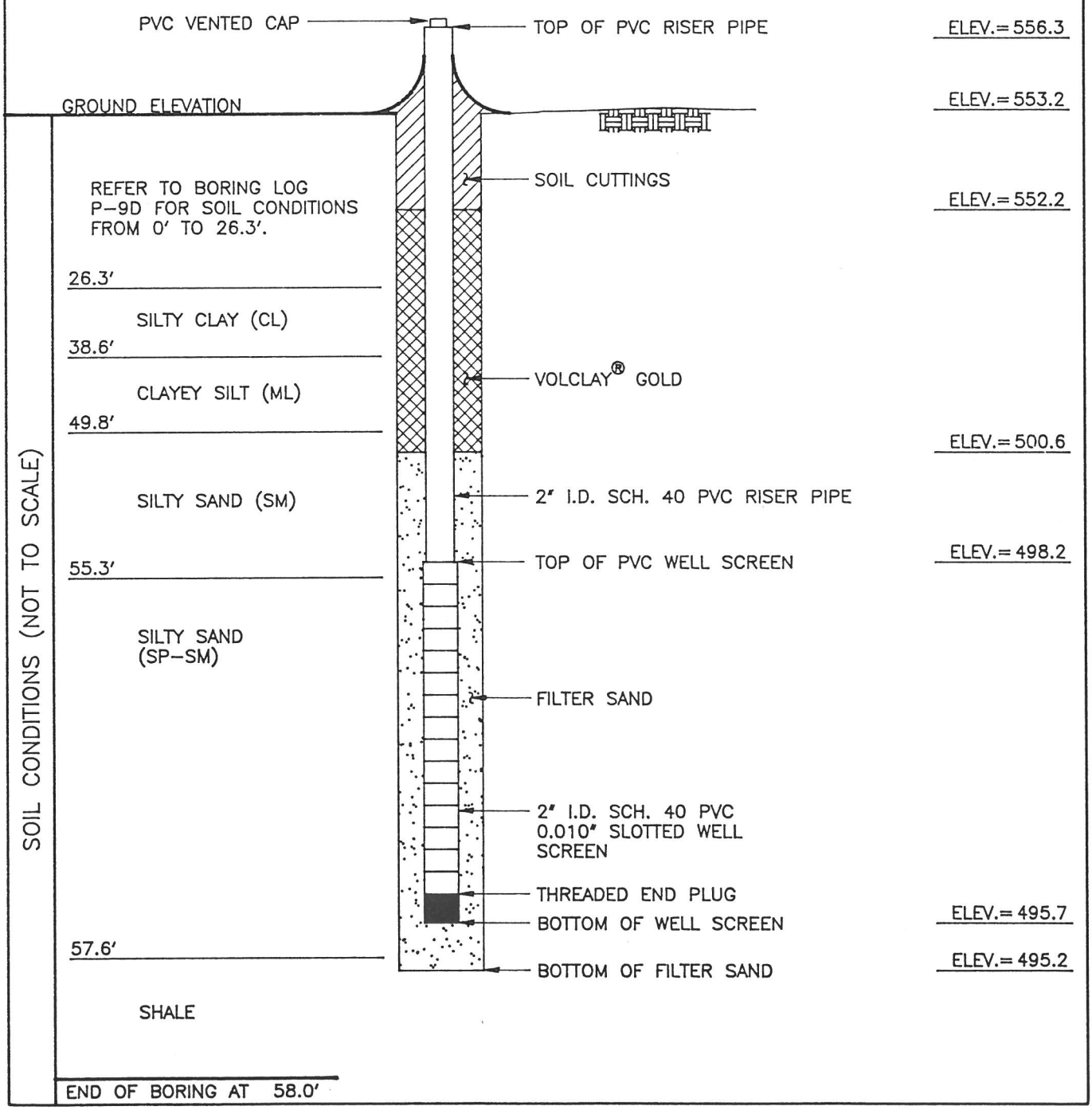
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-8D PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-8D
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 4939.7
CLIENT CWL&P		E 2482.7
ENGINEER KRISHNA REDDY		INSTALLATION DATE 8/13/92
DRILLER KEVIN SHAMWAY		WEATHER CLOUDY, 70'S



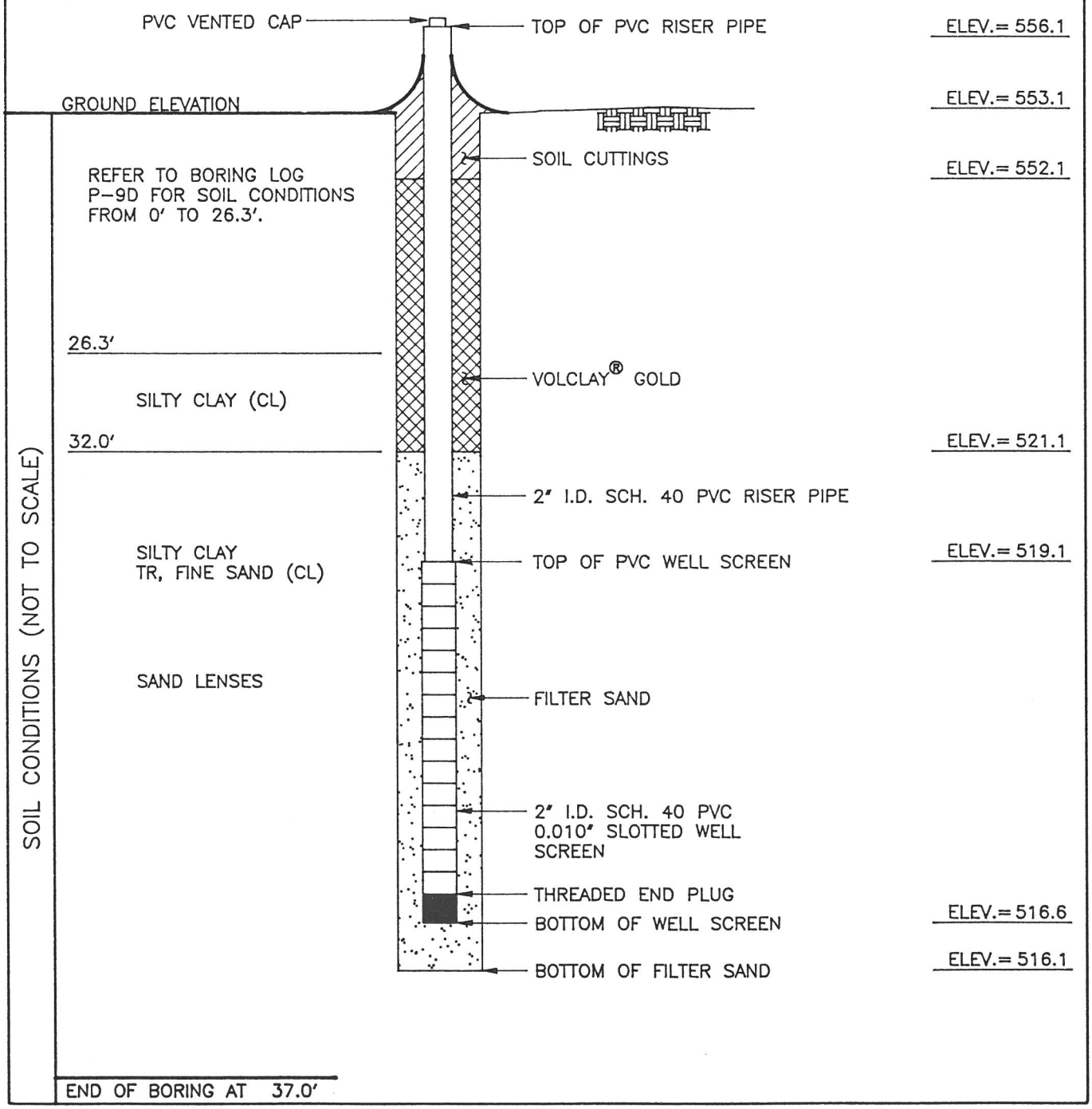
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-8S PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P ENGINEER KRISHNA REDDY DRILLER KEVIN SHAMWAY		BORING NO. P-8S LOCATION N 4933.1 E 2486.0 INSTALLATION DATE 8/13/92 WEATHER CLOUDY, 70'S



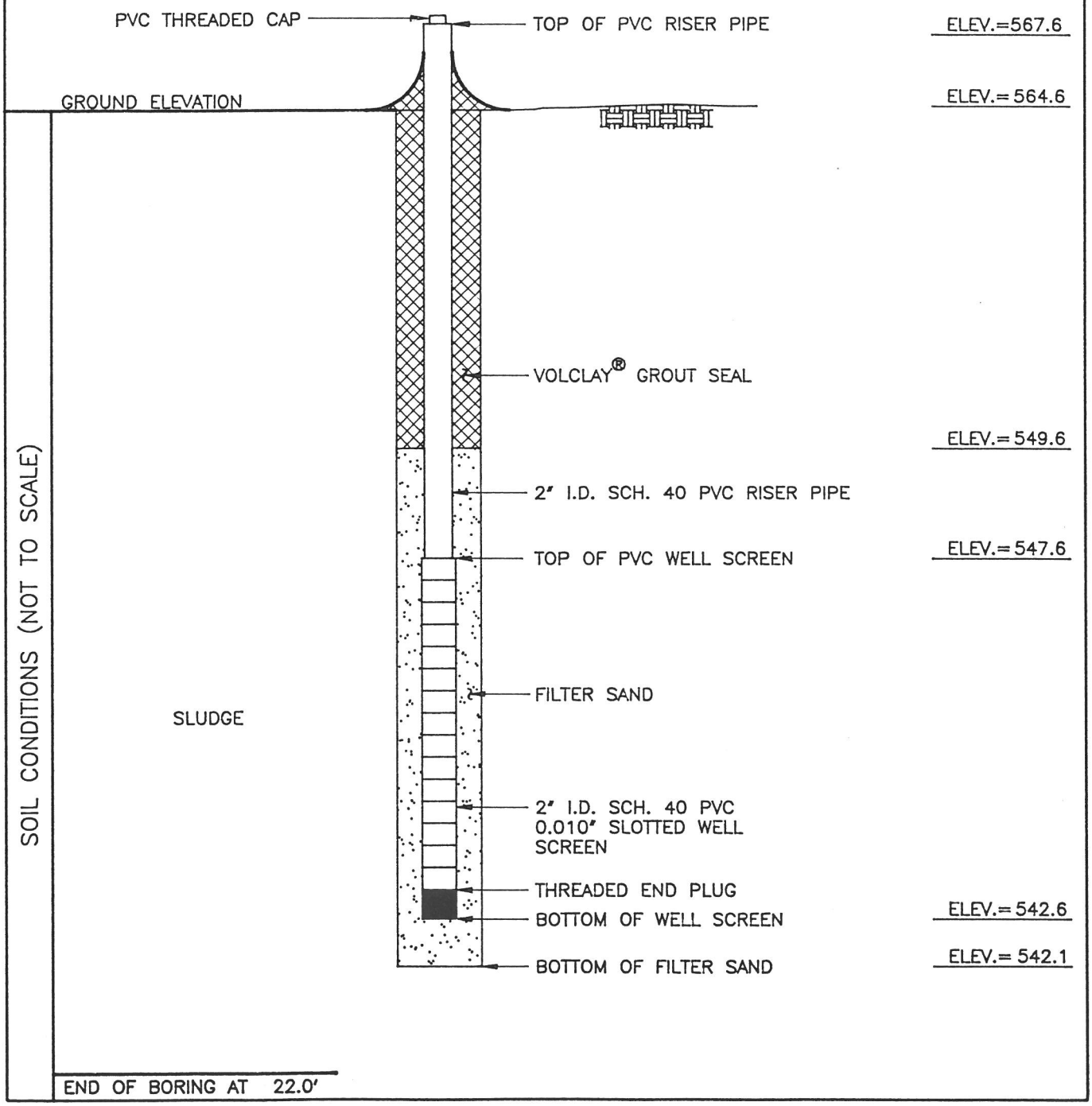
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-9D PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-9D
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 4446.3 E 2422.4
CLIENT CWL&P		
ENGINEER/GEOLOGIST STEVE SCHILLING		INSTALLATION DATE 8/18/92
DRILLER KEVIN SHAMWAY		WEATHER PTLY CLDY, 70'S



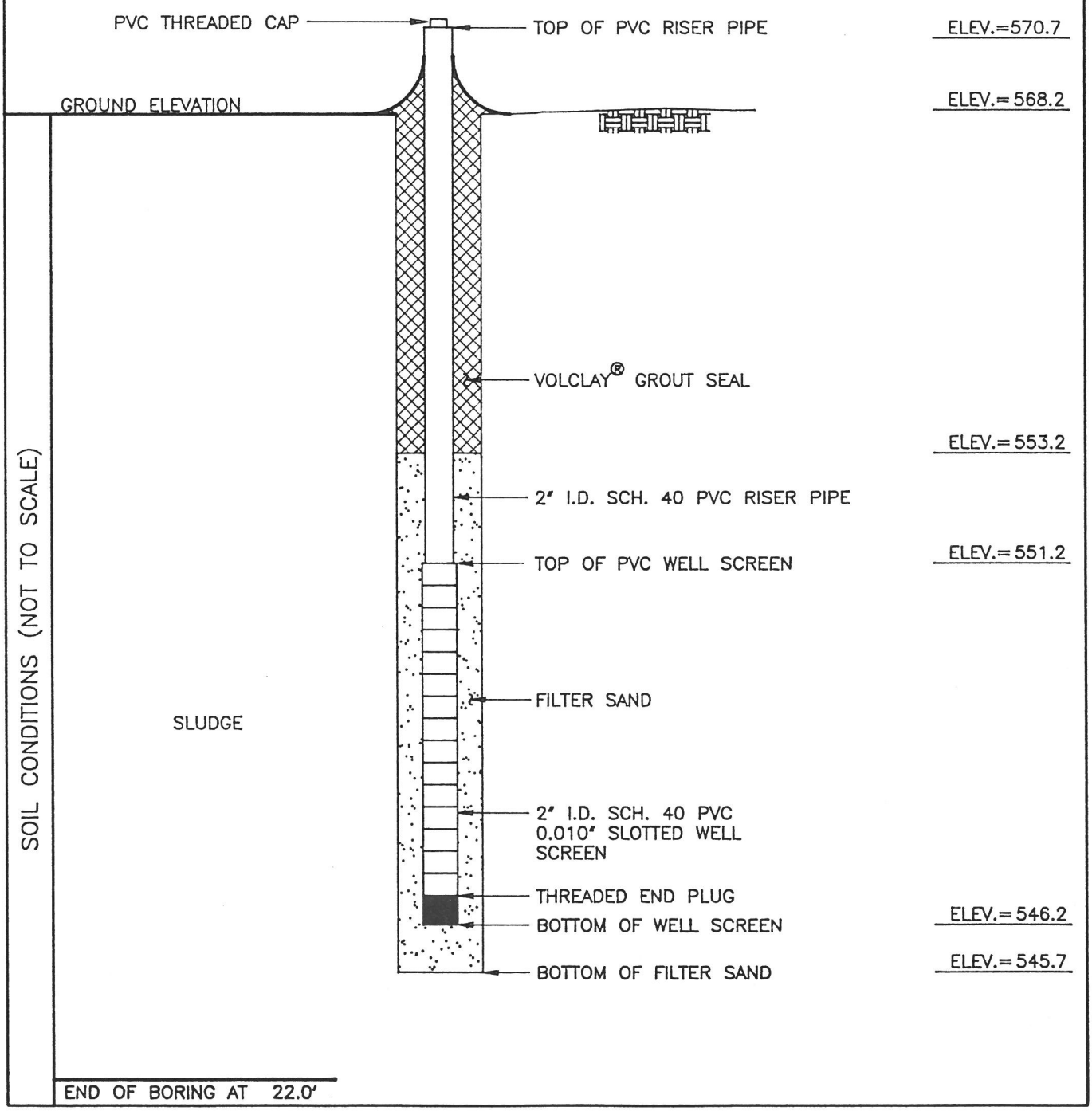
PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. P-9S PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. P-9S
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 4447.3
CLIENT CWL&P		E 2415.6
ENGINEER/GEOLOGIST STEVE SCHILLING		INSTALLATION DATE 8/19/92
DRILLER KEVIN SHAMWAY		WEATHER CLOUDY, 70'S



PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. LP-1 PROJ. NO. 496B
PROJECT FGDS LANDFILL LOCATION SPRINGFIELD, ILLINOIS CLIENT CWL&P GEOLOGIST STEVE VANHOOK DRILLER MANUAL ROSARIO		BORING NO. LP-1 LOCATION N 4326.5 E 2639.9 INSTALLATION DATE 7/25/92 WEATHER CLOUDY, 70'S



PATRICK ENGINEERING INC.	PIEZOMETER INSTALLATION REPORT	PIEZ. NO. LP-2 PROJ. NO. 496B
PROJECT FGDS LANDFILL		BORING NO. LP-2
LOCATION SPRINGFIELD, ILLINOIS		LOCATION N 4257.5
CLIENT CWL&P		E 2365.8
GEOLOGIST STEVE VANHOOK		INSTALLATION DATE 7/25/92
DRILLER MANUAL ROSARIO		WEATHER CLOUDY, 70'S



Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: R-101

Site Name: CWLP - Ash Disposal Facility Grid Coordinate: Northing 623.22 Easting 1426.13

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: January 15, 1990

Driller: B. Williamson Geologist: -- Date Completed: January 15, 199

Drilling Method: Hollow Stem Auger - 3¼" I.D. Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Amount of cement: # of bags 3 lbs. per bag 94

Amount of bentonite: # of bags 0.1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet

Amount of bentonite: # of Bags 0.8 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco-Sandblasting)

Source of Sand: Henry Nelch & Son Co., Springfield, IL

Amount of Sand: # of bags 1.8 lbs. per bag 100

Well Construction Materials

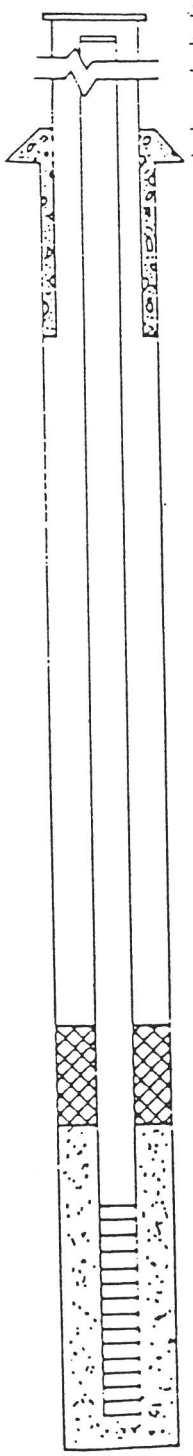
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			2"	
Screen			2"	
Coupling joint screen to riser			--	
Protective casing				6"X5' Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	31.6'
Protective casing length	5'
Screen length	6'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	37.6'
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	6
ID of riser pipe (in)	2

Elevations — .01 ft.



546	83	MSL Top of Protective Casing
546	68	MSL Top of Riser Pipe
	+2.9	ft. Casing Stickup
543	78	MSL Ground Surface
	-3.1	ft. Top of annular sealant
	-21.3	ft. Top of Seal
	2.8	ft. Total Seal Interval
	-24.1	ft. Top of Sand
	-25.8	ft. Top of Screen
	6.0	ft. Total Screen Interval
	-31.8	ft. Bottom of Screen
	-34.0	ft. Bottom of Borehole

Completed by: Surveyed by: Ill. registration #

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: R-102

Site Name: CWLP - Ash Disposal Facility Grid Coordinate: Northing 2294.50 Easting 674.54

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: January 11, 1990

Driller: B. Williamson Geologist: -- Date Completed: January 11, 19

Drilling Method: Hollow Stem Auger - 3¼" I.D. Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Amount of cement: # of bags 4 lbs. per bag 94

Amount of bentonite: # of bags 0.1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet

Amount of bentonite: # of Bags 0.7 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco-Sandblasting)

Source of Sand: Henry Nelch & Son Co., Springfield, IL

Amount of Sand: # of bags 2.0 lbs. per bag 100

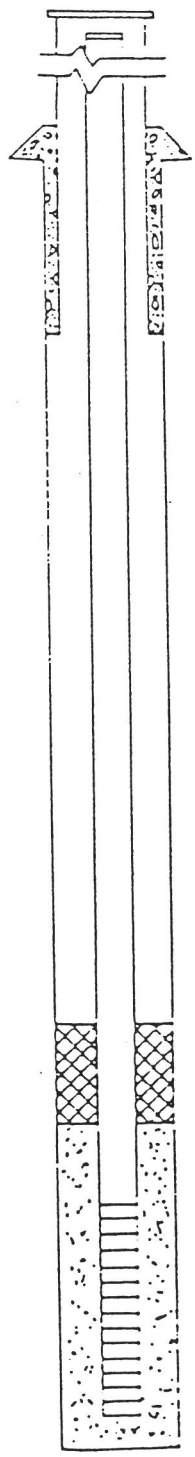
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			2"	
Screen			2"	
Coupling joint screen to riser			--	
Protective casing				6"X5' Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	34.6'
Protective casing length	5'
Screen length	6'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	40.6'
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	6
ID of riser pipe (in)	2



Elevations — .01 ft.

539 35 MSL Top of Protective Casi
539 16 MSL Top of Riser Pipe
+3.4 ft. Casing Stickup

535 76 MSL Ground Surface
-3.0 ft. Top of annular sealant

-25.5 ft. Top of Seal
2.9 ft. Total Seal Interval
-28.4 ft. Top of Sand
-31.2 ft. Top of Screen
6.0 ft. Total Screen Interval
-37.2 ft. Bottom of Screen
-38.0 ft. Bottom of Borehole

Completed by: Surveyed by: Ill. registration #

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: R-103

Site Name: CWLP - Ash Disposal Facility Grid Coordinate: Northing 2208.19 Easting 1504.46

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: January 13, 1990

Driller: B. Williamson Geologist: -- Date Completed: January 13, 19

Drilling Method: Hollow Stem Auger - 3¼" I.D. Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Amount of cement: # of bags 3 lbs. per bag 94

Amount of bentonite: # of bags 0.1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet

Amount of bentonite: # of Bags 0.8 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco-Sandblasting)

Source of Sand: Henry Nelch & Son Co., Springfield, IL

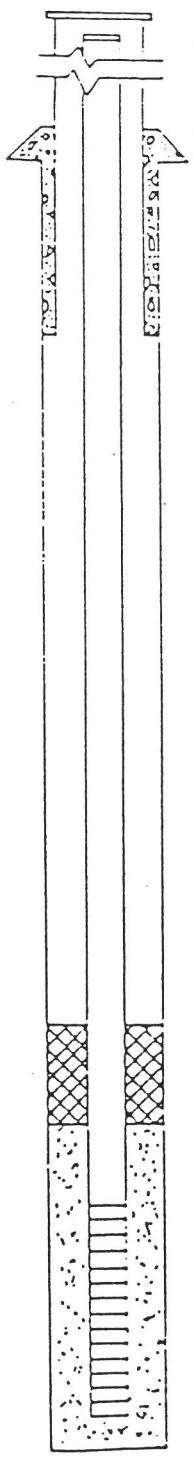
Amount of Sand: # of bags 1.7 lbs. per bag 100

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			2"	
Screen			2"	
Coupling joint screen to riser			--	
Protective casing				6"X5' Steel

Measurements to .01 ft. (where applicable)

Riser pipe length	28.8'
Protective casing length	5'
Screen length	6'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	34.8
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	6
ID of riser pipe (in)	2



Elevations — .01 ft.

538 66 MSL Top of Protective Casi
538 58 MSL Top of Riser Pipe
+2.5 ft. Casing Stickup

536 08 MSL Ground Surface
-3.2 ft. Top of annular sealant

-20.5 ft. Top of Seal
2.9 ft. Total Seal Interval
-23.4 ft. Top of Sand
-26.3 ft. Top of Screen
6.0 ft. Total Screen Interval
-32.3 ft. Bottom of Screen
-33.0 ft. Bottom of Borehole

Completed by: Surveyed by: Ill. registration #

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-104

Site Name: CWLP - Ash Disposal Facility Grid Coordinate: Northing 2296.94 Easting 938.06

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: January 12, 1990

Driller: B. Williamson Geologist: -- Date Completed: January 12, 19

Drilling Method: Hollow Stem Auger - 3¼" I.D. Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Amount of cement: # of bags 3.3 lbs. per bag 94

Amount of bentonite: # of bags 0.1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet

Amount of bentonite: # of Bags 0.6 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco-Sandblasting)

Source of Sand: Henry Nelch & Son Co., Springfield, IL

Amount of Sand: # of bags 1.9 lbs. per bag 100

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			2"	
Screen			2"	
Coupling joint screen to riser			--	
Protective casing				6"X5' Steel

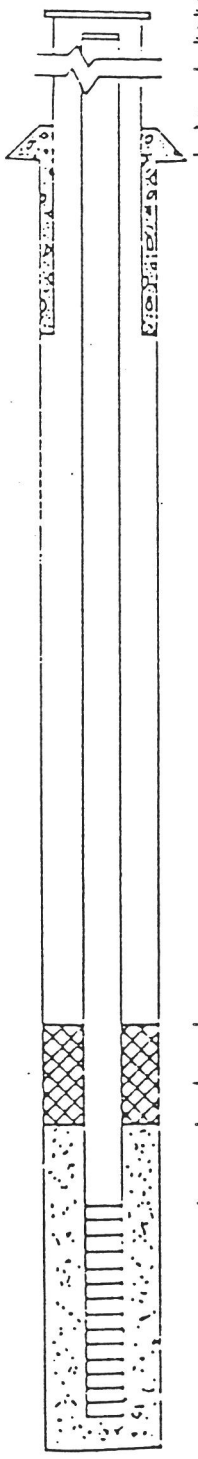
Measurements

to .01 ft. (where applicable)

Riser pipe length	27.9'
Protective casing length	5'
Screen length	6'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	33.9
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	6
ID of riser pipe (in)	2

Elevations — .01 ft.

533	52	MSL Top of Protective Casi
532	95	MSL Top of Riser Pipe
	+2.3	ft. Casing Stickup
530	65	MSL Ground Surface
	-2.8	ft. Top of annular sealant
	21.5	ft. Top of Seal
	2.1	ft. Total Seal Interval
	-23.6	ft. Top of Sand
	-25.6	ft. Top of Screen
	6.0	ft. Total Screen Interval
	-31.6	ft. Bottom of Screen
	-36.0	ft. Bottom of Borehole



Completed by: Surveyed by: Ill. registration #

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-105 / G120

Site Name: CWLP - Ash Disposal Facility Grid Coordinate. Northing: 1641.61 Easting: 610.10

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: January 9, 1990

Driller: B. Williamson Geologist: -- Date Completed: January 16, 19
(Re-Drilled w/4¼" I.D.)

Drilling Method: Hollow Stem Auger - 3¼" I.D & 4¼" I.D Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Amount of cement: # of bags 6 lbs. per bag 94

Amount of bentonite: # of bags 0.2 lbs. per bag 50

Type of Bentonite Seal (Granular. Pellet): Pellet

Amount of bentonite: # of Bags 0.5 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco-Sandblasting)

Source of Sand: Henry Nelch & Son Co., Springfield, IL

Amount of Sand: # of bags 1.8 lbs. per bag 100

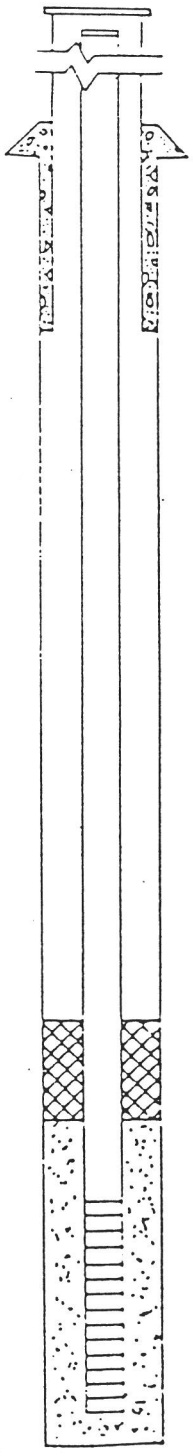
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			2"	
Screen			2"	
Coupling joint screen to riser			--	
Protective casing				6"X5' Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	43.9
Protective casing length	Flush Mount
Screen length	6'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	49.9
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	8
ID of riser pipe (in)	2



Elevations — .01 ft.

553 49		MSL Top of Protective Cas
553 25		MSL Top of Riser Pipe
____	+0.1	ft. Casing Stickup
553 49		MSL Ground Surface
____	-2.9	ft. Top of annular sealant
____	-40.5	ft. Top of Seal
____	2.0	ft. Total Seal Interval
____	-42.5	ft. Top of Sand
____	-43.8	ft. Top of Screen
____	6.0	ft. Total Screen Interval
____	-49.8	ft. Bottom of Screen
____	-53.0	ft. Bottom of Borenole

Completed by: _____ Surveyed by: _____ Ill. registration # _____

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-106

Site Name: CWLP Ash Disposal Facility Grid Coordinate: Northing 1760.44 Easting 983.64

Drilling Contractor: Professional Service Industries, Inc. Date Drilled Start: February 23, 1990

Driller: B. Williamson Geologist: -- Date Completed: February 23, 199

Drilling Method: Hollow stem auger- 3¼" I.D. Drilling Fluids (type): none

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite grout

Amount of cement: # of bags 4 lbs. per bag 94

Amount of bentonite: # of bags 0.1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet

Amount of bentonite: # of Bags 0.8 lbs. per bag 50

Type of Sand Pack: Silica Sand (Marco - Sandblasting)

Source of Sand: Henry Nelch & Son Co. Springfield, IL

Amount of Sand: # of bags 2.0 lbs. per bag 100.0

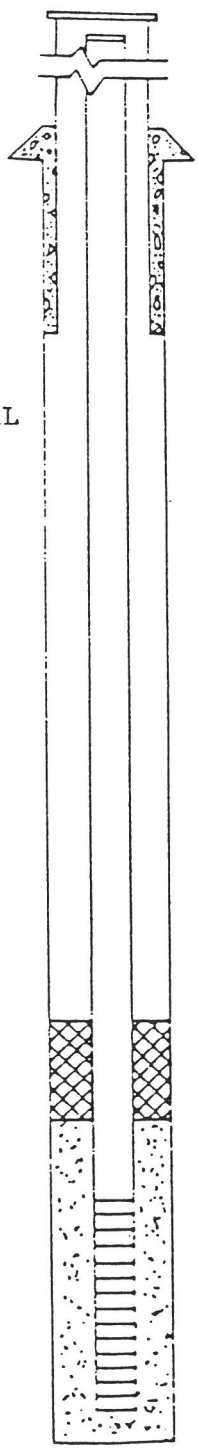
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			--	
Riser pipe above w.t.			3"	
Riser pipe below w.t.			3"	
Screen			3"	
Coupling joint screen to riser			--	
Protective casing				6"x5'

Measurements

to .01 ft. (where applicable)

Riser pipe length	31.3'
Protective casing length	5'
Screen length	8'
Bottom of screen to end cap	0.3'
Top of screen to first joint	0.3'
Total length of casing	39.3'
Screen slot size	0.010
# of openings in screen	--
Diameter of borehole (in)	6
ID of riser pipe (in)	3



Elevations — .01 ft.

525	49	MSL Top of Protective Casing
525	37	MSL Top of Riser Pipe
____	1.2	ft. Casing Stickup
524	17	MSL Ground Surface
____	-3.0	ft. Top of annular sealant
____	-16.5	ft. Top of Seal
____	5.6	ft. Total Seal Interval
____	-22.1	ft. Top of Sand
____	-27.0	ft. Top of Screen
____	8.0	ft. Total Screen Interval
____	-35.0	ft. Bottom of Screen
____	-35.0	ft. Bottom of Borehole

Completed by: _____ Surveyed by: _____ Ill. registration # _____

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Coordinates
Northing: 3728.6
Easting: 2315.7

Boring Information:
Boring No.: G110
Well No.: G110
Surf. Elev.: 554.5
Depth Information:
Total: 59.5
Auger: 59.5
Rotary: N/A
Dates:
Start: 7/12/93
Finish: 7/12/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 55

Personel:
Geologist: B. Hunsberger
Driller: M. Moore
Helper (s): R. Smith

Sample Type: ▯ - Continuous Barrel ⊠ - Split Spoon ▨ - Shelby Tube ▮ - Core ▭ - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_u / [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										Gravel backfill-*access road.*		554.5
	1		1A	3.2'		3.5		Concrete Plug		Dark gray silty CLAY, little sand and gravel, with rootlets.		
5			2A			2.75						549.5
	2		2B			2.8 2.5				Dark gray-black clayey SILT, some fine sand, rootlets.		
			2C	5.0'		0.8				Dark gray-black silty CLAY, soft, with rootlets, some fine sand.		
10	3			1.4'								544.5
	4		4A			0.7 0.5		Cement/Bentonite Grout				
				2.8'		0.65						
			5A			3.25				Dark gray, very moist silty CLAY-clayey SILT, numerous plant and wood fragments *(appears to be original grade).*		
15	5					2.75						539.5
						2.25						
			5B			2.0						
				4.8'		2.8						
	6					1.8 2.2						
20						1.8						534.5

NOTE: ▽ = groundwater encountered while drilling.

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Coordinates
Northing: 3728.6
Easting: 2315.7

Boring Information:
Boring No.: G110
Well No.: G110
Surf. Elev.: 554.5
Depth Information:
Total: 59.5
Auger: 59.5
Rotary: N/A
Dates:
Start: 7/12/93
Finish: 7/12/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 55

Personel:
Geologist: B. Hunsberger
Driller: M. Moore
Helper (s): R. Smith

Sample Type: ▮ – Continuous Barrel ☒ – Split Spoon ⧄ – Shelby Tube ▮ – Core □ – Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
												534.5
	6		6A			1.7				Dark gray silty CLAY, moist, trace fine sand, little organics.		
			6B	5.0'		1.6						
	7									Gray mottled light gray-brown silty CLAY, little fine sand, some plant roots.		
25				2.0'								529.5
			8A			0.7						
	8		8B			2.0 1.2						
				3.0'		1.3						
						2.2						
30			9A			2.2				Gray mottled brown silty CLAY, trace fine sand, little organics.		524.5
	9					2.2						
						2.75						
						2.75						
			9B	5.0'		1.75				Gray clayey SILT.		
						0.75						
			10A			0.3						
35												519.5
						0.2						
	10					0.2				Gray CLAY, very soft, some organic clay strata present. *(* The clay was too soft for the pocket penetrometer).*		
						*						
						*						
				5.0'		*						
	11		11A									
40												514.5

Cement/Bentonite Grout

Bentonite Seal

NOTE: ▽ = groundwater encountered while drilling.

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Coordinates
Northing: 3728.6
Easting: 2315.7

Boring Information:
Boring No.: GII0
Well No.: GII0
Surf. Elev.: 554.5
Depth Information:
Total: 59.5
Auger: 59.5
Rotary: N/A
Dates:
Start: 7/12/93
Finish: 7/12/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 55

Personel:
Geologist: B. Hunsberger
Driller: M. Moore
Helper (s): R. Smith

Sample Type: ▯ – Continuous Barrel ⊠ – Split Spoon ⧄ – Shelby Tube ◧ – Core ☐ – Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
								Bentonite Seal				514.5
	11		11B	5.0'						Gray fine silty SAND, little clay.		
45	12		12A 12B	5.0'				Filter Pack and/or Formation Sand				509.5
50	13		13A	5.0'						Gray, fine clayey SAND, some silt.		504.5
55	14			0.0'				Bentonite Seal		Gray shale with muscovite mica. *(Since there was no recovery in Run # 14, the bedrock contact was determined at the depth the down pressure increased from 300 psi to 1500 psi on the auger column.)*		499.5
	15	⊠	15A 15A	0.7'	10 31							
60										*E.O.B.=59.5 feet*		494.5

NOTE: ▽ = groundwater encountered while drilling.

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-110

Site Name: FGDS Landfill/ City Water, Light and Power Grid Coordinate: Northing 3728.6 Easting 2315.7

Drilling Contractor: AE Exploration Corporation Date Drilled Start: 07/12/93

Driller: M. Moore Geologist: B. Hunsberger Date Completed: 07/12/93

Drilling Method: Hollow Stem Auger Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite

Amount of cement: # of bags 8 lbs. per bag 94

Amount of bentonite: # of bags 1 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Grout

Amount of bentonite: # of Bags 1 lbs. per bag 50

Type of Sand Pack: #10-20 Silica Sand

Source of Sand: Best Environmental - Chardon, OH

Amount of Sand: # of bags 10 lbs. per bag 50

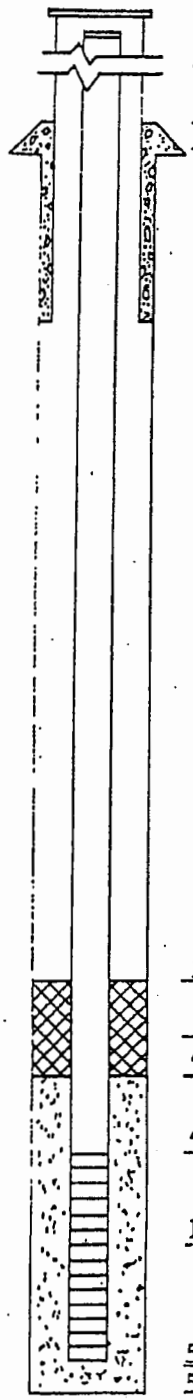
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	Flush			
Riser pipe above w.t.	304			
Riser pipe below w.t.	304			
Screen	304			
Coupling joint screen to riser	Flush			
Protective casing				Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	47.11'
Protective casing length	5.0'
Screen length	10.0'
Bottom of screen to end cap	0.21
Top of screen to first joint	0.065
Total length of casing	57.11'
Screen slot size	.01"
# of openings in screen	---
Diameter of borehole (in)	8.0"
Diameter of riser pipe (in)	2.0"



Elevations — .01 ft.

557 20	MSL	Top of Protective Casing
557 11	MSL	Top of Riser Pipe
2 61	ft.	Casing Stickup
554 50	MSL	Ground Surface
3 0	ft.	Top of annular sealant
37 0	ft.	Top of Seal
5 0	ft.	Total Seal Interval
42 0	ft.	Top of Sand
44 5	ft.	Top of Screen
10 0	ft.	Total Screen Interval
54 5	ft.	Bottom of Screen
59 5	ft.	Bottom of Borehole

Completed by: Brad Hunsberger Surveyed by: City Water, Light and Power Rich Davis IL registration #: 2098

Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 4,445.0
Easting: 2,249.0

Boring Information:
Boring No.: G-111
Well No.: G-111
Surf. Elev.: 553.6
Depth Information:
Total: 59.60
Auger: 59.60
Rotary: 0.00
Dates:
Start: 7/20/93
Finish: 7/21/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 45 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personel:
Geologist: R. Hasenyager
Driller: A. Weisenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										Very dark brown, slightly moist, clayey SILT with roots, other organic matter, and trace sand.		553.6
	1							Concrete Plug		Brown, soft, slightly moist, silty CLAY, with trace sand.		
5				0.0								548.6
	2					3.25						
						4.50						
10				5.0				Cement/Bentonite Grout	▽	Dark brown, moist, plastic, silty CLAY, with trace sand.		543.6
	3					[1.50] 1.75						
						0.75				Brown, moist, plastic, silty CLAY, with trace sand.		
15				5.0						Brown mottled gray, moist, plastic, silty CLAY, With trace sand and organic matter.		538.6
	4			1.3								
	5					1.75 [1.10] 1.00				Black dry, friable, clayey SILT, with no sand or pebbles.		
20				3.0								533.6

NOTE: ▽ = water level 13 hours after completion.
Torvane values are actual dial readings.

Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
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Boring Information:
Boring No.: G-111
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Dates:
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Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 45 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personel:
Geologist: R. Hasenyager
Driller: A. Weisenhofer
Helper (s): K. Doetzel

Sample Type: ▮ - Continuous Barrel ⊠ - Split Spoon ⧄ - Shelby Tube ▮ - Core ☐ - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
												533.6
	6			2.0		[3.40]				Brown mottled gray, moist, plastic, silty CLAY,with trace sand and organics. *Soil sample contained 1,170 ppm sulfate.*		
	7											
25				3.0		2.10						528.6
	8											
30				5.0						▽-- *Free water during drilling* Brown, very moist, clayey SILT with some sand (fine-grained). *Very thin SAND (fine-grained) seam at 30.1'*		523.6
	9									Brown, mottled gray, very moist, clayey SILT, with some sand (fine- grained) and trace organics.		
35				5.0								518.6
	10			2.0		[0.85]				Gray, very moist, sandy SILT.		
						0.50				Reddish brown, moist clayey SILT, with trace organics.		
	11					0.75				Gray, very moist, clayey SILT, with sand (very fine- to fine- grained). *Sandier zones at 38.2'-38.3' and 38.5'-38.8'*		
40				3.0								513.6

Cement/Bentonite Grout

NOTE: ▽ = water level 13 hours after completion.
Torvane values are actual dial readings.

Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 4,445.0
Easting: 2,249.0

Boring Information:
Boring No.: G-111
Well No.: G-111
Surf. Elev.: 553.6
Depth Information:
Total: 59.60
Auger: 59.60
Rotary: 0.00
Dates:
Start: 7/20/93
Finish: 7/21/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 45 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personel:
Geologist: R. Hasenyager
Driller: A. Weisenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_u /[q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										Roots at 39.3'		513.6
	12			2.0						Gray, saturated, clayey SILT, with some sand (very fine-grained).		
	13					0.25 [0.35] 0.25						
45				5.0						Gray, saturated, silty SAND (very fine- to fine-grained).		508.6
	14									Gray, saturated, sandy SILT.		
										Gray, saturated, silty SAND (very fine- to fine-grained).		
50				5.0						Gray, saturated, SAND (very fine- to fine-grained), with some silt.		503.6
										Gray, saturated, silty SAND (very fine- to fine-grained).		
	15									Gray, very moist, interbedded clayey SILT, with some sand (very-fine grained) and silty SAND (very fine- to fine-grained).		
55				4.0	32					Gray, saturated, silty SAND (fine- to coarse-grained) and PEBBLE (very fine- to medium-grained).		498.6
	16				41							
				2.0	27							
	17				17					*Shale and sandstone fragments more abundant in lower 1.0'*		
					6							
					14							
				1.7	12							
	18				60+					Gray, slightly moist, hard, massive, SHALE. *Bedrock*		
60										*E.O.B. = 59.6 feet*		493.6

Borehole Detail: Cement/Bentonite Grout; Bentonite Seal; Filter Pack

NOTE: ▼ = water level 13 hours after completion.
Torvane values are actual dial readings.

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-111

Site Name: City Water, Light & Power Grid Coordinate: Northing 4445.0 Easting 2249.0

Drilling Contractor: AE Exploration Corporation Date Drilled Start: July 20, 1993

Driller: A. Weisenhofer Geologist: R. Hasenyager Date Completed: July 21, 1993

Drilling Method: Hollow Stem Auger Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite

Amount of cement: # of bags 8 lbs. per bag 94

Amount of bentonite: # of bags 1/2 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Bentonite Grout

Amount of bentonite: # of Bags 1/2 lbs. per bag 50

Type of Sand Pack: Quartz sand (1020)

Source of Sand: Best Sand

Amount of Sand: # of bags 4 1/2 lbs. per bag 50

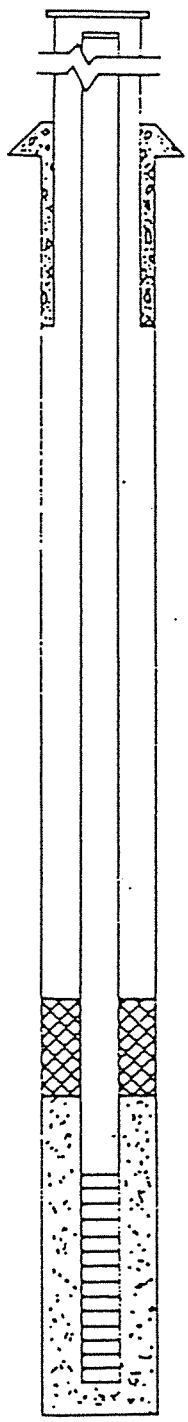
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	304		Sch 40	
Riser pipe above w.t.			Sch 40	
Riser pipe below w.t.	304			
Screen	304			
Coupling joint screen to riser	304			
Protective casing				Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	56.55 feet
Protective casing length	5.0 feet
Screen length	4.72 feet
Bottom of screen to end cap	0.27 feet
Top of screen to first joint	0.21 feet
Total length of casing	61.75 feet
Screen slot size	0.01 inches
# of openings in screen	
Diameter of borehole (in)	8.0 inches
ID of riser pipe (in)	2.0 inches



Elevations — .01 ft.

555	.83	MSL Top of Protective Casing
555	.63	MSL Top of Riser Pipe
2	.03	ft. Casing Stickup
553	.6	MSL Ground Surface
3	.60	ft. Top of annular sealant
48	.00	ft. Top of Seal
5	.08	ft. Total Seal Interval
53	.08	ft. Top of Sand
54	.61	ft. Top of Screen
4	.72	ft. Total Screen Interval
59	.33	ft. Bottom of Screen
59	.60	ft. Bottom of Borehole

Completed by: Rhonald Haseyanger Surveyed by: CWLP Rich Davis Ill. registration # 2098

SKS ENGINEERS, INC.
2900 N. MARTIN LUTHER KING JR. DRIVE
DECATUR, ILLINOIS 62526

SOIL BORING LOG

Date 05/26/2009

SKS Project No. 911607

ROUTE _____ DESCRIPTION CWLP / Landfill Well Replacement LOGGED BY T. Mathias/EK/AL

SECTION N/A LOCATION Springfield, IL SEC. ____ TWP. _____ RNG. _____ PM

COUNTY Sangamon DRILLING METHOD Hollow Stem Auger HAMMER TYPE 140# Safety Hammer

STRUCT. NO. _____
Station _____

BORING NO. R111
Station _____
Offset _____
Ground Surface Elev. _____ ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ Hrs _____ ft

GRASS

BLIND DRILLED TO 44.5 FT.

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
-5				-25			
-10				-30			
-15				-35			
-20				-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

SKS ENGINEERS, INC.
2900 N. MARTIN LUTHER KING JR. DRIVE
DECATUR, ILLINOIS 62526

SOIL BORING LOG

Date 05/26/2009

SKS Project No. 911607

ROUTE _____ DESCRIPTION CWLP / Landfill Well Replacement LOGGED BY T. Mathias/EK/AL

SECTION N/A LOCATION Springfield, IL SEC. ____ TWP. _____ RNG. _____ PM

COUNTY Sangamon DRILLING METHOD Hollow Stem Auger HAMMER TYPE 140# Safety Hammer

STRUCT. NO. _____
Station _____

BORING NO. R111
Station _____
Offset _____
Ground Surface Elev. _____ ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ Hrs _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
BLIND DRILLED TO 44.5 FT.							
44.5 Gray, Saturated Sandy Silt							
46.5 Saturated, Silty Fine Sand							
49.5 Gray, Saturated, Silty Fine Sand							
54.5 Gray, Saturated, Silty Fine Sand, with Gravel							
59.5 END OF BORING @ 59.5 FT.							

2" Groundwater Monitor Well Installed

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1678250020 County: Sangamon

Site Name: City Water Light & Power Landfill Well #: R111

State Plane Coordinate: X E2456708.31 Y N1129507.08 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: R111

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: SKS Engineers, Inc. Driller: D. Baldwin

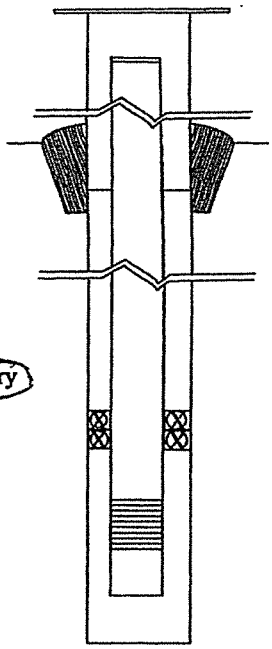
Consulting Firm: _____ Geologist: N/A

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: D. Baldwin (SKS Engineers, Inc.) Date Started: 5/26/09 Date Finished: 5/29/09

Report Form Completed By: D. Baldwin Date: 7/2/09

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite

Installation Method: Slurry

Setting Time: _____

Type of Bentonite Seal - - Granular, Pellet, (Slurry) (Choose One)

Installation Method: Tremie

Setting Time: _____

Type of Sand Pack: Quartz Sand

Grain Size: 1020 (Sieve Size)

Installation Method: Free Drop

Type of Backfill Material: _____ (if applicable)

Installation Method: _____

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
	552.69	0.0	Top of Protective Casing
	552.39	.30	Top of Riser Pipe
	552.69	0.0	Ground Surface
	549.69	3.0	Top of Annular Sealant
	___	___	Static Water Level (After Completion)
	549.69	3.0	Top of Seal
	502.59	50.1	Top of Sand Pack
	501.49	51.2	Top of Screen
	495.89	56.8	Bottom of Screen
	495.59	57.1	Bottom of Well
	495.59	57.1	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	Flush Mount
Riser Pipe Length (feet)	51.2
Bottom of Screen to End Cap (feet)	.31
Screen Length (1st slot to last slot) (feet)	4.72
Total Length of Casing (feet)	56.8
Screen Slot Size **	.010

**Hand-Slotted Well Screens are Unacceptable

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEEI No.: 93-118

Location:
Coord. System: Site Grid
Northing: 4,450.9
Easting: 2,560.6

Boring Information:
Boring No.: G-112
Well No.: G-112
Surf. Elev.: 552.7
Depth Information:
Total: 57.80
Auger: 57.80
Rotary: 0.00
Dates:
Start: 7/21/93
Finish: 7/23/93

Drilling Contractor:
Name: AE Exploration Corp.
City: Springfield, IL
Equipment: CME 45 - 4¼" HSA /w 5 foot continuous barrel sampler.

Personel:
Geologist: R. Hasenyager
Driller: A. Weisenhofer
Helper (s): K. Doetzel

Sample Type: ▮ - Continuous Barrel ⊠ - Split Spoon ⧄ - Shelby Tube ▮ - Core □ - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_u / [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
												552.7
	1			0.0				Concrete Plug		Very dark brown, slightly moist, clayey SILT with roots, other organic matter, and trace sand.		
										Brown, soft, slightly moist, silty CLAY, with trace sand.		
5												547.7
	2			1.3								
10								Cement/Bentonite Grout				542.7
	3			5.0		1.25				Dark brown, slightly moist, plastic, silty CLAY, with trace sand.		
						1.00				Brown, moist, plastic, silty CLAY, with trace sand.		
15												537.7
	4			1.7		1.75				Brown mottled gray, moist, plastic, silty CLAY, with trace sand and organic matter.		
	5			3.0		1.50						
						4.25				Black, moist, friable, clayey SILT, with no sand or pebbles.		
20												532.7

NOTE: ▽ = water level 14 hours after completion.
Torvane values are actual dial readings.

Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

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Site Information:
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Personel:
Geologist: R. Hasenyager
Driller: A. Weisenhofer
Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
												532.7
	6			5.0		4.00 2.75 [1.00] 1.50		Cement/Bentonite Grout		Brown mottled gray, slightly moist, plastic, silty CLAY, with trace sand and organics.		
25	7			2.0								527.7
	8			3.0		0.50 0.50				Brown mottled gray, slightly moist, plastic, silty CLAY, with trace sand and organic matter. ▽-- *Free water during drilling*		
30	9			5.0		0.75 [0.38] [0.30] 0.50 0.75						522.7
35	10			5.0		[0.60] 1.25 1.25 [0.47]				Dark gray, moist, clayey SILT, with trace sand. Reddish brown, moist, clayey SILT, with trace organic matter. Greenish gray, very moist, silty CLAY, with trace sand. *High-angle, dry, parting surfaces at 38.7', 39.1', and 39.5'*		517.7
40												512.7

NOTE: ▽ = water level 14 hours after completion.
Torvane values are actual dial readings.

Andrews Environmental Engineering, Inc.

3535 Mayflower Boulevard, Springfield, IL 62707 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, and Power
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County: Sangamon
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Location:
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Personel:
Geologist: R. Hasenyager
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Helper (s): K. Doetzel

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Recov.	Blow Count	$q_u/[q_s]$ (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
												512.7
	11			3.0		0.50		Cement/Bentonite Grout		*Wood chips and small twigs at 41.4'*		
						0.25 [0.10]				Gray, very moist, clayey SILT, with trace sand. *Small (2-3 mm.)* Bivalvia *and* Gastropoda *throughout bed.*		
	12			2.0						Gray, saturated, soft, sandy SILT.		
45												507.7
	13			3.0		0.25				Gray, saturated, silty SAND (very fine- to fine-grained).		
						[0.22] 0.25				Gray, very moist, plastic, sandy SILT.		
	14			2.0				Bentonite Seal		Gray, saturated, silty SAND (very fine- to fine-grained). SAND (fine-grained) seams at 46.5' and 46.8'.		
50												502.7
	15			4.5		[0.35] 0.50				Gray, very moist, clayey SILT, with organics and trace sand. Thin SAND (fine-grained) seams at 53.7' and 53.9'. *Decreasing organic content with depth. No organics lower 0.5'.*		
						[0.30] 0.50						
						0.50						
55												497.7
	16			1.5				Filter Pack		Gray, very moist, sandy SILT.		
										Gray, saturated, silty SAND (fine- to coarse-grained) and PEBBLE (very fine- to medium-grained). *Shale and sandstone fragments upper 0.3'*		
	17									Gray, slightly moist, hard, massive, SHALE. *Bedrock*		
60										*E.O.B. = 57.8 feet*		492.7

NOTE: ▼ = water level 14 hours after completion.
Torvane values are actual dial readings.

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1678250020 County: Sangamon Well #: G-112

Site Name: City Water, Light & Power Grid Coordinate: Northing 4450.9 Easting 2560.6

Drilling Contractor: AE Exploration Corporation Date Drilled Start: July 21, 1993

Driller: A. Weisenhofer Geologist: R. Hasenyager Date Completed: July 23, 1993

Drilling Method: Hollow Stem Auger Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite

Amount of cement: # of bags 8 lbs. per bag 94

Amount of bentonite: # of bags 1/2 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Bentonite Grout

Amount of bentonite: # of Bags 1/2 lbs. per bag 50

Type of Sand Pack: Quartz Sand (1020)

Source of Sand: Best Sand

Amount of Sand: # of bags 6 lbs. per bag 50

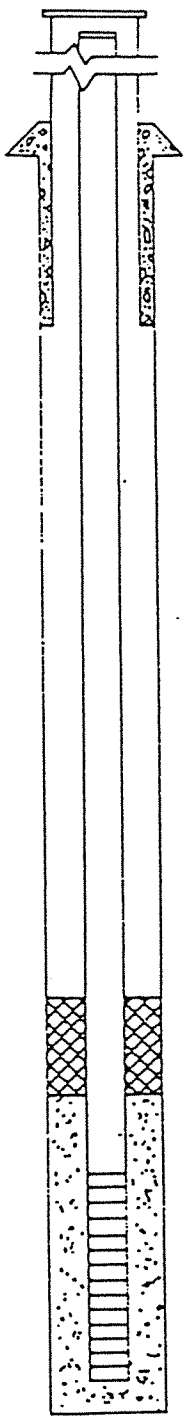
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	304		Sch 40	
Riser pipe above w.t.			Sch 40	
Riser pipe below w.t.	304			
Screen	304			
Coupling joint screen to riser	304			
Protective casing				Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	54.81 feet
Protective casing length	5.0 feet
Screen length	4.73 feet
Bottom of screen to end cap	0.29 feet
Top of screen to first joint	0.21 feet
Total length of casing	60.04 feet
Screen slot size	0.01 inches
% of openings in screen	
Diameter of borehole (in)	8.0 inches
ID of riser pipe (in)	2.0 inches



Elevations — .01 ft.

555	.06	MSL Top of Protective Casing
554	.88	MSL Top of Riser Pipe
2	.18	ft. Casing Stickup
552	.7	MSL Ground Surface
4	.10	ft. Top of annular sealant
46	.10	ft. Top of Seal
5	.07	ft. Total Seal Interval
51	.17	ft. Top of Sand
52	.78	ft. Top of Screen
4	.73	ft. Total Screen Interval
57	.51	ft. Bottom of Screen
57	.80	ft. Bottom of Borehole

Completed by: Rhonald Hasenyager Surveyed by: CLIZP-Rich Davis Ill. registration # 2098

RAPPS

ENGINEERING and APPLIED SCIENCE

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

BORING LOG

Site Name: FGDS Development Landfill — Boring No: AW-1

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 552.85

Logged By: KJM — Checked By: KJM — Date Started: 12/29/08 — Completed: 12/30/08

DEPTH	Material Description Classification System	Sampling Tube No.	Type	% Rec.	Tests OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
0	Fill (not sampled)		5' CONTINUOUS SAMPLER					Blind drilled to 15'		0
15	Gray to brown silty clay fill; Moist; Soft to firm; Sand, pebbles & coal fragments	1		100						15
20	Plant debris	2		100						20
25	Dk. brown to gray clayey silt; Moist; Firm to hard; Laminated	3		100				Base of fill @ 23.6'		25
30										30

Water Level_____ after_____ hrs.

RAPPS

ENGINEERING and APPLIED SCIENCE

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

BORING LOG

Site Name: FGDS Development Landfill — Boring No: AW-1

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 552.85

Logged By: KJM — Checked By: KJM — Date Started: 12/29/08 — Completed: 12/30/08

DEPTH	Material Description Classification System	Sampling Tube No.	Type	% Rec.	Tests OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
30	Trace fine sand; Mottled	4	5' CONTINUOUS SAMPLER	100				Wet seam @ 32.2' Wet seam @ 33.3'		30
35	Softer	5		100						35
	Gray fine to coarse sand; Moist to wet; Clayey and silty zones; Trace gravel	6		90						
40										40
45		7		80						45
50	Pebbles									50
	Dark gray shale; Weathered/broken	8		25				Increased resistance		
55	End of boring @ 54.34'							Refusal		55
60										60

Water Level _____ after _____ hrs.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1678250020 County: Sangamon

Site Name: FGDS Development Landfill Well #: AW-1

State Plane Coordinate: X ____ Y ____ (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: AW-1

N 4512.2 E 2030.49

Surveyed by: David Mihelsic IL Registration #: 3762

Drilling Contractor: Reynolds Drilling Corp. Driller: Andrew Rachford

Consulting Firm: Rapps Engineering & Applied Science Geologist: Ken Miller

Drilling Method: HSA Drilling Fluid (Type): NA

Logged By: Ken Miller Date Started: 12/29/08 Date Finished: 12/30/08

Report Form Completed By: Ken Miller Date: 5/18/09

ANNULAR SPACE DETAILS

Type of Surface Seal: Cement

Type of Annular Sealant: Bentonite Grout

Installation Method: Tremie

Setting Time: >24 hrs

Type of Bentonite Seal - - Granular, (Pellet), Slurry (Choose One)

Installation Method: Poured

Setting Time: 20 hrs

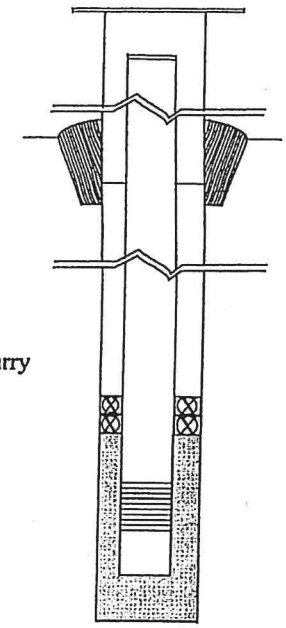
Type of Sand Pack: Quartz Sand

Grain Size: 50 (Sieve Size)

Installation Method: Poured

Type of Backfill Material: ____ (if applicable)

Installation Method: ____



Elevations (MSL)*	Depths (BGS)	(.01ft.)
____	____	Top of Protective Casing
555.60	-2.75	Top of Riser Pipe
552.85	0	Ground Surface
549.85	3.00	Top of Annular Sealant
____	____	Static Water Level (After Completion)
513.90	38.95	Top of Seal
510.90	41.95	Top of Sand Pack
508.90	43.95	Top of Screen
498.90	53.95	Bottom of Screen
498.51	54.34	Bottom of Well
498.51	54.34	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or (Other)
Riser Pipe Above W.T.	SS304, SS316, PTFE, (PVC), or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, (PVC), or Other
Screen	SS304, SS316, PTFE, (PVC), or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	5
Riser Pipe Length (feet)	46.70
Bottom of Screen to End Cap (feet)	0.4
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	57.09
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable

RAPPS

ENGINEERING and APPLIED SCIENCE

BORING LOG

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

Site Name: FGDS Development Landfill — Boring No: AW-2

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 526.68

Logged By: KJM — Checked By: KJM — Date Started: 1/2/09 — Completed: 1/2/09

DEPTH	Material Description Classification System	Sampling Tube No.	Type	% Rec.	Tests OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
0	Dark brown silty clay; Moist; Firm	1	5' CONTINUOUS SAMPLER	100						0
5	Sandy	2		100				Water on bit		5
10	Lt. brown to gray mottled clayey silt; Moist; Firm; Trace sand; Fe oxidation stains	3		100						10
15	Dark gray silt; Moist; Firm Softer; Trace sand	4		100						15
20	Sandy	5		100				Wet seam @ 19' Wet seam @ 20.7'		20
25		6		100						25
30	Gray fine to medium sand									30

Water Level_____ after_____ hrs.

RAPPS

ENGINEERING and APPLIED SCIENCE

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

BORING LOG

Site Name: FGDS Development Landfill — Boring No: AW-2

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 526.68

Logged By: KJM — Checked By: KJM — Date Started: 1/2/09 — Completed: 1/2/09

DEPTH	Material Description Classification System	Sampling Tube No.	Type	% Rec.	Tests OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
30	Gravelly @ base End of Boring @ 32.22'	7	5' CONTINUOUS SAMPLER	100				Refusal Broken shale in bit		30
35										35
40										40
45										45
50										50
55										55
60										60

Water Level_____ after_____ hrs.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1678250020 County: Sangamon

Site Name: FGDS Development Landfill Well #: AW-2

State Plane Coordinate: X ____ Y ____ (or) Latitude: ____ ' " Longitude: ____ ' "

N 5480.91 E 2361.46

Borehole #: AW-2

Surveyed by: David Mihelsic IL Registration #: 3762

Drilling Contractor: Reynolds Drilling Corp. Driller: Kerry Doetzel

Consulting Firm: Rapps Engineering & Applied Science Geologist: Ken Miller

Drilling Method: HSA Drilling Fluid (Type): NA

Logged By: Ken Miller Date Started: 1/2/09 Date Finished: 1/2/09

Report Form Completed By: Ken Miller Date: 5/18/09

ANNULAR SPACE DETAILS

Type of Surface Seal: Cement

Type of Annular Sealant: Bentonite Chips

Installation Method: Poured

Setting Time: >24 hrs

Type of Bentonite Seal - - Granular, (Pellet), Slurry (Choose One)

Installation Method: Poured

Setting Time: >24 hrs

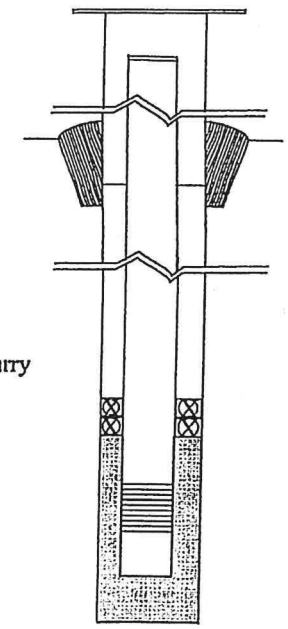
Type of Sand Pack: Quartz Sand

Grain Size: 50 (Sieve Size)

Installation Method: Poured

Type of Backfill Material: ____ (if applicable)

Installation Method: ____



Elevations (MSL)*	Depths (BGS)	(.01ft.)
____	____	Top of Protective Casing
529.98	-3.30	Top of Riser Pipe
526.68	0	Ground Surface
523.68	3.00	Top of Annular Sealant
____	____	Static Water Level (After Completion)
509.86	16.82	Top of Seal
506.86	19.82	Top of Sand Pack
504.86	21.82	Top of Screen
494.86	31.82	Bottom of Screen
494.46	32.22	Bottom of Well
494.46	32.22	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or (Other)
Riser Pipe Above W.T.	SS304, SS316, PTFE, (PVC), or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, (PVC), or Other
Screen	SS304, SS316, PTFE, (PVC), or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	5
Riser Pipe Length (feet)	25.12
Bottom of Screen to End Cap (feet)	0.4
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	35.52
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable

RAPPS

ENGINEERING and APPLIED SCIENCE

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

BORING LOG

Site Name: FGDS Development Landfill — Boring No: AW-3

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 537.75

Logged By: KJM — Checked By: KJM — Date Started: 12/30/08 — Completed: 12/31/08

DEPTH	Material Description Classification System	Sampling: Tube No.	Type	% Rec.	Tests: OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
0	Dark brown clayey silt; Moist; Firm; Organic debris & plant roots									0
	Gray to brown mottled silty clay; Moist; Firm; Trace sand; Laminated; Fe oxidation stains	1	5' CONTINUOUS SAMPLER	100						
5		2		100						5
10		3		95				Wet seam @ 11.5'		10
15	Gray sandy clay; Moist; Firm; Finely laminated	4		95				Water on rods		15
20										20
	Dark gray sandy silt; Moist; Soft to firm; Some clay	5		80						
25		6		30				No recovery 26.5'–30'		25
30										30

Water Level_____ after_____ hrs.

RAPPS

ENGINEERING and APPLIED SCIENCE

821 SOUTH DURKIN – SPRINGFIELD IL 62704 – (217)787-2118

BORING LOG

Site Name: FGDS Development Landfill — Boring No: AW-3

Drilling Firm: Reynolds Drilling Corp. — Drilling Method: HSA — Surface Elev: 537.75

Logged By: KJM — Checked By: KJM — Date Started: 12/30/08 — Completed: 12/31/08

DEPTH	Material Description Classification System	Sampling Tube No.	Type	% Rec.	Tests OVM (ppm)	Qu t/sf PEN	Moist	Comments	Well	DEPTH
30	Dark gray silt; Trace sand	7	5' CONTINUOUS SAMPLER	100						30
35	Sandy									35
	Gray fine to medium silty sand; Wet; Gravelly @ base	8		100						
40	Gray shale							Broken shale in bit No recovery past 40'		40
	End of Boring @ 41.83'	9		0				Refusal		
45										45
50										50
55										55
60										60

Water Level_____ after_____ hrs.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1678250020 County: Sangamon

Site Name: FGDS Development Landfill Well #: AW-3

State Plane Coordinate: X ____ Y ____ (or) Latitude: ____ ____ ____ Longitude: ____ ____ ____ Borehole #: AW-3

Surveyed by: David Mihelsic IL Registration #: 3762

Drilling Contractor: Reynolds Drilling Corp. Driller: Andrew Rachford

Consulting Firm: Rapps Engineering & Applied Science Geologist: Ken Miller

Drilling Method: HSA Drilling Fluid (Type): NA

Logged By: Ken Miller Date Started: 12/30/08 Date Finished: 12/31/08

Report Form Completed By: Ken Miller Date: 5/18/09

ANNUAL SPACE DETAILS

Type of Surface Seal: Cement

Type of Annular Sealant: Bentonite Chips

Installation Method: Poured

Setting Time: >24 hrs

Type of Bentonite Seal - - Granular, (Pellet), Slurry (Choose One)

Installation Method: Poured

Setting Time: 16 hrs

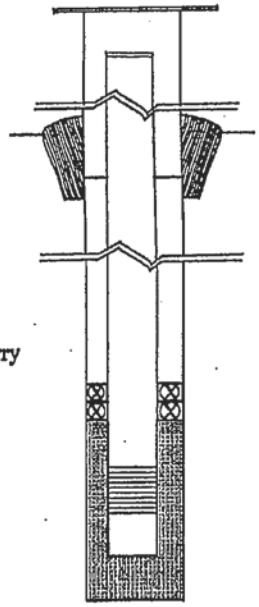
Type of Sand Pack: Quartz Sand

Grain Size: 50 (Sieve Size)

Installation Method: Poured

Type of Backfill Material: ____ (If applicable)

Installation Method: ____



Elevations (MSL)*	Depths (BGS)	(.01ft.)
____	____	Top of Protective Casing
540.33	-2.58	Top of Riser Pipe
537.75	0	Ground Surface
534.75	3.00	Top of Annular Sealant
____	____	Static Water Level (After Completion)
511.32	26.43	Top of Seal
508.32	29.43	Top of Sand Pack
506.32	31.43	Top of Screen
496.32	41.43	Bottom of Screen
495.92	41.83	Bottom of Well
495.92	41.83	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or (Other)
Riser Pipe Above W.T.	SS304, SS316, PTFE, (PVC), or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, (PVC), or Other
Screen	SS304, SS316, PTFE, (PVC), or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	5
Riser Pipe Length (feet)	34.01
Bottom of Screen to End Cap (feet)	0.4
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	44.41
Screen Slot Size **	0.010

**Hand-Slotted Well Screens are Unacceptable

Well Completion Form (revised 02/06/02)

Professional Service Industries, Inc.
480 North Street
Springfield, Illinois 62704
Telephone: 217/544-6663
Fax: 217/544-6143

LOG OF BORING AP-1

Sheet 1 of 1

PSI Job No.: 0020522
Project: Piezometer Installation
Location: CWLP Ash Pond
East Lake Shore Drive
Springfield, Illinois

Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Hammer Type: CME Automatic; ETR = 86%
Boring Location: See attached boring location plan.

WATER LEVELS

While Drilling	9 feet
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0			1	18	Dark brown silty CLAY, very stiff, slightly moist	CL	7-8-9 N_{60}=24		
	5			2	18	Dark brown clayey SILT, stiff, slightly moist	ML	5-5-5 N_{60}=14		
				3	18	Gray clayey SILT, trace brown, firm, moist		2-2-3 N_{60}=7		
	10			4	18		ML	2-2-3 N_{60}=7		
				5	18			1-2-2 N_{60}=6		
	15			6	18	Gray silty CLAY, few brown sand, firm, saturated	CL	1-2-2 N_{60}=6		
				7	18	Gray sandy CLAY, stiff, saturated	CLS	4-3-4 N_{60}=10		
	20			8	18	Blue-gray clayey SILT, soft to very stiff, moist to saturated		3-3-4 N_{60}=10		
	25			9	18		ML	1-2-1 N_{60}=4		
	30			10	18	Gray SAND with SILT, medium dense/very stiff, saturated	SW-SM	6-7-6 N_{60}=19		
				11	6	Gray SHALE, hard, slightly moist	CL	50/6"		
	35					Boring terminated ay -31.5'				

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture
PL
LL
0 25 50
STRENGTH, tsf
Qu
Qp
0 2.0 4.0

Well Diagram: J-Plug; Concrete Cap; 2" PVC Solid Riser; Bentonite Seal; Sand Filter Pack; 0.01" PVC Slotted Well Screen

Completion Depth: 35.0 ft
Date Boring Started: 4/21/10
Date Boring Completed: 4/21/10
Logged By: Rob Preuss
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Texas Cone

Latitude:
Longitude:
Drill Rig: ATV D50
Remarks: N_{60} denotes the normalization to 60% efficiency as described in ASTM D4633. Moistures determined by visual methods.

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
480 North Street
Springfield, Illinois 62704
Telephone: 217/544-6663
Fax: 217/544-6143

LOG OF BORING AP-2

Sheet 1 of 1

PSI Job No.: 0020522
Project: Piezometer Installation
Location: CWLP Ash Pond
East Lake Shore Drive
Springfield, Illinois

Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Hammer Type: CME Automatic; ETR = 86%
Boring Location: See attached boring location plan.

WATER LEVELS

While Drilling	9 feet
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft @ × Moisture ◪ PL ✚ LL (0 · 25 · 50); STRENGTH, tsf ▲ Qu ✳ Qp (0 · 2.0 · 4.0)	Additional Remarks	Well Diagram
	0											J-Plug
				1	10	Dark brown silty CLAY, some sand, stiff, slightly moist (FILL)	CL	4-4-6 N_{60}=14				Concrete Cap
	5			2	8	Dark brown silty CLAY, soft to firm, moist	CL	2-2-2 N_{60}=6				2" PVC Solid Riser
				3	6	Gray silty CLAY, soft to firm, moist	CL	1-1-2 N_{60}=4				Bentonite Seal
	10			4	18	Gray clayey SILT, soft to firm, saturated		2-2-2 N_{60}=6				
				5	18		ML	2-1-1 N_{60}=3				Sand Filter Pack
	15			6	18			2-1-2 N_{60}=4				0.01" PVC Slotted Well Screen
				7	18	Light gray SAND, dense, saturated	SP	4-9-16 N_{60}=36				
	20			8	14	Gray SHALE, hard, slightly moist Boring terminate at -20'	CL	19-24-50/2"				

Completion Depth: 20.0 ft
Date Boring Started: 4/21/10
Date Boring Completed: 4/21/10
Logged By: Rob Preuss
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Texas Cone

Latitude:
Longitude:
Drill Rig: ATV D50
Remarks: N_{60} denotes the normalization to 60% efficiency as described in ASTM D4633. Moistures determined by visual methods.

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
480 North Street
Springfield, Illinois 62704
Telephone: 217/544-6663
Fax: 217/544-6143

LOG OF BORING AP-3

Sheet 1 of 1

PSI Job No.: 0020522
Project: Piezometer Installation
Location: CWLP Ash Pond
East Lake Shore Drive
Springfield, Illinois

Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Hammer Type: CME Automatic; ETR = 86%
Boring Location: See attached boring location plan.

WATER LEVELS
While Drilling: None feet
Upon Completion: N/A
Delay: N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft; Moisture; PL; LL; STRENGTH, tsf; Qu; Qp	Additional Remarks	Well Diagram
	0			1	18	Dark brown silty CLAY, very stiff, slightly moist	CL	6-7-8 N_{60}=21				J-Plug
				2	18	Gray/brown clayey SILT, soft to stiff, moist to saturated	ML	3-3-4 N_{60}=10				Concrete Cap
	5			3	18			1-1-1 N_{60}=3				2" PVC Solid Riser
				4	18	Gray clayey SILT, soft to very stiff, saturated		2-1-2 N_{60}=4				Bentonite Seal
	10			5	18			2-2-4 N_{60}=9				Sand Filter Pack
				6	16		ML	2-2-4 N_{60}=9				
	15			7	18			4-4-6 N_{60}=14				0.01" PVC Slotted Well Screen
				8	10	Gray SHALE, hard, slightly moist	CL	32-50/3"				
	20					Boring terminated at -19.5						

Completion Depth: 20.0 ft
Date Boring Started: 4/21/10
Date Boring Completed: 4/21/10
Logged By: Rob Preuss
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Texas Cone

Latitude:
Longitude:
Drill Rig: ATV D50
Remarks: N_{60} denotes the normalization to 60% efficiency as described in ASTM D4633. Moistures determined by visual methods

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
480 North Street
Springfield, Illinois 62704
Telephone: 217/544-6663
Fax: 217/544-6143

LOG OF BORING AP-4

Sheet 1 of 1

PSI Job No.: 0020522
Project: Piezometer Installation
Location: CWLP Ash Pond
East Lake Shore Drive
Springfield, Illinois

Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Hammer Type: CME Automatic; ETR = 86%
Boring Location: See attached boring location plan.

WATER LEVELS
While Drilling 11 feet
Upon Completion N/A
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0		SS	1	17	Brown silty CLAY, some brown sand, firm to stiff, slightly moist (FILL)	CL	4-4-3 N_{60}=10		
	5		SS	2	18	Brown silty CLAY, trace roots, firm to stiff, moist (FILL)	CL	4-3-2 N_{60}=7		
			SS	3	10	Brown SILT, trace gray, firm to stiff, moist (FILL)	ML	6-3-2 N_{60}=7		
	10		SS	4	12	5" Brown SAND transitioning to Black FLY ASH at 9.4', stiff to very stiff, slightly moist (FILL)		2-2-4 N_{60}=9		
			SS	5	18			2-2-2 N_{60}=6		
			SS	6	16		SAND/FLY ASH	2-1-1 N_{60}=3		
	15		SS	7	16			6-6-5 N_{60}=16		
			SS	8	18	Black FLY ASH, some fine sub-round gravel, stiff to very stiff, moist to saturated (FILL)	FLY ASH	3-3-3 N_{60}=9		
	20					Gray/green (organic?) CLAY, stiff, trace fine sand, moist to saturated				
			SS	9	1		CL	3-3-4 N_{60}=10		
	25		SS	10	18	Brown/gray silty CLAY, fiorm to stiff, saturated		2-2-3 N_{60}=7		
	30						CL			
			SS	11	18	Gray SILT, stiff to very stiff, saturated		3-3-4 N_{60}=10		
	35		SS	12	18			4-4-4 N_{60}=11		
	40						ML			
			SS	13	18			4-4-6 N_{60}=14		
	45		SS	14	18	Gray fine to coarse SAND, medium dense, saturated		4-5-7 N_{60}=17		
	50						SW			
	55		SS	15	18			5-5-7 N_{60}=17		
			SS	16	1	Gray SHALE, hard, moist	CL	50/1"		
	60					Boring terminated at -60'				

STANDARD PENETRATION TEST DATA
N in blows/ft ●
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Well Diagram: J-Plug; Concrete Cap; 2" PVC Solid Riser; Bentonite Seal; Sand Filter Pack; 0.01" PVC Slotted Screen

Completion Depth: 60.0 ft
Date Boring Started: 4/20/10
Date Boring Completed: 4/20/10
Logged By: Rob Preuss
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Texas Cone

Latitude:
Longitude:
Drill Rig: ATV D50
Remarks: N_{60} denotes the normalization to 60% efficiency as described in ASTM D4633. Moistures determined by visual methods.

The stratification lines represent approximate boundaries. The transition may be gradual.

Andrews Engineering, Inc.

3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 5132.40
Easting: 831.70

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-1R
Well No.: AP-1R
Surf. Elev.: 533.10

Depth Information:
Total: 32.50
Auger: 32.50
Core:

Dates:
Start: 1/30/2012
Finish: 1/30/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA and 5' CB

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: – Continuous Barrel – Split Spoon – Shelby Tube – Core – Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tst)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
	1			NA				Stickup = 2.50' Concrete		Dark brown silty CLAY; very stiff; slightly moist	CL	
										Dark brown clayey SILT; stiff; slightly moist	ML	530
5	2			NA						Gray clayey SILT; trace brown; firm; moist	ML	525
10	3			NA				Bentonite Grout				
										Gray silty CLAY; few brown sand; firm; saturated	CL	520
15	4			NA						Gray sandy CLAY; stiff; saturated	SC	
								Bentonite Chips				515
	5							Silica Sand		Blue-gray clayey SILT; soft to very stiff; moist to saturated	ML	
20												

NOTES: AP-1R blind-drilled to 19.0 ft bgs
Geology from 0-19.0 ft bgs based on AP-1 log

Andrews Engineering, Inc.
3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 5132.40
Easting: 831.70

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-1R
Well No.: AP-1R
Surf. Elev.: 533.10

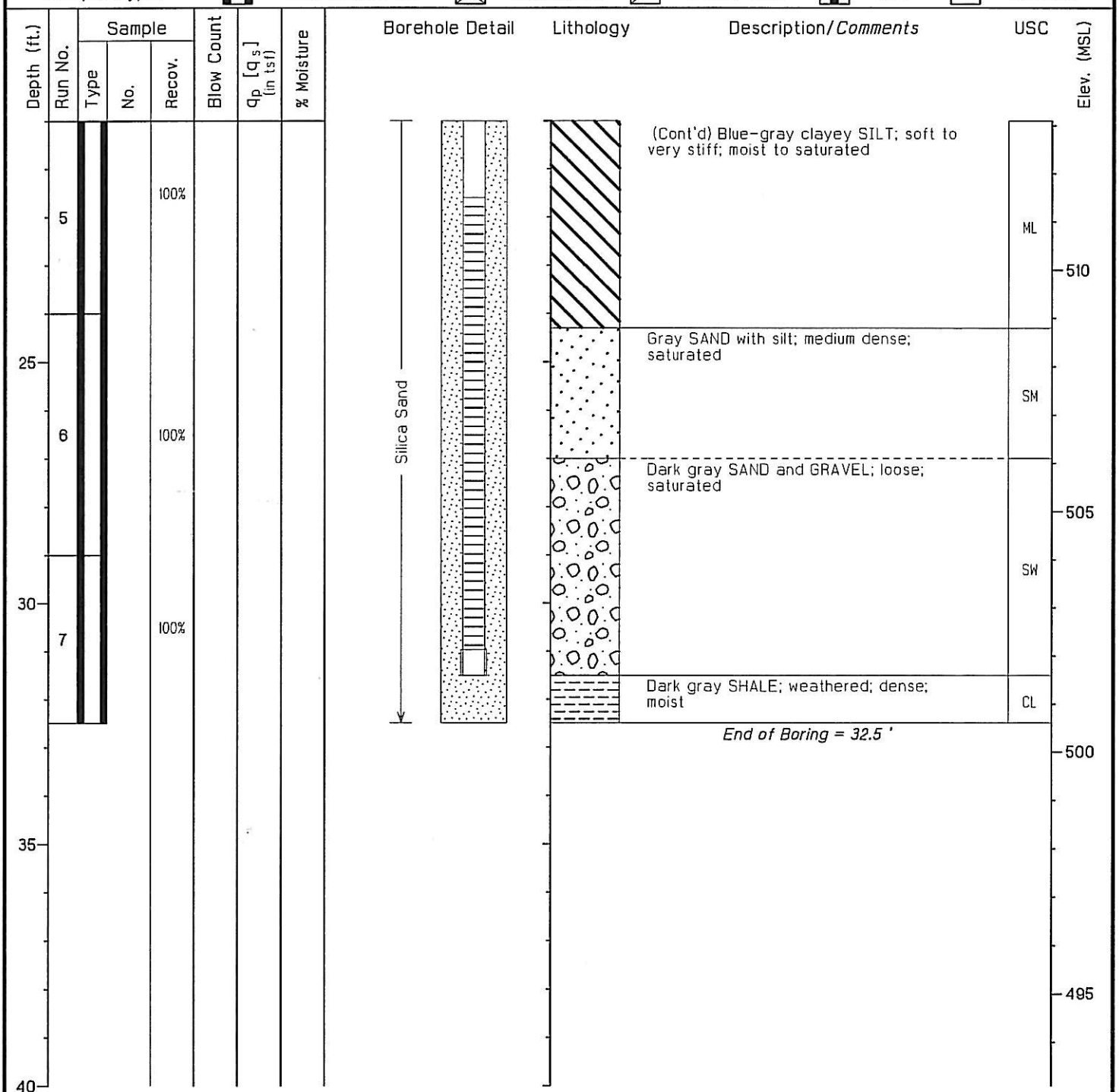
Depth Information:
Total: 32.50
Auger: 32.50
Core:

Dates:
Start: 1/30/2012
Finish: 1/30/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA and 5' CB

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill



NOTES: AP-1R blind-drilled to 19.0 ft bgs
Geology from 0-19.0 ft bgs based on AP-1 log

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-1R

Site Name: City Water, Light, & Power Borehole #: AP-1R

Coordinates: X 831.70 Y 5132.40 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Terra Drill, Inc. Consulting Firm: Andrews Engineering, Inc.

Driller: J. Brown Geologist: M. Hewitt

Drilling Method: 4¼" HSA w/ 5' Continuous Barrel Logged by: M. Hewitt

Drilling Fluids (type): _____ Report Form Completed by: J. Rhoades

Date Well Started: 1/30/2012 Date Well Finished: 1/30/2012 Date Form Completed: 2/27/2012

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: 2 Hours

Type of bentonite seal: Bentonite Chips

Installation method: Free drop

Setting time: 2 Hours

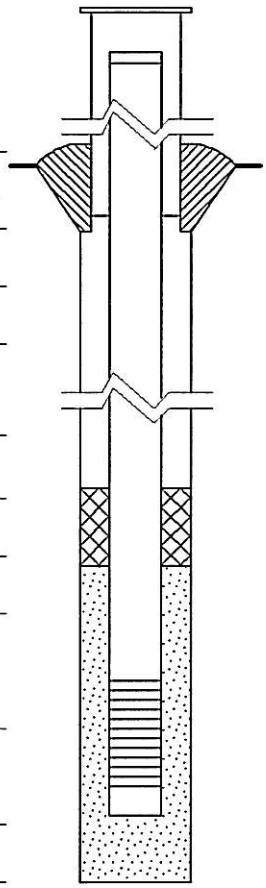
Type of sand pack: Unimin Sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: _____ (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)*	(0.01 ft)
535.60	-2.50	Top of Protective Casing
.00	533.10	Top of Riser Pipe
533.10	.00	Ground Surface
530.10	3.00	Top of Annular Sealant
n/a	n/a	Static Water Level Measured on (after completion)
517.00	16.10	Top of Seal
513.51	19.59	Top of Sandpack
-21.59	554.69	Top of Screen
-30.97	564.07	Bottom of Screen
-31.50	564.60	Bottom of Well
500.60	32.50	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
• positive (+) values below GS, negitive (-) values above GS

CASING MEASUREMENTS

Diameter of Borehole (in)	8.0
ID of Riser Pipe (in)	2.0
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	21.59
Bottom of Screen to End Cap (ft)	.53
Screen Length [1st slot to last slot] (ft)	9.38
Total Length of Casing (ft)	31.50
Screen Slot Size*	0.01"

*Hand-slotted well screens are unacceptable.

WELL CONSTRUCTION MATERIALS

Protective Casing	SS304, SS316, PTFE, PVC or *Other:Steel*
Riser Pipe Above W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Riser Pipe Below W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Screen	SS304, SS316, PTFE, *PVC*, or Other:

(AE950315)

Andrews Engineering, Inc.

3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 4184.70
Easting: 725.50

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-2R
Well No.: AP-2R
Surf. Elev.: 533.10

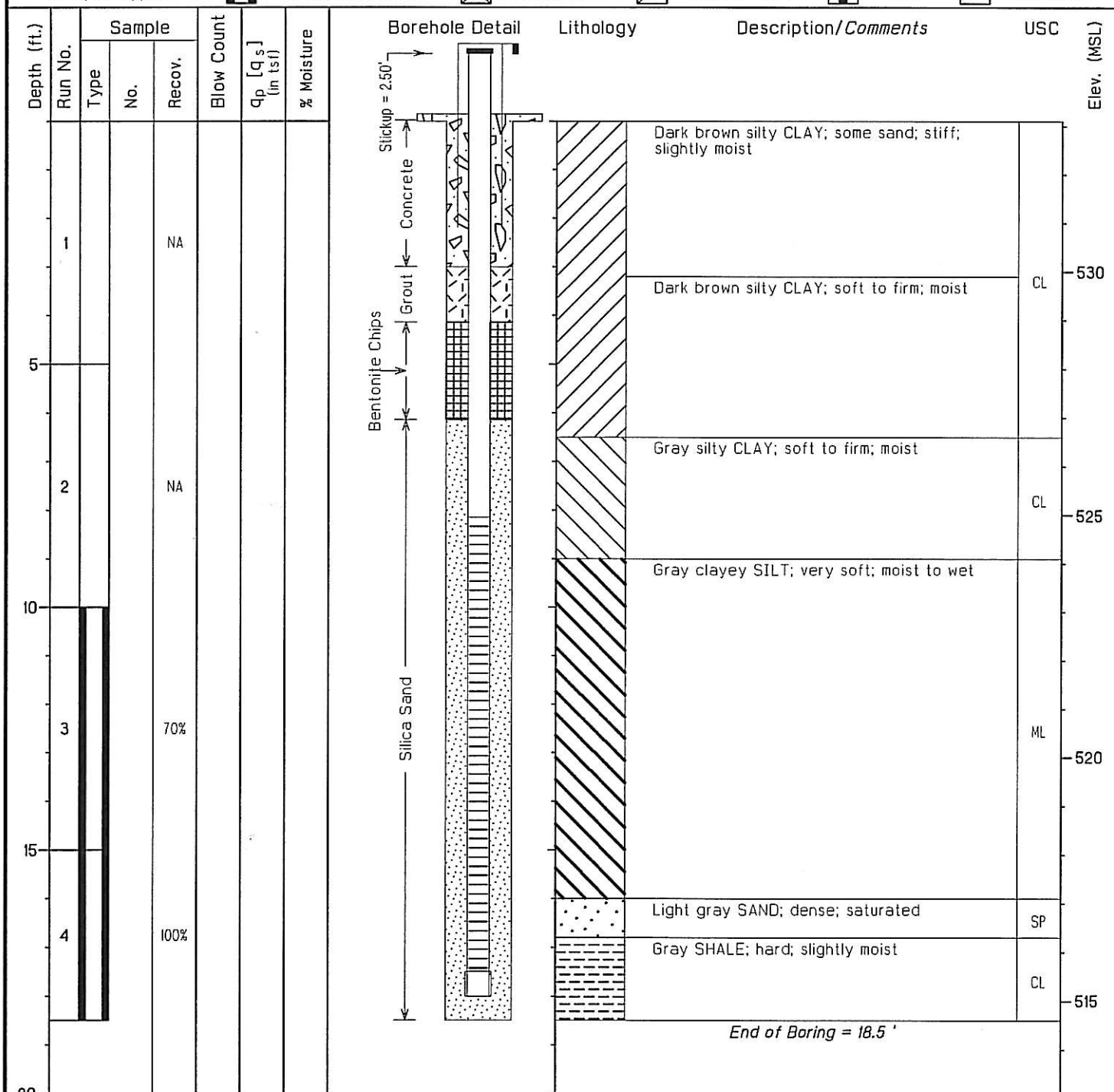
Depth Information:
Total: 18.50
Auger: 18.50
Core:

Dates:
Start: 1/31/2012
Finish: 1/31/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA and 5' CB

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: – Continuous Barrel – Split Spoon – Shelby Tube – Core – Blind Drill



NOTES: AP-2R blind-drilled to 10.0 ft bgs
Geology from 0-10.0 ft bgs based on AP-1 log

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-2R

Site Name: City Water, Light, & Power Borehole #: AP-2R

Coordinates: X 725.50 Y 4184.70 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Terra Drill, Inc. Consulting Firm: Andrews Engineering, Inc.

Driller: J. Brown Geologist: M. Hewitt

Drilling Method: 4¼" HSA w/ 5' Continuous Barrel Logged by: M. Hewitt

Drilling Fluids (type): _____ Report Form Completed by: J. Rhoades

Date Well Started: 1/31/2012 Date Well Finished: 1/31/2012 Date Form Completed: 2/27/2012

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: 2 Hours

Type of bentonite seal: Bentonite Chips

Installation method: Free drop

Setting time: 2 Hours

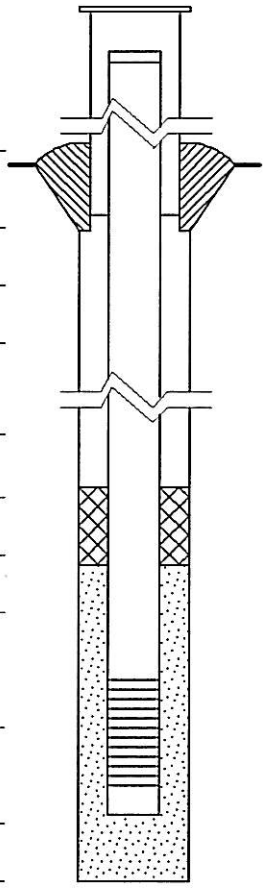
Type of sand pack: Unimin Sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: _____ (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)*	(0.01 ft)
535.60	-2.50	Top of Protective Casing
.00	533.10	Top of Riser Pipe
533.10	.00	Ground Surface
530.10	3.00	Top of Annular Sealant
n/a	n/a	Static Water Level Measured on (after completion)
528.96	4.14	Top of Seal
526.96	6.14	Top of Sandpack
-8.14	541.24	Top of Screen
-17.47	550.57	Bottom of Screen
-18.00	551.10	Bottom of Well
514.60	18.50	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
• positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	SS304, SS316, PTFE, PVC or *Other:Steel*
Riser Pipe Above W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Riser Pipe Below W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Screen	SS304, SS316, PTFE, *PVC*, or Other:

CASING MEASUREMENTS

Diameter of Borehole (in)	8.0
ID of Riser Pipe (in)	2.0
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	8.14
Bottom of Screen to End Cap (ft)	.53
Screen Length [1st slot to last slot] (ft)	9.33
Total Length of Casing (ft)	18.00
Screen Slot Size*	0.01"

*Hand-slotted well screens are unacceptable.

(AE950315)

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 160192

Location:
Coord. System: Site Grid
Northing: 4185.2
Easting: 735.9

Weather: Sunny, 40F

Boring Information:
Boring No: AP-2A
Well No: AP-2A
Surf Elev.: 533.6

Depth Information:
Total: 19.0
Auger: 19.0
Core:

Dates:
Start: 2/16/16
Finish: 2/16/16

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo, IL
Equipment: AMS Powerprobe w/ 4.25" HSA and 5' MC

Personnel:
Geologist: C. Myrvold
Driller: J. Edwards
Helper(s): Z. Strickland

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.6
0							Blind drilled to 9.0 feet. For detailed geology refer to the original log for AP-2R	
	1							530.0
5								
								525.0
10	2		3.2/4				Gray CLAYEY SILT; moist to wet; moderately loose	
								520.0
15	3		4.0/4					
	4		2.0/2				Light gray SAND; fine to medium grained; saturated; some gravel Gray SHALE; weathered; hard; slightly moist	515.0
20							End of Boring = 19 Feet	

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-2A

Site Name: Springfield City Water, Light, and Power Borehole #: _____

Coordinates: X 735.9 Y 4185.2 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Springfield City Water, Light, and Power IL Registration #: _____

Drilling Contractor: Bulldog Drilling, Inc. Consulting Firm: Andrews Engineering, Inc.

Driller: J. Edwards Geologist: C. Myrvold

Drilling Method: AMS Powerprobe w/ 4.25" HSA and 5' MC Logged by: C. Myrvold

Drilling Fluids (type): na Report Form Completed by: C. Myrvold

Date Well Started: 2/16/2016 Date Well Finished: 2/16/2016 Date Form Completed: 3/06/2016

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: N/A

Installation method: _____

Setting time: _____

Type of bentonite seal: Bentonite chips

Installation method: Free drop

Setting time: 24+ hours

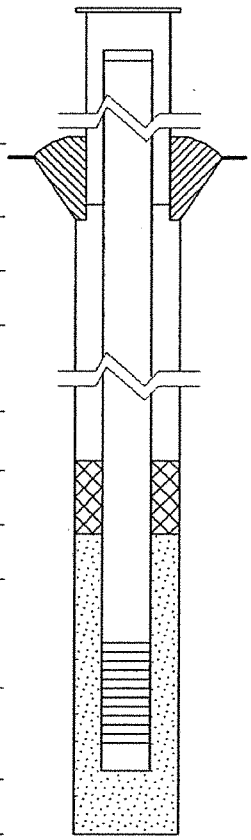
Type of sand pack: Silica sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)*	(0.01 ft)
536.50	-2.90	Top of Protective Casing
536.10	-2.50	Top of Riser Pipe
533.60	0.00	Ground Surface
	N/A	Top of Annular Sealant
		Static Water Level Measured on (after completion)
530.60	3.00	Top of Seal
527.19	6.41	Top of Sandpack
525.19	8.41	Top of Screen
515.54	18.06	Bottom of Screen
515.10	18.50	Bottom of Well
514.60	19.00	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

Notes:

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	10.91
Bottom of Screen to End Cap (ft)	0.44
Screen Length (1st slot to last slot) (ft)	9.65
Total Length of Casing (ft)	21.00
Screen Slot Size¥	#10 (0.01)

¥Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 3164.10
Easting: 3203.10

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-5
Well No.: AP-5
Surf. Elev.: 581.6

Depth Information:
Total: 49.0
Auger: 49.0
Core:

Dates:
Start: 2/1/2012
Finish: 2/1/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA
5' CB and 2' SS

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: Continuous Barrel | Split Spoon | Shelby Tube | Core | Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
0								Stickup = 2.50'				0
								Concrete		Dark yellowish brown silty CLAY; very firm; moist; some dark brown mottling; trace organics	CL	
	1			100%								
5												-5
	2			76%						Olive brown clayey SILT; moderately soft; moist; some dark yellowish brown mottling		
										grades dark yellowish brown; clay content increasing	ML	
10								Bentonite Grout				-10
	3			100%						Olive brown silty CLAY; very firm; moist; trace coarse sand; few iron concretions; some dark yellowish brown mottling	CL	
15												-15
	4			100%				Bentonite Chips		some gravel		
								Silica Sand		Dark yellowish brown sandy CLAY; some gravel; very soft; moist to wet	SC	
20	5			100%								-20
										Dark yellowish brown clayey SILT with sand and gravel; firm; moist	ML-SM	

NOTES:

Andrews Engineering, Inc.
3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 3164.10
Easting: 3203.10

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-5
Well No.: AP-5
Surf. Elev.: 581.6

Depth Information:
Total: 49.0
Auger: 49.0
Core:

Dates:
Start: 2/1/2012
Finish: 2/1/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA
5' CB and 2' SS

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: - Continuous Barrel - Split Spoon - Shelby Tube - Core - Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										(Cont'd) Dark yellowish brown clayey SILT with sand and gravel; firm; moist	ML-SM	20
	5											
	6			100%						Dark yellowish brown SAND; coarse-grained; loose; wet	SP	
										Yellowish gray clayey SILT with sand; trace gravel; very hard; moist	ML	
25	7			100%								25
										Gray silty SAND with clay; some gravel; soft; wet	SM	
	8			100%						Gray clayey SILT; some gravel; very hard; moist		
30												30
	9			90%								
										some shale and coal fragments	ML	
35	10			100%								35
	11									Light gray silty SAND; some gravel; trace chert; rounded; moderately firm; moist	SM	
40												40

Silica Sand
Bentonite Chips

NOTES:

Andrews Engineering, Inc.
3300 Ginger Creek Drive, Springfield, IL 62711 (217) 787-2334

Field Boring Log

Site Information:
Name: City Water, Light, & Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 2011-127

Location:
Coord. System: Site Grid
Northing: 3164.10
Easting: 3203.10

Weather:
Cloudy; 38° F; West 10-15 MPH

Boring Information:
Boring No.: AP-5
Well No.: AP-5
Surf. Elev.: 581.6

Depth Information:
Total: 49.0
Auger: 49.0
Core:

Dates:
Start: 2/1/2012
Finish: 2/1/2012

Drilling Contractor:
Name: Terra Drill, Inc.
City: Dupo, IL
Equipment: CME 550 with 4¼" I.D. HSA
5' CB and 2' SS

Personnel:
Geologist: M. Hewitt
Driller: J. Brown
Helper (s): J. Horn

Sample Type: Continuous Barrel | Split Spoon | Shelby Tube | Core | Blind Drill

Depth (ft.)	Run No.	Sample Type	Sample No.	Sample Recov.	Blow Count	q_p [q_s] (in tsf)	% Moisture	Borehole Detail	Lithology	Description/*Comments*	USC	Elev. (MSL)
										Dark gray silty CLAY; some gravel; some shale fragments; trace coal fragments; very firm; moist	SM	540
	11										CL	
45	12			100%				Bentonite Chips				545
										Gray SHALE; hard; moist		
	13			55%							CL	
										End of Boring = 49.0 '		
50												550
55												555
60												560

NOTES:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-5

Site Name: City Water, Light, & Power Borehole #: AP-5

Coordinates: X 3203.10 Y 3164.10 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Terra Drill, Inc. Consulting Firm: Andrews Engineering, Inc.

Driller: J. Brown Geologist: M. Hewitt

Drilling Method: 4¼" HSA w/ 5' CB & 2' SS Logged by: M. Hewitt

Drilling Fluids (type): _____ Report Form Completed by: J. Rhoades

Date Well Started: 2/1/2012 Date Well Finished: 2/1/2012 Date Form Completed: 2/27/2012

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: 2 Hours

Type of bentonite seal: Bentonite Chips

Installation method: Free drop

Setting time: 2 Hours

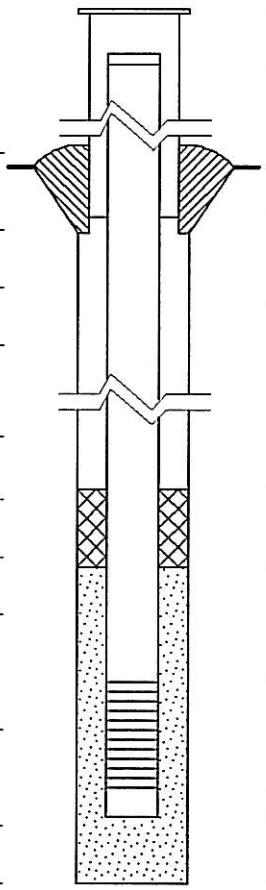
Type of sand pack: Unimin Sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: Bentonite Chips (if applicable)

Installation method: Free drop



ELEVATION (MSL)*	DEPTH (BGS)◆ (0.01 ft)	
584.30	-2.70	Top of Protective Casing
583.90	-2.30	Top of Riser Pipe
581.60	.00	Ground Surface
578.60	3.00	Top of Annular Sealant
n/a	n/a	Static Water Level Measured on (after completion)
565.48	16.12	Top of Seal
563.48	18.12	Top of Sandpack
563.78	17.82	Top of Screen
554.44	27.16	Bottom of Screen
553.90	27.70	Bottom of Well
551.10	30.50	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
◆ positive (+) values below GS, negitive (-) values above GS

NOTES:

•Borehole AP-5 sampled to 49.0 feet below ground surface (BGS) and backfilled with bentonite chips to 30.5 feet BGS

WELL CONSTRUCTION MATERIALS

Protective Casing	SS304, SS316, PTFE, PVC or *Other:Steel*
Riser Pipe Above W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Riser Pipe Below W.T.	SS304, SS316, PTFE, *PVC*, or Other:
Screen	SS304, SS316, PTFE, *PVC*, or Other:

CASING MEASUREMENTS

Diameter of Borehole (in)	8.0
ID of Riser Pipe (in)	2.0
Protective Casing Length (ft)	5.0
Riser Pipe Length (ft)	20.12
Bottom of Screen to End Cap (ft)	.54
Screen Length [1st slot to last slot] (ft)	9.34
Total Length of Casing (ft)	30.00
Screen Slot Size*	0.01"

*Hand-slotted well screens are unacceptable.

(AE950315)

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.:

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: sunny, 73 deg

Boring Information:
Boring No: TW3E
Well No: TW3E
Surf Elev.: 0

Depth Information:
Total: 40.5'
Auger: 40.5'
Core: -

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo
Equipment: 4.25" HSA, CME 55, 5' Continuous Macrocore

Personnel:
Geologist: D. Ghosh
Driller: J. Gates
Helper(s): C. Clines

Dates:
Start: 06/27/2017
Finish: 06/27/2017

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1		4.5/5				**CLAYEY SILT** dark brown, iron oxidation staining, moist, firm to hard, moderate cementation, with root structure	
5	2		5.0/5				**SILT** brown to gray, iron oxidation, moist, 2" wet seam at 12', firm, moderate cementation, blocky, some clay	-5.0
10	3		5.0/5				**SILT** gray, firm to hard, trace fine grained sand sandy 14.5-15'	-10.0
15	4		4.5/5				**SILTY CLAY** dark gray, moist to wet, soft to firm, strong cementation, laminated, some wood fragments	-15.0
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: TW3E Boring No: TW3E Well No: TW3E

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	5		5.0/5				cont: dark gray, moist to wet, soft to firm, strong cementation, laminated, some wood fragments	
								-25
26	6		3.0/5				**SILTY CLAY** dark gray, till, moist to wet, soft to firm, moderate cementation, trace fine grained sand and gravel	
								-30
31	7		4.5/5					
							SANDY SILT fine grained sand	-35
36	8		4.0/5.5				**SILTY SAND** gray, fine to medeium grained, wet medium to coarse grained, trace fine grained, angular	
							SHALE	-40
41							End of Boring = 40.5 Feet	

Notes:

Illinois Environmental Protection Agency **Well Completion Report**

Site Number: _____ County: Sangamon

Site Name: City Water, Light & Power (CWLP) Ash Ponds Well #: TW3E

State Plane Coordinate: X _____ Y _____ (or) Latitude: ____ ____ ____ Longitude: ____ ____ ____ Borehole #: TW3E

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Bulldog Drilling, Inc. Driller: J. Gates

Consulting Firm: Andrews Engineering, Inc. Geologist: D. Ghosh

Drilling Method: CME 55 w/ 4.25" HSA Drilling Fluid (Type): none

Logged By: D. Ghosh Date Started: 6/27/17 Date Finished: 6/27/17

Report Form Completed By: M. Hewitt Date: 9/18/17

ANNULAR SPACE DETAILS

Type of Surface Seal: Bentonite Grout

Type of Annular Sealant: Bentonite Grout

Installation Method: Tremi

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One) X

Installation Method: Free drop

Setting Time: N/A

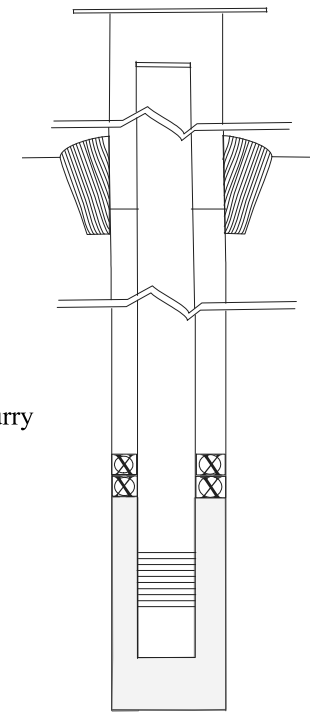
Type of Sand Pack: Silica Sand

Grain Size: 10/20 (Sieve Size)

Installation Method: Free Drop

Type of Backfill Material: None (if applicable)

Installation Method: N/A



	Elevations (MSL)*	Depths (BGS)	(.01ft.)
	_____	_____	Top of Protective Casing
	_____	-2.17	Top of Riser Pipe
	_____	0	Ground Surface
	_____	0	Top of Annular Sealant
	_____	9.14	Static Water Level (After Completion)
	_____	28.0	Top of Seal
	_____	28.2	Top of Sand Pack
	_____	30.22	Top of Screen
	_____	39.82	Bottom of Screen
	_____	40.5	Bottom of Well
	_____	40.5	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC X, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC X, or Other
Screen	SS304, SS316, PTFE, PVC X, or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2.049
Protective Casing Length (feet)	
Riser Pipe Length (feet)	32.39
Bottom of Screen to End Cap (feet)	0.68
Screen Length (1st slot to last slot) (feet)	9.6
Total Length of Casing (feet)	42.67
Screen Slot Size **	0.01

**Hand-Slotted Well Screens are Unacceptable

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.:

Location:
Coord. System: Site Coordinates
Northing: 5613.3
Easting: 1737.4

Weather: rain, 55 deg; sunny, 73 deg

Boring Information:
Boring No: TW3N
Well No: RW-3
Surf Elev.: 536.8

Depth Information:
Total: 41.6'
Auger: 41.6'
Core: -

Dates:
Start: 06/26/2017
Finish: 06/27/2017

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo
Equipment: 4.25" HSA, CME 55, 5' Continuous Macrocore

Personnel:
Geologist: D. Ghosh
Driller: J. Gates
Helper(s): C. Clines

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	536.8
0	1		3.5/5				**SILTY CLAY** dark brown, pervasive iron oxidation staining, dry (moist below 3'), firm to hard, moderate cementation, with root structure	
							SILTY CLAY light tan, moist, moderate cementation, blocky	535.0
5	2		5.0/5				**SILT** brown to gray, mottling, iron oxidation staining, moist, firm, moderate cementation	530.0
10	3		4.5/5				**SAND** sand lens, with silt, wet, trace clay	525.0
							SANDY SILT brown to gray, laminated, some wood fragments, trace coarse sand, coal and roots	
15	4		5.0/5				**SILTY CLAY** gray, wet to moist, very soft, strong cementation, laminated, some wood fragments, trace fine sand	520.0
20							**SILTY CLAY** dark gray, wet, very soft, strong cementation, homogeneous	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: RW-3 Boring No: TW3N Well No: RW-3

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							cont: dark gray, wet, very soft, strong cementation, homogeneous	515
	5		3.0/5					
26								510
	6		4.0/5				**SILTY CLAY** dark gray, till, moist, firm to hard, trace coarse and fine gravel, trace coal	
31								505
	7		4.5/5					
							SANDY SILT	
36							**SILTY SAND** gray, fine to medium graineed, wet, trace angular gravel	500
	8		5.0/5					
							SHALE weathered	
41	9							
							End of Boring = 41.6 Feet	495

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site Number: _____ County: Sangamon

Site Name: City Water, Light & Power (CWLP) Ash Ponds Well #: TW3N

State Plane Coordinate: X _____ Y _____ (or) Latitude: ____ ____ ____ Longitude: ____ ____ ____ Borehole #: TW3N

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Bulldog Drilling, Inc. Driller: J. Gates

Consulting Firm: Andrews Engineering, Inc. Geologist: D. Ghosh

Drilling Method: CME 55 w/ 4.25" HSA Drilling Fluid (Type): none

Logged By: D. Ghosh Date Started: 6/26/17 Date Finished: 6/27/17

Report Form Completed By: M. Hewitt Date: 9/18/17

ANNULAR SPACE DETAILS

Type of Surface Seal: Bentonite Grout

Type of Annular Sealant: Bentonite Grout

Installation Method: Tremi

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One) ✘

Installation Method: Free drop

Setting Time: N/A

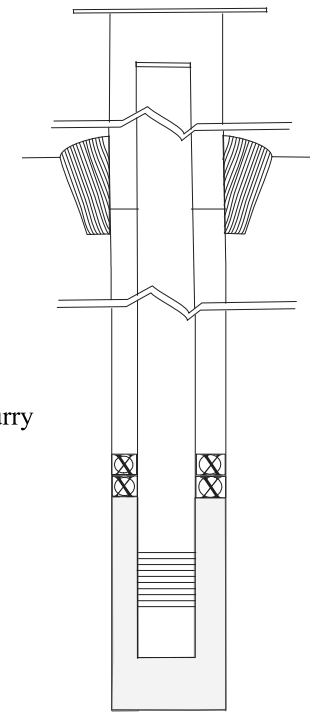
Type of Sand Pack: Silica Sand

Grain Size: 10/20 (Sieve Size)

Installation Method: Free Drop

Type of Backfill Material: None (if applicable)

Installation Method: N/A



	Elevations (MSL)*	Depths (BGS)	(.01ft.)
	_____	_____	Top of Protective Casing
	_____	-2.5	Top of Riser Pipe
	_____	0	Ground Surface
	_____	0	Top of Annular Sealant
	_____	8.71	Static Water Level (After Completion)
	_____	27	Top of Seal
	_____	29.6	Top of Sand Pack
	_____	31.34	Top of Screen
	_____	40.92	Bottom of Screen
	_____	41.6	Bottom of Well
	_____	41.6	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC ✘, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC ✘, or Other
Screen	SS304, SS316, PTFE, PVC ✘, or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2.049
Protective Casing Length (feet)	
Riser Pipe Length (feet)	33.84
Bottom of Screen to End Cap (feet)	0.68
Screen Length (1st slot to last slot) (feet)	9.58
Total Length of Casing (feet)	44.1
Screen Slot Size **	0.01

**Hand-Slotted Well Screens are Unacceptable

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.:

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: rain, 55 deg

Boring Information:
Boring No: TW3W
Well No: TW3W
Surf Elev.: 536.80

Depth Information:
Total: 23.8'
Auger: 23.8'
Core: -

Dates:
Start: 06/26/2017
Finish: 06/26/2017

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo
Equipment: 4.25" HSA, CME 55, 5' Continuous Macrocore

Personnel:
Geologist: D. Ghosh
Driller: J. Gates
Helper(s): C. Clines

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**SILTY CLAY** dark brown, dry, firm to hard, moderate cementation, root structure in upper 2 feet	
	1		4.5/5				high clay content, moist, soft to firm, blocky iron oxidation spots	
5								-5.0
	2		4.5/5				**SILT** brown to gray, iron oxidation pervasive, moist, soft to firm, moderate cementation, some clay very soft	
10							**SILTY SAND** brown, fine to medium grained sand, wet, poor cementation, moderately sorted, trace clay	-10.0
	3		4.0/5				**CLAYEY SAND** brown to dark gray, with gravel, coarse grained towards bottom, wet, strong cementation, poorly sorted	
15								-15.0
	4		4.5/5				**SILTY CLAY** dark gray, with coal fragments, moist, very soft, strong cementation, homogeneous appearance, coal content high at 19-19.5'	
20								-20.0
	5		2.8/3.8				**SILTY CLAY** blue gray, till, wet, soft, moderate cementation, homogeneous appearance, trace coarse sand and gravel light tan, silty from 22-22.5'	
							SANDY SHALE	
							End of Boring = 23.8 Feet	

Notes: Borehole refusal at 23.8'.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: _____ County: Sangamon

Site Name: City Water, Light & Power (CWLP) Ash Ponds Well #: TW3W

State Plane Coordinate: X _____ Y _____ (or) Latitude: ____ ____ ____ Longitude: ____ ____ ____ Borehole #: TW3W

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: Bulldog Drilling, Inc. Driller: J. Gates

Consulting Firm: Andrews Engineering, Inc. Geologist: D. Ghosh

Drilling Method: CME 55 w/ 4.25" HSA Drilling Fluid (Type): none

Logged By: D. Ghosh Date Started: 6/26/17 Date Finished: 6/26/17

Report Form Completed By: M. Hewitt Date: 9/18/17

ANNULAR SPACE DETAILS

Type of Surface Seal: Bentonite Grout

Type of Annular Sealant: Bentonite Grout

Installation Method: Tremi

Setting Time: 24 hours

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One) ✘

Installation Method: Free drop

Setting Time: N/A

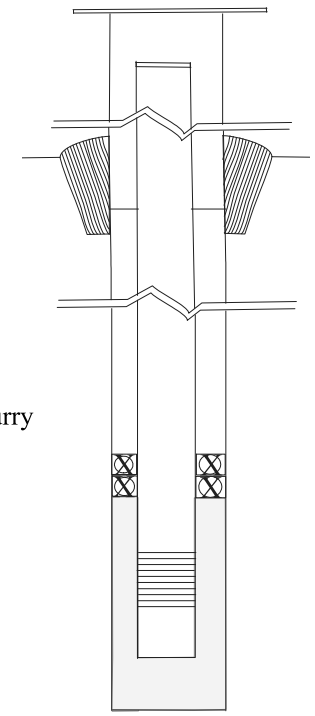
Type of Sand Pack: Silica Sand

Grain Size: 10/20 (Sieve Size)

Installation Method: Free Drop

Type of Backfill Material: None (if applicable)

Installation Method: N/A



Elevations (MSL)*	Depths (BGS)	(.01ft.)
_____	_____	Top of Protective Casing
_____	-2.58	Top of Riser Pipe
536.80	0	Ground Surface
_____	0	Top of Annular Sealant
_____	9.32	Static Water Level (After Completion)
_____	9.6	Top of Seal
_____	11.85	Top of Sand Pack
_____	13.54	Top of Screen
_____	23.12	Bottom of Screen
_____	23.8	Bottom of Well
_____	23.8	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC ✘, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC ✘, or Other
Screen	SS304, SS316, PTFE, PVC ✘, or Other

CASING MEASURMENTS

Diameter of Borehole (inches)	8.25
ID of Riser Pipe (inches)	2.049
Protective Casing Length (feet)	
Riser Pipe Length (feet)	16.12
Bottom of Screen to End Cap (feet)	0.68
Screen Length (1st slot to last slot) (feet)	9.58
Total Length of Casing (feet)	26.38
Screen Slot Size **	0.01

**Hand-Slotted Well Screens are Unacceptable

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 65, overcast

Boring Information:
Boring No: GP1
Well No: GP1
Surf Elev.: 537.06

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: N/A

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo, IL
Equipment: CME 55cc 4.25" HSA w/ 5' MC and 2' SS

Personnel:
Geologist: B. Kenning
Driller: C. Clines
Helper(s): D. Smith

Dates:
Start: 6/14/2019
Finish: 6/14/2019

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
						Ground Surface	0.0
0						Brown clayey TOPSOIL.	
						Light brown to gray silty CLAY, moist, stiff.	
	1		4.2				
5							-5.0
	2		2.2				
10							-10.0
	3		4.6				
15							-15.0
						Gray clayey SILT, moist to wet, moderately stiff.	
	4		4.3				
20							-20.0
	5		4.2				
						Brown/gray silty CLAY, moist, moderately stiff, contains coal fragments.	
						Gray clayey SILT, moist to wet, moderately stiff.	
25							-25.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP1 Boring No: GP1 Well No: GP1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
	6		3.7				
30							-30
	7		3.7			Gray SAND, fine-grained, wet, loose.	
35							-35
	8		4.1			Gray SAND, fine to medium-grained, wet, loose, trace gravel.	
						Gray SAND, medium to coarse-grained, wet, loose, trace gravel.	
40						Gray SHALE, weathered, moist, soft.	-40
						End of Boring = 40 Feet	
45							-45
50							-50

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP1

Site Name: Springfield CWLP Ash Pond Borehole #: GP1

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: C. Clines Geologist: B. Kenning

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC and 2' SS Logged by: B. Kenning

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 6/14/19 Date Well Finished: 6/14/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

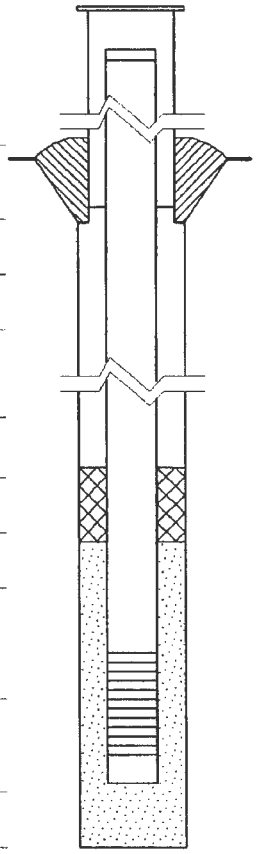
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing	_____	_____
Top of Riser Pipe	539.44	- 2.82'
Ground Surface	537.06	0.00'
Top of Annular Sealant	534.06	3.00'
Static Water Level Measured on (after completion)	_____	_____
Top of Seal	511.72	25.34'
Top of Sandpack	509.72	27.34'
Top of Screen	507.97	29.34'
Bottom of Screen	498.27	39.04'
Bottom of Well	497.81	39.50'
Bottom of Borehole	497.06	40.00'

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	31.91
Bottom of Screen to End Cap (ft)	0.46
Screen Length (1st slot to last slot) (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 60, partly cloudy, light breeze

Boring Information:
Boring No: GP2
Well No: GP2 /AP-7
Surf Elev.: □□□□□

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: N/A

Dates:
Start: 6/14/2019
Finish: 6/14/2019

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo, IL
Equipment: CME 55cc 4.25" HSA w/ 5' MC and 2' SS

Personnel:
Geologist: B. Kenning
Driller: C. Clines
Helper(s): D. Smith

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
						Ground Surface	0.0
0						Brown clayey TOPSOIL.	
						Brown silty CLAY, moist, stiff.	
	1		3.0				
5							-5.0
	2		3.5				
10							-10.0
						Brown/gray clayey SILT, moist, stiff.	
	3		3.0				
15							-15.0
	4		3.8				
20							-20.0
	5		2.7				
25							-25.0

Notes: No signs of freewater

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP2 Boring No: GP2 Well No: AP-7

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
	6		4.1			Gray clayey SAND, fine-grained, moist, moderately stiff.	
30	7		4.1				-30
						Gray clayey SILT, moist, stiff, coal fragments at 30.4'.	
35							-35
	8		3.4			Gray SHALE, weathered, slightly moist, soft.	
40						End of Boring = 40 Feet	-40
45							-45
50							-50

Notes: No signs of freewater

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP2 /AP-7

Site Name: Springfield CWLP Ash Pond Borehole #: GP2

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: C. Clines Geologist: B. Kenning

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: B. Kenning

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 6/14/19 Date Well Finished: 6/14/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

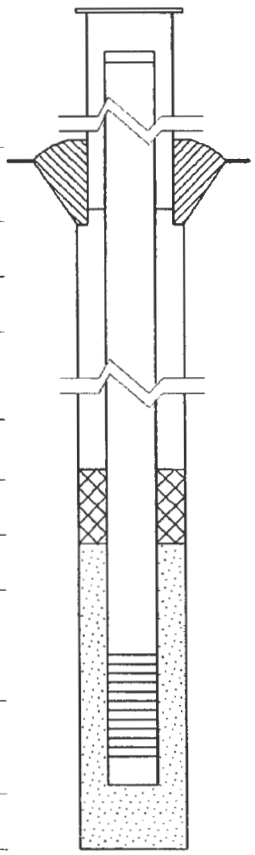
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing	_____	_____
Top of Riser Pipe	539.02	- 2.88'
Ground Surface	536.36	0.00'
Top of Annular Sealant	533.36	3.00'
Static Water Level Measured on (after completion)	_____	_____
Top of Seal	511.02	25.34'
Top of Sandpack	509.02	27.34'
Top of Screen	507.46	29.34'
Bottom of Screen	497.76	39.04'
Bottom of Well	497.3	39.50'
Bottom of Borehole	496.36	40.00'

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	31.78
Bottom of Screen to End Cap (ft)	0.46
Screen Length (1st slot to last slot) (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

* Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield
County: Sangamon
Site No.:
AEEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 65, partly cloudy

Boring Information:
Boring No: GP3
Well No: GP3
Surf Elev.: 549.12

Depth Information:
Total: 25'
Auger: 25'
Core: N/A

Dates:
Start: 6/13/2019
Finish: 6/13/2019

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo, IL
Equipment: CME 55cc 4.25 in HSA w/ 5' MC and 2' SS

Personnel:
Geologist: B. Kenning
Driller: C. Clines
Helper(s): D. Smith

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
						Ground Surface	0.0
0						Brown silty to clayey TOPSOIL, moist, stiff.	
						Brown silty CLAY to clayey SILT, moist, stiff.	
	1		4.7				
5				2 4 4 6			-5.0
	2		1.6				
						Light brown clayey SILT, slightly moist, stiff.	
	3		1.6	4 9 12 12			
10				6 11 11 12			-10.0
	4		1.8				
						Brown clayey SAND, fine-grained, slightly moist, moderately stiff.	
	5		3.0				
15							-15.0
						Brown silty CLAY, moist, stiff, contains coal fragments.	
	6		4.0				
						Brown clayey SAND, fine-grained, moist, moderately loose.	
20							-20.0

Notes: Macrocore refusal at 23'; Split spoon refusal at 24'; blind drilled to EOB depth of 25'

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP3 Boring No: GP3 Well No: GP3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
	7		2.2			Gray SHALE, weathered, slightly moist, soft.	
	8		0.7	41 50 3"			
	9		0.0				
25						End of Boring = 25 Feet	-25
30							-30
35							-35
40							-40

Notes: Macrocore refusal at 23'; Split spoon refusal at 24'; blind drilled to EOB depth of 25'

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP3

Site Name: Springfield CWLP Ash Pond Borehole #: GP3

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: C. Clines Geologist: B. Kenning

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: B. Kenning

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 6/13/19 Date Well Finished: 6/13/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

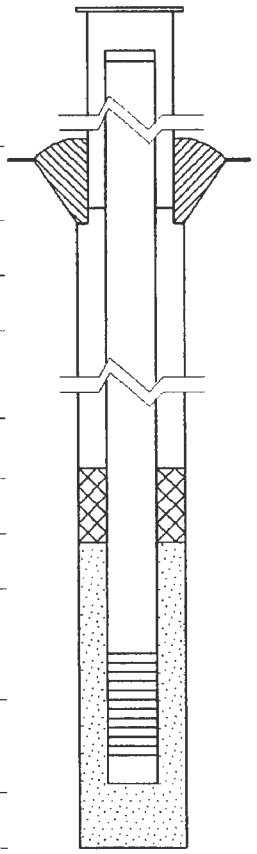
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe		- 1.14'
Ground Surface		0.00'
Top of Annular Sealant		3.00'
Static Water Level Measured on (after completion)		
Top of Seal		3.00'
Top of Sandpack		17.07'
Top of Screen		19.07'
Bottom of Screen		23.75'
Bottom of Well		24.30'
Bottom of Borehole		24.80'

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	20.33
Bottom of Screen to End Cap (ft)	0.55
Screen Length (1st slot to last slot) (ft)	4.68
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water Light and Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 80's F, Sunny

Boring Information:
Boring No: GP4
Well No: GP4
Surf Elev.: 0

Depth Information:
Total: 38.0
Auger: 38.0
Core: N/A

Drilling Contractor:
Contractor Name: Bulldog Drilling, Inc.
City: Dupo, IL
Equipment: AMS PowerProbe 9500 w/ 5' MC

Personnel:
Geologist: C. Myrvold
Driller: J. Edwards
Helper(s): S. Guy

Dates:
Start: 5/17/19
Finish: 5/17/19

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							Gray clayey SILT, moist, loose.	
							Brown/gray silty CLAY, moist, stiff.	
	1		4.3/5					
5								-5.0
	2		3.7/4					
							Gray clayey SILT, moist, moderately loose.	
							Brown silty SAND, fine to medium-grained, moist, moderately tight.	
10								-10.0
	3		4.0/4					
							Gray to dark gray silty CLAY, moist, stiff; trace to some sand.	
15	4		1.3/4					-15.0
	5		4.0/4					
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP4 Boring No: GP4 Well No: GP4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							(cont.) Gray to dark gray silty CLAY, moist, stiff; trace to some sand.	
	6		3.1/4					
25								-25.0
	7		4.0/4					
30								-30.0
	8		3.4/4					
35	9		4.0/4					-35.0
							End of Boring = 38 Feet	
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP4

Site Name: Springfield CWLP Ash Pond Borehole #: GP4

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: J. Edwards Geologist: C. Myrvold

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: C.Myrvold

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 5/17/19 Date Well Finished: 5/17/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

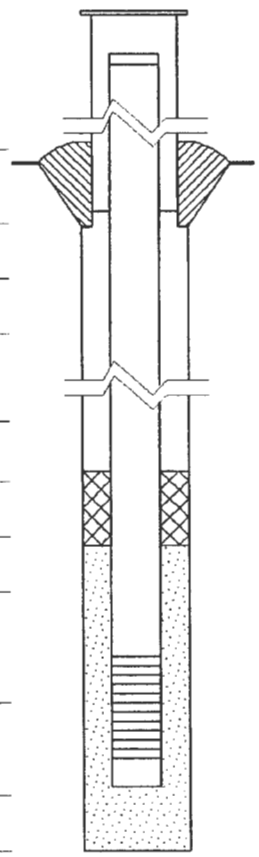
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe		- 3.00'
Ground Surface		0.00'
Top of Annular Sealant		3.00'
Static Water Level Measured on (after completion)		
Top of Seal		23.43'
Top of Sandpack		25.43'
Top of Screen		27.43'
Bottom of Screen		37.20'
Bottom of Well		37.50'
Bottom of Borehole		38.00'

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	30.18
Bottom of Screen to End Cap (ft)	0.30
Screen Length [1st slot to last slot] (ft)	9.77
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL
County: Sangamon
Site No.:
AEEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather:

Boring Information:
Boring No: GP5
Well No: GP5
Surf Elev.: 0

Depth Information:
Total: 15.5'
Auger: 15.5'
Core: N/A

Drilling Contractor:
Contractor Name: Bulldog Drilling
City: Dupo, IL
Equipment: CME 55cc w/ 4.25" HSA and 5' MC

Personnel:
Geologist: C. Myrvold
Driller: C. Clines
Helper(s): D. Smith

Dates:
Start: 6/11/2019
Finish: 6/11/2019

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Sample Run No.	Sample Type	Sample Recov.	Blow Count	Lithology	Description/Comments	Elev. (MSL)
						Ground Surface	0.0
0	1		0.5			Brown silty CLAY, moist, stiff.	
5	2		4.5			Brown to gray silty CLAY, moderately stiff, shows of iron oxidation.	-5.0
10	3		2			Black COAL, slightly moist, soft.	-10.0
	4		3			Gray SHALE, weathered, dry, soft.	
15	5		0.5				-15.0
						End of Boring = 15.5 Feet	
20							-20.0

Notes: Refusal at 15.5'; No well installation

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water Light and Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 80's F, Sunny

Boring Information:
Boring No: GP6
Well No: GP6 AP-6
Surf Elev.: 0

Depth Information:
Total: 37.0
Auger: 37.0
Core: N/A

Dates:
Start: 5/17/19
Finish: 5/17/19

Drilling Contractor:
Contractor Name: Bulldog Drilling, Inc.
City: Dupo, IL
Equipment: AMS PowerProbe 9500 w/ 5' MC

Personnel:
Geologist: C. Myrvold
Driller: J. Edwards
Helper(s): S. Guy

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							Dark brown clayey silt TOPSOIL, moist, moderately loose.	
							Brown/gray silty CLAY to clayey SILT, moist, stiff.	
	1		4.1/5					
5								-5.0
	2		4.0/4					
10								-10.0
	3		4.0/4				Brown silty SAND, fine-grained, saturated, loose.	
							Dark gray clayey SAND, fine-grained, wet to saturated, moderately loose, some silt.	
							Dark gray clayey SILT, moist, moderately stiff to stiff, some sand.	
15	4		1.3/4					-15.0
	5		3.0/4					
20								-20.0

Notes: refusal at 37'

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP6 Boring No: GP6 Well No: GP6 AP-6

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							(cont.) Dark gray clayey SILT, moist, moderately stiff to stiff, some sand.	
	6		4.0/4				Dark gray silty CLAY, moist, moderately stiff, some sand.	
25								-25.0
	7		4.0/4					
30								-30.0
	8		2.7/4					
	9		4.0/4					
35								-35.0
							Dark brownish gray clayey SAND, fine-grained, moist to wet, moderately loose.	
							End of Boring = 37 Feet	
40								-40.0

Notes: refusal at 37'

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP6 /AP-6

Site Name: Springfield CWLP Ash Pond Borehole #: GP6

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: J. Edwards Geologist: C. Myrvold

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: C.Myrvold

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 5/17/19 Date Well Finished: 5/17/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

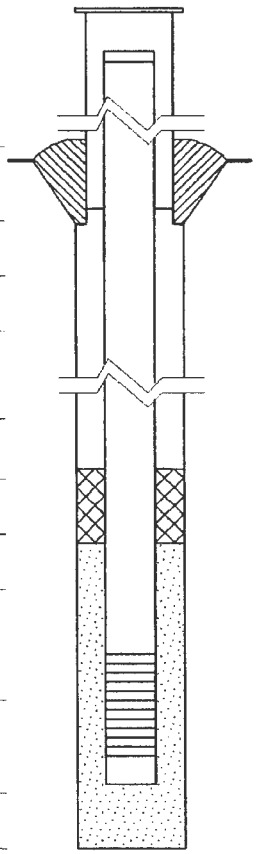
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)*	(0.01 ft)
Top of Protective Casing	_____	_____	
Top of Riser Pipe	537.82	- 3.00'	
Ground Surface	535.4	0.00'	
Top of Annular Sealant	532.4	3.00'	
Static Water Level Measured on (after completion)	_____	_____	
Top of Seal	512.97	22.43'	
Top of Sandpack	510.97	24.43'	
Top of Screen	508.64	26.43'	
Bottom of Screen	498.87	36.20'	
Bottom of Well	498.57	36.50'	
Bottom of Borehole	498.4	37.00'	

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	29.18
Bottom of Screen to End Cap (ft)	0.30
Screen Length (1st slot to last slot) (ft)	9.77
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water Light and Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 80's F, Sunny

Boring Information:
Boring No: GP7
Well No: GP7
Surf Elev.: 0

Depth Information:
Total: 36.5
Auger: 36.5
Core: N/A

Drilling Contractor:
Contractor Name: Bulldog Drilling, Inc.
City: Dupo, IL
Equipment: AMS PowerProbe 9500 w/ 5' MC

Personnel:
Geologist: C. Myrvold
Driller: J. Edwards
Helper(s): S. Guy

Dates:
Start: 5/16/19
Finish: 5/16/19

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							Dark brown clayey silt TOPSOIL, moist, moderately loose.	
							Brown/gray silty CLAY to clayey SILT, moist, stiff, trace sand.	
	1		4.1/5					
5								-5.0
	2		4.0/4					
10								-10.0
	3		4.0/4					
							Gray silty CLAY, moist, stiff.	
15	4		2.7/4					-15.0
							17.0 - 18.0: Soft, saturated.	
							18.0 - 25.0: moderately loose to moderately stiff.	
	5		4.0/4					
20								-20.0

Notes: Refusal at 36.50'

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP7 Boring No: GP7 Well No: GP7

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							(cont.) Gray silty CLAY, moist, stiff.	
	6		4.0/4				23.0 - 25.0: gray to brown/gray.	
25							Dark gray silty CLAY, moist, moderately stiff; some sand.	-25.0
	7		3.1/4					
							Dark gray silty SAND, fine-grained, wet, loose, some clay.	
30								-30.0
	8		3.7/4					
	9		3.5/ 3.5					
35								-35.0
							Gray to dark gray SHALE, weathered, soft, dry.	
							End of Boring = 36.5 Feet	
40								-40.0

Notes: Refusal at 36.50'

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP7

Site Name: Springfield CWLP Ash Pond Borehole #: GP7

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: J. Edwards Geologist: C. Myrvold

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: C.Myrvold

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 5/16/2019 Date Well Finished: 5/16/2019 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

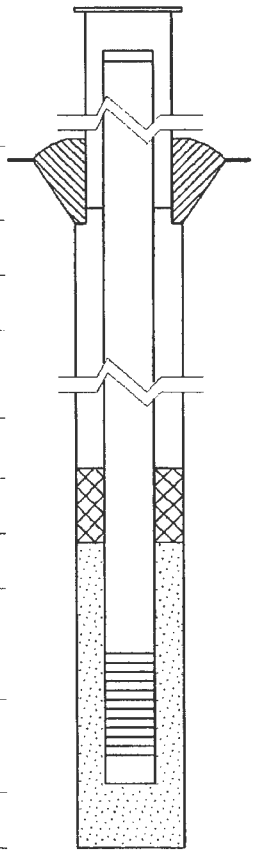
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe		-3.08'
Ground Surface		0.00'
Top of Annular Sealant		3.00'
Static Water Level Measured on (after completion)		
Top of Seal		21.93'
Top of Sandpack		23.93'
Top of Screen		25.93'
Bottom of Screen		35.70'
Bottom of Well		36.00'
Bottom of Borehole		36.50'

* Referenced to a National Geodetic Vertical Datum
+ positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	28.76
Bottom of Screen to End Cap (ft)	0.30
Screen Length (1st slot to last slot) (ft)	9.77
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water Light and Power
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 180247

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: 80's F, Sunny

Boring Information:
Boring No: GP8
Well No: GP8
Surf Elev.: 0

Depth Information:
Total: 42.0
Auger: 42.0
Core: N/A

Drilling Contractor:
Contractor Name: Bulldog Drilling, Inc.
City: Dupo, IL
Equipment: AMS PowerProbe 9500 w/ 5' MC

Personnel:
Geologist: C. Myrvold
Driller: J. Edwards
Helper(s): S. Guy

Dates:
Start: 5/15/19
Finish: 5/16/19

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							Dark brown clayey SILT, moist to wet, loose.	
							Brown silty CLAY, moist, stiff, trace sand, black mottling.	
	1		2.7/4					
5	2		3.3/4					-5.0
	3		4.0/4					-10.0
	4		4.0/4				Gray silty CLAY, moist, moderately stiff.	
15	5		4.0/4					-15.0
20								-20.0

Notes: Refusal at 42.00'

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP8 Boring No: GP8 Well No: GP8

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							(cont.) Gray silty CLAY, moist, moderately stiff.	
	6		2.2/4					
25	7		4.0/4					-25.0
30	8		4.0/4					-30.0
	9		4.0/4					
35							Dark gray clayey SAND, fine-grained, moist, moderately stiff.	-35.0
	10		4.0/4					
40								-40.0

Notes: Refusal at 42.00'

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: GP8 Boring No: GP8 Well No: GP8

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	11		2.0/2				Gray to dark gray weathered SHALE, soft, slightly moist.	
							End of Boring = 42 Feet	
45								-45.0
50								-50.0
55								-55.0
60								-60.0

Notes: Refusal at 42.00'

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: GP8

Site Name: Springfield CWLP Ash Pond Borehole #: GP8

Coordinates: X _____ Y _____ (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Bulldog drilling Consulting Firm: Andrews Engineering, Inc.

Driller: J. Edwards Geologist: C. Myrvold

Drilling Method: CME 55cc 4.25 in HSA w/ 5'MC Logged by: C.Myrvold

Drilling Fluids (type): N/A Report Form Completed by: B. Kenning

Date Well Started: 5/15/19 Date Well Finished: 5/16/19 Date Form Completed: 7/19/2019

ANNULAR SPACE DETAILS

Type of surface seal: _____

Type of annular sealant: Bentonite Grout

Installation method: Tremie

Setting time: > 24 hours

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

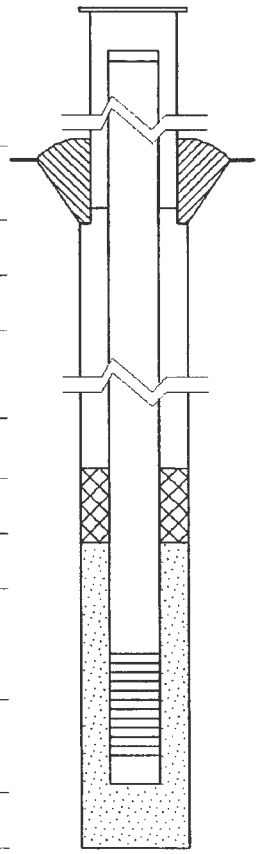
Type of sand pack: Silica Sand Pre-Pack

Grain size: 10/20 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe		- 3.00'
Ground Surface		0.00'
Top of Annular Sealant		3.00'
Static Water Level Measured on (after completion)		
Top of Seal		27.43'
Top of Sandpack		29.43'
Top of Screen		31.43'
Bottom of Screen		41.20'
Bottom of Well		41.50'
Bottom of Borehole		42.00'

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.50
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	34.18
Bottom of Screen to End Cap (ft)	0.30
Screen Length (1st slot to last slot) (ft)	9.77
Total Length of Casing (ft)	N/A
Screen Slot Size‡	#10 (0.01)

‡Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL.
County: Sangamon
Site No.:
AEI No.: 200387

Location:
Coord. System:
Northing: 3401.7
Easting: 1265.0

Weather: 52F Sunny

Boring Information:
Boring No: W-9
Well No: AP-8
Surf Elev.: 537.2

Depth Information:
Total: 39.6
Auger: 4.25" HSA
Core: 5ft. Continuous Sampler

Dates:
Start: 2/25/2021
Finish: 2/25/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner ltd.
City: Hindsboro, IL.
Equipment: CME 850

Personnel:
Geologist: C.M. Latham
Driller: Todd Skinner
Helper(s): A. Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**SILTY TOPSOIL** Dark brown, organic roots, moist, low-moderate firm.	
	1		4/5				**SILTY CLAY** Dark brown, firm, moist. Mottling with light brown and grey silty clay. Oxidation. 3'-5'.	
5							**CLAYEY SILT** Grey, oxidation mottling, moist, soft.	-5.0
	2		5/5				Increased oxidation at 8'	
							SAND SEAM Fine-grained, well sorted, subrounded, saturated, soft.	
10							**CLAYEY SILT** Grey, oxidation, moist, soft.	-10.0
	3		5/5				**SILTY CLAY** Light grey, moist, soft	
15								-15.0
	4		5/5					
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-9 Boring No: W-9 Well No: AP-8

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							CLAYEY SILT Brown, moist, soft-firm. Organic roots at 20'	
	5		5/5				Mottling with grey clay at 23.5'	
							SILTY CLAY Grey, moist, soft.	
25							**SILTY CLAY** Dark grey, firm, moist.	-25.0
							Mottled dark grey clay with blue clay at 26.5'	
	6		5/5				**CLAY** Dark grey, firm, moist.	
							Mottled dark grey clay with blue clay at 26.5'	
30							**SILTY CLAY** Blue, with trace organic coal fragments, moist, soft, moderate plasticity.	-30.0
	7		5/5					
							CLAYEY SILT WITH SAND Moist, poorly sorted, trace coal.	
35								-35.0
	8		3.5/5					
							SAND Loose sands, saturated, poorly sorted.	
				60			**SHALE**	
	9			40			Blue, moist, weathered, with lamination.	
40							End of Boring = 39.6 Feet	-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-8

Site Name: Springfield CWLP Ash Pond Borehole #: W-9

Coordinates: X 1265.0 Y 3401.7 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: C.M.Latham

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/25/2021 Date Well Finished: 2/25/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

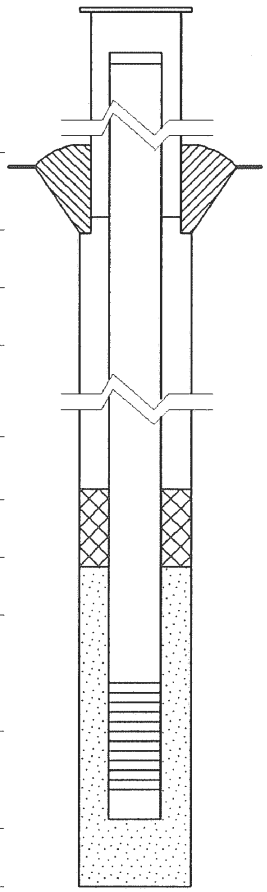
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
540.30	-3.10	Top of Protective Casing
540.30	-3.10	Top of Riser Pipe
537.20	0.00	Ground Surface
534.20	3.00	Top of Annular Sealant
530.20	7.00	Static Water Level Measured on (after completion)
_____	3.00	Top of Seal
510.60	26.60	Top of Sandpack
508.60	28.60	Top of Screen
498.02	39.18	Bottom of Screen
497.60	39.60	Bottom of Well
497.60	39.60	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	29.48'
Bottom of Screen to End Cap (ft)	0.42
Screen Length [1st slot to last slot] (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL.
County: Sangamon
Site No.:
AEI No.: 200387

Location:
Coord. System:
Northing: 5216.8
Easting: 703.0

Weather: 43F Sunny

Boring Information:
Boring No: W-8
Well No: AP-9
Surf Elev.: 9.30

Depth Information:
Total: 32.5ft.
Auger: 4.25". HSA
Core: 5ft. Continuous Sampler

Dates:
Start: 2/26/2021
Finish: 2/26/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner ltd.
City: Hindsboro, IL.
Equipment: CME 850

Personnel:
Geologist: C.M. Latham
Driller: Todd Skinner
Helper(s): A. Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1		5/5				**CLAYEY SILT** Dark brown, organic roots and leaves, moist, soft.	
							CLAYEY SILT Dark brown, moist, firm, slight mottling with dark grey clay.	
5	2		4.5				**SILTY CLAY** Medium brown, silty clay, soft, high plasticity, moist.	-5.0
10	3		4.5/5				Oxidation at 11' Moderate mottling with dark grey clay at 12 ft.	-10.0
15	4		5/5				**SILTY CLAY** Dark grey, moist, soft, high plasticity. **CLAY** Light grey clay, moist, soft, mottled with brown clay and oxidation.	-15.0
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-8 Boring No: W-8 Well No: AP-9

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							SILTY CLAY Brown, moist, firm, mottled with oxidation.	
							Mottled with blue clay and oxidation.	
	5		5/5				**CLAY** Blue clay, moist, firm, high plasticity.	
							Increasing silt content.	
25								-25.0
							CLAYEY SILT WITH SAND Poorly sorted, moist.	
	6		4.5/5				Gradation to heavier sand content; poorly sorted, moist.	
							SAND AND GRAVEL Sand and gravel with organic coal fragments; moist, poorly sorted.	
30							**SHALE** Grey, laminated, weathered, shale. Firm, Moist.	-30.0
	7			30 88 4				
							End of Boring = 32.5 Feet	
35								-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-9

Site Name: Springfield CWLP Ash Pond Borehole #: W-8

Coordinates: X 703.0 Y 5216.8 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: C.M. Latham

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/26/2021 Date Well Finished: 2/26/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

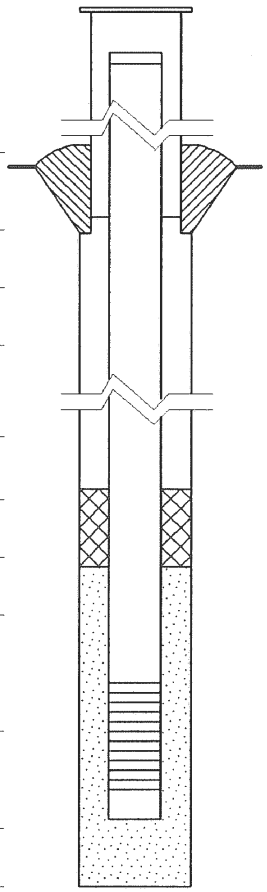
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



	ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing	537.20	-2.90
Top of Riser Pipe	537.20	-2.90
Ground Surface	534.30	0.00
Top of Annular Sealant	531.30	3.00
Static Water Level Measured on (after completion)	525.00	9.30
Top of Seal	_____	3.00
Top of Sandpack	514.00	20.30
Top of Screen	512.00	22.30
Bottom of Screen	502.24	32.06
Bottom of Well	501.80	32.50
Bottom of Borehole	501.80	32.50

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	24.91
Bottom of Screen to End Cap (ft)	0.44
Screen Length [1st slot to last slot] (ft)	9.76
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield
County: Sangamon
Site No.:
AEI No.: 200387

Location:
Coord. System:
Northing: 4684.0
Easting: 695.6

Weather: 40F Partly cloudy

Boring Information:
Boring No: W-5
Well No: AP-10
Surf Elev.: 6.02

Depth Information:
Total: 34.97
Auger: 4.25" HSA
Core: 5ft. Continous Sampler

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner ltd.
City: Hindsboro, Il.
Equipment: CME 850

Personnel:
Geologist: C.M. Latham
Driller: Todd Skinner
Helper(s): A. Bruce

Dates:
Start: 2/24/2021
Finish: 2/24/2021

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**SILTY TOPSOIL** Dark brown, moist, very firm, hard silt in shoe.	
	1		2.5/5				**SILT** Medium brown, moist, very firm, hard silt in shoe.	
5							**CLAYEY SILT** Brown, moist, soft, homogenous.	-5.0
	2		4/4				**SILTY CLAY** Brown, high plasticity, moist, very soft, homogenous. Trace sand seen in top of barrel.	
10							Wet from 10'-15'	-10.0
	3		5				Free water at 12'5"	
15							**SILTY CLAY** Grey, soft, moist. Fine sands, trace gravels at 17'	-15.0
	4		5				**CLAYEY SILT WITH SAND** Blueish grey with trace gravel, soft, moderate sorting.	
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-5 Boring No: W-5 Well No: AP-10

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							SANDY GRAVEL Poorly sorted, sub rounded, saturated, unconsolidated sands. Poorly sorted angular gravel.	
							SILTY CLAY Blue, high plasticity, firm, moist, tight clay. Very thin sand seam, fine grained, saturated at 23' Very thin sand seam, fine grained, saturated at 29.5'	
	5		5/5					
25								-25.0
	6		5/5					
30								-30.0
	7		4/5				**DIAMICTON** Blue, subrounded, poorly sorted sandy clay, with angular coal up to 0.3ft. Angular gravels; poorly sorted. Trace silts, saturated. Gradation into larger gravel and sand clasts towards bottom with trace silts and no clay.	
				33			**SHALE** Grey, moist, with lamination.	
	8			60				
35							End of Boring = 34.97 Feet	-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-10

Site Name: Springfield CWLP Ash Pond Borehole #: W-5

Coordinates: X 695.6 Y 4684.0 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: C.M. Latham

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/24/2021 Date Well Finished: 2/24/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

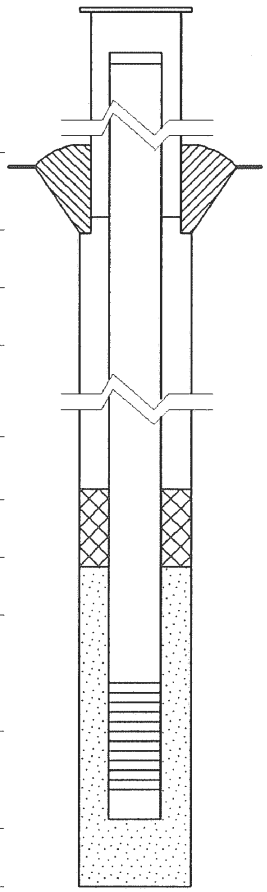
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)	
537.50	-3.10	Top of Protective Casing
537.50	-3.10	Top of Riser Pipe
534.40	0.00	Ground Surface
531.40	3.00	Top of Annular Sealant
528.38	6.02	Static Water Level Measured on (after completion)
_____	3.00	Top of Seal
511.80	22.60	Top of Sandpack
509.70	24.70	Top of Screen
499.89	34.51	Bottom of Screen
499.43	34.97	Bottom of Well
499.43	34.97	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	29.48'
Bottom of Screen to End Cap (ft)	0.46
Screen Length [1st slot to last slot] (ft)	9.71
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 200387-0025

Location:
Coord. System:
Northing: 4150.6
Easting: 524.5

Weather: Clear 40s

Boring Information:
Boring No: W-4
Well No: AP-11
Surf Elev.: 535.30

Depth Information:
Total: 20.1
Auger: 4.25" HSA
Core: 5ft continous sampler

Dates:
Start: 2/23/2021
Finish: 2/23/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner LTD
City: Hindsboro
Equipment: CME 850

Personnel:
Geologist: Scott Kangas
Driller: Todd Skinner
Helper(s): Adam Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**CLAYEY SILT TOPSILT** Black to dark brown, moist, soft to moderately stiff.	
	1		3.5/5				**CLAYEY SILT** Dark brown, moist, stiff to hard, homogenous.	
5							Very hard, trace fine sand, and oxidation with depth	-5.0
	2		3.75/5					
10								-10.0
	3		5/5				**SILTY CLAY** Olive gray, moist, soft, heavily oxidated, trace fine sand that increases with depth	
15							**CLAYEY SAND** Dark Gray to reddish brown with depth, wet, soft, fine well sorted sand	-15.0
	4		2.5/5				**GRAVEL AND SAND** Gray, poorly sorted up to 1" angular pieces, wet	
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-4 Boring No: W-4 Well No: AP-11

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							SHALE Weathered, gray	
							End of Boring = 20.1 Feet	
25								-25.0
30								-30.0
35								-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-11

Site Name: Springfield CWLP Ash Pond Borehole #: W-4

Coordinates: X 524.5 Y 4150.6 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: S Kangas

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: S Kangas

Drilling Fluids (type): N/A Report Form Completed by: S Kangas

Date Well Started: 2/23/2021 Date Well Finished: 2/23/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: >24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

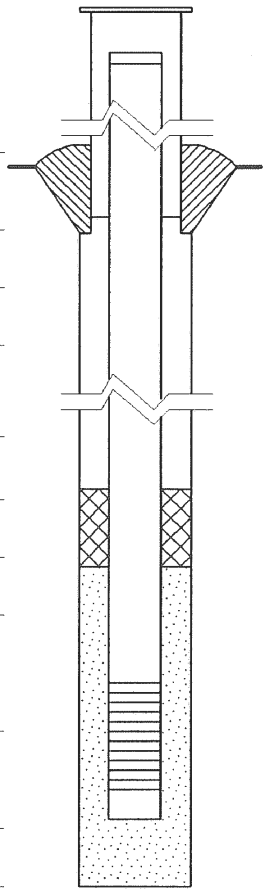
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
538.10	-2.80	Top of Protective Casing
538.10	-2.80	Top of Riser Pipe
535.30	0.00	Ground Surface
531.80	3.50	Top of Annular Sealant
_____	_____	Static Water Level Measured on (after completion)
531.80	3.50	Top of Seal
527.60	7.70	Top of Sandpack
525.28	10.02	Top of Screen
515.58	19.72	Bottom of Screen
515.15	20.15	Bottom of Well
515.15	20.15	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	#2
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	14.96
Bottom of Screen to End Cap (ft)	0.43
Screen Length [1st slot to last slot] (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size¥	#10 (0.01)

¥Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 200387-0025

Location:
Coord. System:
Northing: 3797.7
Easting: 667.6

Weather: Clear 40s

Boring Information:
Boring No: W-3
Well No: AP-12
Surf Elev.: 537.80

Depth Information:
Total: 27.3
Auger: 4.25" HSA
Core: 5ft continous sampler

Dates:
Start: 2/23/2021
Finish: 2/23/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner LTD
City: Hindsboro, IL
Equipment: CME 850

Personnel:
Geologist: Scott Kangas
Driller: Todd Skinner
Helper(s): Adam Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**CLAYEY SILT TOPSOIL** Dark brown, moist, soft to slightly stiff, root structures	
							CLAYEY SILT Brown, moist, stiff to hard, heavily oxidated, homogenous	
	1		4/5					
5								-5.0
							SILT Light gray, moist, firm to hard, heavily oxidated, mottling, homogenous.	
	2		4/5					
10								-10.0
							CLAYEY SILT Brown, moist, stiff to hard, moderate oxidation	
	3		5/5				Lighter in color, trace fine sand, and increase clay content with depth	
15								-15.0
	4		4/5					
							SANDY CLAY Gray, wet, soft, fine sand, well sorted and homgenous	
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-3 Boring No: W-3 Well No: AP-12

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	5		2.5/ 2.5					
							CLAYEY SAND Dark gray, wet, stiff, well sorted fine sand	
	6		2/2.5					
							GRAVEL AND SAND Gray, poorly sorted, angular to subangular, 1.5" or less in size	
25								-25.0
	7		2.3/ 2.3				**SHALE** Gray, weathered	
							End of Boring = 27.3 Feet	
30								-30.0
35								-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-12

Site Name: Springfield CWLP Ash Pond Borehole #: W-3

Coordinates: X 667.6 Y 3797.7 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: Scott Krangus

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/23/2021 Date Well Finished: 2/24/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

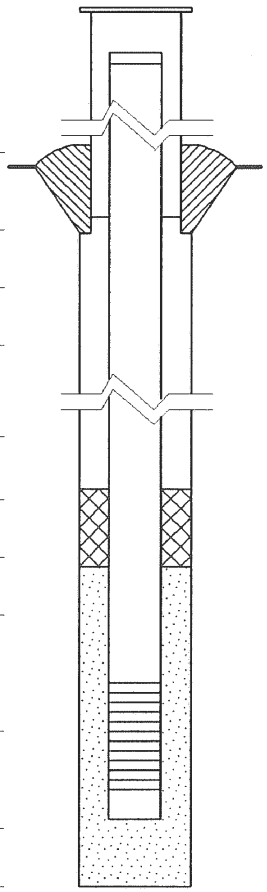
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
540.70	-2.90	Top of Protective Casing
540.60	-2.80	Top of Riser Pipe
537.80	0.00	Ground Surface
534.80	3.00	Top of Annular Sealant
_____	_____	Static Water Level Measured on (after completion)
_____	3.00	Top of Seal
522.80	15.00	Top of Sandpack
520.80	17.00	Top of Screen
510.88	26.92	Bottom of Screen
510.30	27.50	Bottom of Well
510.50	27.30	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	24.94
Bottom of Screen to End Cap (ft)	0.38
Screen Length [1st slot to last slot] (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL.
County: Sangamon
Site No.:
AEI No.: 200387

Location:
Coord. System:
Northing: 3451.2
Easting: 852.1

Weather: 50F Sunny

Boring Information:
Boring No: W-2
Well No: AP-13
Surf Elev.: 538.6

Depth Information:
Total: 27.6
Auger: 4.25" HSA
Core: 5ft. Continuous Sampler

Dates:
Start: 2/23/2021
Finish: 2/24/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner ltd.
City: Hindsboro, IL.
Equipment: CME 850

Personnel:
Geologist: C.M. Latham
Driller: Todd Skinner
Helper(s): A. Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**SILTY TOPSOIL** Dark Brown-black, moist, soft.	
	1		3.5				**CLAYEY SILT** Light brown, firm, moist.	
5							**SILT** Grey, moist, firm, homogenous.	-5.0
	2		4/5				**SILT** Reddish brown, moist, firm, homogenous.	
10								-10.0
	3		5/5				**CLAYEY SILT** Reddish brown, mottled with grey clay, moist, soft-firm, homogenous.	
15								-15.0
	4		5/5					
20								-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-2 Boring No: W-2 Well No: AP-13

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	5		1.25/ 2.5				**SAND AND GRAVEL** Dirty olive, saturated, poorly sorted, angular.	
25				29 60 4			**SHALE** Grey, weathered, with lamination.	-25.0
							End of Boring = 27.6 Feet	
30								-30.0
35								-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-13

Site Name: Springfield CWLP Ash Pond Borehole #: W-2

Coordinates: X 852.1 Y 3451.2 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: C.M. Latham

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/24/2021 Date Well Finished: 2/24/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

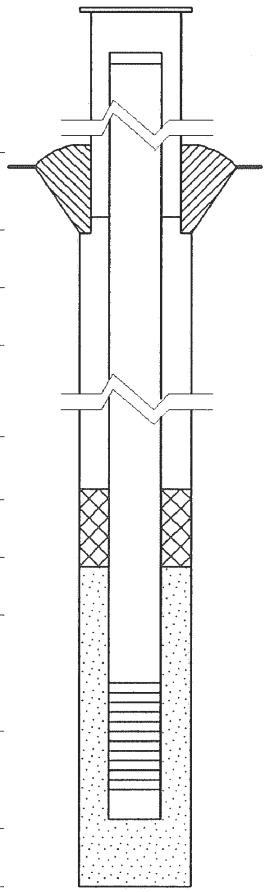
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)	
542.00	-3.40	Top of Protective Casing
542.00	-3.40	Top of Riser Pipe
538.60	0.00	Ground Surface
355.60	3.00	Top of Annular Sealant
532.35	6.25	Static Water Level Measured on (after completion)
_____	3.00	Top of Seal
524.08	14.52	Top of Sandpack
522.08	16.52	Top of Screen
511.47	27.13	Bottom of Screen
511.00	27.60	Bottom of Well
511.00	27.60	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	19.94'
Bottom of Screen to End Cap (ft)	0.47'
Screen Length [1st slot to last slot] (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP
Location: Springfield, IL
County: Sangamon
Site No.:
AEI No.: 200387

Location:
Coord. System:
Northing: 3171.5
Easting: 1275.2

Weather: 44F Partly Sunny

Boring Information:
Boring No: W-1
Well No: AP-14
Surf Elev.: 536.80

Depth Information:
Total: 27.5
Auger: 4.25" HSA
Core: 5ft Continuous Sampler

Dates:
Start: 2/25/2021
Finish: 2/26/2021

Drilling Contractor:
Contractor Name: Total Drilling Services/Skinner ltd.
City: Hindsboro, IL
Equipment: CME 850 4.25" HSA w/ 5' cont. sampler and 2'SS

Personnel:
Geologist: C.M. Latham
Driller: Todd Skinner
Helper(s): A. Bruce

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0							**SILTY TOPSOIL** Dark brown, moist, soft, organic leaves	
	1		3.5/5				**SILTY CLAY** Some gravel	
5							**CLAYEY SILT** Dark brown, moist, soft, organic leaves and roots, oxidation	-5.0
	2		5/5				**SILTY CLAY** Medium brown, mottled with grey clay and oxidation, high plasticity, moist, firm.	
10								-10.0
	3		4/5				Groundwater encountered at 14'	
15							**SILTY CLAY** Grey, moist, firm, high plasticity, oxidation	-15.0
	4		5/5					
20							21-21.5' coal fragments with undifferentiated organic materials	-20.0

Notes:

ANDREWS ENGINEERING
3300 Ginger Creek Drive - 217.787.2334
Springfield, IL 62711

FIELD BORING LOG

Boring Information: W-1 Boring No: W-1 Well No: AP-14

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	5		3/5				**SILTY CLAY** Some gravel	
							SAND Coarse grained, poorly sorted, unconsolidated, saturated.	
25								-25.0
	6		3/5	30 60 4			**SHALE** Grey, weatherd with lamination	
							End of Boring = 27.5 Feet	
30								-30.0
35								-35.0
40								-40.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Sangamon Well #: AP-14

Site Name: Springfield CWLP Ash Pond Borehole #: W-1

Coordinates: X 1275.2 Y 3171.5 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Total Drilling Services/Skinner LTD. Consulting Firm: Andrews Engineering, Inc.

Driller: Todd Skinner Geologist: C. M. Latham

Drilling Method: CME 850 4.25 in HSA w/ 5'MC and 2' SS Logged by: C.M. Latham

Drilling Fluids (type): N/A Report Form Completed by: C.M. Latham

Date Well Started: 2/25/2021 Date Well Finished: 2/26/2021 Date Form Completed: 3/2/2021

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite Chips

Installation method: Free Drop

Setting time: > 24

Type of bentonite seal: Bentonite Chips

Installation method: Free Drop

Setting time: > 24 hours

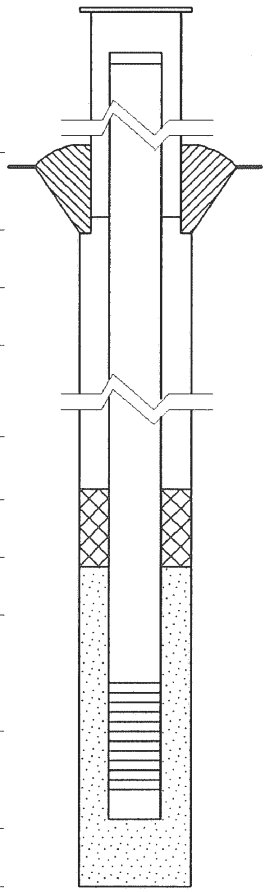
Type of sand pack: Silica Sand Pre-Pack

Grain size: 20/40 (sieve size)

Installation method: Free Drop

Type of backfill material: N/A (if applicable)

Installation method: _____



ELEVATION (MSL)*	DEPTH (BGS)* (0.01 ft)	
539.60	-2.80	Top of Protective Casing
539.60	-2.80	Top of Riser Pipe
536.80	0.00	Ground Surface
533.80	3.00	Top of Annular Sealant
534.80	2.00	Static Water Level Measured on (after completion)
_____	3.00	Top of Seal
521.45	15.35	Top of Sandpack
519.45	17.35	Top of Screen
509.75	27.05	Bottom of Screen
509.30	27.50	Bottom of Well
509.30	27.50	Bottom of Borehole

* Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	N/A
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	
Protective Casing Length (ft)	N/A
Riser Pipe Length (ft)	19.94
Bottom of Screen to End Cap (ft)	0.45
Screen Length [1st slot to last slot] (ft)	9.70
Total Length of Casing (ft)	N/A
Screen Slot Size*	#10 (0.01)

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127375.6
Easting: 2456111.7

Weather: Sunny 62 F

Boring Information:
Boring No: B-1
Well No: B-1
Surf Elev.: 557.77

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	557.8
0	1						CINDER and GRAVEL (fill)	
	2		0.3/1.5	3 4 2				555.0
	3							
5	4		0.2/1.5	1 2 1			CINDER (fill); dry; loose	
	5						Gray silty CLAY; with cinders; dry; medium stiff	
	6		0.5/1.5	1 3 2				550.0
	7							
10	8		0.9/1.5	1 2 8	1.0		Gray silty CLAY; with gravel and sand; moist; stiff; 20 mm VST@ 9.5' = 6.0, 3.2, 4.3	
	9							
	10		0.8/1.5	0 1 3	1.0		Gray sandy CLAY; moist; medium stiff	545.0
	11						Gray SANDY LOAM	
15	12		0.9/1.5	4 18 9			Black CINDER (fill); with gravel and silty clay; wet; loose	
	13							
	14		0.2/1.5	1 1 1				540.0
	15							
20	16		1.1/1.5	1 1 3	0.3		Gray SANDY LOAM; wet; slightly stiff	
	17							
	18		1.1/1.5	0 0 3			Gray SILTY LOAM; wet; soft; 20 mm VST@ 51.5' = 6.7, 2.3, 2.5	535.0
	19							
25	20		1.8/2.0				Gray SANDY LOAM; moist	
	21				0.7			
	22		1.2/1.5	2 3 5	1.5		Gray silty CLAY; moist; stiff	530.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127370.68
Easting: 2456072.07

Weather: Sunny 72 F

Boring Information:
Boring No: B-1L
Well No: B-1L
Surf Elev.: 552.56

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/11/2023
Finish: 10/11/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Brown silty CLAY; moist; stiff; some dark brown mottling; few organics; trace ash fragments; trace gravel	
	2		1.1/1.5	2 6 7	3.75			550.0
	3							
5	4		1.0/1.5	3 5 4	3.5			
	5							
	6		0.6/1.5	2 3 3	2.5			545.0
	7							
10	8		0.6/1.5	1 4 3	2.25		16 mm VST@ 9.5' = 7.7, 2.4, 2.8 Brown SAND; medium to coarse grained; moist; loose	
	9						Black coal ASH fragments; wet; loose	
	10		0.3/1.5	1 3 3				540.0
	11							
15	12		0.6/1.5	0 2 2				
	13							
	14		0.5/1.5	4 10 3				535.0
	15						Dark gray sandy SILT; wet; soft; trace gravel	
20	16		1.1/1.5	0 0 2	0.25		More clayey Dark gray CLAY; moist; soft; some organic fragments; trace gravel	
	17				0.5			
	18		1.4/2.0				20 mm VST@ 22.0' = 13.0+, 3.9, 3.9	530.0
	19				2.0			
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127355.19
Easting: 2456023.58

Weather: Sunny 65 F

Boring Information:
Boring No: B-1LL
Well No: B-1LL
Surf Elev.: 542.84

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	542.8
0	1						Brown clayey SILT; with sand; moist; loose	
	2		0.2/1.5	6 8 8				540.0
	3							
5	4		0.2/1.5	6 5 5				
	5							
	6		0.6/1.5	4 4 5			Gray silty CLAY; with cinders; dark yellowish brown mottling; moist; stiff	535.0
	7				2.25			
10	8		0.6/1.5	7 9 10			Gray SAND; medium to coarse grained; wet; loose	
	9							
	10		0.7/1.5	3 5 5			Gray silty CLAY; with black organic varved material; few ash fragments	530.0
	11				2.75			
15	12		2.0/2				16 mm VST@ 14.5' = 8.5, 3.6, 4.2	
	13				0.5		Very soft	
	14		1.4/1.5	1 2 2	0.75			525.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127408.40
Easting: 2456167.19

Weather: Rainy 62 F

Boring Information:
Boring No: B-1U
Well No: B-1U
Surf Elev.: 564.17

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/13/2023
Finish: 10/13/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.2
0	1						Black CINDERS; moist; loose	
	2		1.0/1.5	4 5 6	2.0		Dark brown silty CLAY; moist; stiff; some black cinders; trace organics; trace gravel	
	3							560.0
5	4		0.9/1.5	2 3 5	1.5			
	5						Black fly ASH with CINDERS; moist to wet; moderately stiff	
	6		1.0/1.5	2 6 6	1.0			
	7							555.0
10	8		0.8/1.5	2 5 6				
	9							
	10		0.8/1.5	1 2 1				
	11							550.0
15	12		1.4/1.5	0 1 1			Black fly ASH; wet; soft	
	13						CINDERS	
	14		1.1/1.5	1 2 3	0.25		Black fly ASH; wet; soft; laminated	
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127389.92
Easting: 2456246.00

Weather: Sunny 64 F

Boring Information:
Boring No: B-1CCR
Well No: B-1CCR
Surf Elev.: 568.03

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	568.0
0	1						Black bottom ash and CINDERS; moist; loose	
	2		0.5/1.5	5 5 2				565.0
	3							
5	4		0.3/1.5	1 2 3				
	5						Black fly ASH; moist to wet	
	6		0.8/1.5	1 3 3	1.0			560.0
	7						Black bottom ASH; moist to wet; moderately loose	
10	8		1.0/1.5	1 1 1				
	9							
	10		1.2/1.5	1 0 1				555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black fly ASH; moist to wet; moderately firm	
	13						Black bottom ASH; wet; loose	
	14		0.9/1.5	2 6 7				550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128015.70
Easting: 2455909.16

Weather: Sunny 65 F

Boring Information:
Boring No: B-2L
Well No: B-2L
Surf Elev.: 536.92

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	536.9
0	1						Gray/brown silty CLAY; some iron concretions; moist; stiff; some organics; some ash fragments; some gravel	
	2		0.5/1.5	1 4 4	1.25			535.0
	3							
5	4		1.3/1.5	2 2 3	1.0			
	5							
	6		1.8/2.0				Light gray clayey SILT; few dark yellow brown mottling; moist; firm; trace iron concretions	530.0
	7				2.25			
10	8		1.5/1.5	1 2 2	0.75		20 mm VST@9.5' = 13.0, 3.2, 2.8	
	9				<0.25		Gray clayey SAND; wet; soft	
	10		1.5/1.5	0 1 1	<0.25			525.0
	11							
15	12		1.0/1.5	0 0 1	<0.25			
	13							
	14		1.0/1.5	0 1 1	0.25		Gray clayey SILT; laminated; moist to wet; soft	520.0
	15							
20	16		1.3/1.5	0 1 2			Brown SAND; medium to coarse grained; wet; loose	
	17							
	18		1.5/1.5	1 3 3	0.75		Dark gray clayey SILT; laminated; moist; soft; organic fragments	515.0
	19							
25							End of Boring = 24.5 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128026.78
Easting: 2455971.03

Weather: Cloudy 62 F

Boring Information:
Boring No: B-2
Well No: B-2
Surf Elev.: 554.71

Depth Information:
Total: 30.0'
Auger: 30.0'
Core: -

Dates:
Start: 10/06/2023
Finish: 10/06/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.7
0	1						Gray brown SILT; dry	
	2		0.4/1.5	3 5 5	4.75			
	3							
5	4		0.8/1.5	3 4 6	2.5		Becoming moist	550.0
	5							
	6		0.7/1.5	3 4 4	2.0		Brown silty CLAY; moist	
	7				2.5			
10	8		0.9/1.5	2 4 4				545.0
	9						Greenish brown silty CLAY; moist	
	10		1.0./1.5	2 3 4	1.5			
	11							
15	12		1.0/1.5	1 3 5	2.0		Brown silty CLAY; moist; trace black organics; 16 mm VST@ 14.5' = 7.0, 4.3, 4.2	540.0
	13							
	14		1.0/1.5	1 2 4	2.0			
	15							
20	16		1.4/1.5	1 3 4	2.5		Brownish gray silty CLAY; black/orange inclusions; organics; moist	535.0
	17							
	18		1.9/2.0					
	19							
25	20		1.5/1.5	1 3 4	1.0		Brownish/greenish gray silty CLAY; moist; trace brown organics; 16 mm VST@ 25.0' = 5.4, 3.2, 3.5	530.0
	21							
	22		1.5/1.5	0 2 2	<0.25		Becoming trace fine grained sand	
	23				<0.25		Orangish brown SILT; moist	
30								525.0
							End of Boring = 30 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128045.00
Easting: 2456005.51
Weather: Sunny 78 F

Boring Information:
Boring No: B-2U
Well No: B-2U
Surf Elev.: 562.33

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

Dates:
Start: 10/12/2023
Finish: 10/12/2023

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	562.3
0	1						Black coal ASH (cinders); moist; loose	
	2		0.4/1.5	2 5 1				560.0
	3							
5	4		0.2/1.5	1 1 2				
	5							
	6		0.8/1.5	2 4 8	2.0		Gray silty CLAY; some yellow brown mottling; some iron concretions; moist; stiff; trace gravel	555.0
	7							
10	8		0.4/1.5	2 5 4			Black coal ASH (cinders); wet; loose	
	9							
	10		1.5/1.5	1 2 11	<0.25		Black fly ASH; wet; soft; some cinders	550.0
	11							
15	12		1.0/1.5	1 0 2	<0.25		With cinders	
	13							
	14		0.4/1.5	3 3 4			Black coal ASH (cinders); wet; loose	545.0
	15							
20	16		0.5/2.0				Black fly ASH; wet; soft; 20 mm VST@ 19.5' = 3.0, 3.2, 3.8	
	17				<0.25			
	18		0.5/1.5	1 2 5			Black CINDERS; wet; loose	540.0
	19							
25	20		0.5/1.5	0 1 2	1.25		Olive brown CLAY; moist; stiff; some organics	
							End of Boring = 26 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128059.37
Easting: 2456087.51
Weather: Sunny 64 F

Boring Information:
Boring No: B-2CCR
Well No: B-2CCR
Surf Elev.: 566.77

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	566.8
0	1						Mix of lime sludge, and fly and bottom ASH; some dark yellow brown mottling; moist; soft	
	2		1.3/1.5	1 1 1	0.25			565.0
	3							
5	4		1.6/1.5	1 0 1			More bottom ash	
	5							
	6		0.9/1.5	1 5 3	<0.25		Lime SLUDGE; wet; soft	560.0
	7							
10	8		1.5/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; some organic fragments	
	9							555.0
	10		1.5/1.5	0 0 0			Some bottom ash	
	11							
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		0.4/1.5	1 0 1			Black bottom ASH; wet; loose	550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128663.99
Easting: 2456486.97

Weather: Sunny 69 F

Boring Information:
Boring No: B-3
Well No: B-3
Surf Elev.: 554.19

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.2
0	1						Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	2		0.5/1.5	1 1 2	1.0			
	3							
5	4		0.9/1.5	2 2 2			Brown/gray SAND; coarse grained; moist to wet; loose	550.0
	5							
	6		0.8/1.5	1 2 3	2.57		Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	7							545.0
10	8		1.5/2.0				16 mm VST@ 9.5' = 9.3, 5.3, 5.4	
	9				1.5			
	10		1.0/1.5	1 3 3	1.5		Black/gray	
	11							540.0
15	12		1.3/1.5	2 3 4	1.5			
	13							
	14		1.2/1.5	1 2 5	1.25		With dark yellow brown mottling	
	15							535.0
20	16		1.6/2.0				16 mm VST@ 19.5' = 11.8, 5.0, 5.1	
	17				1.75			
	18		1.5/1.5	1 2 4			Manganese oxide concretions Dark yellowish brown silty CLAY; more silty; organic staining; moist; stiff	
	19							530.0
25	20		1.1/1.5	0 2 2	1.25		Yellow brownclayey SILT; some dark yellow brown mottling; laminated; some magnesium oxide concretions; moist; soft; 16 mm VST@ 24.5' = 9.1, 6.0, 5.9	
	21							
	22		1.2/1.5	0 2 4	0.5			
	23				2.75		Yellow brown silty CLAY; some dark yellow brown mottling; few manganese oxide concretions; moist; stiff	525.0
30							End of Boring = 29.5 Feet	

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128634.05
Easting: 2456502.96

Weather: Sunny 64 F

Boring Information:
Boring No: B-3U
Well No: B-3U
Surf Elev.: 562.94

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	562.9
0	1						Dark yellowish brown silty CLAY; some iron concretions; moist; stiff; trace gravel	
	2		0.8/1.5	2 4 7	3.25		GYPSUM; moist; loose	560.0
	3							
5	4		0.5/1.5	2 2 2				
	5						Olive gray silty CLAY; few dark yellow brown mottling; laminated; some bottom ash; moist; stiff; trace gravel	
	6		0.7/1.5	2 4 6	1.5			555.0
	7							
10	8		1.3/2.0				16 mm VST@ 9.5' = 0.8, 3.9, 4.2	
	9						Bottom ASH; moist to wet; loose	
	10		0.5/1.5	1 0 1			Fly ASH; wet; soft	550.0
	11							
15	12		1.5/1.5	0 1 0				
	13				0.5		Little bottom ASH	
	14		1.5/1.5	0 0 1	0.5			545.0
	15				<0.25			
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128336.73
Easting: 2456638.09

Weather: Sunny 65 F

Boring Information:
Boring No: B-3CCR
Well No: B-3CCR
Surf Elev.: 564.05

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.0
0	1						Fly ash with bottom ASH; moist; moderately firm	
	2		0.7/1.5	1 3 4	1.0			
	3							560.0
5	4		1.5/1.5	1 0 0	<0.25		Light gray lime SLUDGE; with rootlets; some organics; moist; soft	
	5							
	6		0.9/1.5	0 1 1	<0.25			
	7							555.0
10	8		1.1/1.5	0 0 0	<0.25		FlyASH; moist to wet; soft	
	9						Some organic matter	
	10		1.5/1.5	0 0 0	<0.25			
	11							550.0
15	12		1.4/1.5	0 0 0				
	13							
	14		1.5/1.5	0 0 0				
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127732.94
Easting: 2455960.98

Weather: Sunny 65 F

Boring Information:
Boring No: B-4L
Well No: B-4L
Surf Elev.: 533.51

Depth Information:
Total: 21.5'
Auger: 21.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.5
0	1						Dark gray silty CLAY; some dark yellow brown mottling; some organic fragments; moist; soft; some gravel; trace coal fragments	
	2		0.4/1.5	3 2 1	0.25			
	3							530.0
5	4		0.7/1.5	1 1 1	<0.25			
	5						Grading to light gray	
	6		1.4/1.5	1 2 2	0.25		Light gray silty CLAY; some dark yellow brown mottling; few iron concretions; moist; soft	
	7							525.0
10	8		1.5/1.5	1 1 2	0.75			
	9							
	10		1.2/2.0				16 mm VST@ 12.0' = 5.6, 2.6, 2.4	
	11				1.75			520.0
15	12		1.4/1.5	0 1 2	0.5		Gray clayey SILT; some dark yellow brown mottling; trace iron concretions; laminated; moist to wet; soft	
	13							
	14		1.5/1.5	0 0 0	<0.25		Light gray silty CLAY; some dark yellow brown mottling; moist; soft	
	15							515.0
20	16		0.0/2.0				Shelby tube attempted but no recovery; 20 mm VST@ 19.5' = 4.2, 1.4, 1.6	
							End of Boring = 21.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127789.13
Easting: 2456023.78
Weather: Sunny 62 F

Boring Information:
Boring No: B-4
Well No: B-4
Surf Elev.: 555.18

Depth Information:
Total: 34.5'
Auger: 34.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.2
0	1						Gray silty CLAY; with cinders; dry; stiff	
	2		0.8/1.5	3 6 6	3.3			
	3							
5	4		0.2/1.5	4 6 5	4.0			550.0
	5							
	6		0.7/1.5	2 3 4	1.0		Brown/gray silty CLAY; moist; moderately stiff; trace cinders	
	7							
10	8		0.6/1.5	1 3 4			Gray; 16 mm VST@ 9.5' = 4.4, 2.5, 2.7	545.0
	9				1.0			
	10		0.8/1.5	0 1 2	0.5		Soft	
	11							
15	12		0.9/1.5	1 2 3	1.0		Mottling	540.0
	13							
	14		0.6/1.5	0 2 2	1.1			
	15							
20	16		1.3/2.0				Oxidation staining; moderately stiff; 16 mm VST @ 19.5' = 2.6, 1.7, 1.7	535.0
	17				2.1			
	18		0.8/1.5	0 0 1				
	19				0.5			
25	20		0.9/1.5	0 0 1	0.2-0.5		Soft	530.0
	21							
	22		1.5/1.5	0 1 2	0.1		Brown/gray silty LOAM; wet; soft; trace sand	
	23							
30	24		1.5/1.5	0 0 0	0.1		Brown sandy LOAM; wet; very soft	525.0
	25							
	26		1.5/1.5	0 0 0	0.5		Brown/gray silty CLAY; wet; soft	
	27							
35							End of Boring = 34.5 Feet	520.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127802.23
Easting: 2456057.41

Weather: Sunny 78 F

Boring Information:
Boring No: B-4U
Well No: B-4U
Surf Elev.: 563.01

Depth Information:
Total: 29.0'
Auger: 29.0'
Core: -

Dates:
Start: 10/12/2023
Finish: 10/12/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	563.0
0	1						Black CINDERS; moist; loose	
	2		0.4/1.5	3 6 1				560.0
	3						Black silty CLAY; with fly ash; moist; stiff; some organic fragments	
5	4		0.7/1.5	1 0 1	2.75			
	5						Olive gray silty CLAY; some dark yellow brown mottling; moist; stiff	
	6		0.7/1.5	1 2 2	1.75		Black CINDERS; wet; loose	555.0
	7							
10	8		0.8/1.5	1 0 0	<0.25		Black fly ASH; wet; soft	
	9							
	10		1.0/1.5	2 4 3				550.0
	11							
15	12		0.9/1.5	0 2 2				
	13							
	14		1.1/1.5	1 3 6				545.0
	15							
20	16		0.7/1.5	2 3 4			Black CINDERS; wet; loose	
	17							
	18		1.2/1.5	0 0			Light gray/black fly ASH	540.0
	19							
25	20		0.4/1.5	0 0 1	1.25		Olive gray silty CLAY; some dark yellow brown mottling; moist; moderately stiff; trace organics	
	21							
	22		1.9/2.0					535.0
					1.25		End of Boring = 29 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127834.10
Easting: 2456152.87

Weather: Sunny 64 F

Boring Information:
Boring No: B-4CCR
Well No: B-4CCR
Surf Elev.: 567.59

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	567.6
0	1						Dark yellow brown silty CLAY; moist; stiff; some bottom ash	
	2		0.8/1.5	1 3 3	1.75			565.0
	3						Dark gray fly ash with bottom ASH; moist; moderately loose	
5	4		0.4/1.5	2 2 2				
	5						Gray lime SLUDGE; with layers of fly ash; wet; soft; few organic fragments	
	6		1.2/1.5	2 3 3	<0.25			560.0
	7							
10	8		1.4/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; trace to some organic fragments	
	9							
	10		1.5/1.5	1 0 0	<0.25			555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black bottom ash with fly ASH; wet; moderately loose; some organic fragments	
	13				<0.25		Black fly ash with bottom ASH; wet; moderately soft; some organic fragments	
	14		0.2/1.5	0 1 1				550.0
	15							
20	16		0.9/1.5	0 1 3			Black bottom ASH; wet; loose	
							End of Boring = 21 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129295.29
Easting: 2455215.62

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5L
Well No: B-5L
Surf Elev.: 534.00

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	534.0
0	1						Dark brown silty CLAY; dry; stiff	
	2		0.5/1.5	4 6 5	>4.5			
	3							530.0
5	4		1.0/1.5	5 5 7				
	5				2.7			
	6		0.2/1.5	2 2 2			Soft	
	7							525.0
10	8		1.6/2.0		0.5		Gray silty CLAY; soft; 20 mm VST@ 9.5' = 5.8, 2.5, 2.9	
	9				0.2-0.7			
	10		1.5/1.5	0 2 1			Gray CLAY; very soft	
	11							520.0
15	12		1.5/1.5	0 1 2				
	13				0.2-0.5			
	14		1.5/1.5	0 0 0	0.1		Gray sandy CLAY; very soft	
	15						Gray SAND; 20 mm VST@19.0' = 7.2, 3.2, 3.2	515.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129302.48
Easting: 2455281.11

Weather: Cloudy, 62 F

Boring Information:
Boring No: B-5
Well No: B-5
Surf Elev.: 553.62

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 10/06/2023
Finish: 10/06/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.6
0	1						Greenish brown SILT; dry	
	2		0.9/1.5	3 7 7	4.5			
	3							550.0
5	4		0.7/1.5	3 4 8	3.5		Greenish brown silty CLAY	
	5							
	6		0.5/1.5	2 2 4	2.5		Brown mottling	
	7							545.0
10	8		0.9/1.5	2 4 5	1.5			
	9							
	10		0.9/1.5	2 5 6	3.5			
	11							540.0
15	12		0.8/1.5	3 4 7			16 mm VST@15.0' = 1.3, 3.3, 3.2	
	13				3.0			
	14		0.7/1.5	2 5 6	3.5			
	15							535.0
20	16		0.9/1.5	1 5 8	4.5		Dark gray clayey SILT; moist; wood chucks	
	17							
	18		0.9/1.5	2 5 5	2.0			
	19							530.0
25	20		1.9/2.0				16 mm VST@ 24.0' = 3.7-3.8	
	21							
	22		1.3/1.5	0 1 2	0.5		Brown silty CLAY; moist	
	23							525.0
30	24		1.2/1.5	0 0 1	<0.25		Saturated	
	25							
	26		1.2/1.5	0 1 2	0.5		Brown silty CLAY; trace greenish gray and dark brown mottling	
	27							520.0
35	28		1.5/1.5	0 2 2	0.25		Very little silt	
	29							
	30		1.5/1.5	0 0 2				
	31							515.0
40							End of Boring = 39.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129333.75
Easting: 2455341.56

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5CCR
Well No: B-5CCR
Surf Elev.: 552.59

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Bottom ASH	
	2		0.9/1.5	14 12				550.0
	3				4.5		Dark gray sandy LOAM; stiff	
5	4		1.4/1.5	3 2 3			Dark gray SAND; bottom ash; wet	
	5				1.0			
	6		1.5/1.5	1 1 1			Dark gray sandy LOAM; bottom ash	545.0
	7				1.0			
10	8		0.6/1.5	1 4 6			Black SAND; bottom ash; wet	
	9							
	10		0.4/1.5	5 9 4				540.0
	11							
15	12		0.2/1.5	0 1 1			Black SAND; coarse grained; bottom ash; wet	
	13							
	14		0.2/1.5	3 2 3				535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130126.84
Easting: 2455243.51

Weather: Sunny, 85 F

Boring Information:
Boring No: B-6L
Well No: B-6L
Surf Elev.: 531.19

Depth Information:
Total: 23.5'
Auger: 23.5'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	531.2
0	1				1.5		Grayish brown silty CLAY; moist; firm; trace sand	530.0
	2		0.5/1.5	4 7 7				
	3							
5	4		0.5/1.5	3 2 3	1.5		Reddish brown silty CLAY; moist; firm; trace sand	525.0
	5							
	6		0.1/2.0					
	7							
10	8		0.6/1.5	W 1 1			20 mm VST@ 10.0' = 5.2, 2.8, 3.0	
	9				0		Gray clayey SILT; soft; moist	520.0
	10		1.5/1.5	W 1 1	0.5		Gray/reddish brown clayey SILT; soft; moist	
	11							
15	12		0.9/1.5	1 2 2				
	13				0-0.5		Gray SILT to reddish brown SAND; fine to coarse grained; moist	515.0
	14		1.1/1.5	W W W	0.25		Gray silty clay to clayey SILT; moist; soft; some organics, wood, bark, and ash	
	15							
20	16		0.9/1.5	W 1 2	3.9		20 mm VST@ 20.0' = 7.2, 3.9	
	17				0.5		Gray clayey SILT; moist	510.0
	18		0.9/1.5	W W W	0.5			
							End of Boring = 23.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130094.72
Easting: 2455316.59

Weather: Mostly Cloudy, 71 F

Boring Information:
Boring No: B-6
Well No: B-6
Surf Elev.: 553.93

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/05/2023
Finish: 10/05/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.9
0	1		1.3/2.0	5 15 37 33			Dark brown SILTY (fill)	
	2		0.8/2.0	5 5 6 7	+4.5		Dark brown silty CLAY; moist	
	3							550.0
5	4		0.7/1.5	2 3 5	2.25			
	5							
	6		0.8/1.5	1 3 7	2			545.0
	7							
10	8		0.8/1.5	5 8 7			8.2 mm VST@ 9.5' = 1.3-1.4	
	9				4.0			
	10		0.9/1.5	3 4 6	4.0			540.0
	11							
15	12		1.2/1.5	2 4 6	3.0		13 mm VST@ 15.0' = 4.7-4.6	
	13							
	14		2.0/2.0					
	15		1.4/2.0	2 5 6 10	2.7			535.0
20	16		1.5/2.0	5 10 11 12	4.2		Dark greenish gray silty CLAY; moist	
	17		1.3/2.0	2 4 6 8	3.0		Gray CLAY and SAND; with coal; brown mottling	530.0
25	18		1.6/2.0	1 5 6 6	2.0		Gray silty CLAY; 6.1 mm VST@ 25.5' = 4.0-3.9	
	19		2.0/2.0	1 1 2 2	1.0		Gray clayey SILT	
30	20		1.9/2.0	0 0 0 2	0.25			525.0
	21							
	22		2.0/2.0	0 0 0 2	<0.25		Gray silty CLAY; yellow brown mottling	520.0
35	23		2.0/2.0	0 0 0 0	<0.25		Brown CLAY; mottling light brown; trace sand	
	24		1.8/2.0	0 2 2 3	1.0		Light gray clayey sandy SILT; mottling yellow brown	515.0
	25							
40							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130067.17
Easting: 2455388.17

Weather: Sunny, 65 F

Boring Information:
Boring No: B-6CCR
Well No: B-6CCR
Surf Elev.: 553.32

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.3
0	1						Gray fly ASH; moist; friable; some gypsum; trace bottom ash	
	2		1.0/1.5	13 12				
	3							550.0
							Bottom ASH; moist; loose	
5	4		0.9/1.5	5 3 2				
	5							
	6		1.1/1.5	2 2 2	<0.25		Fly ASH; moist to wet; soft	545.0
	7							
10	8		1.5/1.5	1 0 0	<0.25			
							Fly ASH; wet; soft	
	9							
	10		0.6/1.5	0 0 0	<0.25			540.0
	11							
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			535.0
	15							
20	16		1.5/1.5	0 0 0	<0.25			
	17							
	18		1.5/1.5	0 0 0	<0.25			530.0
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130467.06
Easting: 2455885.37

Weather: Sunny, 85 F

Boring Information:
Boring No: B-7L
Well No: B-7L
Surf Elev.: 533.19

Depth Information:
Total: 20.0'
Auger: 20.0'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.2
0	1				3.5		Gray silty CLAY; dry; very firm; trace sand	
	2		0.5/1.5	3 5 7				530.0
	3							
5	4		0.5/1.5	3 4 7	1.5		Reddish brown clayey SILT; moist; trace sand	
	5							
	6			3 3 3	1.0		Brownish red SAND; wet	525.0
	7							
10	8		0.6/1.5	W 3 2			20 mm VST@ 10.0' = 3.8, 1.2	
					0.25		Brownish red SAND with dark black SILT; ash	
	9							
	10		1.5/1.5	2 1 2			ASH	
	11				0.25		Gray silty CLAY; wet; soft	520.0
15	12		0.9/1.5	W W W	0.25		Gray clayey SILT; moist; soft	
	13							
	14		1.1/1.5	W W W	0			515.0
	15							
20							20 mm VST@ 20.0' = 6.7, 3.0, 3.1	
							End of Boring = 20 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130413.91
Easting: 2455917.71

Weather: Haze, 79 F

Boring Information:
Boring No: B-7
Well No: B-7
Surf Elev.: 552.56

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Brown/gray sandy CLAY; mottling; dry; very stiff	
	2		0.6/1.5	3 5 6	>4.5			550.0
	3						Brown silty CLAY; slightly moist; very stiff	
5	4		0.5/1.5	3 4 7	2.5			
	5						BrowGray silty LOAM; slightly moist; stiff	545.0
	6		0.7/1.5	3 4 5	2.5			
	7						Gray silty CLAY; 16 mm VST@ 9.5' = 13+, 5.2, 5.2	
10	8		0.7/1.5	2 3 6	2.4		Gray silty LOAM	
	9							540.0
	10		0.8/1.5	2 4 7	2.2		Gray silty LOAMSlightly moist; fractured	
	11							
15	12		0.9/1.5	2 4 7	2.3			
	13						Brown sandy LOAM; moist; stiff	535.0
	14		0.5/1.5	2 4 5	2.5			
	15						Brown/gray silty LOAM; mottling; moist; stiff; 16 mm VST@ 19.5' = 11.4, 6.1, 6.2	
20	16		2.0/2.0					
	17				2.1		Brown/gray silty CLAY; mottling; moist; stiff	530.0
	18		1.2/1.5	2 3 5	1.6			
	19						Red brown SAND; moist; loose	
25	20		1.4/1.5	2 3 5	1.7		Brown sandy LOAM; wet; soft	525.0
	21							
	22		1.5/1.5	0 1 2	0.2		Brown/gray silty LOAM; with sand; moist; soft	
	23							
30	24		1.5/1.5	0 2 2	0.5 1.2			520.0
	25							
	26		1.5/1.5	0 1 1	0.2			
	27							
35	28		1.5/1.5	0 0 2	0.5			
	29							
	30		1.5/1.5	1 1 1	0.8		Gray SILT; very moist; soft	515.0
	31							
40							End of Boring = 39.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130310.33
Easting: 2455947.06

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-7CCR
Well No: B-7CCR
Surf Elev.: 552.18

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.2
0	1						Fly ash, bottom ASH and cinder (fill); moist to wet; soft	
	2		1.0/1.5	3 2 2	0.25			550.0
	3							
5	4		1.0/1.5	0 1 1	<0.25		Bottom ASH; moist; loose	
	5						Fly ASH; wet; soft	
	6		0.6/1.5	0 0 0	<0.25			545.0
	7							
10	8		1.1/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 0	<0.25			540.0
	11							
15	12		1.3/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130109.51
Easting: 2456566.64

Weather: Haze, 79 F

Boring Information:
Boring No: B-8L
Well No: B-8L
Surf Elev.: 530.62

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	530.6
0	1						Brown silty LOAM; dry; hard	
	2		0.8/1.5	4 6 7	>4.5			
	3							
5	4		0.2/1.5	4 3 4			Brown silty CLAY; moist; stiff	525.0
	5							
	6		1.1/1.5	1 1 1	0.1		Wet; soft	
	7							
10	8		1.5/1.5	1 1 1			20 mm VST@9.5' = 5.4, 3.4, 3.8	
	9				0.0-0.1		Wet; very soft	520.0
	10		1.6/2.0				Some mottling; wet; soft	
	11				0.5			
15	12		1.4/1.5	1 1 1	0.5		Brown sandy LOAM; wet; soft	515.0
	13						Gray sandy LOAM; wet; soft	
	14		1.1/1.5	0 1 3			Gray SAND; loose; trace clay	
	15							
20	16		1.4/1.5	0 0 1				
	17				0.2		Gray SILT; wet; soft	510.0
	18		1.5/1.5	0 0 0			20 mm VST@ 22.0' = 6.8, 3.4, 3.8	
	19				0.1		Gray sandy LOAM; wet; soft	
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130083.21
Easting: 2456391.16

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-8U
Well No: B-8U
Surf Elev.: 551.74

Depth Information:
Total: 33.5'
Auger: 33.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	551.7
0	1						Dark gray to brown silty CLAY; moist; moderatyely firm; some organic fragments; some bottom ash	
	2		0.8/1.5	1 2 2	1.0			550.0
	3							
5	4		0.9/1.5	3 5 5	4.0			
	5							
	6		1.0/1.5	3 5 6	4.5			545.0
	7							
10	8		1.8/2.0				16 mm VST@ 9.5' = 10.0, 3.8, 3.9	
	9				0.75			
	10		1.1/1.5	2 2 5	1.5		Color grades to light brown; more clayey; some dark yellow brown mottling; some iron oxide modules	540.0
	11							
15	12		0.8/1.5	2 3 5	1.5		Black/dark brown silty CLAY; moist; stiff; trace coal fragments	
	13							
	14		0.9/1.5	2 4 7	3.0			535.0
	15							
20	16		1.7/2.0				16 mm VST@ 19.5' = 11.2, 4.0, 3.8	
	17				2.25			
	18		1.0/1.5	3 6 7	2.5		Trace organic fragments	530.0
	19							
25	20		1.3/1.5	1 1 3	0.5		16 mm VST@ 24.5' = 5.8, 3.2, 3.0 More silty; some organics	
	21							
	22		1.5/1.5	1 1 2	0.5		Dark gray clayey SILT; moist to wet; moderately soft; some organics	525.0
	23							
30	24		1.3/1.5	1 1 2	0.75			
	25							520.0
	26		1.5/1.5	0 1 1	0.5			
							End of Boring = 33.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129778.29
Easting: 2456635.89

Weather: Haze, 79 F

Boring Information:
Boring No: B-9L
Well No: B-9L
Surf Elev.: 524.07

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	524.1
0	1						Brown silty LOAM; moist; soft	
	2		1.4/1.5	1 2 2	1.0 0.5			
	3							520.0
5	4		1.5/1.5	1 1 1	1.0			
	5				0.1			
	6		2.0/2.0				Brown SAND; medium grained; moist; soft	
	7							515.0
10	8		1.0/1.5	0 0 1	0.1		Brown sandy CLAY; wet; soft; gray at 10.5'	
	9						Gray silty CLAY; wet; soft	
	10		0.9/1.5	0 1 2	0.5			
	11							510.0
15	12		1.5/1.5	0 0 1	0.5 0.2			
	13							
	14		1.5/1.5	0 0 0	0.3			
	15						16 mm VST@19.5' = 5.4, 2.9, 3.1	505.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129690.26
Easting: 2456402.29

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-9U
Well No: B-9U
Surf Elev.: 552.15

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.2
0	1						Dark brown/gray silty CLAY; moist; stiff	
	2		0.7/1.5	3 7 7	4.0			550.0
	3							
5	4		1.0/1.5	3 4 6	3.75			
	5							
	6		0.5/1.5	3 3 6	2.25		More clayey; trace bottom ash fragments	545.0
	7							
10	8		1.7/2.0				Yellow brown silty CLAY; moist; stiff; laminated; trace iron nodules; 16 mm VST@ 9.5' = 7.5, 4.1, 3.5	
	9				1.0			540.0
	10		0.8/1.5	2 4 5	2.75		Black silty CLAY; few cinders (bottom ash); moist; stiff	
	11							
15	12		0.8/1.5	3 5 8	3.0			
	13							
	14		0.7/1.5	2 4 6	2.5			535.0
	15							
20	16		1.9/2.0				16 mm VST@ 19.5' = 11.3, 6.0, 5.6	
	17				3.25			
	18		0.8/1.5	2 5 7	2.25		Trace organic fragments; trace coal fragments	530.0
	19							
25	20		0.9/1.5	1 4 5	2.25		16 mm VST@ 24.5' = 7.0, 3.8, 3.5	
	21		1.1/2.0	2 5 6 7	2.5 0.75		Light brown silty clay to CLAY; moist; stiff; some iron oxidized nodules; trace organic fragments; rootlets; more clayey at 26.5'	525.0
	22		1.2/2.0	3 4 5 6	0.75		Gray CLAY	
30	23		1.5/2.0	1 2 4 5	1.0		Some dark yellow brown mottling; some iron oxidized nodules	
	24		1.6/2.0	0 1 2 3	0.5		Black to dark gray clayey SILT; moist; soft; trace organic fragments	520.0
35	25		1.7/2.0	0 2 3 4	0.5			
	26		2.0/2.0	0 1 3 3	1.0		Dark gray clayey SILT; moist; moderately stiff; with organic fragments; some coal; glauconite the last 0.3'	515.0
	27		2.0/2.0	0 1 2 4	0.75		Dark gray clayey SAND; moist; moderately stiff; trace coal fragments	
40							Dark gray sandy CLAY; moist; moderately stiff; trace coal fragments	
							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129680.19
Easting: 2456242.16
Weather: Sunny, 69 F

Boring Information:
Boring No: B-9CCR
Well No: B-9CCR
Surf Elev.: 553.97

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.0
0	1						Bottom ASH; moist	
	2		0.3/1.5	1 6 4				
	3							550.0
5	4		1.5/1.5	0 1 0	<0.25		Fly ASH; wet; soft	
	5							
	6		1.5/1.5	0 0 0	<0.25			
	7							545.0
10	8		1.5/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 1	<0.25			
	11							540.0
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			
	15							535.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129518.55
Easting: 2455869.56

Weather: Sunny, 65 F

Boring Information:
Boring No: B-10CCR
Well No: B-10CCR
Surf Elev.: 555.35

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.4
0	1						Bottom ASH; moist to wet; loose	
	2		0.8/1.5	4 5 3				
	3							
5	4		0.8/1.5	2 7 12			Moist; loose	550.0
	5							
	6		1.3/1.5	1 2 1	<0.25		Fly ASH; moist to wet; soft; some bottom ash	
	7							
10	8		1.4/1.5	1 0 1	<0.25		Trace bottom ash	545.0
	9							
	10		1.3/1.5	0 0 0	<0.25		Wet; soft	
	11							
15	12		1.1/1.5	4 1 2			Bottom ASH; wet; loose	540.0
	13							
	14		0.9/1.5	0 0 0	<0.25		Fly ASH; wet; soft	
	15							
20	16		1.5/1.5	0 0 0	<0.25			535.0
	17							
	18		1.5/1.5	0 0 0	<0.25			
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128891.26
Easting: 2456234.99

Weather: Sunny, 69 F

Boring Information:
Boring No: B-11U
Well No: B-11U
Surf Elev.: 552.27

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.3
0	1						Black silty CLAY; with sand and gravel; moist; moderately stiff	
	2		0.3/1.5	1 3 10/3"				550.0
	3							
5	4		0.4/1.5	1 1 2	1.25		Yellow brown silty CLAY; some dark yellow mottling; some iron oxide nodules; moist; moderately stiff	
	5							
	6		0.8/1.5	1 2 3	2.5			545.0
	7							
10	8		2.0/2.0				16 mm VST@ 9.5' = 9.2, 2.8, 2.8	
	9				2.0			
	10		1.2/1.5	2 4 5				540.0
	11				3.5		Gray	
15	12		0.9/1.5	4 7 7	2.25		Organic fragments	
	13						Dark gray clayey SILT; moist; moderately firm; some organic fragments	
	14		1.3/1.5	1 4 6	2.0			535.0
	15							
20	16		1.8/2.0				Dark gray brown silty CLAY; moist; stiff; 16 mm VST@19.5' = 13+, 7.4, 7.6	
	17				2.5			
	18		1.5/1.5	0 3 4	1.25		Yellow brown silty CLAY; some dark yellow brown mottling; iron oxide and manganese oxide concretions; moist; moderately stiff	530.0
	19						16 mm VST@ 24.5' = 4.9, 3.1, 3.1	
25	20		1.5/1.5	0 0 0	<0.25		Yellow brown clayey silt to SILT; wet; soft	
	21							
	22		1.5/1.5	0 0 0				525.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128541.37
Easting: 2455514.61

Weather: Sunny, 87 F

Boring Information:
Boring No: B-12L
Well No: B-12L
Surf Elev.: 533.69

Depth Information:
Total: 23.0'
Auger: 23.0'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.7
0	1						Brown silty CLAY; dry; very stiff	
	2		0.4/1.5	4 8 7	4.0			530.0
	3							
5	4		0.6/1.5	2 5 5	4.0			
	5							
	6		1.2/1.5	2 2 3	0.7		Brown silty CLAY; moist; soft	
	7							525.0
10	8		1.2/1.5	1 2 3	1.0		20 mm VST@ 10.0' = 3.8, 3.9	
	9							
	10		1.4/1.5	1 2 3	1.2		Moist; stiff	
	11							520.0
15	12		2.0/2.0		4.5		Gray/brown silty CLAY; mottling; stiff	
	13							
	14		1.5/1.5	1 2 4	0.5		Gray SILT; soft	
	15							515.0
20	16		1.0/1.5	0 6 7			Brown SAND; saturated; 20 mm VST@ 19.5' = 3.8, 1.5, 1.4	
	17						Gray sandy CLAY; moist	
	18		1.4/1.5	5 25 50/4.5	>4.5		Gray SHALE; dry; hard	
25							End of Boring = 23.5 Feet	510.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128504.92
Easting: 2455639.11

Weather: Sunny, 74 F

Boring Information:
Boring No: B-12U
Well No: B-12U
Surf Elev.: 553.41

Depth Information:
Total: 8.5'
Auger: 8.5'
Core: -

Dates:
Start: 10/23/2023
Finish: 10/23/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.4
0	1						Dark yellow brown silty CLAY; some bottom ash; moist; stiff; some organic fragments; trace iron oxide nodules	
	2		0.3/1.5	5 5 6	3.25			550.0
	3							
5	4		1.0/1.5	3 4 5	4.0			
	5							
	6		0.7/1.5	3 3 3	1.5			545.0
	7							
10	8		1.5/2.0		1.5		16 mm VST@ 9.5' = 10.8, 5.0, 4.3	
	9							
	10		0.8/1.5	2 5 9	3.5			540.0
	11							
15	12		0.9/1.5	2 5 7	3.25		Light gray silty cLAY; with bottom ash; moist; stiff	
	13							
	14		1.0/1.5	1 4 8	4.0			535.0
	15							
20	16		1.7/2.0				Yellow brown silty CLAY; moist; moderately stiff; few manganese oxide nodules; 16 mm VST@ 19.5' = 13+, 6.0, 6.0	
	17				2.5			
	18		1.4/1.5	1 2 3	1.5			530.0
	19							
25	20		1.5/1.5	1 2 4	0.75		16 mm VST@ 24.5' = 9.5, 4.0, 3.7	
	21							
	22		1.5/1.5	2 2 3	0.75			525.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13BN
Well No: B-13BN
Surf Elev.: 553.19

Depth Information:
Total: 10.5'
Auger: 10.5'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Light brown clayey silt to silty CLAY; moist; firm; few dark yellow brown mottling; trace iron oxide nodules	
	2		1.0/1.5	3 5 6	4.25			
	3							
5	4		0.7/1.5	4 4 7	3.75			-5.0
	5							
	6		1.0/1.5	5 8 11	4.75+		Brown silty CLAY; moist; very firm; trace iron oxide nodules 16 mm VST@ 8.0' = 13+, 6.7, 6.5	
	7		1.7/2.0					
10					3.5		End of Boring = 10.5 Feet	-10.0
15								-15.0
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13BS
Well No: B-13BS
Surf Elev.: 552.00

Depth Information:
Total: 10.5'
Auger: 10.5'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Dark brown clayey silt to silty CLAY; moist; very firm; trace iron oxide nodules; trace rootlets	
	2		1.0/1.5	4 4 5	4.5+			
	3							
5	4		0.5/1.5	4 5 6	4.5			-5.0
	5							
	6		1.1/1.5	3 7 9	4.5+		Grades to dark gray; trace organics; trace rootlets; 16 mm VST@8.5' = 13+, 6.5, 5.8	
	7		1.5/2.0					
10					3.5			-10.0
							End of Boring = 10.5 Feet	
15								-15.0
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Cloudy, 72 F

Boring Information:
Boring No: B-13L
Well No: B-13L
Surf Elev.: 547.96

Depth Information:
Total: 16.0'
Auger: 16.0'
Core: -

Dates:
Start: 10/24/2023
Finish: 10/24/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Dark brown clayey silt to silty CLAY; moist; very firm	
	2		1.0/1.5	4 5 6	4.5+			
	3							
5	4		1.0/1.5	4 5 7	4.5			-5.0
	5							
	6		1.4/1.5	3 7 10	3.75		Some rootlets; some manganese oxide nodules	
	7							
10	8		1.5/1.5	4 6 10	3.5		Trace rootlets; some manganese oxide nodules	-10.0
	9							
	10		1.5/1.5	3 6 8	2.5		Trace rootlets; some iron oxide nodules	
	11							
15	12		1.3/1.5	4 4 7	2.25		Light gray silty CLAY; moist; firm; some organics; some iron staining; few iron oxide nodules	-15.0
							End of Boring = 16 Feet	
20								-20.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 0
Easting: 0

Weather: Sunny, 74 F

Boring Information:
Boring No: B-13LF
Well No: B-13LF
Surf Elev.: 564.08

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/23/2023
Finish: 10/23/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	0.0
0	1						Yellow brown clayey SILT; dry; stiff	
	2		0.2/1.5	5 7 5				
	3							
5	4		0.8/1.5	4 5 6	3.75		Light gray silty CLAY; moist; stiff	-5.0
	5							
	6		0.5/1.5	5 50/4"			GYPSUM; dry; loose	
	7							
10	8		0.3/1.5	27 0/3.5				-10.0
	9							
	10		0.8/1.5	35 50/5"				
	11							
15	12		0.7/1.5	37 50/4"				-15.0
	13							
	14		0.4/1.5	0/4.5				
	15							
20	16		1.2/1.5	13 34 50/3"	3.75		Dark yellow brown silty CLAY; moist; firm	-20.0
	17						GYPSUM	
	18		0.6/1.5	50/5"				
	19							
25	20		0.4/1.5	50/5"				-25.0
							End of Boring = 26 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128150.33
Easting: 2455538.81

Weather: Sunny 66 F

Boring Information:
Boring No: B1
Well No: T1
Surf Elev.: 535.33

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 05/01/2024
Finish: 05/01/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	535.3
0							Dark brown silty CLAY (topsoil); Sample CS1A	
	1		4.0/5		0.25		Dark brown silty CLAY; moist	
5								530.0
	2		5.0/5		0.25		Sample CS2 7.0-7.5'; saturated 7.5'	
10							Free water 9.5'	
							Light brown silty CLAY; gray mottling; Sample CS3A 11.0-11.3'	525.0
	3		5.0/5		2.0		Sample CS3B 13.0-13.5'	
					2.75			
15					1.75		Sample CS4A 15.5-16.0'	520.0
	4		3.0/4.5		0.5		Brown SAND and GRAVEL; fine to coarse grained; silty clay matrix	
							Gray SANDSTONE; weathered	
							Greenish gray SANDSTONE; fine grained	
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128803.76
Easting: 2455006.85

Weather: Sunny 66 F

Boring Information:
Boring No: B2
Well No: T2
Surf Elev.: 547.22

Depth Information:
Total: 35.0'
Auger: 35.0'
Core: -

Dates:
Start: 05/01/2024
Finish: 05/01/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	547.2
0							Dark brown silty CLAY (topsoil); Sample CS1A 0-0.5	
							Brown silty CLAY; moist; Sample CS1B 2.5-3.0	
	1		4.3/5		3.0 3.0			545.0
5							Brown clayey SILT; greenish gray mottling; moist	
	2		4.0/5					540.0
					2.25		Sample CS2A 8.0-8.5'	
10							Sample CS3A 11.0-11.5	
							Dark brown CONCRETIONS; Sample CS3B 12.1-12.3'	535.0
	3		5.0/5				Brown silty CLAY; Sample CS3C	
					1.5			
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B2 Boring No: B2 Well No: T2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Sample CS4	
	4		5.0/5		4.75			530.0
20	5		2.0/2					
							Gray clayey SILT; brown mottling; moist; trace black organics	525.0
	6		3.0/3		3.25		Sample CS6A 23-23.5'	
25							Increasing black organics; Sample CS7A 25.5-26	
					1.25			
							Gray silty CLAY; brown mottling; moist; trace organics	520.0
	7		5.0/5		1.75		Sample CS7B 27.0-28.0'	
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B2 Boring No: B2 Well No: T2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Sample CS8A	
							Gray to brownish gray SHALE; weathered; wet; Sample CS8B	515.0
	8		5.0/5				Gray SHALE; Sample CS8C 32.25-33.0'	
35							End of Boring = 35 Feet	
								510.0
40								
								505.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130726.70
Easting: 2455622.14

Weather: Cloudy 50 F

Boring Information:
Boring No: B4
Well No: T4
Surf Elev.: 546.56

Depth Information:
Total: 35.0'
Auger: 35.0'
Core: -

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

Dates:
Start: 04/26/2024
Finish: 04/26/2024

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	546.6
0							Brown silty CLAY; moist; organics	
	1		4.7/5		0.5			545.0
5							Brown clayey SILT; moist; trace organics; becoming more dense with depth	
	2		5.0/5		3.5 >5			540.0
10								
	3		5.0/5		0.5		Black organics; Sample CS3A	535.0
					0.25		Brown silty CLAY; Sample CS3B	
15								

Notes:

Andrews Engineering, Inc.
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Springfield, IL 62711

FIELD BORING LOG

Boring Information: B4 Boring No: B4 Well No: T4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Brown clayey SILT; moist	
					0.25			530.0
	4		3.6/5				Brown silty CLAY; moist; medium to fine coarse gravel	
					0.5			
							Gray SHALE; weathered	
							Gray SHALE; weathered; moist	
20								
								525.0
	5		3.6/5					
25							End of Boring = 25 Feet	
								520.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130996.32
Easting: 2455852.04

Weather: Sunny 43 F

Boring Information:
Boring No: B5
Well No: T5
Surf Elev.: 538.15

Depth Information:
Total: 20.0'
Auger: 20.0'
Core: -

Dates:
Start: 04/25/2024
Finish: 04/25/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	538.2
0							Brown SILT; moist	
					0.25			
							Dark brown silty CLAY; moist	
	1		4.6/5		2.0			535.0
							Dark brown silty CLAY; brown/tan mottling; moist	
					2.25		Olive green to brown silty CLAY; mottling; moist	
5								
	2		4.8/5		2.25		8.0' Free water	530.0
10							Brown SAND; fine grained; with silt; saturated	
							Olive green clayey SILT; brown mottling	
					>5.0			
	3		3.8/5				Gray SHALE; weathered	525.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B5 Boring No: B5 Well No: T5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	4		1.6/5				Black SHALE; saturated	520.0
20							End of Boring = 20 Feet	515.0
25								510.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1131175.15
Easting: 2456259.47

Weather: Sunny 43 F

Boring Information:
Boring No: B6
Well No: T6
Surf Elev.: 535.96

Depth Information:
Total: 42.2'
Auger: 42.2'
Core: -

Dates:
Start: 04/25/2024
Finish: 04/25/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	536.0
0							Dark brown silty CLAY (topsoil)	
					1.5			535.0
	1		4.1/5				Greenish brown silty CLAY; moist; trace organics	
5								
	2		4.2/5		2.0		Greenish brown silty CLAY; gray mottling; trace organics	530.0
10								
	3		5.0/5		4.5		Gray/brown clayey SILT; greenish mottling; moist	525.0
							14.0' Wet	
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B6 Boring No: B6 Well No: T6

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray silty CLAY; trace brown mottling; organics	520.0
	4		5.0/5		1.75		18.0' Saturated	
20							Gray CLAY; saturated; soft	
					0.25			515.0
	5		5.0/5				Dark gray SILT; saturated	
25							Dark gray silty CLAY; saturated; small gravel	
								510.0
	6		4.7/5					
					0.5			
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B6 Boring No: B6 Well No: T6

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Dark gray SILT; saturated; trace white clasts	505.0
	7		5.0/5		0.5			
35					0.5			500.0
	8		3.5/5				Gray SILT to silty SAND; fine to coarse grained	
40	9		1.5/5				Gray SHALE (bedrock)	495.0
							End of Boring = 42.2 Feet	
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: T1

Site Name: CWLP Borehole #: B1

Coordinates: X 1128150.33 Y 2455538.81 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: Lisa Mauntel

Date Well Started: 05/01/2024 Date Well Finished: 05/01/2024 Date Form Completed: 06/06/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite chips

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

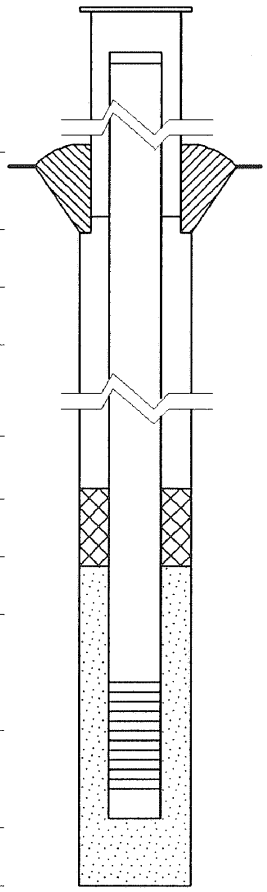
Type of sand pack: Quartz sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
536.10	-2.45	Top of Protective Casing
535.65	-2.00	Top of Riser Pipe
533.65	0	Ground Surface
531.83	3.50	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
529.83	5.50	Top of Seal
527.29	8.04	Top of Sandpack
525.77	9.56	Top of Screen
516.27	19.06	Bottom of Screen
515.83	19.50	Bottom of Well
515.83	19.50	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	5.00
Riser Pipe Length (ft)	9.88
Bottom of Screen to End Cap (ft)	0.44
Screen Length [1st slot to last slot] (ft)	9.50
Total Length of Casing (ft)	19.82
Screen Slot Size*	#10 (0.01')

*Hand-slotted well screens are unacceptable.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: T2

Site Name: CWLP Borehole #: B2

Coordinates: X 1128803.76 Y 2455006.85 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: Lisa Mauntel

Date Well Started: 05/01/2024 Date Well Finished: 05/01/2024 Date Form Completed: 06/06/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

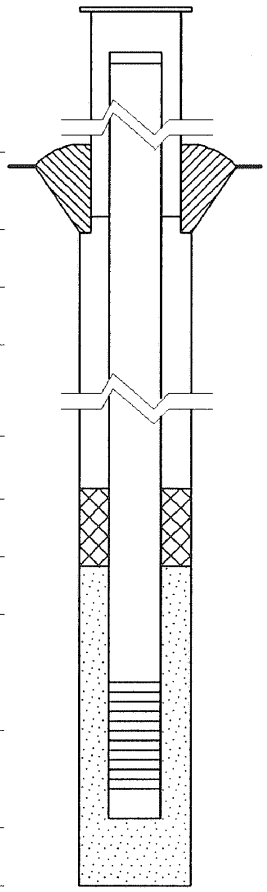
Type of sand pack: Quartz sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
549.86	-2.64	Top of Protective Casing
549.62	-2.4	Top of Riser Pipe
547.22	0	Ground Surface
544.22	3.00	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
526.12	21.10	Top of Seal
524.02	23.20	Top of Sandpack
522.46	24.76	Top of Screen
512.96	34.26	Bottom of Screen
512.22	35.00	Bottom of Well
512.22	35.00	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	5.00
Riser Pipe Length (ft)	27.16
Bottom of Screen to End Cap (ft)	0.44
Screen Length [1st slot to last slot] (ft)	9.50
Total Length of Casing (ft)	37.40
Screen Slot Size*	#10 (0.01')

*Hand-slotted well screens are unacceptable.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: T4

Site Name: CWLP Borehole #: B4

Coordinates: X 1130726.70 Y 2455622.14 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: Lisa Mauntel

Date Well Started: 04/26/2024 Date Well Finished: 04/26/2024 Date Form Completed: 06/06/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

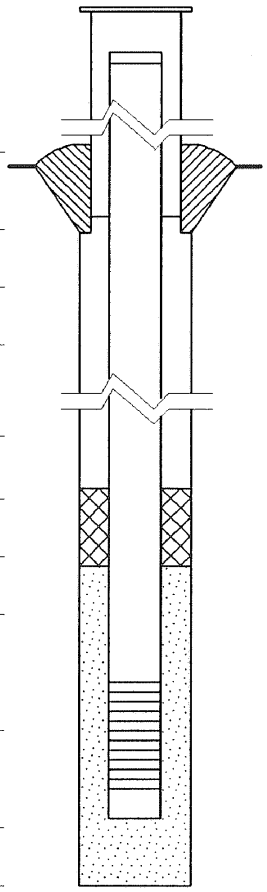
Type of sand pack: Quartz sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
549.43	-2.87	Top of Protective Casing
548.94	-2.38	Top of Riser Pipe
546.56	0	Ground Surface
543.56	3.00	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
534.76	11.80	Top of Seal
532.66	13.90	Top of Sandpack
531.43	15.13	Top of Screen
521.94	24.62	Bottom of Screen
521.56	25.00	Bottom of Well
521.56	25.00	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	5.00
Riser Pipe Length (ft)	17.51
Bottom of Screen to End Cap (ft)	0.44
Screen Length [1st slot to last slot] (ft)	9.49
Total Length of Casing (ft)	27.38
Screen Slot Size*	#10 (0.01')

*Hand-slotted well screens are unacceptable.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: T5

Site Name: CWLP Borehole #: B5

Coordinates: X 1130996.32 Y 2455852.04 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: Lisa Mauntel

Date Well Started: 04/25/2024 Date Well Finished: 04/25/2024 Date Form Completed: 06/06/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

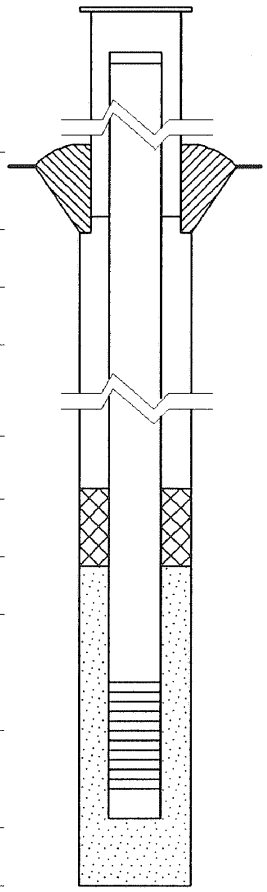
Type of sand pack: Quartz sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
541.00	-2.85	Top of Protective Casing
540.66	-2.51	Top of Riser Pipe
538.15	0	Ground Surface
535.15	3.00	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
531.55	6.60	Top of Seal
529.35	8.80	Top of Sandpack
528.22	9.93	Top of Screen
518.72	19.43	Bottom of Screen
518.29	19.86	Bottom of Well
518.29	19.86	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	5.00
Riser Pipe Length (ft)	12.44
Bottom of Screen to End Cap (ft)	0.43
Screen Length [1st slot to last slot] (ft)	9.50
Total Length of Casing (ft)	22.37
Screen Slot Size*	#10 (0.01')

*Hand-slotted well screens are unacceptable.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: T6

Site Name: CWLP Borehole #: B6

Coordinates: X 1131175.15 Y 2456259.47 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: Lisa Mauntel

Date Well Started: 04/25/2024 Date Well Finished: 04/25/2024 Date Form Completed: 06/06/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

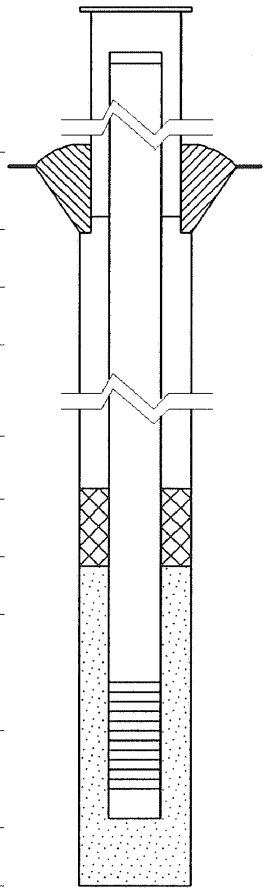
Type of sand pack: Quartz sand

Grain size: 20/40 (sieve size)

Installation method: Free drop

Type of backfill material: n/a (if applicable)

Installation method: n/a



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	538.32	-2.36
Ground Surface	535.96	0
Top of Annular Sealant	532.96	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	507.96	28.00
Top of Sandpack	505.76	30.20
Top of Screen	503.92	32.04
Bottom of Screen	494.20	41.76
Bottom of Well	493.85	42.11
Bottom of Borehole	493.85	42.11

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	Anodized Aluminum
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.25
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	5.00
Riser Pipe Length (ft)	32.85
Bottom of Screen to End Cap (ft)	0.35
Screen Length [1st slot to last slot] (ft)	9.72
Total Length of Casing (ft)	42.92
Screen Slot Size*	#10 (0.01')

*Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127471.67
Easting: 2456542.99

Weather: Sunny 72 F

Boring Information:
Boring No: L1
Well No: L1
Surf Elev.: 568.96

Depth Information:
Total: 38.0'
Auger: 38.0'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	569.0
0							Light gray SLUDGE (fill)	
	1							
	2		0.8/2	3 3 3 4				565.0
5	3							
	4		1.4/2	WOH				560.0
10	5							
								555.0
15				1				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.4/2	1 2 1 3			Light gray SLUDGE (fill)	
	7							550.0
20	8		1.5/2	4 4 3 5			20.0' Water sample collected	
	9							545.0
25	10		1.6/2	2 3 4 5				
	11							540.0
30				WH				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		1.1/2	WH 1 1 2				
	13							535.0
35	14		1.5/1.5	5 6 8	0.75		Olive green silty CLAY; dark brown mottling; saturated	
	15		2.0/2					
							End of Boring = 38 Feet	530.0
40								
								525.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: L1

Site Name: CWLP Borehole #: L1

Coordinates: X 1127471.56 Y 2456542.96 (or) Latitude: ___ ° ___ ' ___ " Longitude: ___ ° ___ ' ___ "

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 05/02/2024 Date Well Finished: 05/02/2024 Date Form Completed: 05/02/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

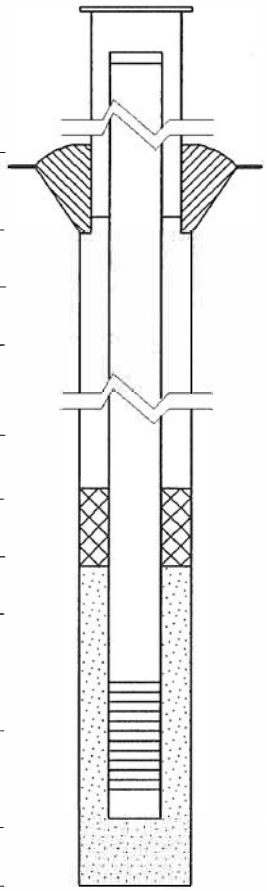
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	572.31	-3.35
Ground Surface	568.96	0
Top of Annular Sealant	565.96	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	543.86	25.1
Top of Sandpack	541.21	27.75
Top of Screen	539.69	29.27
Bottom of Screen	534.94	34.02
Bottom of Well	534.46	34.5
Bottom of Borehole	530.96	38

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	32.62
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	37.85
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128216.45
Easting: 2456765.72

Weather: Sunny 72 F

Boring Information:
Boring No: L3
Well No: L3
Surf Elev.: 563.02

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	563.0
0							Dark gray ASH (fill)	
	1							
								560.0
5	2		0.22	WH WH 1 1				
	3							555.0
							9.5' Free water	
10	4		2.0/2	WH				
	5							550.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WH				
	7							545.0
20	8		1.6/2	1 1 1 1			20.0' Water sample collected; saturated	
	9							540.0
25	10		1.6/2	1 1 1 1				
	11							535.0
30	12		0.8/1	WH				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12			WH				
	13							
	14		1.5/1.5	WH 3 4 6			Brown silty CLAY; greenish gray mottling	530.0
35	15		1.8/2		0.75			
							End of Boring = 36.5 Feet	525.0
40								520.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: L3

Site Name: CWLP Borehole #: L3

Coordinates: X 1128216.93 Y 2456765.85 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 05/02/2024 Date Well Finished: 05/02/2024 Date Form Completed: 05/02/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

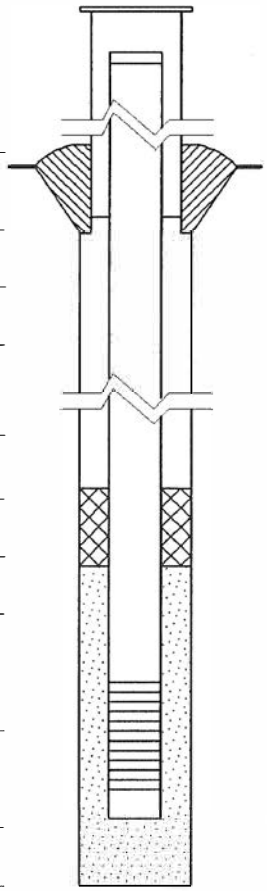
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	565.88	-2.86
Ground Surface	563.02	0
Top of Annular Sealant	560.02	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	539.52	23.5
Top of Sandpack	537.22	25.8
Top of Screen	535.75	27.27
Bottom of Screen	531.00	32.02
Bottom of Well	530.52	32.5
Bottom of Borehole	526.52	36.5

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	30.13
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	35.36
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127968.18
Easting: 2457141.08

Weather: Sunny 72 F

Boring Information:
Boring No: L4
Well No: L4
Surf Elev.: 568.58

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	568.6
0							Gray ASH (fill)	
	1							565.0
5	2							
	3							560.0
10	4							
	5							555.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L4 Boring No: L4 Well No: L4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray ASH (fill)	
	6		1.4/2	1 1 4 6	1.0		Brown silty CLAY; gray mottling; moist	
	7		1.5/2					550.0
20	8		1.5/2	6 8 10 12	4.75			
							End of Boring = 21 Feet	
								545.0
25								
								540.0
30								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: L4

Site Name: CWLP Borehole #: L4

Coordinates: X 1127968.18 Y 2457141.08 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 05/02/2024 Date Well Finished: 05/02/2024 Date Form Completed: 05/02/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

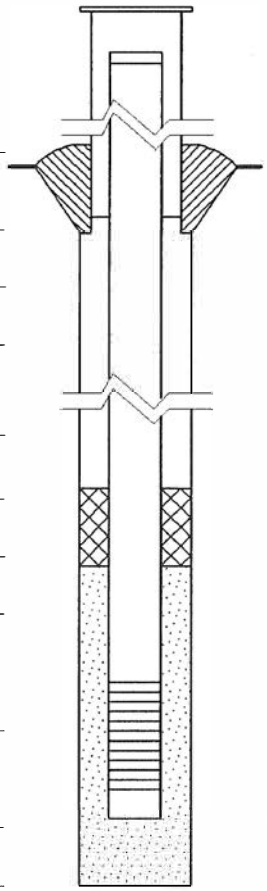
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
		Top of Protective Casing
568.58	-2.33	Top of Riser Pipe
566.25	0	Ground Surface
563.25	3.00	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
559.75	6.5	Top of Seal
557.55	8.7	Top of Sandpack
556.13	10.12	Top of Screen
551.38	14.87	Bottom of Screen
550.85	15.4	Bottom of Well
545.25	21	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	12.46
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	17.74
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128308.56
Easting: 2456118.23

Weather: Cloudy 61 F

Boring Information:
Boring No: L5
Well No: L5
Surf Elev.: 565.19

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 05/03/2024
Finish: 05/03/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	565.2
0	1						Gray silty CLAY (fill)	
5	2		1.5/2				Light gray LIME SLUDGE (fill)	560.0
	3							
10	4		2.0/2				Dark gray to black COAL ASH (fill)	555.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2				16.0' Free water	
	7							
20	8		2.0/2					545.0
	9							
25	10		2.0/2					540.0
	11		3.0/3					
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		3.0/3					
	13		2.0/2				Light gray LIME SLUDGE (fill); Sample CA 32.5-35.2'	
35	14		3.0/3		1.0		Brown silty CLAY; greenish gray mottling	530.0
	15		2.0/2					
40							End of Boring = 39.5 Feet	525.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: L5

Site Name: CWLP Borehole #: L5

Coordinates: X 1128308.68 Y 2456118.11 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 05/03/2024 Date Well Finished: 05/03/2024 Date Form Completed: 05/03/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

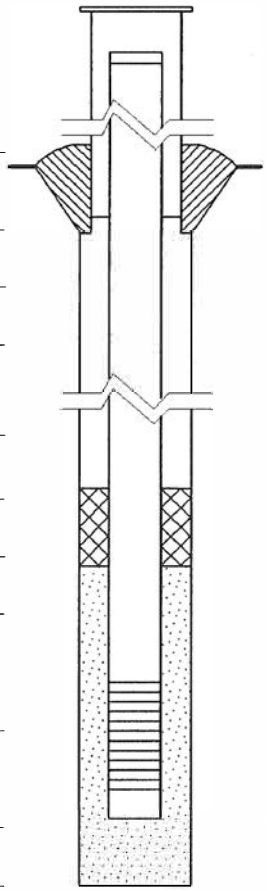
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	568.01	-2.82
Ground Surface	565.19	0
Top of Annular Sealant	562.19	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	541.49	23.7
Top of Sandpack	539.39	25.8
Top of Screen	535.09	30.1
Bottom of Screen	530.39	34.8
Bottom of Well	529.89	35.3
Bottom of Borehole	525.69	39.5

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	32.92
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	38.12
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129934.00
Easting: 2455460.00

Weather: Cloudy 59F

Boring Information:
Boring No: D1
Well No: D1
Surf Elev.: 564.0

Depth Information:
Total: 40.5'
Auger: 40.5'
Core: -

Dates:
Start: 04/29/2024
Finish: 04/29/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.0
0	1						Dark gray ASH (fill)	
								560.0
5	2		2.0/2	WH				
	3							
								555.0
10	4		1.5/2	3 21 23 24				
	5							
								550.0
15				W				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.3/2	W 1 3 W			Dark gray ASH (fill) Saturated	
	7							545.0
20	8		2.0/2	WOH				
	9							540.0
25	10		2.0/2	2 3 1 1			Groundwater sample at 25.0'	
	11							535.0
30				W				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2	W W 1 1				
	13							530.0
35	14		2.0/2	W W 1 1				
	15		2.0/2	W W 3 4				
	16		1.9/2		1.0		Dark gray clayey SILT	525.0
40							End of Boring = 40.5 Feet	
								520.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: D1

Site Name: CWLP Borehole #: D1

Coordinates: X 1129774.64 Y 2455460.38 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 04/29/2024 Date Well Finished: 04/29/2024 Date Form Completed: 04/29/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

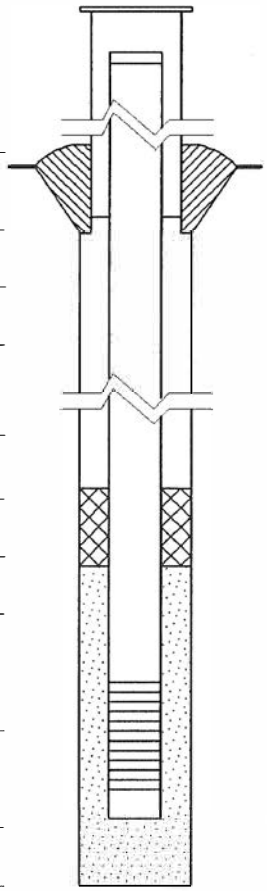
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	566.20	-2.18
Ground Surface	564.02	0
Top of Annular Sealant	561.02	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	533.72	30.3
Top of Sandpack	532.72	31.3
Top of Screen	530.75	33.27
Bottom of Screen	526.00	38.02
Bottom of Well	525.52	38.5
Bottom of Borehole	523.52	40.5

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	35.44
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	40.67
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130169.00
Easting: 2456076.00

Weather: Cloudy 59F

Boring Information:
Boring No: D2
Well No: D2
Surf Elev.: 558.0

Depth Information:
Total: 37.5'
Auger: 37.5'
Core: -

Dates:
Start: 04/29/2024
Finish: 04/29/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	558.0
0							Dark gray ASH (fill)	
	1							555.0
5	2		0.0/2	WOH				
	3							550.0
10	4		2.0/2	WOH				
	5							545.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Dark gray ASH (fill)	
	7							540.0
20	8		2.0/2	W W 1 1			Groundwater sample at 20.0'	
	9							535.0
25	10		2.0/2	WOH				
	11							530.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		0.0/2	WOH				
	13		0.0/2	WOH				525.0
	14		2.0/2	W W W 6				
35							Gray clayey SILT; brown mottling; saturated	
	15		1.5/2					
							End of Boring = 37.5 Feet	520.0
40								
								515.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: D2

Site Name: CWLP Borehole #: D2

Coordinates: X 1130279.34 Y 2456218.06 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 04/29/2024 Date Well Finished: 04/29/2024 Date Form Completed: 04/29/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

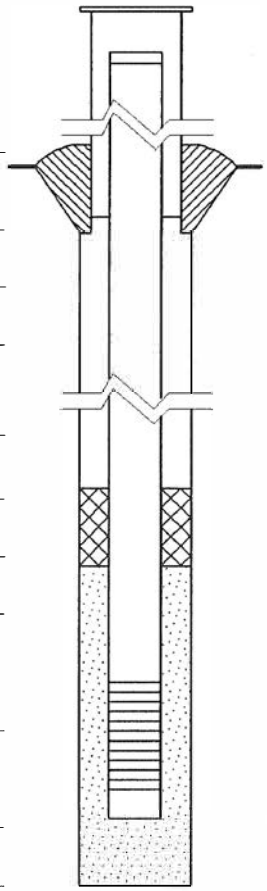
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	560.93	-2.93
Ground Surface	558.00	0
Top of Annular Sealant	555.00	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	531.20	26.8
Top of Sandpack	528.73	27.77
Top of Screen	523.98	29.27
Bottom of Screen	523.98	34.02
Bottom of Well	523.50	34.5
Bottom of Borehole	520.50	37.5

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	32.19
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	37.42
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129640.00
Easting: 2455918.00

Weather: Sunny 66F

Boring Information:
Boring No: D3
Well No: D3
Surf Elev.: 554.9

Depth Information:
Total: 31.5'
Auger: 31.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.9
0							Dark gray ASH (fill); wet	
	1							
5	2		2.0/2	2 2 2 3				550.0
	3							
10	4		2.0/2	WH				545.0
	5						Free water at 12.0'	
15								540.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		0.2/2	WH 1				
	7							
20	8		0.1/2	WH			Groundwater sample at 20.0'	535.0
	9							
25	10		0.3/2	WH				530.0
	11		2.0/2					
30					0.75		Brown silty CLAY; greenish gray mottling; Jar Sample SS6A	525.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					
							End of Boring = 31.5 Feet	
35								520.0
40								515.0
45								510.0

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: D3

Site Name: CWLP Borehole #: D3

Coordinates: X 1129517.94 Y 2455925.82 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 04/30/2024 Date Well Finished: 04/30/2024 Date Form Completed: 04/30/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

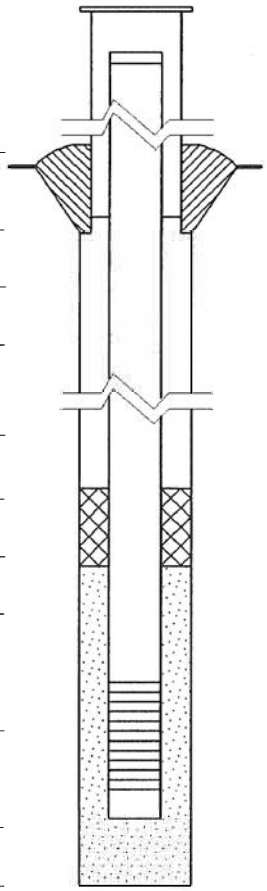
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



	ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)
Top of Protective Casing		
Top of Riser Pipe	557.90	-2.87
Ground Surface	555.03	0
Top of Annular Sealant	552.03	3.00
Static Water Level Measured on (after completion)		NA
Top of Seal	535.14	19.9
Top of Sandpack	533.18	21.85
Top of Screen	531.76	23.27
Bottom of Screen	527.01	28.02
Bottom of Well	526.53	28.5
Bottom of Borehole	523.53	31.5

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	26.13
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	31.36
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129248.00
Easting: 2455777.00

Weather: Sunny 66F

Boring Information:
Boring No: D4
Well No: D4
Surf Elev.: 561.00

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	561.0
0							Dark gray ASH (fill); dry	
	1							560.0
5	2		1.2/2	W 1 2 3				555.0
	3							
10	4		0.5/2	WOH			Moist	550.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Wet	
								545.0
	7							
							Free water at 19.5'; Groundwater sample at 20.0'	
20	8		2.0/2	WOH				
								540.0
	9							
							Saturated	
25	10		2.0/2	WOH				
								535.0
	11							
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					530.0
	13		3.0/3	WH 2 3 2 1 1	0.75		Brown silty CLAY; greenish gray mottling	
35	14		2.0/2					525.0
							End of Boring = 36.5 Feet	
40								520.0
45								

Notes:

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Springfield Well #: D4

Site Name: CWLP Borehole #: D4

Coordinates: X 1129061.39 Y 2455862.82 (or) Latitude: ___° ___' ___" Longitude: ___° ___' ___"

Surveyed by: Andrews Engineering, Inc. IL Registration #: _____

Drilling Contractor: Skinner Limited Consulting Firm: Andrews Engineering, Inc.

Driller: T. Skinner Geologist: S. Van Hook

Drilling Method: 4 1/4" HSA 5' CSD 3" Logged by: S. Van Hook

Drilling Fluids (type): NA Report Form Completed by: S. Van Hook

Date Well Started: 04/30/2024 Date Well Finished: 04/30/2024 Date Form Completed: 04/30/2024

ANNULAR SPACE DETAILS

Type of surface seal: Concrete

Type of annular sealant: Bentonite grout

Installation method: Free drop

Setting time: 24+ hours

Type of bentonite seal: Bentonite pellets

Installation method: Free drop

Setting time: 24+ hours

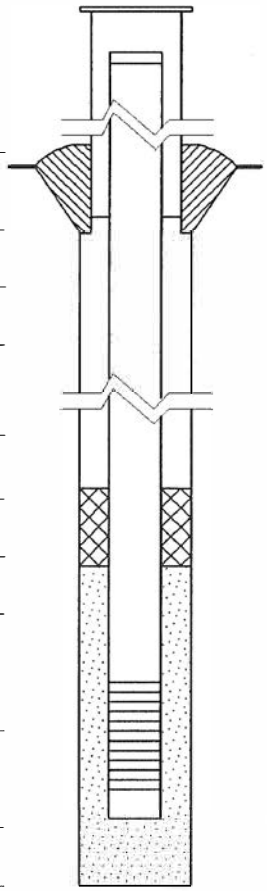
Type of sand pack: Quartz sand

Grain size: 10/20 (sieve size)

Installation method: Free drop

Type of backfill material: bentonite chips/pellets (if applicable)

Installation method: Free drop



ELEVATION (MSL)®	DEPTH (BGS)* (0.01 ft)	
		Top of Protective Casing
565.61	-3.81	Top of Riser Pipe
561.80	0	Ground Surface
558.80	3.00	Top of Annular Sealant
	NA	Static Water Level Measured on (after completion)
537.70	24.1	Top of Seal
536.55	25.25	Top of Sandpack
535.53	26.27	Top of Screen
530.78	31.02	Bottom of Screen
530.30	31.5	Bottom of Well
525.00	36.8	Bottom of Borehole

® Referenced to a National Geodetic Vertical Datum
* positive (+) values below GS, negitive (-) values above GS

WELL CONSTRUCTION MATERIALS

Protective Casing	NA
Riser Pipe Above W.T.	PVC
Riser Pipe Below W.T.	PVC
Screen	PVC

CASING MEASUREMENTS

Diameter of Borehole (in)	8.5
ID of Riser Pipe (in)	2.00
Protective Casing Length (ft)	NA
Riser Pipe Length (ft)	30.08
Bottom of Screen to End Cap (ft)	0.48
Screen Length (1st slot to last slot) (ft)	4.75
Total Length of Casing (ft)	35.31
Screen Slot Size¥	#10 (0.01')

¥ Hand-slotted well screens are unacceptable.

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130314.00
Easting: 2455461.00

Weather: Sunny 54F

Boring Information:
Boring No: B100
Well No: B100
Surf Elev.: 533.00

Depth Information:
Total: 106.00'
Auger: 106.00'
Core: -

Dates:
Start: 04/22/2024
Finish: 04/22/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.0
0					2.0		Dark brown silty CLAY (topsoil); organics Brownish green silty CLAY; mottling; moist	
	1		5.0/5					530.0
5								
	2		5.0/5		2.0		Saturated Silt seam	525.0
10							Trace organics	
	3		5.0/5				Sample CS3A	520.0
							Gray silty CLAY; saturated Sample CS3B	
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	4		4.2/5		0.5			515.0
20	5		4.6/5		1.0			510.0
25	6		5.0/5		1.5			505.0
							Gray silty SAND; very fine grained	
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray silty SAND; fine grained; saturated	
	7		5.0/5				Gray SHALE; weathered; trace black organics; fracture 35.1, 35.6, 35.7, 36.0, 36.1, 36.2, 36.6, 36.65, 36.85, 36.9, 37.15, 37.2, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.3, 38.9, 39.1, 39.65, 40.4, 40.75, 40.9, 41.3, 41.4, 41.5, 41.6, 41.7, 41.75, 41.8, 41.85, 41.95, 42.1, 42.2, 42.4, 42.5, 42.6, 42.7, 43.0, 43.2, 43.4, 44.7, 45.9, 45.1, 46.8, 47.2, 47.4, 47.9	500.0
35	8		1.0/1					
	9		5.0/5					495.0
40	10		5.0/5					490.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray CLAYSTONE; less fissle; fractured 48.0, 48.35, 49.5, 49.6	485.0
	11		5.0/5					
50								
								480.0
	12		5.0/5					
55								
								475.0
	13		5.0/5					
60								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Dark gray SHALE; fractured 61.4, 61.7, 61.8, 61.95, 62.0, 62.15, 62.2, 62.3, 62.35, 62.4 62.5, 62.7, 62.85, 63.6, 64.1, 64.2, 64.25, 64.3, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.15, 65.2, 65.3, 65.6, 65.8, 66.8, 67.1, 67.65, 67.9, 68.6, 68.7, 69.6, 69.85, 70.0, 70.1	470.0
	14		5.0/5					
65								
	15		5.0/5					465.0
70								
							Dark gray CLAYSTONE; trace mica; fractured 70.5	
							Fractured 72.3, 72.7, 74.3, 75.2, 76.2, 76.9	460.0
	16		5.0/5					
75								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Light gray SANDSTON bedding with CLAYSTONE; fine grained	
							Dark gray CLAYSTONE; fractured 77.8, 79-79.2	455.0
	17		5.0/5					
80								
								450.0
	18		5.0/5					
							Dark gray SHALE and CLAYSTONE	
85								
								445.0
	19		5.0/5					
90								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
								440.0
	20		5.0/5					
95								
							Sandstone lens	435.0
	21		5.0/5					
100								
							Light gray LIMESTONE; fossils (shells)	
							Dark gray limey SHALE; fossils (shells)	
								430.0
	22		5.0/5					
105								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray LIMESTONE	
							End of Boring = 106 Feet	
								425.0
110								
								420.0
115								
								415.0
120								

Notes:

GEOTECHNICS
Soil & Material Testing
A DIVISION OF KLINGNER
4510 Paris Gravel Road • Hannibal, MO 63401 • voice 573.221.7714 • fax 573.221.7762

February 27, 2024 23-1071

Andrews Engineering
101 East Walton
Warrenton, MO 63383

Attn: Mr. Karl Finke, P.E., R.G.

RE: Geotechnical Drilling Services: Andrews - Springfield Ash Ponds CPT Soundings

Dear Mr. Finke:

In accordance with your request, we have completed the geotechnical CPT Soundings for the Springfield Ash Ponds in Springfield, Illinois.

Scope of Services

The scope of our services for this phase of the project consisted of investigating the site's subsurface conditions by performing fourteen (14) CPT Soundings near the requested locations in Springfield, Illinois. The CPT Soundings were performed to depths of approximately 21½ to 47 feet below the existing ground surface. The locations of the soundings were determined by Andrews Engineering and staked in the field by Andrews. The scope of services consisted of exploratory CPT Soundings to help determine the subsurface material strengths and SPT N_{60} correlations in the vicinity of the proposed site.

Conclusions

The geotechnical investigation, including exploration and field testing has been completed for the exploratory geotechnical investigation CPT soundings for the Springfield Ash Pond project in Springfield, Illinois. These data are supplied for the benefit of the designers and owner and do not express or imply any warranty of the subsurface conditions. The scope of our services does not include environmental assessment of investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client. As always, if you have any questions do not hesitate to contact us.

Sincerely,

GEOTECHNICS, A DIVISION OF KLINGNER

Brian Joseph Sick

Brian Joseph Sick, P.E.
Geotechnical Services Department Manager

Encl. CPT Sounding Logs

Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	568.21	CPT-1CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1120729, Easting 2441681		MAS		u2

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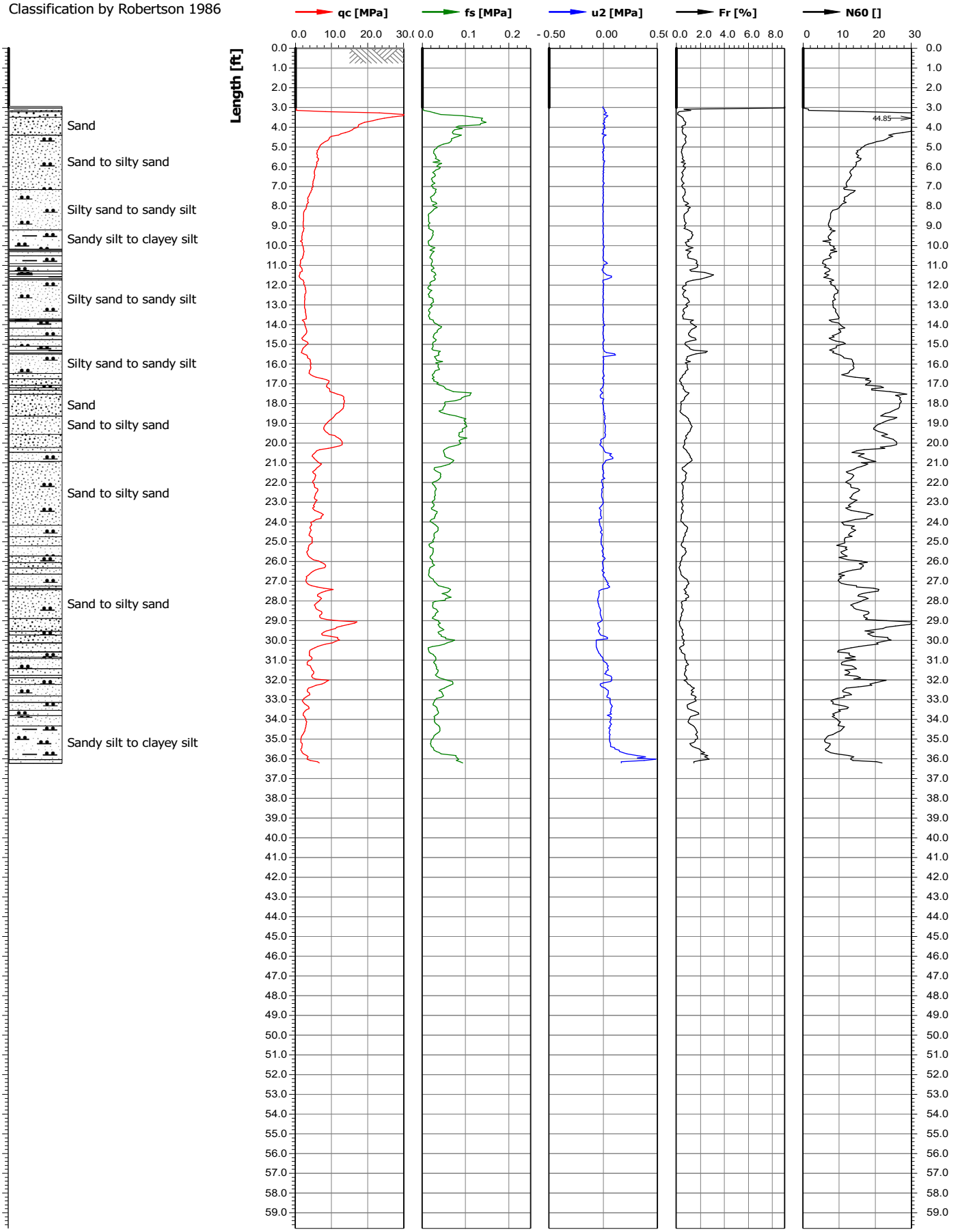
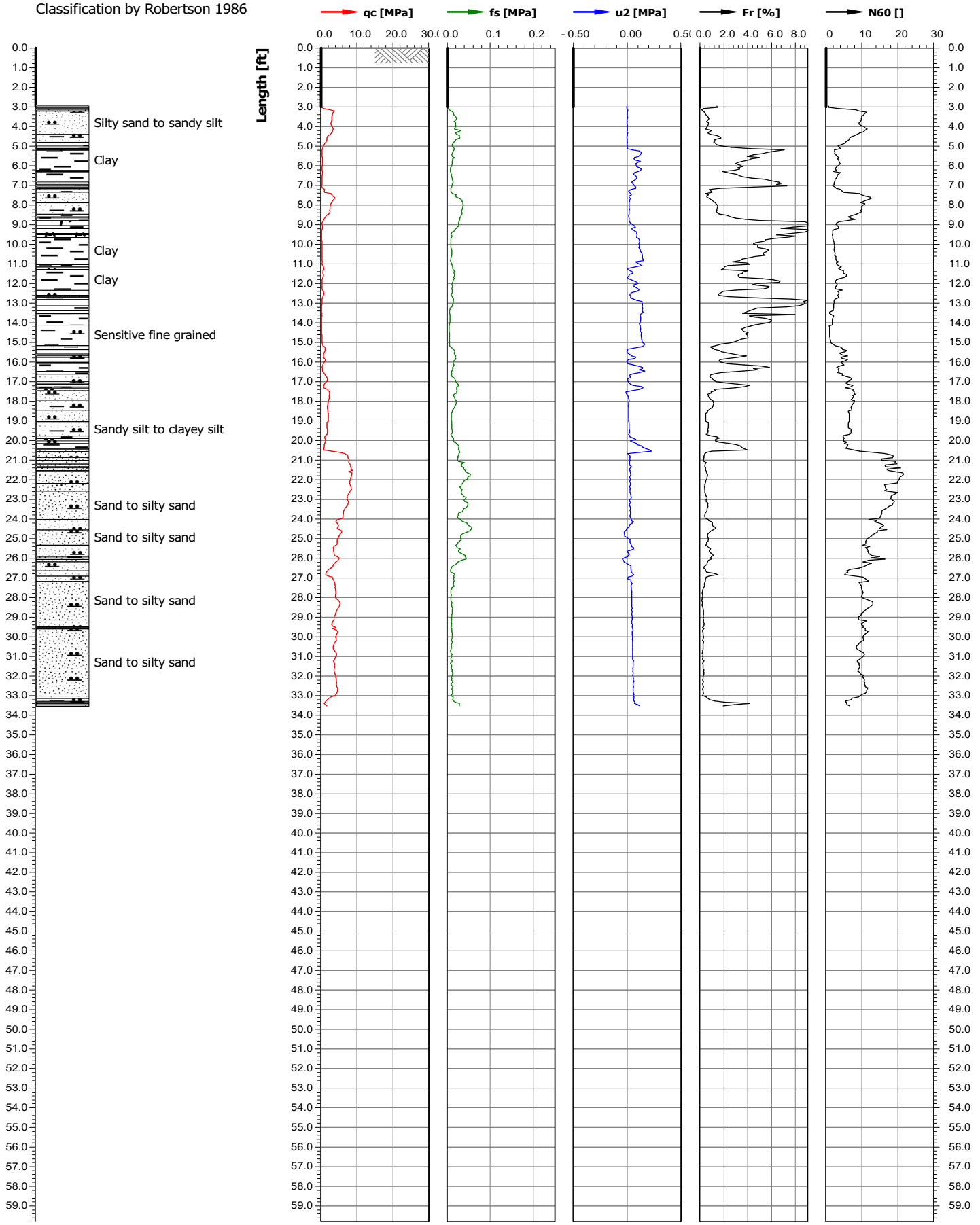
Soil & Material Testing

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	566.80	CPT-2CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121392, Easting 2441523		MAS		u2	

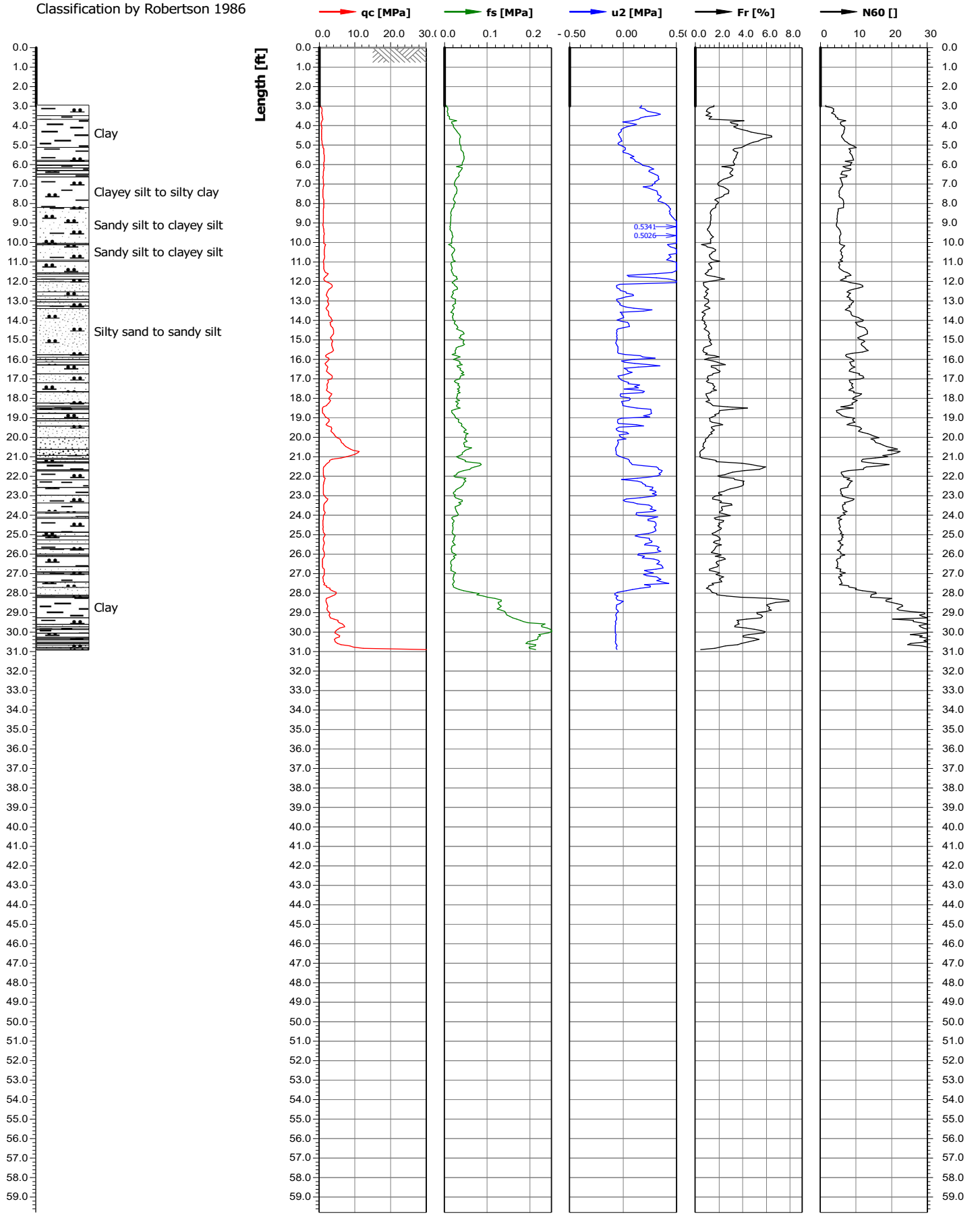
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	536.61	CPT-2L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121336, Easting 2441348		MAS		u2

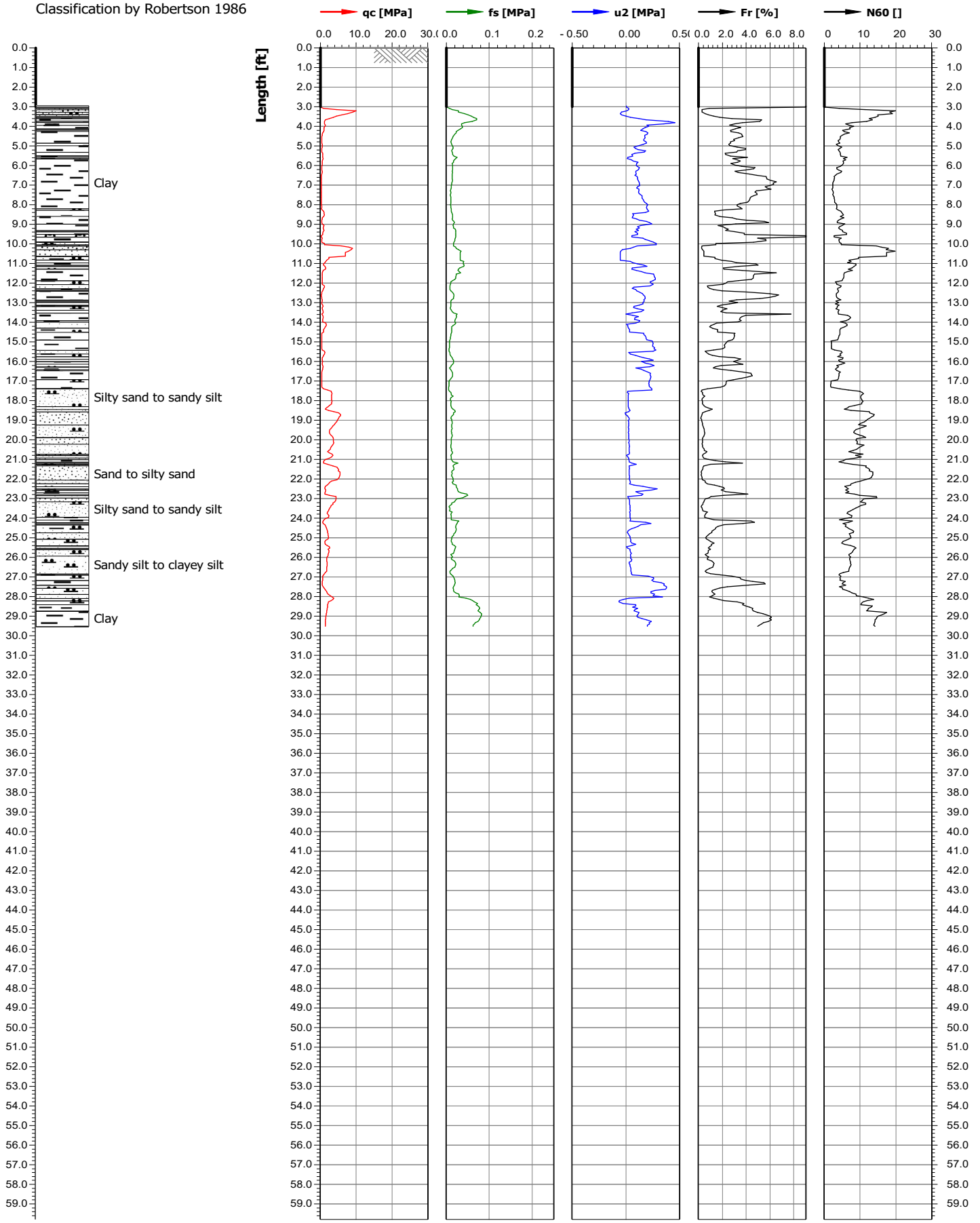
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



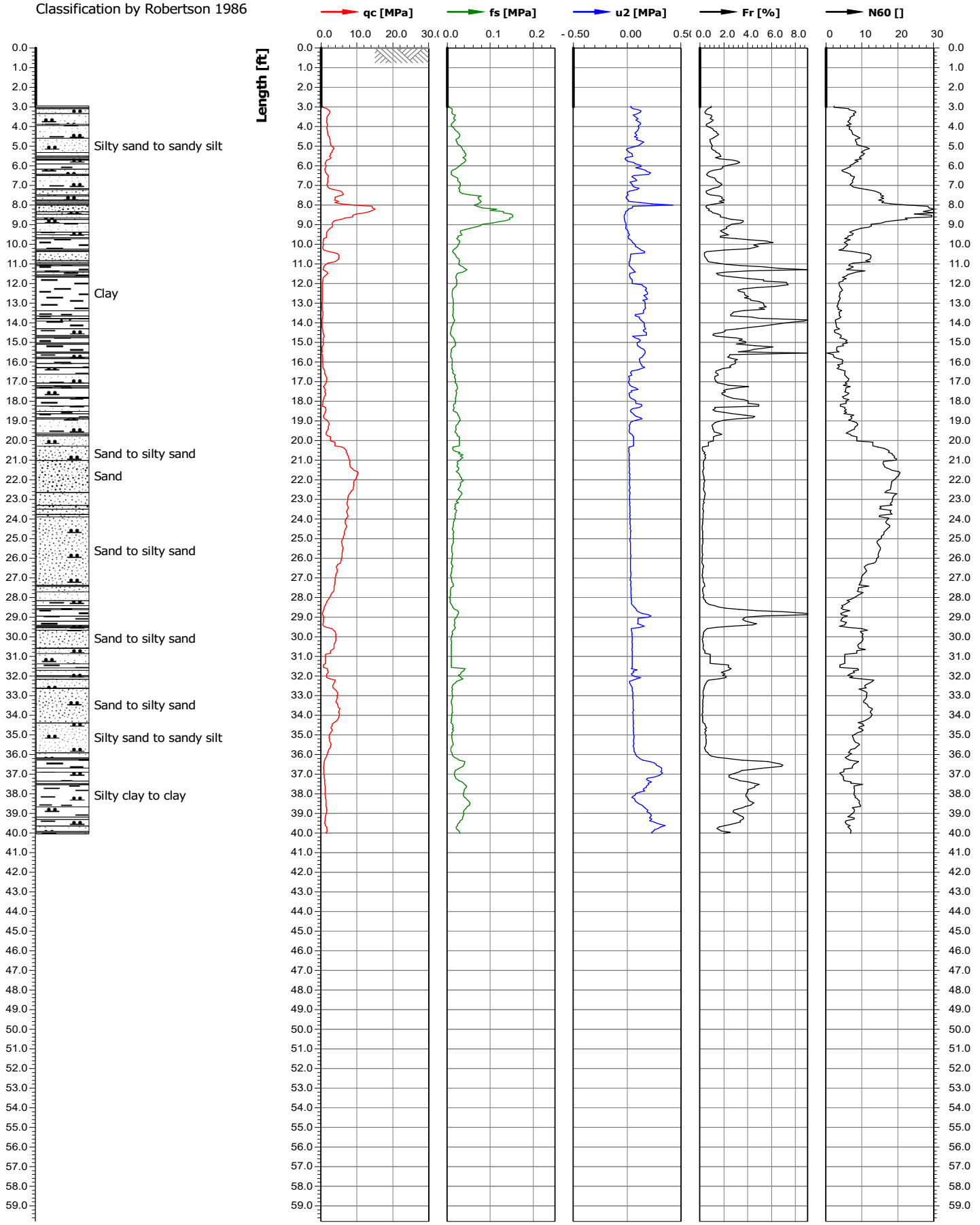
Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	564.30	CPT-3CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121521, Easting 2442246		MAS		u2	

Classification by Robertson 1986



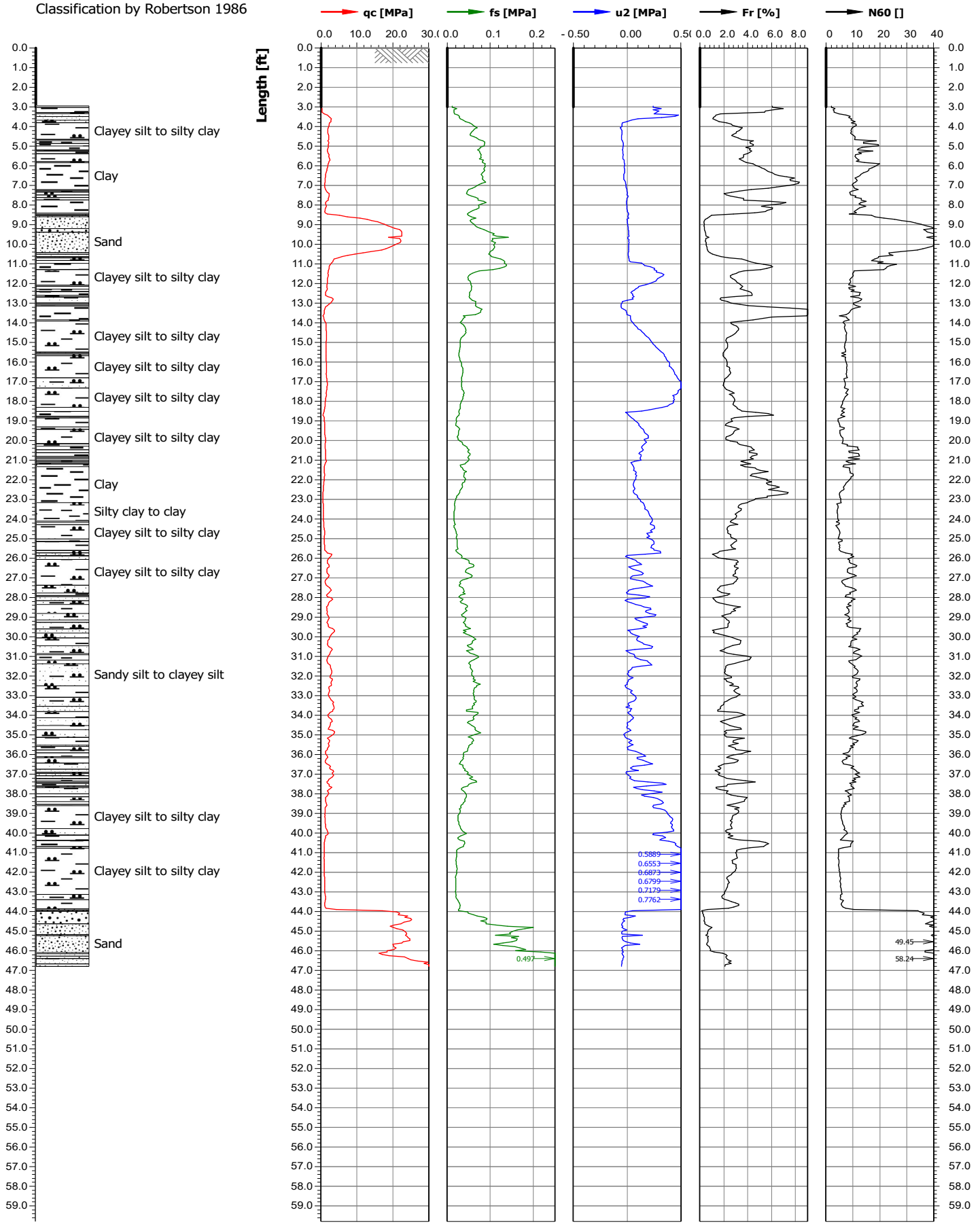
Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	568.50	CPT-4CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121297, Easting 2441920		MAS		u2	

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	541.01	CPT-4L	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1120958, Easting 2441425		MAS		u2	

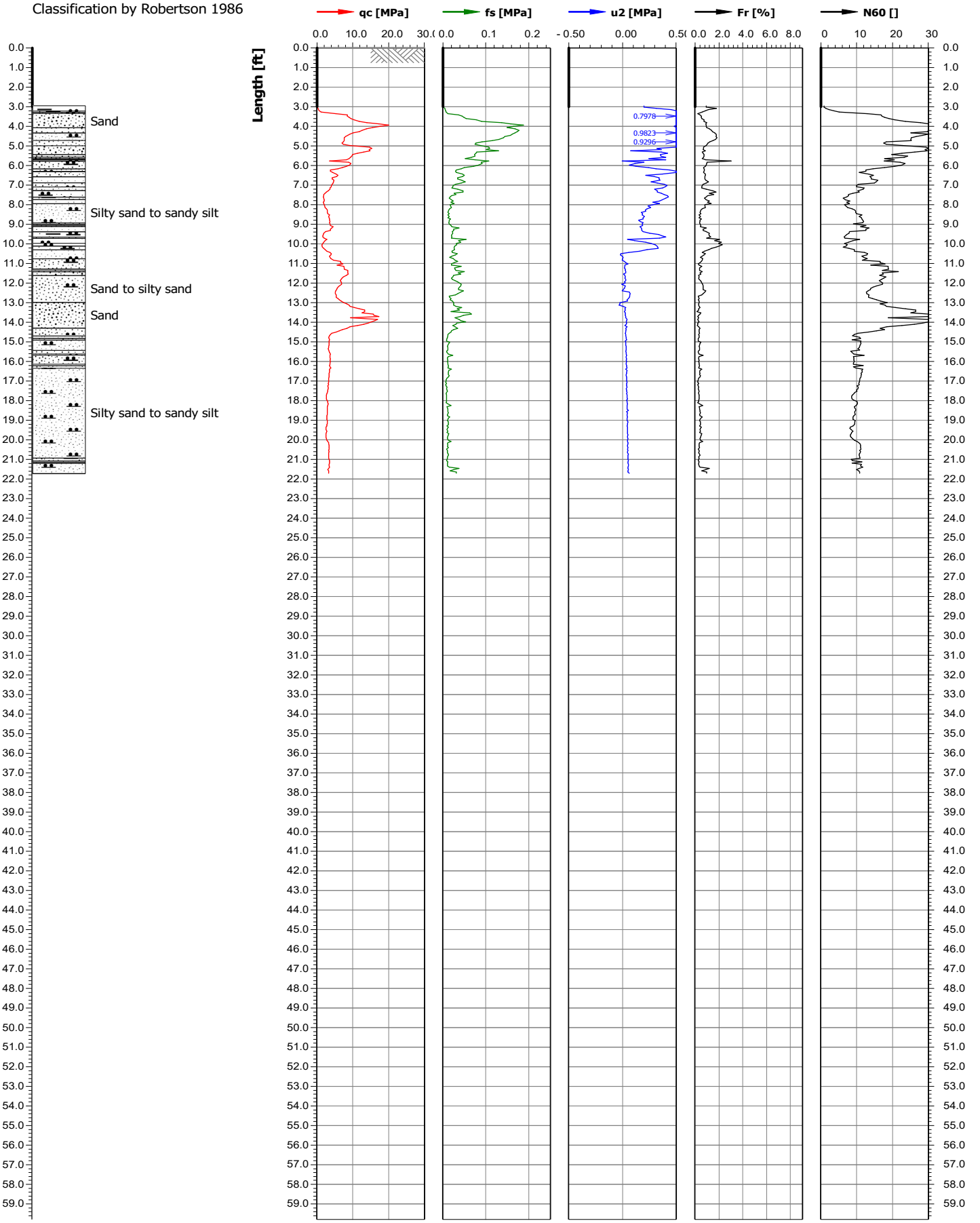
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.98	CPT- 5CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122667, Easting 2440793		MAS		u2

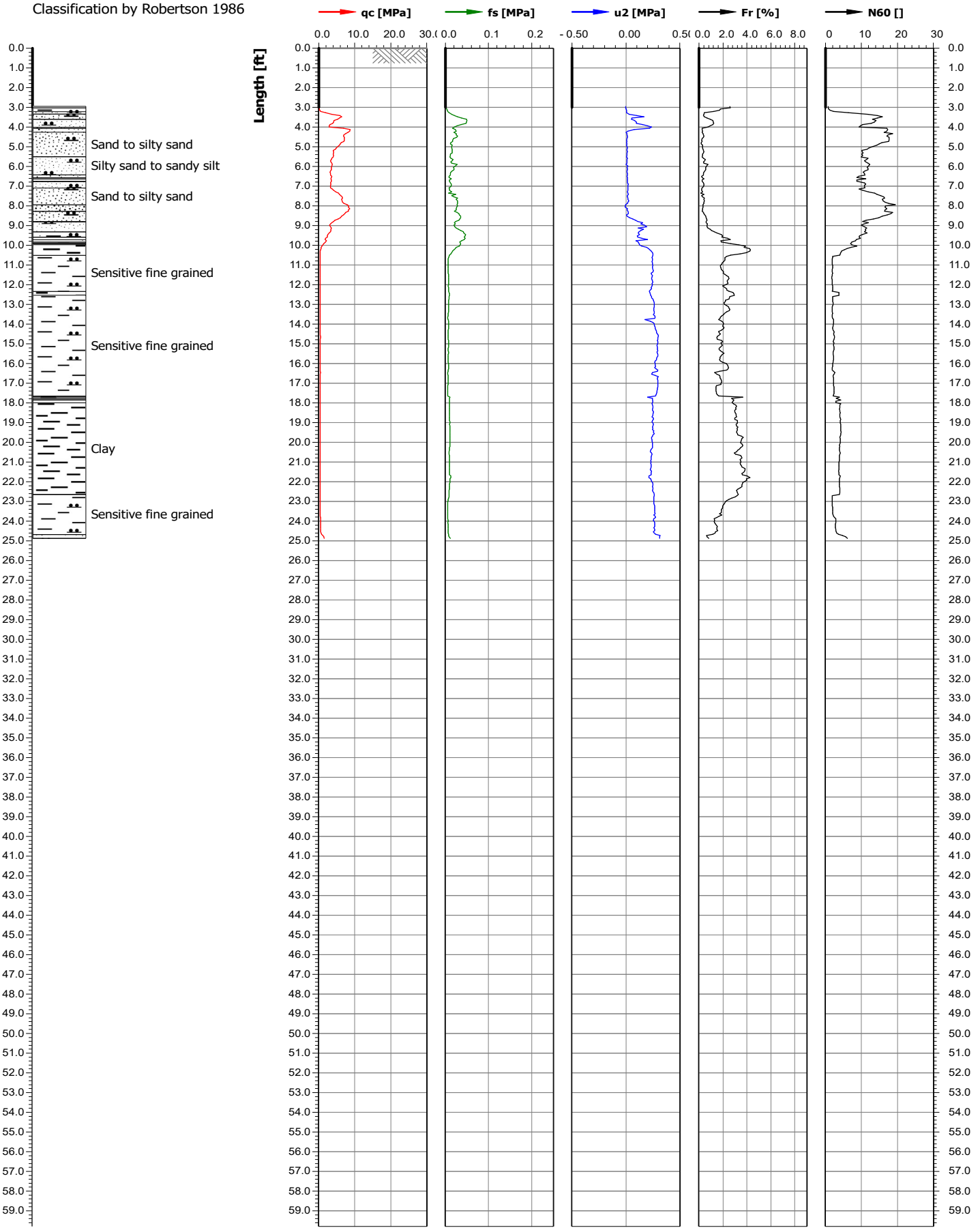
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	552.98	CPT-6CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1123387, Easting 2440830		MAS		u2	

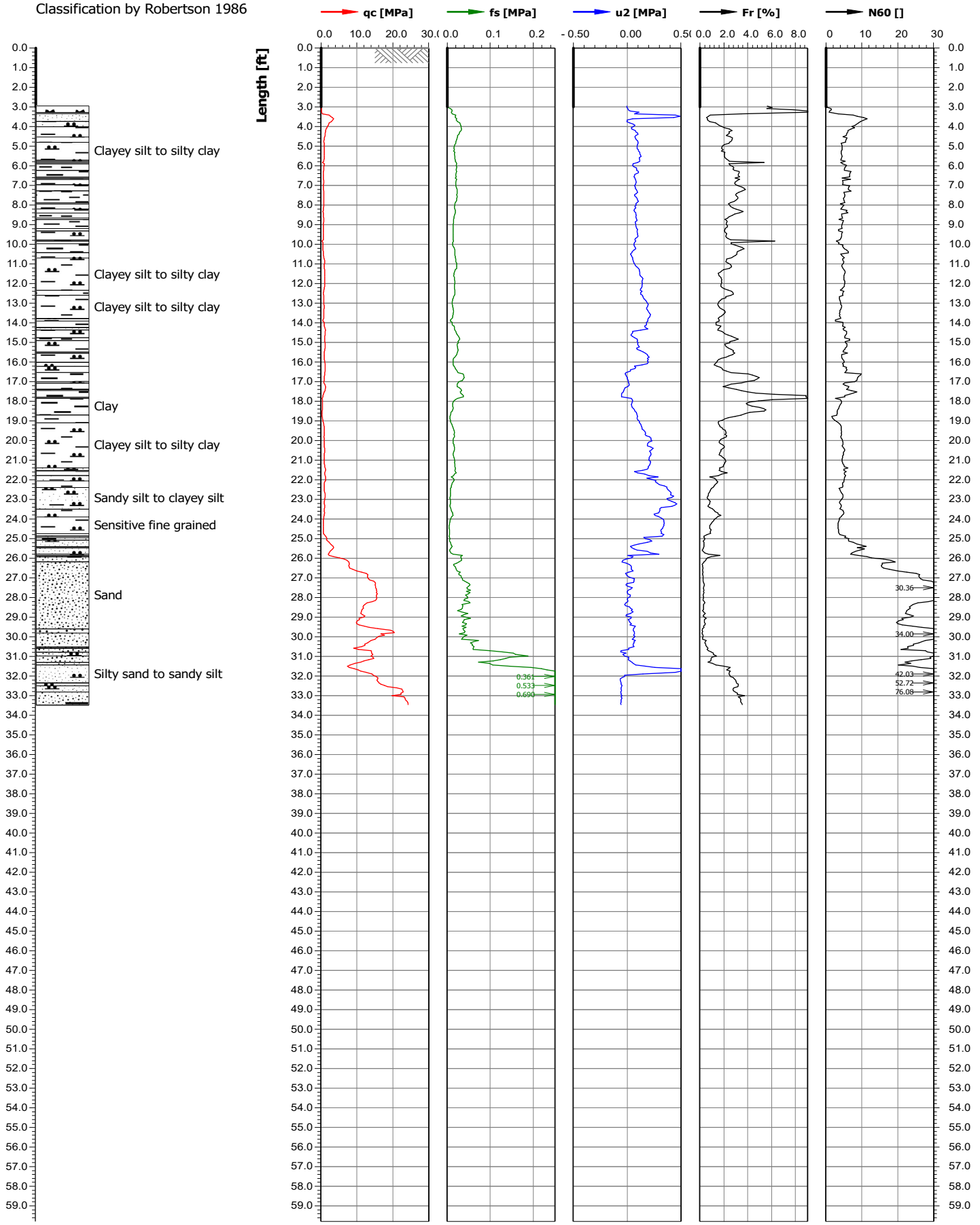
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	531.40	CPT-6L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123455, Easting 2440700		MAS		u2

GEOTECHNICS
Soil & Material Testing

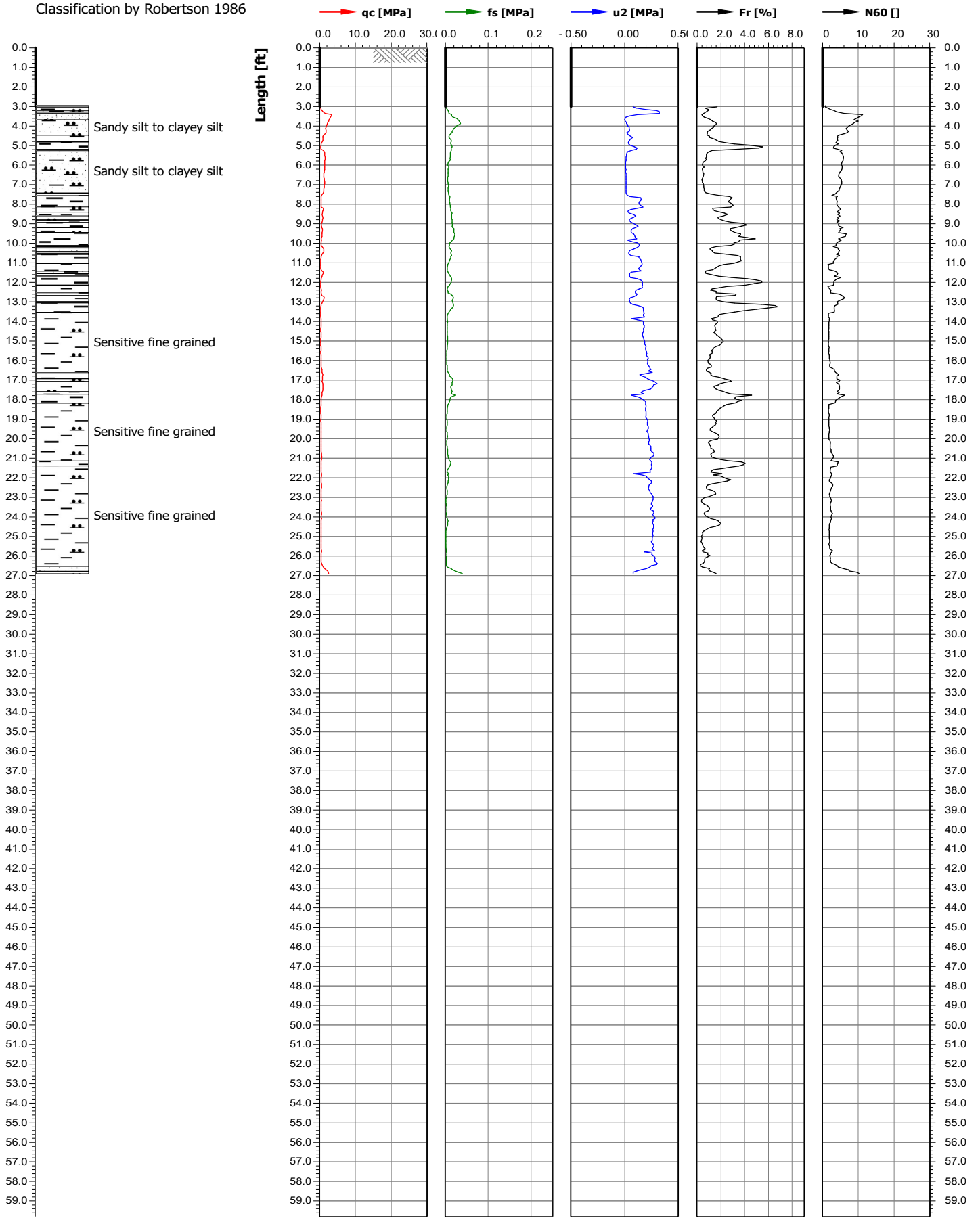
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.10	CPT- 7CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123637, Easting 2441397		MAS		u2

GEOTECHNICS
Soil & Material Testing

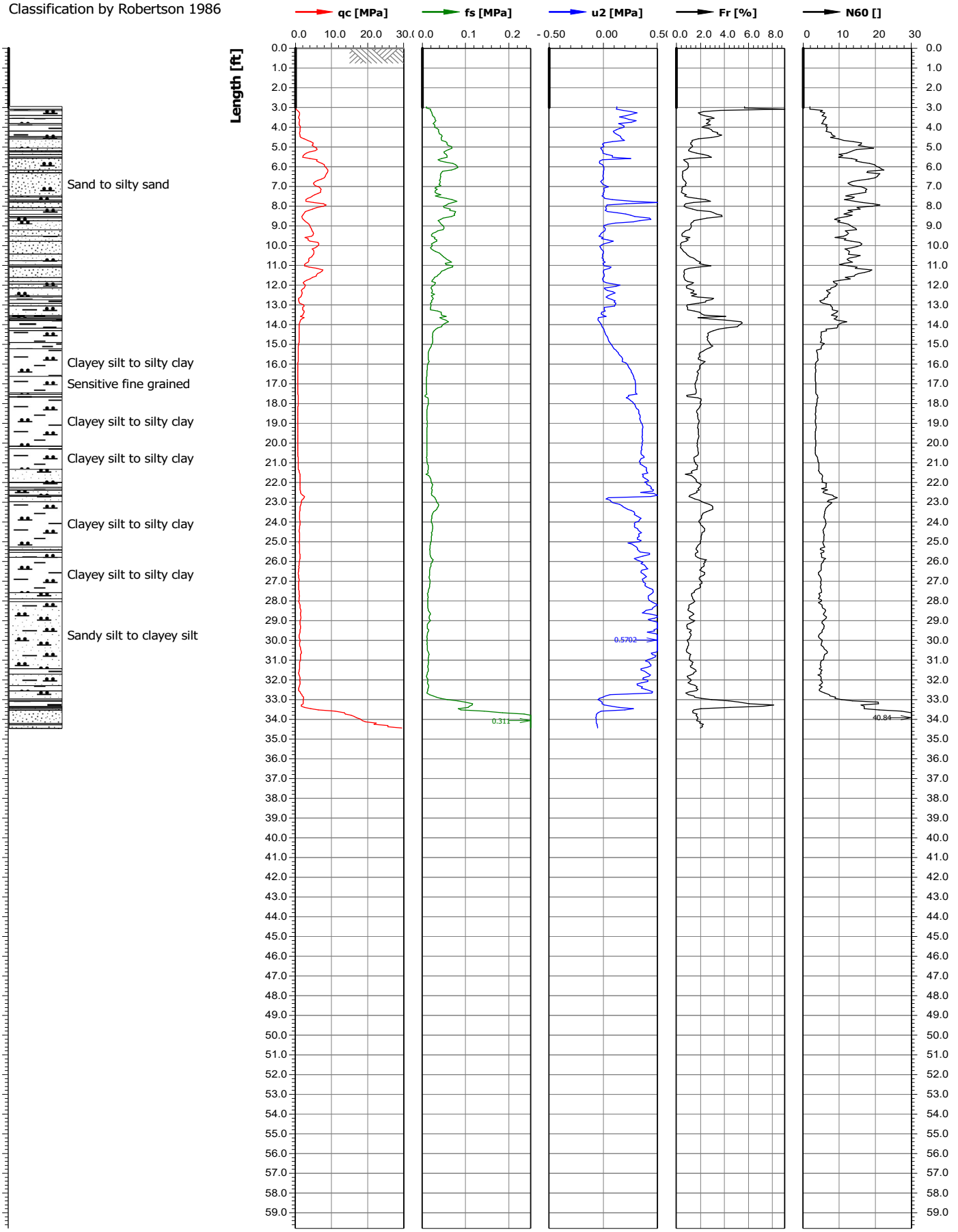
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	533.99	CPT-7L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123789, Easting 2441320		MAS		u2

GEOTECHNICS
Soil & Material Testing

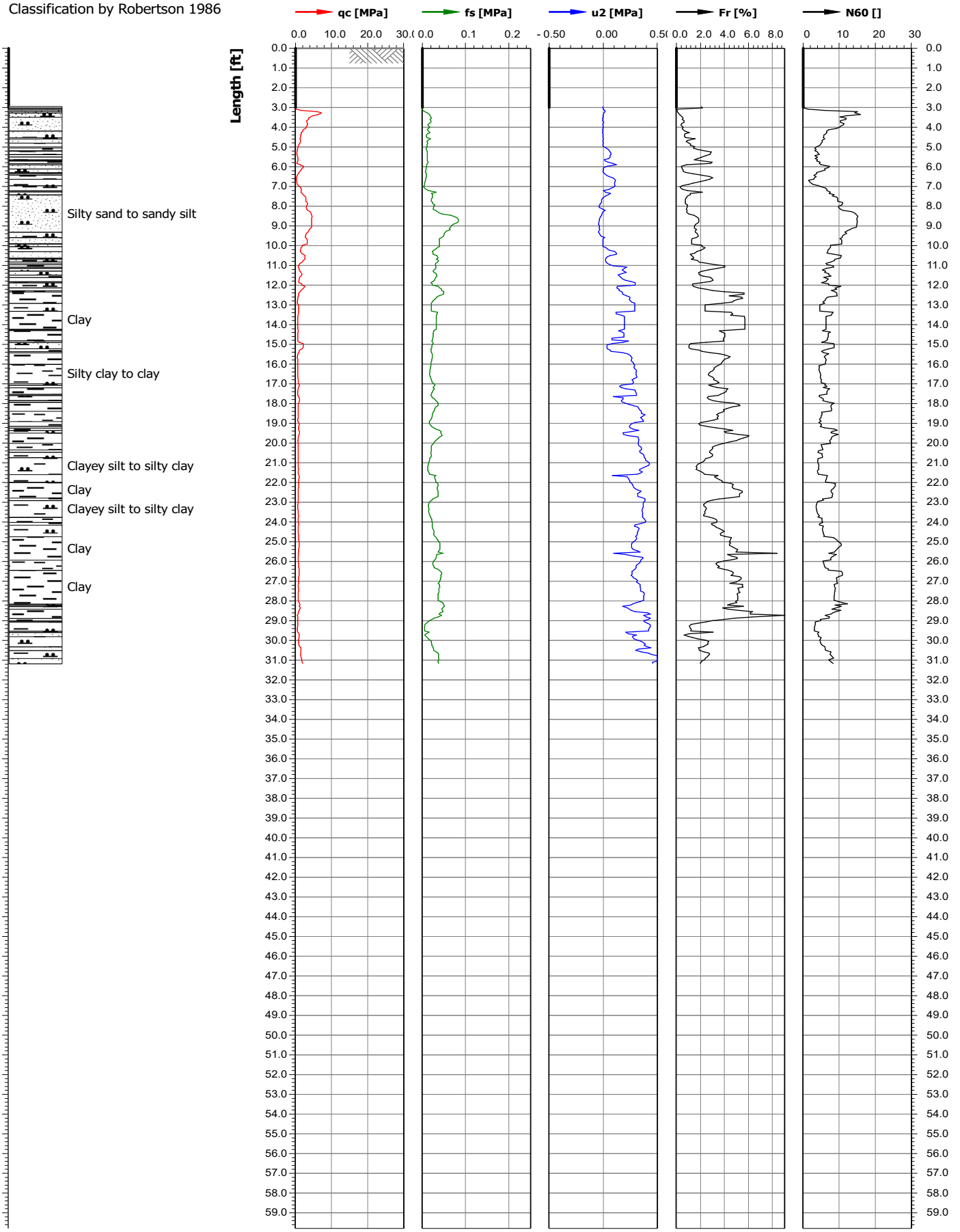
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	555.41	CPT- 10CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122854, Easting 2441308		MAS		u2

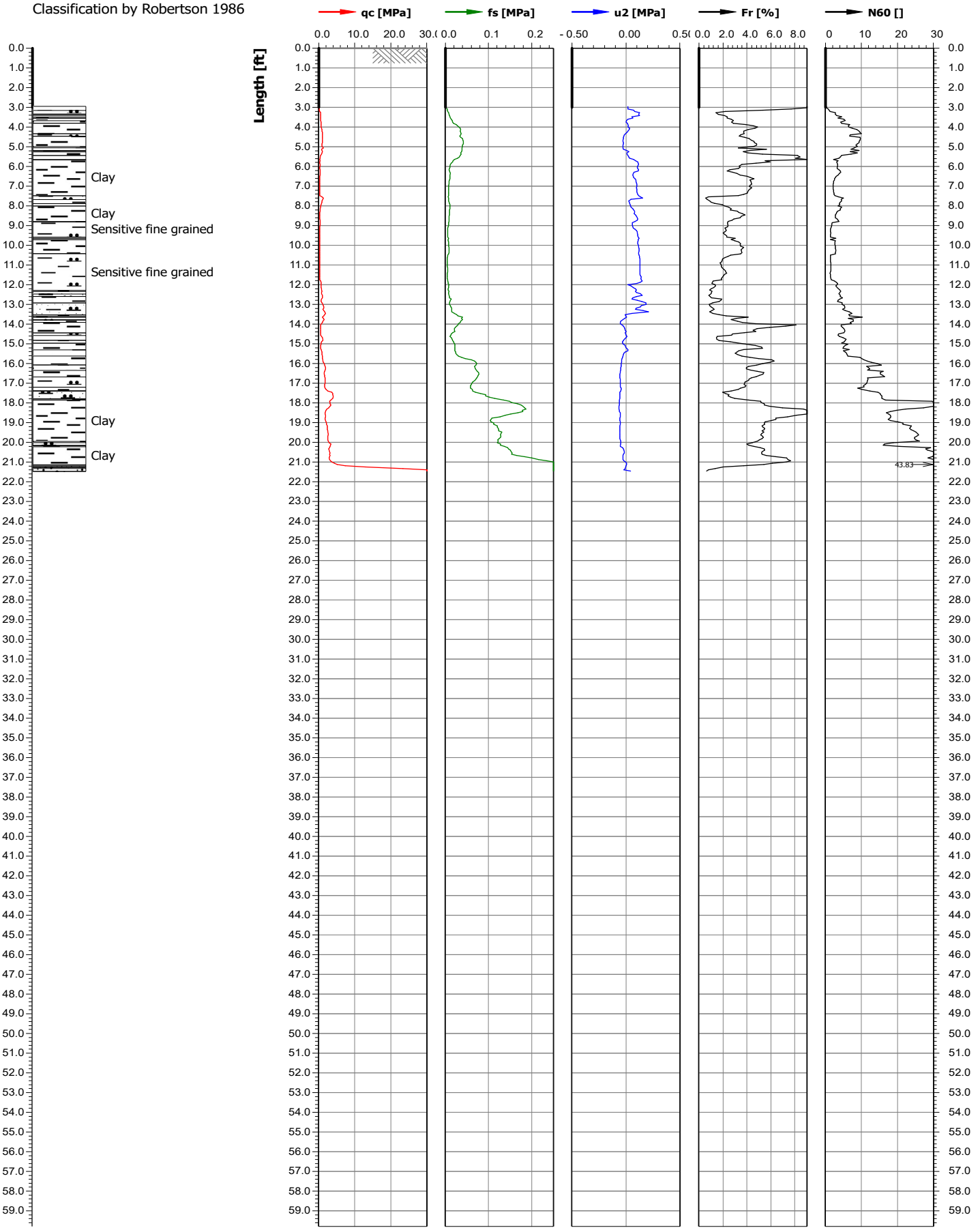
GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number	
Springfield, IL CWLP	3.00	566.01	CPT- 14CCR	5732	
Project ID	Client	Date investigation	Standard/Standar...	Nominal surface area of...	GEOTECHNICS
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0	Soil & Material Testing
Project name		Page	Scale	Net surface area quotie...	
CWLP Ash Ponds		1/1	1:75	0.830/0.000	
Remarks1		Equipment operator		U	
Northing 1121321, Easting 2442579		MAS		u2	

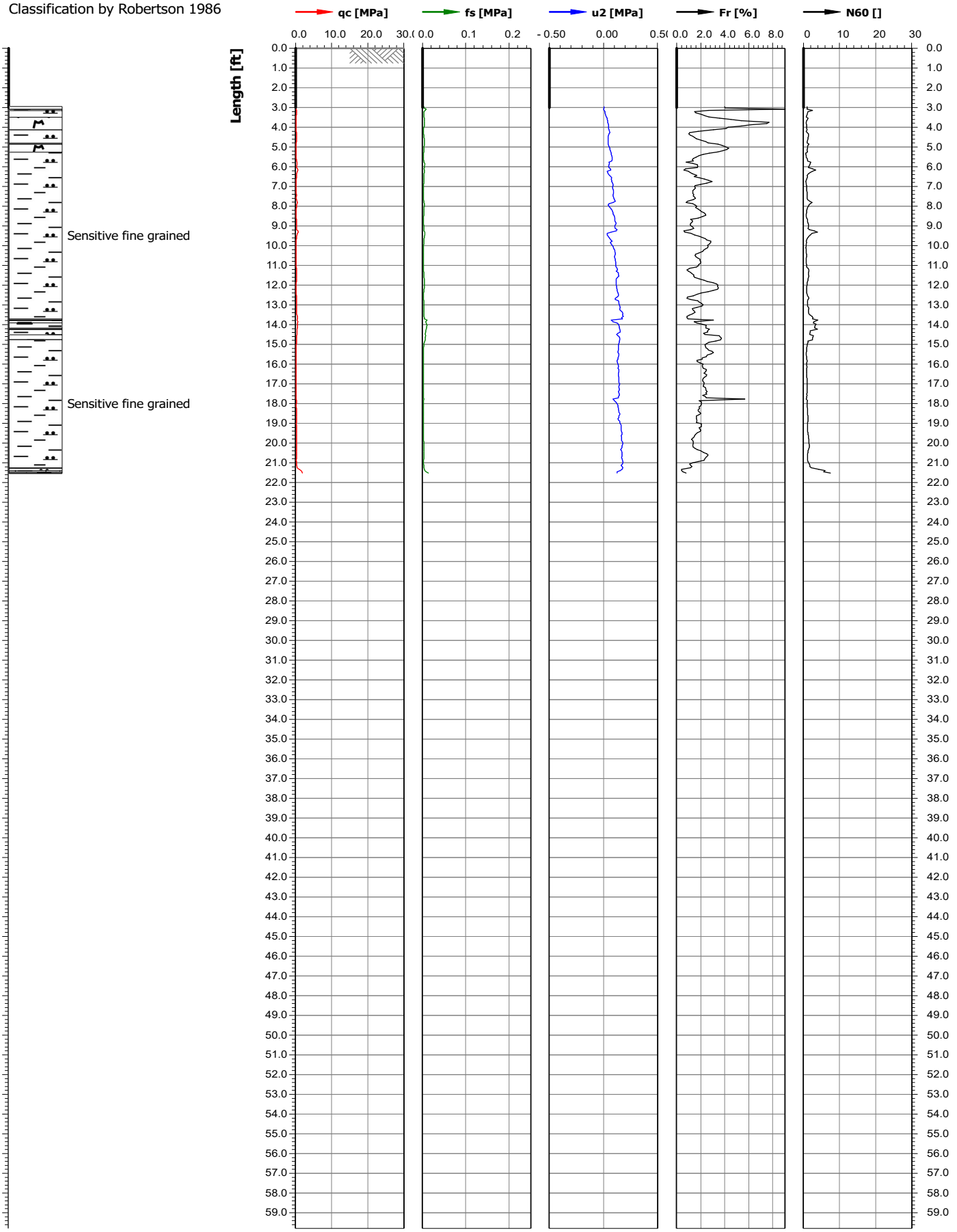
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.30	CPT- 15CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122726, Easting 2441795		MAS		u2

GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986



APPENDIX B:
GEOTECHNICAL AND HYDRAULIC CONDUCTIVITY TEST DATA

GEOTECHNICAL AND HYDRAULIC CONDUCTIVITY DATA FROM 1993 PATRICK REPORT

Table 4
Summary of Laboratory Test Results for Creek Fill Materials

Boring/ Piezometer	Sample Number	Depth (ft)	USCS Symbol	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Dry Density (pcf)	Unconfined Compressive Strength (tsf)	Hydraulic Conductivity (cm/sec)	Cation Exchange Capacity (meq/100 gm)
					Gravel (%)	Sand (%)	Silt or Clay (%)	LL	PL	PI				
B-7	SS-4	6.0-8.0	CL	24.4	0	33	46/21*							
CB-1	3T-5	8.0-10.0	CL	27.4				44	23	18	95.5		$1.5x10^{-7}$	
CB-1	3T-5	8.0-10.0	CL	29.4							94.4	0.6		
CB-2	3T-9	16.0-18.0	ML	37.8				34	25	9	79.6		$2.4x10^{-7}$	
CB-3	SS-4	6.0-8.0	CL-ML	20.5	0	48	52							
CB-8	SS-3	4.0-6.0	OL	31.4				35	21	14				
CB-9	SS-5	8.0-10.0	OL	34.2										18.1
P-1D	SS-5	8.0-10.0	OL	20.4				46	20	26				
P-2D	3T-15	28.0-30.0	CL	25.9							99.1		$7.3x10^{-7}$	
P-1S	SS-2A	38.0-38.7	SC**	19.3	2	65	33							
P-3S	SS-3	10.0-12.0	SM**	-	0	55	45							
P-5D	SS-4	6.0-8.0	OL	31.8				45	25	20				
P-5S	3T-2	10.0-12.0	OL	26.3							95.7		$7.6x10^{-8}$	
P-8D	SS-4	60.-8.0	OL	25.3				37	21	16				
P-8S	SS-3	10.0-12.0	OL	41.0	0	12	62/26*							
B-13***	2-ST	5.0-7.0	CL/OL	37.2	0	2	67/31*	39	23	16	83.7		$2.2x10^{-7}$	14.0
B-16***	2-ST	5.0-7.0	CL/OL	22.1	0	5	67/28*	38	28	10	104.4		$2.1x10^{-7}$	16.0
P-9D****	3T-8	14.0-16.0	CL	22.7							102.3		$3.3x10^{-8}$	

* *Represent percentages of silt and clay based on hydrometer analysis*
** *Granular Creek Fill*
*** *Based on PSI (1989) investigation*
**** *Berm Fill*

ref:hb\496b\496b-4.tbl

Table 5

Summary of Slug Test Results for Creek Fill

Location	Soil Type Tested	USCS Classification	Calculated Hydraulic Conductivity (cm/sec)		
			Recovery Test	Drawdown Test	Average Value
P-1S	Clayey sand	SC	2.4×10^{-4}	6.1×10^{-5}	1.5×10^{-4}
P-3S	Silty sand	SM	5.6×10^{-3}	1.5×10^{-2}	1.0×10^{-2}
P-5S	Organic silty clay	OL	7.1×10^{-5}	1.1×10^{-4}	8.6×10^{-5}
P-8S	Clayey sand	SC	1.2×10^{-4}	NT	1.2×10^{-4}

Refer to Appendix D for detailed test results.
NT = Not Tested

ref:hb/496b/496b-5.tbl

Table 6
Summary of Laboratory Test Results for Upper Cohesive Deposit

Boring/ Piezometer	Sample Number	Depth (ft)	USCS Symbol	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Dry Density (pcf)	Unconfined Compressive Strength (tsf)	Hydraulic Conductivity (cm/sec)	Cation Exchange Capacity (meq/100 gm)
					Gravel (%)	Sand (%)	Silt or Clay (%)	LL	PL	PI				
B-4	3T-4	6.0 - 8.0	CL	28.0							98.7		4.7×10^{-8}	
P-6D	SS-2	2.0 - 4.0	CL	21.2				29	18	11				
P-6S	SS-2A	6.0 - 6.5	CL	23.4	0	14	86							
P-7D	SS-3	4.0 - 6.0	CL	21.7				33	19	14				
P-7D	SS-4	6.0 - 8.0	CL	25.3										16.5
P-7D	3T-5	8.0 - 10.0	CL	22.6							101.2		2.0×10^{-7}	
P-7S	SS-1B	10.5 - 11.0	CL	-	0	43	40/17*							
B-5**	2-ST	5.0 - 7.0	CL/ML	24.3	0	18	63/19*	23	21	2	100.8		1.6×10^{-8}	11.0
B-15**	2-ST	5.0 - 7.0	CL/ML	23.9	0	15	62/23*	27	19	8	102.8		5.2×10^{-7}	12.0
B-16**	4-ST	10.0 - 12.0	CL/ML	24.2	0	40	55/5*	Non-Plastic			102.1		7.6×10^{-8}	10.0

* Represent percentages of silt and clay based on hydrometer analysis.
** Based on PSI (1989) investigation.

ref:hb\496b\496b-6.tbl

Table 7
Summary of Laboratory Test Results for Shallow Sand

Boring/ Piezometer	Sample Number	Depth (ft)	USCS Symbol	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Dry Density (pcf)	Unconfined Compressive Strength (tsf)	Hydraulic Conductivity (cm/sec)	Cation Exchange Capacity (meq/100 gm)
					Gravel (%)	Sand (%)	Silt or Clay (%)	LL	PL	PI				
B-1	SS-7	12.0 - 14.0	SC	21.8	0	50	50							
P-7D	SS-6B	11.5 - 12.0	SC	23.1	0	52	48							

ref:hb\496b\496b-7.tbl

** Represent percentages of silt and clay based on hydrometer analysis.*

Table 8

Summary of Slug Test Results for Shallow Sand

Location	Soil Type Tested	USCS Classification	Calculated Hydraulic Conductivity (cm/sec)		
			Recovery Test	Drawdown Test	Average Value
P-6S	Clayey sand	SC	2.9×10^{-2}	1.6×10^{-2}	2.2×10^{-2}
P-7S	Clayey sand	SC	3.6×10^{-3}	4.3×10^{-3}	3.9×10^{-3}

Refer to Appendix D for detailed test results
NT = Not Tested

ref:hb/496b/496b-8.tbl

Table 9
Summary of Laboratory Test Results for Lower Cohesive Deposits

Boring/ Piezometer	Sample Number	Depth (ft)	USCS Symbol	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Dry Density (pcf)	Unconfined Compressive Strength (tsf)	Hydraulic Conductivity (cm/sec)	Cation Exchange Capacity (meq/100 gm)
					Gravel (%)	Sand (%)	Silt or Clay (%)	LL	PL	PI				
B-1	SS-9	16.0 - 18.0	ML/CL-ML	36.9				25	22	3				
B-3	3T-20	38.0 - 40.0	CL	24.6							104.2		8.2×10^{-8}	
B-4	SS-8	12.0 - 14.0	CL	29.1	0	8	70/22*	32	20	12				
B-6	SS-10	18.0 - 20.0	CL-ML/CL	23.5				25	20	5				
B-6	SS-14	26.0 - 28.0	CL-ML	25.1	0	44	56							
B-7	SS-9	16.0 - 18.0	CL-ML	18.2	0	38	50/12*							
B-9	SS-8	14.0 - 16.0	CL	24.6										10.7
CB-2	SS-11	20.0 - 22.0	CL	34.9				47	22	25				
CB-3	SS-9	16.0 - 18.0	CL-ML	27.1	0	33	55/12*							
CB-4	3T-9	16.0 - 18.0	CL/CL-ML	23.9							103.3		4.3×10^{-7}	
CB-6	3T-7	12.0 - 14.0	CL	29.9							95.3		5.3×10^{-7}	
CB-6	3T-7	12.0 - 14.0	CL	26.4							99.0	1.4		
CB-6	SS-12	22.0 - 24.0	ML/CL-ML	23.6				23	20	3				
P-3D	3T-9	16.0 - 18.0	CL	34.5							89.2		1.3×10^{-8}	
P-3D	SS-13	24.0 - 26.0	CH	53.7				71	32	39				
P-4	3T-11	20.0 - 22.0	CH	40.9							78.2		2.9×10^{-8}	
P-4	SS-16	30.0 - 32.0	CH	52.6				67	30	37				
P-7D	SS-8	14.0 - 16.0	CL-ML/CL	26.9				29	22	7				
P-7D	SS-13	24.0 - 26.0	CL-ML	24.3	0	34	54/12*							
P-7M	3T-2	18.0 - 20.0	CL	22.5							101.4		1.5×10^{-7}	
P-9D	SS-26	50.0 - 52.0	CL	20.7	0	33	53/14*							
P-9S	3T-1	34.0 - 36.0	CL	24.1							101.2		1.3×10^{-6}	
B-2**	3-ST	10.0 - 12.0	CL-ML	22.9	0	32	58/10*	← Non-Plastic →			93.4		8.4×10^{-7}	9.0
B-2**	5-ST	15.0 - 17.0	CL	22.0	0	15	77/18*	30	18	12	104.9		5.1×10^{-7}	7.0
B-2**	7-ST	20.0 - 22.0	CL	23.1	0	38	50/12*	← Non-Plastic →			103.2		3.2×10^{-7}	6.0
B-13**	4-ST	10.0 - 12.0	CL-ML	21.7	0	48	42/10*	← Non-Plastic →			105.4		9.7×10^{-7}	8.0
B-13**	6-ST	15.0 - 17.0	CL-ML	24.8	0	20	62/18*	← Non-Plastic →			100.6		1.8×10^{-6}	

** Represent percentages of silt and clay based on hydrometer analysis.*

Table 10

Summary of Slug Test Results for Lower Cohesive Deposit

Location	Soil Type Tested	USCS Classification	Calculated Hydraulic Conductivity (cm/sec)		
			Recovery Test	Drawdown Test	Average Value
P-7M	Silty clay	CL	NT	7.6×10^{-5}	7.6×10^{-5}
P-9S	Silty clay	CL	NT	4.9×10^{-5}	4.9×10^{-5}

Refer to Appendix D for detailed test results
NT = Not Tested

ref:hb/496b/496b-10.tbl

Table 11
Summary of Laboratory Test Results for Basal Sand

Boring/ Piezometer	Sample Number	Depth (ft)	USCS Symbol	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Dry Density (pcf)	Unconfined Compressive Strength (tsf)	Hydraulic Conductivity (cm/sec)	Cation Exchange Capacity (meq/100 gm)
					Gravel (%)	Sand (%)	Silt or Clay (%)	LL	PL	PI				
B-4	SS-14	26.0-28.0	SC	17.6	0	56	44							
B-13	SS-14	26.0-28.0	SM	15.1	16	65	19							
CB-1	SS-13	24.0-26.0	SM	21.1	0	69	31							
CB-6	SS-14	26.0-28.0	SC	30.9	0	62	38							
P-1D	SS-25B	48.0-50.0	SC	21.1	0	64	36							
P-2D	SS-28A	54.0-54.5	SW-SM	-	3	91	6							
P-3D	SS-17B	33.0-33.5	SM	17.9	0	58	42							
P-4	SS-19	36.0-38.0	SW-SM	-	23	69	8							
P-5D	SS-14A	26.0-27.3	SM	-	29	54	17							
P-6D	SS-15	28.0-30.0	SM	14.6	23	55	22							
P-7D	SS-15	29.0-30.0	SW-SM/SM	10.9	27	59	14							
P-8D	SS-13A	24.0-25.5	SW-SM/SM	-	34	50	16							
P-9D	SS-29A	56.0-57.5	SP-SM/SM	-	22	66	12							

ref:hb\496b\496b-11.tbl

Table 12

Summary of Slug Test Results for Basal Sand

Location	Soil Type Tested	USCS Classification	Calculated Hydraulic Conductivity (cm/sec)		
			Recovery Test	Drawdown Test	Average Value
P-1D	Silty to clayey Sand to sand	SC/SM/SP	6.1×10^{-4}	1.1×10^{-3}	8.4×10^{-4}
P-3D	Silty sand	SM	1.6×10^{-2}	7.6×10^{-3}	1.2×10^{-2}
P-4	Silty sand	SP-SM/SM	2.0×10^{-3}	3.0×10^{-3}	2.5×10^{-3}
P-5D	Silty sand	SM/SW-SM	5.0×10^{-3}	3.8×10^{-3}	4.4×10^{-3}
P-6D	Silty sand	SM	3.6×10^{-2}	3.3×10^{-2}	3.4×10^{-2}
P-7D	Silty sand	SW-SM/SM	5.6×10^{-3}	6.1×10^{-3}	5.8×10^{-3}
P-8D	Silty sand to sand	SM/SW-SM	2.3×10^{-2}	3.0×10^{-2}	2.6×10^{-2}
P-9D	Silty sand	SM/SP-SM	7.2×10^{-4}	5.6×10^{-4}	6.4×10^{-4}

Refer to Appendix D for detailed test results.
NT = Not Tested

ref:hb/496b/496b-12.tbl

Table 13

Summary of Slug Test Results for Bedrock (Shale)

Location	Soil Type Tested	USCS Classification	Calculated Hydraulic Conductivity (cm/sec)		
			Recovery Test	Drawdown Test	Average Value
P-7R	Shale	-	NT	1.8×10^{-7}	1.8×10^{-7}
P-6R	Shale	-	NT	1.3×10^{-6}	1.3×10^{-6}

Refer to Appendix D for detailed test results
NT = Not Tested

ref:hb/496b/496b-13.tbl

GEOTECHNICAL AND HYDRAULIC CONDUCTIVITY DATA FROM 2023/2024 INVESTIGATIONS

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Moisture Content (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
1	2.5-3	14.5								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	5-5.5	10.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	7.5-8	19.8								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
1	10-10.5	21.7								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	13-13.5	21.3								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	15.5-16	24.8								Sandy Lean Clay (CL), Light Brown mottled Gray, Silty
1	17.5-18	47.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1	20.5-21	25.6								Lean Clay (CL), Gray mottled Greenish Gray, Black Oxidation, Silty
1	22.5-23	27.1								Lean Clay (CL), Gray mottled Light Gray, Silty
1 ST	24.5-26.5	27.9	127.7	99.8	0.49	85.70	65.7/20.0	30 / 17	1.23×10^{-6}	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist
1	28-28.5	25.5								Fat Clay (CL), Gray, Silty
1	32.5-33	26.0								Sandy Lean Clay (CL), Light Gray/Gray mottled Yellow Brown, Silty
1L	2-3.5	18.5								Fat Clay (CH), Yellow Brown mottled Brown
1L	4.5-6	21.4								Fat Clay (CH), Yellow Brown mottled Brown
1L	7-8.5	21.4								Lean Clay (CL), Yellow Brown mottled Brown, Silty
1L	9.5-11	17.7								Sandy Lean Clay (CL), Yellow Brown, Silty
1L	12-13.5	23.4								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	14.5-16	19.7								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	17-18.5	n/a								
1L	19.5-21	30.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1L ST-18	22-24	30.7	118.9	91.0	0.57	97.60	63.0/34.6	43/21	5.84×10^{-6}	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
1LL	2-3.5	11.7								Sandy Lean Clay with Gravel (CL), Yellow Brown mottled Brown, Silty
1LL	4.5-6	13.4								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	7-8.5	20.1								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	9.5-11	17.8								Poorly Graded Sand (SP), Yellow Brown, Fine to Medium
1LL	12-13.5	22.1								Fat Clay (CH), Gray mottled Light Gray
1LL ST-12	14.5-16.5	24.7	125.2	100.4	0.26	84.40	64.5/19.9	39/21	6.02×10^{-6}	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist
1LL	17-18.5	26.2								Fat Clay (CH), Light Brown, Silty
1U	2-3.5	14.6								Lean Clay (CL), Brown mottled Light Gray/Reddish Brown, Silty, With Coal
1U	4.5-6	21.0								Lean Clay (CL), Brown mottled Light Brown/Light Gray, Silty, Trace Gravel
1U	7-8.5	36.5								Silt (ML), Black, Clayey, With Coal
1U	9.5-11	6.1								Coal, Black, With Silt
1U	12-13.5	32.2								Coal, Black
1U	14.5-16	59.2								Silt (ML), Black, Clayey, With Coal
1U	17-18.5	68.6								Silt (ML), Black, With Coal and Ash
1CCR	2-3.5	10.7								Cinders, Black
1CCR	4.5-6	11.3								Cinders, Black
1CCR	7-8.5	22.2								Cinders/Ash Black
1CCR	9.5-11	21.5								Cinders/Ash Black
1CCR	12-13.5	20.1								Cinders. Black
1CCR	14.5-16	53.5								Cinders, Black, With Clayey Silt
1CCR	17-18.5	22.2								Cinders, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
2	2-3.5	18.5								Fat Clay (CH), Brown mottled Light Gray
2	4.5-6	22.0								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2	7-8.5	27.0								Fat Clay (CH), Dark Brown mottled Brown
2	9.5-11	24.9								Fat Clay (CH), Yellow Brown mottled Brown
2	12-13.5	28.4								Fat Clay (CH), Light Gray mottled yellow Brown
2	14.5-16	25.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
2	17-18.5	27.2								Fat Clay (CH), Light Gray mottled Yellow Brown
2	19.5-21	27.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2 ST	22-24	26.8	123.1	97.1	0.50	91.70	57.8/33.9	57/21	$6.87x10^{-8}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
2	24.5-26	24.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
2	27-27.5	21.2								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2	27.5-28.5	22.4								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2L	2-3.5	21.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
2L	4.5-6	28.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2L ST 6	7-9'	25.5	126.5	100.8	0.33	87.70	74.3/13.4	27/21	$8.24x10^{-6}$	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist
2L	9.5-11	22.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
2L	12-13.5	22.0								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty
2L	14.5-16	23.6						20/16		Sandy Silty Clay (CL), Yellow Brown mottled Light Gray
2L	17-18.5	21.1								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown/Brown, Silty
2L	19.5-21	21.4								Poorly Graded Sand (SP), Yellow Brown, Fine, With Clay Seams
2L	22-23.5	29.0								Lean Clay (CL), Light Gray, Silty
2U	2-3.5	8.1								Cinders, Dark Brown
2U	4.5-6	8.3								Cinders, Dark Brown
2U	7-8.5	20.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2U	9.5-11	11.0								Cinders/Silt, Dark Brown
2U	12-13.5	65.7								Sandy Silt (ML), Dark Brown
2U	14.5-16	46.3								Sandy Silt (ML), Dark Brown
2U	17-18.5	24.6								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
2U	19.5-21	53.1								Coal, Dark Gray
2U	22-23.5	31.7								Poorly Graded Sand (SP), Dark Gray, Fine to Coarse
2U	24.5-26	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray
2CCR	2-3.5	58.6								Lean Clay (CL), Light Gray mottled Yellow Brown/Brown, Silty, Trace Coal
2CCR	4.5-6	23.5								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	7-8.5	238.7								Ash, Light Gray
2CCR	9.5-11	107.7								Coal/Ash, Black
2CCR	12-13.5	86.4								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	14.5-16	54.5								Coal, Black, Clayey, With Organics
2CCR	17-18.5	86.8								Coal, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
3	2-3.5	25.9								Fat Clay (CH), Brown mottled reddish Brown
3	4.5-6	20.6								Poorly Graded Sand (SP), Brown, Fine to Medium
3	7-8.5	22.2								Lean Clay (CL), Light Brown mottled Brown
3 ST 8	9.5-11.5	25.8	122.9	97.7	0.67	98.10	67.6/30.5	60/24	$8.50x10^{-9}$	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist
3	12-13.5	26.6								Fat Clay (CH), Brown mottled Light Gray/Reddish Brown
3	14.5-16	24.8								Fat Clay (CH), Brown, Reddish Oxidation
3	17-18.5	27.1								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown
3 ST16	19.5-21.5	25.8	121.6	96.7	0.62	95.00	65.7/29.3	43/20	$4.27x10^{-7}$	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist
3	22-23.5	29.0								Fat Clay (CH), Light Gray mottled Yellow Brown, Silty
3	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Black Oxidation, Silty
3	27-28.5	28.9								Fat Clay (CH), Light Brown mottled Light Gray
3U	2-3.5	16.0								Lean Clay (CL), Brown mottled Yellow Brown/Light Brown, Silty, Trace Sand
3U	4.5-6	27.7								Ash, Yellow Brown
3U	7-8.5	20.7								Lean Clay (CL), Brown mottled Light gray, With Coal
3U ST 8	9.5-11.5	21.3	122.6	101.0	0.55	81.10	65.5/15.6	38/22	$1.52x10^{-8}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist
3U	12-13.5	37.2								Coal, Black
3U	14.5-16	32.0								Silt (ML), Brown, Clayey
3U	17-18.5	62.6								Silt (ML), Brown, Clayey
3CCR	2-3.5	22.7								Lean Clay (CL), Brown, Silty, Trace Coal
3CCR	4.5-6	91.2								Ash, Light Gray, With Clay Seams
3CCR	7-8.5	51.6								Ash, Light Gray, With Clay Seams
3CCR	9.5-11	113.5								Coal, Black
3CCR	7-8.5	51.6								Ash, Light Gray, With Clay Seams
3CCR	9.5-11	113.5								Coal, Black
3CCR	12-13.5	86.9								Coal, Black, With Organics/Clay Seams
3CCR	14.5-16	61.1								Coal, Black, With Clay Seams
3CCR	17-18.5	65.8								Coal, Black, With Clay Seams
4	3-3.5	16.5								Lean Clay (CL), Light Gray mottled Yellow Brown
4	5.5-6	18.2								Lean Clay (CL), Yellow Brown mottled Brown
4	7.5-8	23.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	10.5-11	26.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	12.5-13	26.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	14.5-16	26.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation, Trace Sand
4	17.5-18	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4 ST	19.5-21.5	28.3	124.0	96.7	0.95	97.20	64.8/32.4	49/22	$6.53x10^{-8}$	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4	22-22.5	30.1								Fat Clay (CH), Yellow Brown/Light Brown mottled Brown, Silty
4	25-25.5	33.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
4	27-27.5	22.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
4	30-30.5	23.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
4L	2-3.5	31.7								Lean Clay (CL), Dark Brown, Silty over Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Gravel
4L	4.5-6	27.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4L	7-8.5	27.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
4L	9.5-11	29.8								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
4L ST10	12-14'	27.4	124.2	97.5	0.42	87.90	71.7/16.2	32/20	$9.53x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist
4L	14.5-16	25.7								Lean Clay with Sand (CL), Yellow Brown mottled Light gray
4L	17-18.5	27.4						31/23		Lean Clay (CL/ML), Light Gray, Silty
4U	2-3.5	6.5								Cinders, Black
4U	4.5-6	30.8								Fat Clay (CH), Yellow Brown mottled Gray, Silty
4U	7-8.5	23.0								Fat Clay (CH), Yellow Brown mottled Gray, Silty, With Cinders
4U	9.5-11	36.4								Silt (ML), Black, With Cinders
4U	12-13.5	24.5								Cinders, Black
4U	14.5-16	38.0								Cinders, Black, Silty
4U	17-18.5	24.8								Cinders, Black
4U	19.5-21	18.0								Coal, Black
4U	22-23.5	59.2								Ash, Light Gray
4U	24.5-26	28.0								Fat Clay (CH), Yellow Brown mottled Light Gray
4U ST22	27-29	26.9	125.3	98.7	0.53	97.10	69.6/27.5	62/24	$9.17x10^{-9}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4CCR	2-3.5	21.0								Lean Clay (CL), Yellow Brown, With Brick
4CCR	4.5-6	23.0								Silt (ML), Brown, Clayey, With Clay Seams
4CCR	7-8.5	56.0								Ash, Light Gray
4CCR	9.5-11	91.3								Cinder/Ash, Black
4CCR	12-13.5	83.6								Cinder/Ash, Black
4CCR	14.5-16	59.3								Cinders/Silt, Black
4CCR	17-18.5	33.0								Cinders, Black
4CCR	19.5-21	59.5								Ash/Cinders, Black
5	2-3.5	14.8								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	4.5-6	16.7								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	7-8.5	13.6								Lean Clay with Sand (CL), Yellow Brown mottled Light Gray,
5	9.5-11	22.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
5	12-13.5	21.0								Fat Clay (CH), Yellow Brown mottled Light Gray
5	14.5-16	22.8								Fat Clay (CH), Brown mottled Yellow Brown
5	17-18.5	21.2								Lean Clay (CL), Brown mottled Light Brown
5	19.5-21	21.8								Fat Clay (CH), Brown, Silty
5	22-23.5	19.4								Sandy Lean Clay (CL), Light Gray mottled Gray/Yellow Brown
5 ST	24.5-26.5	24.3	124.0	99.8	0.25	90.20	67.3/22.9	43/22	$2.67x10^{-7}$	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist
5	27-28.5	25.6								Lean Clay (CL), Yellow Brown mottled Light Gray
5	29.5-31	24.5								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	32-33.5	24.7								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	34.5-36	24.6								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	37-38.5	23.6								Sandy Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
5L	3-3.5	18.9								Fat Clay (CH), Brown mottled Light Brown
5L	5-6'	23.1								Fat Clay (CH), Brown mottled Yellow Brown
5L	8-8.5	22.5								Fat Clay (CH), Brown mottled Light Gray
5L ST	9.5-11	28.8	119.9	93.1	0.51	94.60	73.2/21.4	46/24	$5.18x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
5L	13-13.5	30.1								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	15.5-16	30.9								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	17-17.5	28.3						39/22		Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
5CCR	3-3.5	24.6								Silt with Sand (ML), Light Gray
5CCR	5.5-6	24.2								Sandy Lean Clay (CL), Gray, Silty
5CCR	7-7.5	27.8								Sandy Silt (ML), Gray
5CCR	9.5-10	13.5								Silty Sand (SM), Dark Brown, Trace Gravel
5CCR	15-15.5	9.8								Coal, Black
5CCR	17.5-18	13.9								Coal, Black
6	0-2	7.3								Clayey Sand with Gravel (SC), Brown
6	2-4'	21.3								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	5-7.5	24.0								Lean Clay (CL), Brown mottled Gray, Trace Sand, Fat Seams
6	7.5-9	20.5								Lean Clay (CL), Gray mottled Light Brown, Trace Sand/Coal
6	10-11.5	20.5								Fat Clay (CH/CL), Light Gray mottled Gray/Light Brown,
6	12.5-14	20.9								Lean Clay (CL), Brown, Silty
6	15-16.5	19.9								Lean Clay (CL), Light Gray mottled Light Brown, Silty
6 ST	17-19	21.9	128.6	105.5	0.95	90.20	61.9/28.3	34/19	$4.25x10^{-8}$	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
6	19-21	n/a								Lean Clay (CL), Brown, Silty, With Organics
6	21-23	22.0								Lean Clay (CL), Brown/Gray, Silty
6	23-25	20.6								Lean Clay with Sand (CL), Gray mottled Brown, With Coal
6	25-27	31.3								Lean Clay (CL), Gray, Silty
6	27-29	27.1								Sandy Silt (ML), Gray, Clayey
6	29-31	29.9								Silt (ML), Gray, Clayey
6	31-33	n/a								
6	33-35	28.2								Lean Clay (CL), Gray mottled Yellow Brown, Silty
6	35-37	27.1								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	37-39	21.0								Sandy Silt (ML), Light Gray mottled Yellow Brown, Clayey
6L	2.5-4	17.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
6L	5-6.5	21.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
6L ST1	7.5-9	26.6	121.9	96.3	0.44	91.60	74.1/17.5	41/23	$5.47x10^{-7}$	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist
6L	10-11.5	27.5								Lean Clay with Sand (CL), Brown, Silty
6L	12.5-14	23.5								Silty Clayey Sand (SC-SM), Light Gray mottled Yellow Brown
6L	15-16.5	24.9								Clayey Sand (SC), Yellow Brown mottled Light Gray
6L	17.5-19	35.9						31/19		Lean Clay (CL), Gray, Trace Organics
6L	20-21.5	21.1								Silty Clayey Sand (SC-SM), Gray
6L	22.5-24	24.0								Silty Clayey Sand (SC-SM), Light Gray mottled Light Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
6CCR	2-3.5	15.5								Ash/Cinders, Black, Clayey
6CCR	4.5-6	13.3								Ash/Cinders/Coal, Black, Clayey
6CCR	7-8.5	29.4								Ash, Gray
6CCR	9.5-11	39.1								Silt (ML), Brown mottled Light Gray
6CCR	12-13.5	44.4								Silt (ML), Light gray
6CCR	14.5-16	51.6								Silt (ML), Light Gray mottled Brown
6CCR	17-18.5	87.7								Silt (ML), Dark Brown mottled Light Brown
6CCR	19.5-21	106.5								Silt (ML), Dark Brown
6CCR	22-23.5	97.4								Silt (ML), Dark Brown mottled Brown
7	2.5-3	15.1								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray
7	4.5-5	21.8								Lean Clay (CL), Light Brown/Brown mottled Yellow Brown, With Fat Clay Seams
7	7.5-8	21.1								Fat Clay (CH), Light Brown mottled Light Gray, Silty, With Lean Clay Seams
7	10-10.5	21.3								Lean Clay (CL), Light Brown mottled Brown/Light Gray, Silty
7	12-12.5	24.7								Lean Clay (CL), Brown mottled Light Brown, Silty
7	15-15.5	21.1								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, With Organics
7	17.5-18	19.5								Sandy Lean Clay (CL), Brown mottled Light Gray
7 ST	19.5-21.5	25.8	120.2	95.5	0.55	97.70	62.2/35.5	63/20	$1.71x10^{-8}$	Fat Clay (CH), Brown/ Yellow Brown mottled Light Gray, Silty, Stiff, Moist
7	23-23.5	24.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
7	25-25.5	26.1								Fat Clay (CH/CL), Light Gray mottled Yellow Brown
7	27.5-28	28.6								Silty Clayey Sand (SC-SM), Brown mottled Yellow Brown
7	30-30.5	30.7								Sandy Silt (ML), Light Brown, With Fat Clay Seams
7	32.5-33	38.1								Fat Clay (CH), Light Gray, With Silty Sand Seams
7	35-36.5	32.4								Silt (ML), Gray, Clayey
7	37-37.5	39.2								Silt (ML), Brown, Clayey
7CCR	2-3.5	26.5								Silt (ML), Brown, Clayey
7CCR	4.5-6	46.8								Silt (ML), Brown, Clayey, With Cinders
7CCR	7-8.5	54.9								Silt (ML), Brown, Clayey
7CCR	9.5-11	55.5								Sandy Silt (ML), Light Gray
7CCR	12-13.5	42.7								Silt (ML), Light Gray
7CCR	14.5-16	49.5								Silt (ML), Light Gray mottled Dark Brown
7CCR	17-18.5	45.8								Silty Sand (SM), Light Gray
7L	2-3.5	16.8								Fat Clay (CH), Yellow Brown mottled Light Gray
7L	4.5-6	14.6								Fat Clay (CH), Light Gray mottled Brown over Sandy Lean Clay (CL), Yellow Brown mottled Light Brown
7L	7-8.5	24.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown over Poorly Graded Sand (SP), Yellow Brown, Fine, Silty
7L	9.5-11	27.3								Fat Clay (CH), Light Brown mottled Brown, Silty, Trace Sand
7L	12-13.5	37.7								Silt (ML), Brown
7L	15-16.5	29.2						33/25		Silt (ML), Brown, Trace Sand
7L	17-18.5	26.0								Fat Clay (CH/CL), Brown, Silty, Trace Sand

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
8L	3-3.5	15.5								Fat Clay (CH), Yellow Brown mottled Light Brown
8L	5.5-6	14.1								Lean Clay (CL), Yellow Brown mottled Brown
8L	7.5-8	27.2								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L	10.5-11	27.8								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L ST5	12-14'	23.8	126.4	102.1	0.33	69.80	56.6/13.2	26/19	$3.41x10^{-6}$	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist
8L	15.5-16	29.8								Sandy Lean Clay (CL), Light Gray, Silty
8L	17.5-18	33.5								Sandy Lean Clay (CL), Light Gray, Silty, With Organics
8L	20.5-21	32.3						39/26		Silt (ML), Gray, With Lean Clay (CL) Seams
8L	22.5-23	26.7						31/21		Lean Clay (CL), Gray, Silty
8U	2-3.5	24.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	4.5-6	22.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	7-8.5	23.8								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
8U ST8	9.5-11.5	24.0	125.7	101.4	0.55	90.60	68.1/22.5	48/21	$2.25x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
8U	12-13.5	22.5								Fat Clay (CH), Light Gray mottled Yellow Brown
8U	14.5-16	23.9								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray
8U	17-18.5	21.9								Lean Clay (CL), Brown mottled Yellow Brown Light Gray, Silty
8U ST16	19.5-21.5	25.7	127.1	101.1	0.80	95.50	79.7/15.8	45/19	$9.40x10^{-9}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
8U	22-23.5	27.8								Lean Clay (CL), Brown, Silty
8U	24.5-26	31.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	27-28.5	31.7								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	29.5-31	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	32-33.5	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
9L	2-2.5	23.6								Sandy Lean Clay (CL), Light Brown mottled Light Gray
9L	4.5-5	24.6								Lean Clay with Sand (CL), Light Brown mottled Light Gray/Yellow Brown, Silty
9L ST	7-9'	28.0	126.5	98.8	0.15	79.90	65.0/14.9	26/17	$2.55x10^{-6}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist
9L	10.5-11	55.9								Silty Clayey Sand (SC-SM), Gray, With Organics
9L	13-13.5	27.2								Sandy Silt (ML), Gray, Clayey
9L	15.5-16	28.1						33/22		Lean Clay (CL), Gray, Silty
9L	18-18.5	28.6						46/21		Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
9U	2-3.5	19.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
9U	4.5-5	20.3								Fat Clay (CH), Brown mottled Light GrayYellow Brown
9U	7-8.5	19.9								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	9.5-11	n/a								
9U	12-13.5	25.5								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	14.5-16	22.2								Fat Clay (CH), Gray mottled Yellow Brown
9U	17-18.5	23.6								Lean Clay with Sand (CL), Brown mottled Light Brown/Light Gray
9U ST 16	19.5-21.5	22.4	125.2	102.3	0.95	96.00	78.6/17.4	46/22	$2.63x10^{-8}$	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist
9U	22-23.5	21.3								Lean Clay (CL), Brown mottled Light Gray/Yellow Brown
9U	24.5-26	25.2								Fat Clay (CH), Gray mottled Yellow Brown, Trace Coal
9U	26-28	23.3								Fat Clay (CH), Yellow Brown mottled Light Brown/Light Gray
9U	28-30	28.7								Fat Clay (CH), Yellow Brown mottled Light Gray
9U	30-32	29.4								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	32-34	29.5								Fat Clay (CH/CL), Gray mottled Light Gray, Silty
9U	34-36	29.7								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9U	36-38	29.5								Sandy Lean Clay (CL), Gray mottled Light Gray
9U	38-40	24.6								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9CCR	2-3.5	15.0								Sandy Lean Clay (CL), Gray mottled Light Brown
9CCR	4.5-5	42.3								Silt (ML), Gray mottled Light Gray
9CCR	7-8.5	64.2								Silt (ML), Gray mottled Light Gray
9CCR ST8	9.5-11.5	23.2	126.9	103.0	0.72	94.50	66.6/27.9	46/21	$9.55x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist
9CCR	12-13.5	46.9								Silt (ML), Gray mottled Light Gray
9CCR	14.5-16	41.4								Silt (ML), Gray mottled Light Gray
9CCR	17-18.5	41.0								Silt (ML), Gray mottled Light Gray
10CCR	2-3.5	25.9								Ash/Cinders, Gray
10CCR	4.5-5	13.8								Ash/Cinders, Gray
10CCR	7-8.5	28.7								Ash, Brown/Light Gray
10CCR	9.5-11	38.2								Ash, Brown/Light Gray
10CCR	12-13.5	58.1								Ash, Brown/Light Brown
10CCR	14.5-16	27.2								Ash/Cinders, Dark Gray mottled Light Brown
10CCR	17-18.5	52.9								Ash, Brown/Gray
10CCR	19.5-21	59.5								Ash/Cinders, Gray mottled Brown
10CCR	22-23.5	58.0								Ash/Cinders, Gray mottled Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
11U	2-3.5	18.0								Sandy Lean Clay (CL), Dark Brown
11U	4.5-5	20.4								Lean Clay with Sand (CL), Yellow Brown mottled Brown
11U	7-8.5	23.5								Fat Clay (CH), Light Gray mottled Yellow Brown, Trace Sand
11U ST8	9.5-11.5	21.8	129.9	106.7	0.80	92.50	52.4/40.1	36/20	$1.38x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
11U	12-13.5	23.2								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray, Trace Sand
11U	14.5-16	20.7								Lean Clay (CL), Brown mottled Yellow Brown
11U	17-18.5	28.6								Lean Clay (CL), Brown mottled Light Brown
11U ST16	19.5-21.5	25.7	123.1	97.9	0.50	95.90	66.8/29.1	48/21	$3.04x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist
11U	22-23.5	25.8								Fat Clay (CH), Yellow Brown mottled Brown
11U	24.5-26	28.3						34/21		Lean Clay (CL), Yellow Brown mottled Brown, Silty
11U	27-28.5	25.9								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
12L	3.5-4	14.5								Fat Clay (CH), Brown mottled Light Brown
12L	5.5-6	17.4								Fat Clay (CH), Brown mottled Light Brown/Yellow Brown
12L	8.5-9	23.2								Fat Clay (CH/CL), Yellow Brown mottled Light Gray
12L	11.5-12	24.5								Fat Clay (CH), Brown mottled Light Gray/Yellow Brown
12L	14-14.5	24.5								Lean Clay (CL), Light Gray mottled Yellow Brown/Gray
12L ST	14.5-16	23.2	127.7	103.6	0.55	87.10	71.6/15.5	30/19	$9.69x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
12L	19-19.5	22.9								Lean Clay (CL), Light Gray mottled Yellow Brown
12L	20-20.5	10.0								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown
12L	23-23.5	13.0								Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
12U	2-3.5	19.0								Lean Clay (CL), Brown, Silty
12U	4.5-5	17.1								Lean Clay (CL), Brown mottled Light Brown/Reddish Brown, Black Oxidation, Silty
12U	7-8.5	20.0								Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
12U ST8	9.5-11.5	21.8	129.5	106.2	0.75	95.20	69.6/25.6	45/22	$3.13x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	12-13.5	17.3								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
12U	14.5-16	15.2								Lean Clay (CL), Brown, With Lime Fines, Trace Gravel
12U	17-18.5	18.9								Lean Clay (CL), Brown, With Ash/Coal
12U ST16	19.5-21.5	21.6	123.3	101.4	0.95	96.10	73.0/23.1	42/22	$1.03x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	22-23.5	25.6								Lean Clay (CL), Brown mottled Reddish Brown, Silty
12U	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Reddish Oxidation, Silty
12U	27-28.5	25.2								Lean Clay (CL), Light Gray mottled Yellow Brown/Light Brown, Reddish Oxidation, Silty
13L	2-3.5	15.9								Lean Clay (CL), Brown
13L	4.5-5	17.4								Lean Clay (CL), Brown
13L	7-8.5	19.3								Lean Clay (CL), Brown mottled Yellow Brown
13L	9.5-11	19.6								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13L	12-13.5	23.5								Lean Clay (CL), Brown mottled Reddish Brown
13L	14.5-16	27.4								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown, Black Oxidation

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

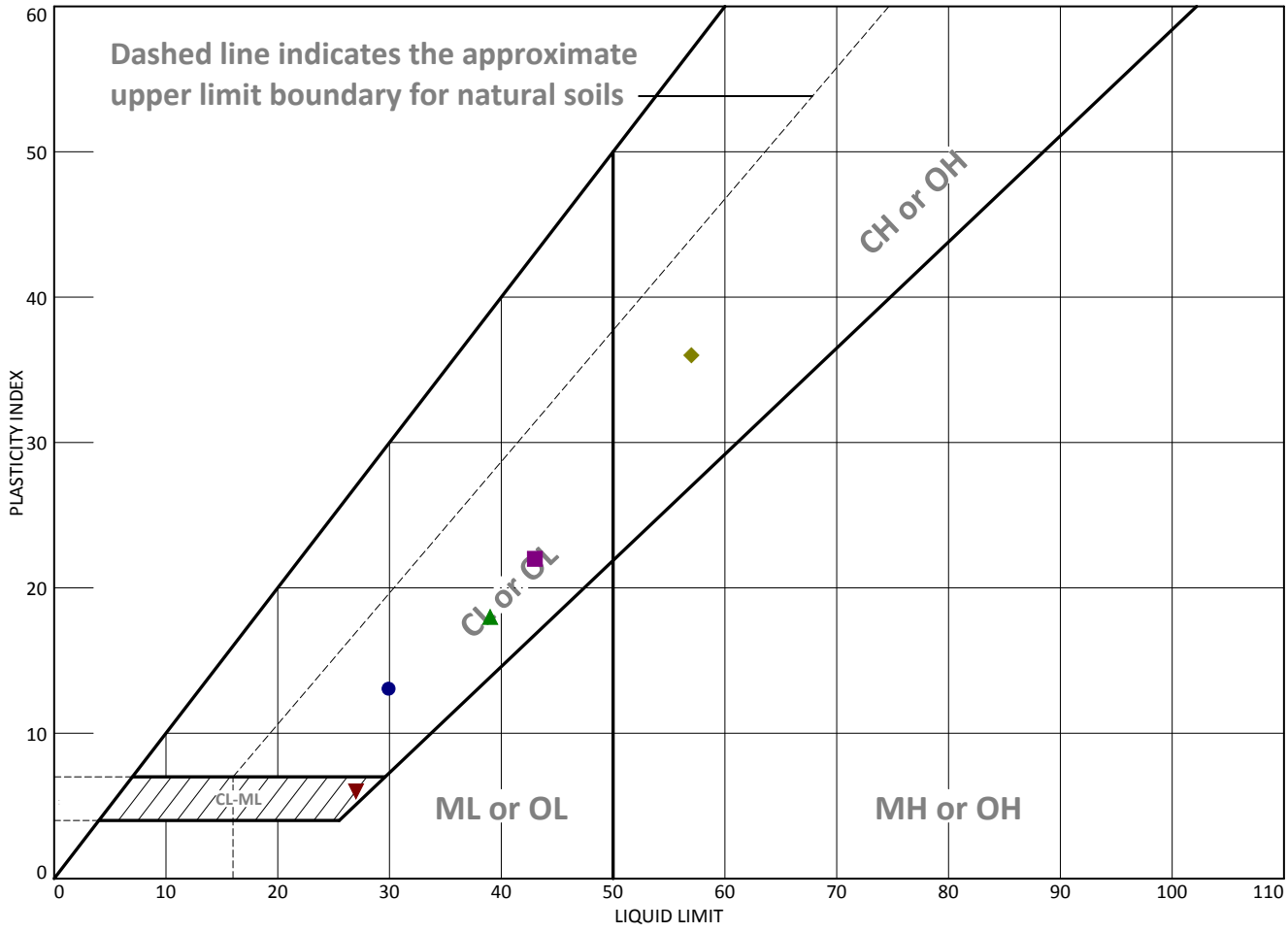
Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
13BN	2-3.5	18.6								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Silty
13BN	4.5-5	21.1								Lean Clay (CL), Light Brown mottled Reddish Brown
13BN	7-8.5	15.5								Lean Clay (CL), Light Brown mottled Reddish Brown, Silty
13BN ST7	8.5-10.5	18.4	132.2	111.6	0.95	90.90	74.9/16.0	34/20	$8.84x10^{-9}$	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist
13BS	2-3.5	16.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	4.5-5	15.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	7-8.5	19.1								Lean Clay (CL), Brown mottled Light Brown/Light Gray
13BS ST7	8.5-10.5	21.1	127.5	105.3	0.95	94.90	78.6/16.3	52/25	$2.32x10^{-8}$	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist
13LF	2-3.5	12.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13LF	4.5-5	22.3								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams
13LF	7-8.5	21.0								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams, Over Light Gray Ash
13LF	9.5-11	21.4								Ash, Light Gray
13LF	12-13.5	21.1								Ash, Light Gray
13LF	14.5-16	19.1								Ash, Light Gray
13LF	17-18.5	20.9								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Over Light Gray Ash
13LF	19.5-21	21.6								Ash, Yellow Brown mottled Light Gray
13LF	22-23.5	24.8								Ash, Yellow Brown
13LF	24.5-26	28.3								Ash, Yellow Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist	30	17	13	98.2	85.7	CL
■	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist	43	21	22	99.8	97.6	CL
▲	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist	39	21	18	99.6	84.4	CL
◆	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	57	21	36	98.1	91.7	CH
▼	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist	27	21	6	98.3	87.7	CL-ML

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 1	**Depth:** 24½-26½ ft.	**Sample Number:**
■	**Location:** Boring 1L	**Depth:** 22-24 ft.	**Sample Number:** 18
▲	**Location:** Boring 1 LL	**Depth:** 14½-16½ ft.	**Sample Number:** 12
◆	**Location:** Boring 2	**Depth:** 22-24 ft.	**Sample Number:** 8
▼	**Location:** Boring 2L	**Depth:** 7-9 ft.	**Sample Number:** 6

Remarks:

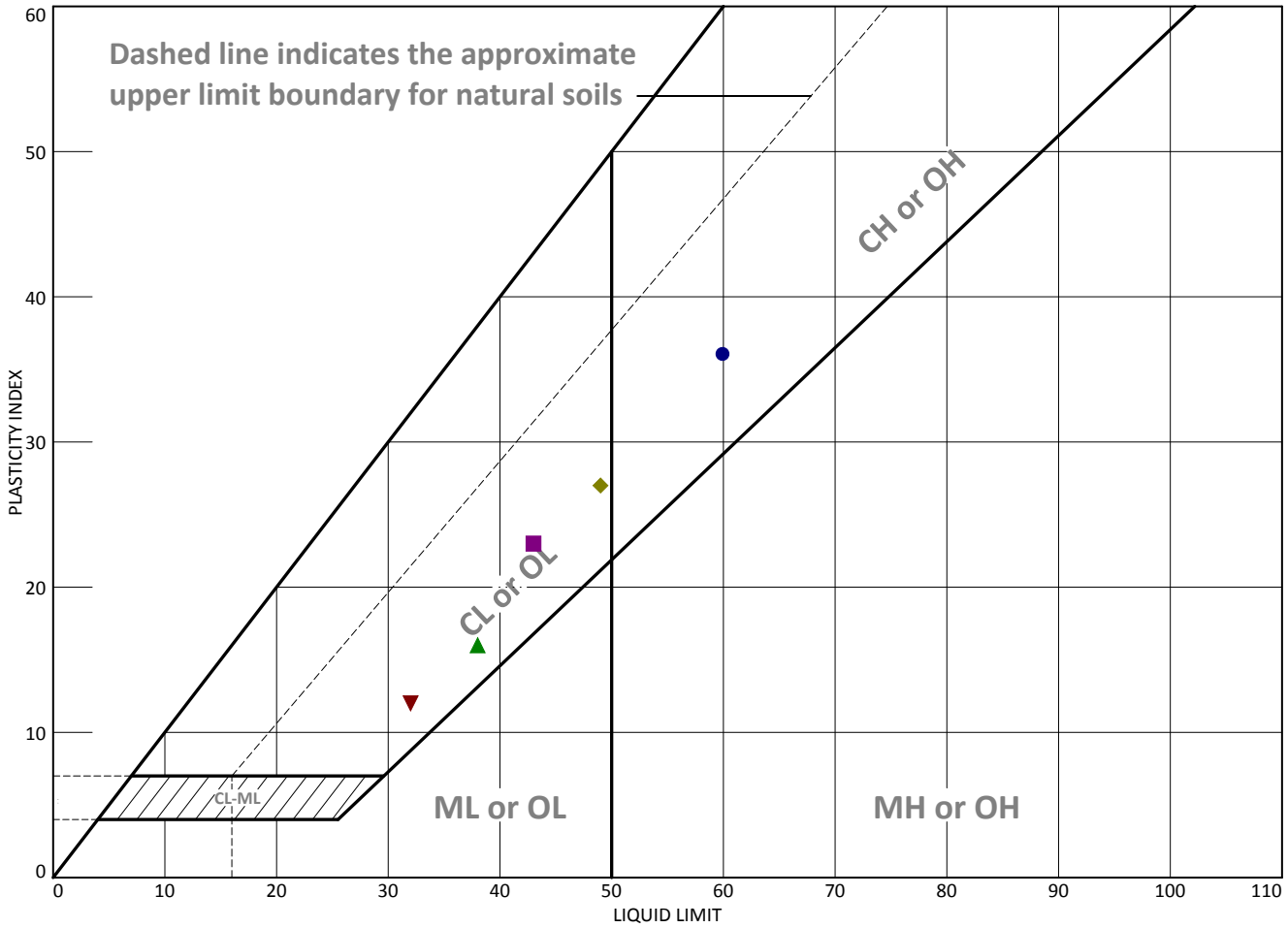
- ● Natural Moisture = 27.9%
- ■ Natural Moisture = 30.7%
- ▲ Natural Moisture = 24.7%
- ◆ Natural Moisture = 26.8%
- ▼ Natural Moisture = 25.5%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-1

Tested By: ○ DAW □ MAS △ DAW ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist	60	24	36	99.3	98.1	CH
■	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist	43	20	23	98.5	95.0	CL
▲	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist	38	22	16	90.3	81.1	CL
◆	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	49	22	27	99.5	97.2	CL
▼	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist	32	20	12	97.4	87.9	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 3 ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
■	**Location:** Boring 3 ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
▲	**Location:** Boring 3U ST8	**Depth:** 9½-11 ft.	**Sample Number:** 8
◆	**Location:** Boring 4	**Depth:** 19½-21½ ft.	**Sample Number:**
▼	**Location:** Boring 4L	**Depth:** 12-14 ft.	**Sample Number:** 10

Remarks:

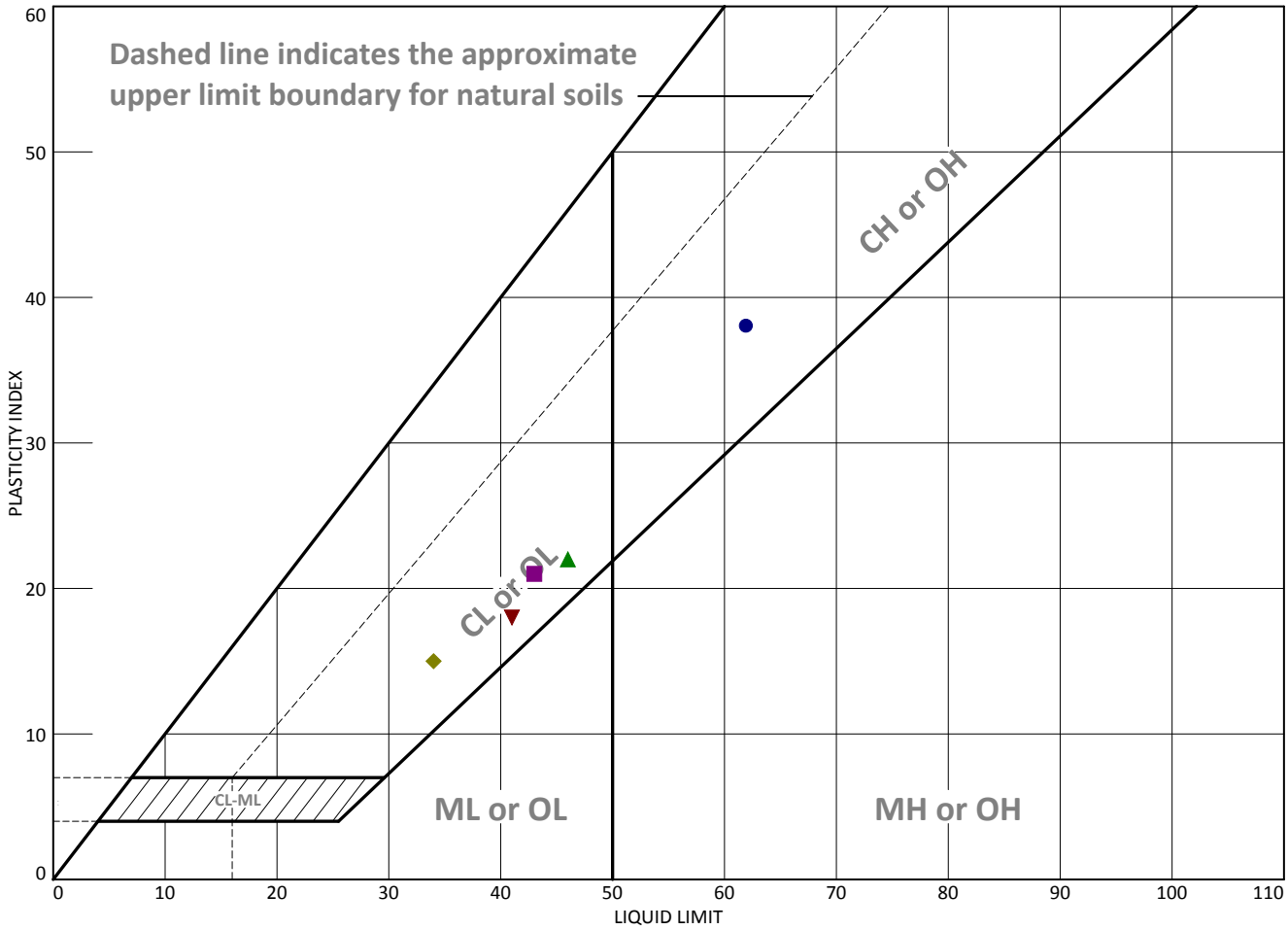
- ● Natural Moisture = 25.8%
- ■ Natural Moisture = 25.8%
- ▲ Natural Moisture = 21.3%
- ◆ Natural Moisture = 28.3%
- ▼ Natural Moisture = 27.4%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-2

Tested By: ○ DAW □ BRH △ DAW ◇ DAW ▽ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	62	24	38	99.4	97.1	CH
■	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist	43	22	21	98.7	90.2	CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	46	24	22	98.3	94.6	CL
◆	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	19	15	99.0	90.2	CL
▼	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist	41	23	18	99.6	91.6	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 4U	**Depth:** 27-29 ft.	**Sample Number:** 22
■	**Location:** Boring 5	**Depth:** 24½-26½ ft.	**Sample Number:** 10
▲	**Location:** Boring 5L	**Depth:** 9½-11 ft.	**Sample Number:**
◆	**Location:** Boring 6	**Depth:** 17-19 ft.	**Sample Number:** 8
▼	**Location:** Boring 6L	**Depth:** 7½-9 ft.	**Sample Number:** ST1

Remarks:

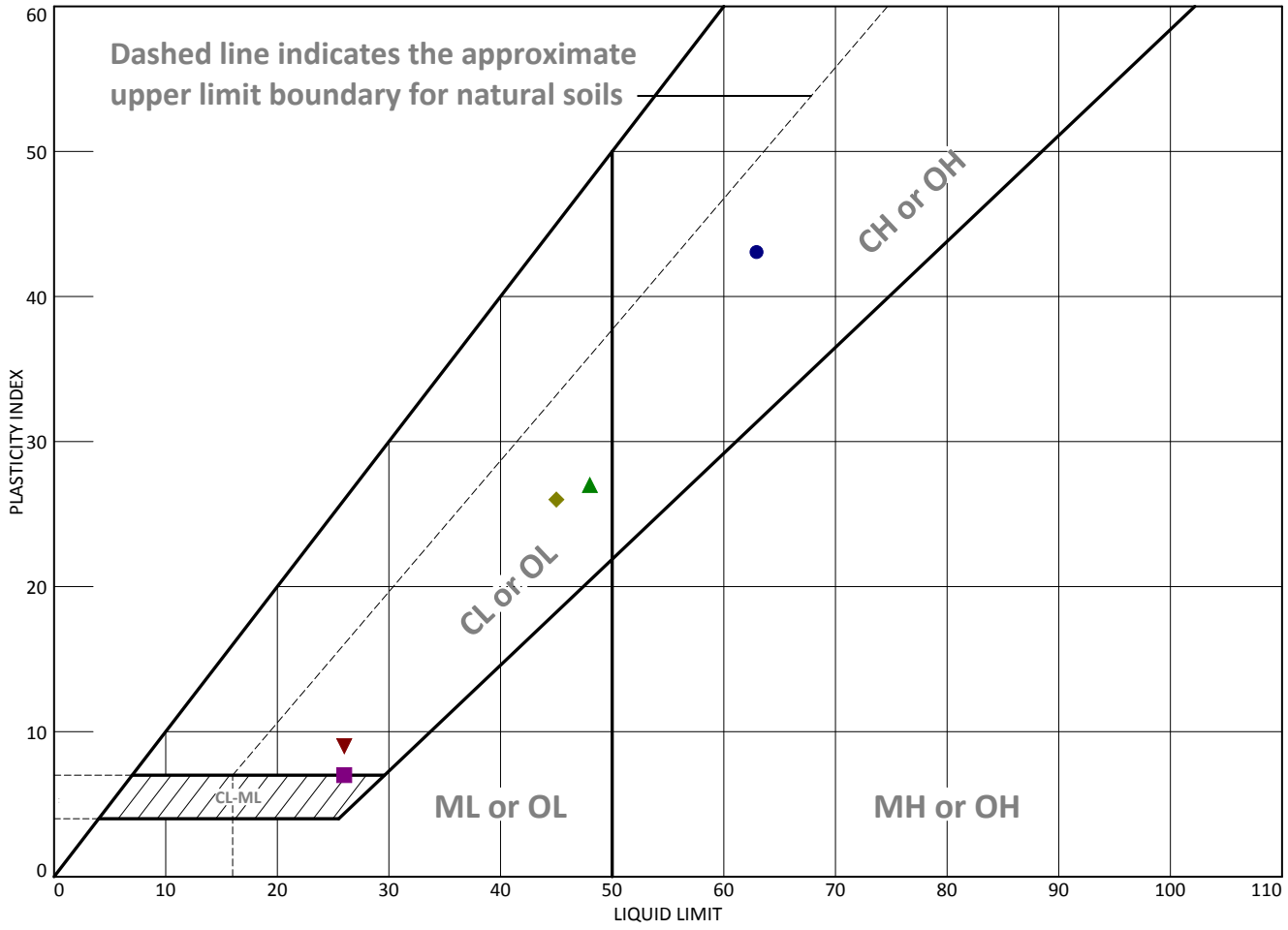
- ● Natural Moisture = 26.9%
- ■ Natural Moisture = 24.3%
- ▲ Natural Moisture = 28.8%
- ◆ Natural Moisture = 21.9%
- ▼ Natural Moisture = 26.6%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-3

Tested By: ○ MAS □ DAW △ DAW ◇ DAW ▽ BRH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist	63	20	43	98.8	97.7	CH
■	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist	26	19	7	99.8	69.8	CL-ML
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	48	21	27	96.6	90.6	CL
◆	Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist	45	19	26	99.3	95.5	CL
▼	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist	26	17	9	98.4	79.9	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 7	**Depth:** 19½-21½ ft.	**Sample Number:** 7
■	**Location:** Boring 8L	**Depth:** 12-14 ft.	**Sample Number:** 5
▲	**Location:** Boring 8U ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
◆	**Location:** Boring 8U ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
▼	**Location:** Boring 9L	**Depth:** 7½-9 ft.	**Sample Number:**

Remarks:

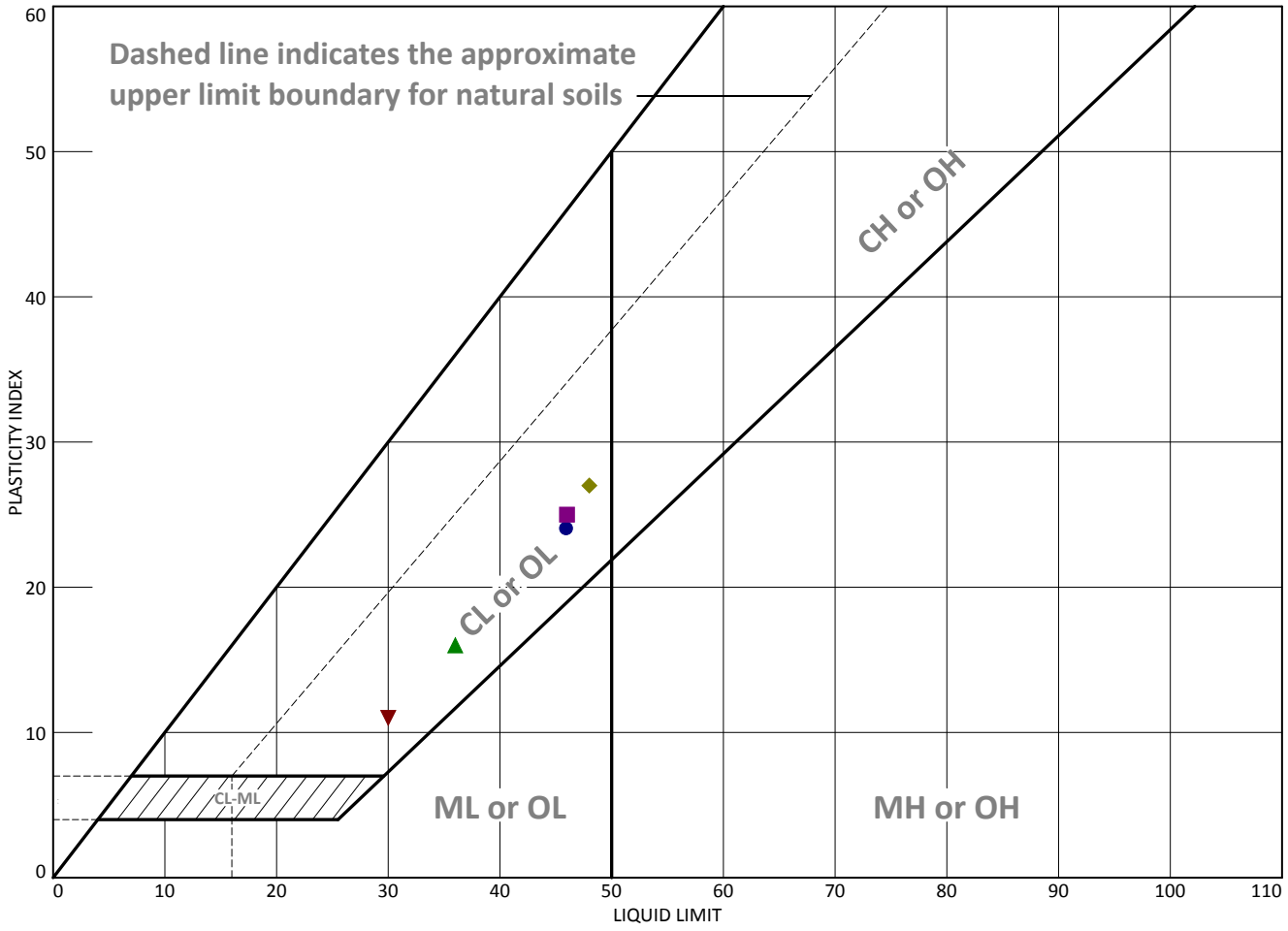
- ● Natural Moisture = 25.8%
- ■ Natural Moisture = 23.8%
- ▲ Natural Moisture = 24.0%
- ◆ Natural Moisture = 25.7%
- ▼ Natural Moisture = 28.0%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-4

Tested By: ○ DJS □ DAW △ BRH ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist	46	22	24	99.7	96.0	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist	46	21	25	99.2	94.5	CL
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	36	20	16	98.2	92.5	CL
◆	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist	48	21	27	99.2	95.9	CL
▼	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	30	19	11	99.8	87.1	CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

●	**Location:** Boring 9U ST16	**Depth:** 19½-21½ ft.	**Sample Number:** 16
■	**Location:** Boring 9 CCR ST8	**Depth:** 9½-11½ ft.	**Sample Number:** 8
▲	**Location:** Boring 11U ST8	**Depth:** 9½-11½ ft.	**Sample Number:**
◆	**Location:** Boring 11U ST16	**Depth:** 19½-21½ ft.	**Sample Number:**
▼	**Location:** Boring 12L	**Depth:** 14½-16 ft.	**Sample Number:**

Remarks:

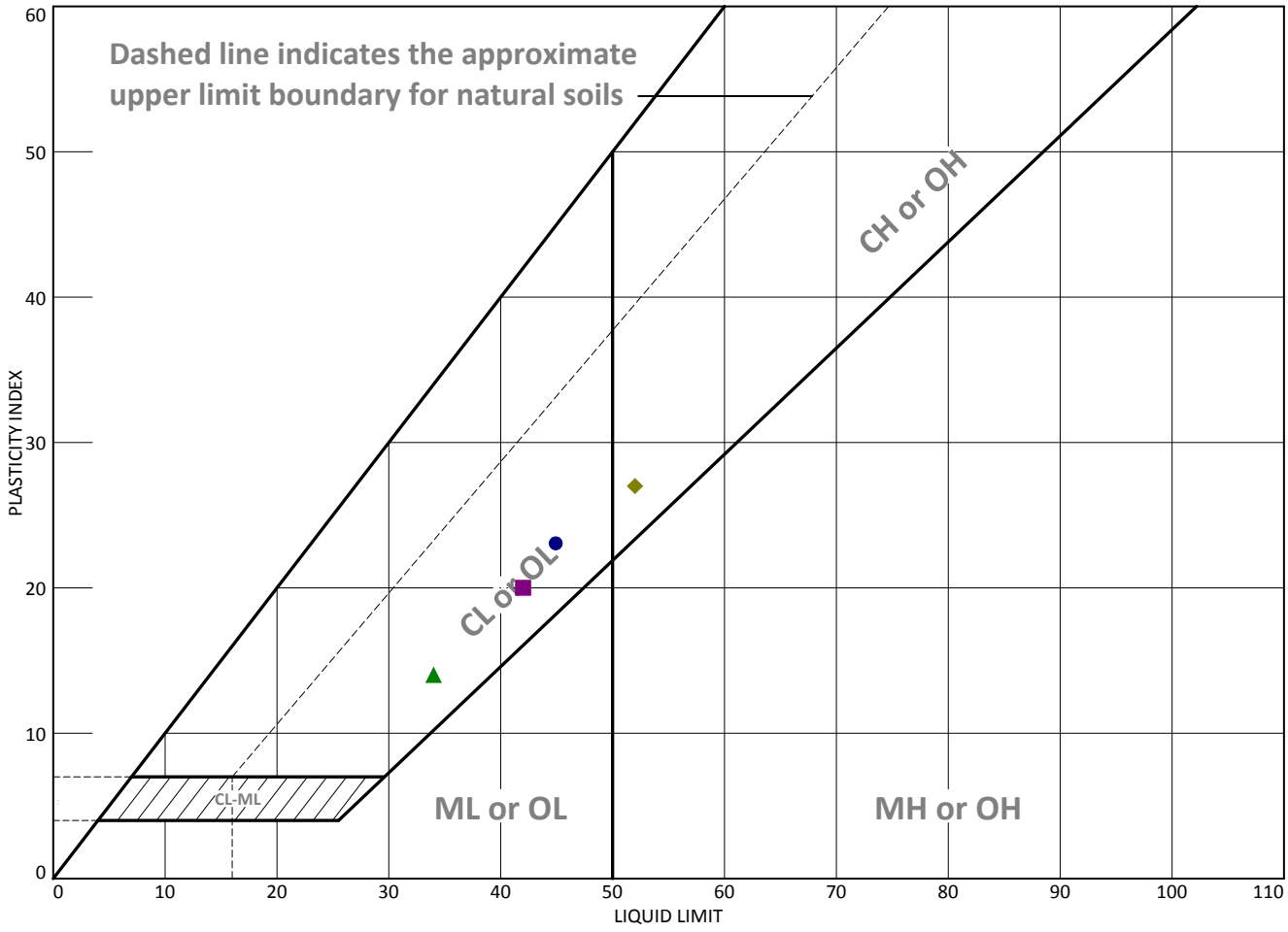
- ● Natural Moisture = 22.4%
- ■ Natural Moisture = 23.2%
- ▲ Natural Moisture = 21.8%
- ◆ Natural Moisture = 25.7%
- ▼ Natural Moisture = 23.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-5

Tested By: ○ NPP □ NPP △ MAS ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	45	22	23	99.6	95.2	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	42	22	20	99.3	96.1	CL
▲	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	20	14	99.9	90.9	CL
◆	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist	52	25	27	99.3	94.9	CH

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 12U ST8 **Depth:** 9½-11½ ft. **Sample Number:** 8

■ **Location:** Boring 12U ST16 **Depth:** 19½-21½ ft. **Sample Number:** 16

▲ **Location:** Boring 13 BN ST7 **Depth:** 8½-10½ ft. **Sample Number:** 7

◆ **Location:** Boring 13 BS ST7 **Depth:** 8½-10½ ft. **Sample Number:** 7

Remarks:

● Natural Moisture = 21.8%

■ Natural Moisture = 21.6%

▲ Natural Moisture = 18.4%

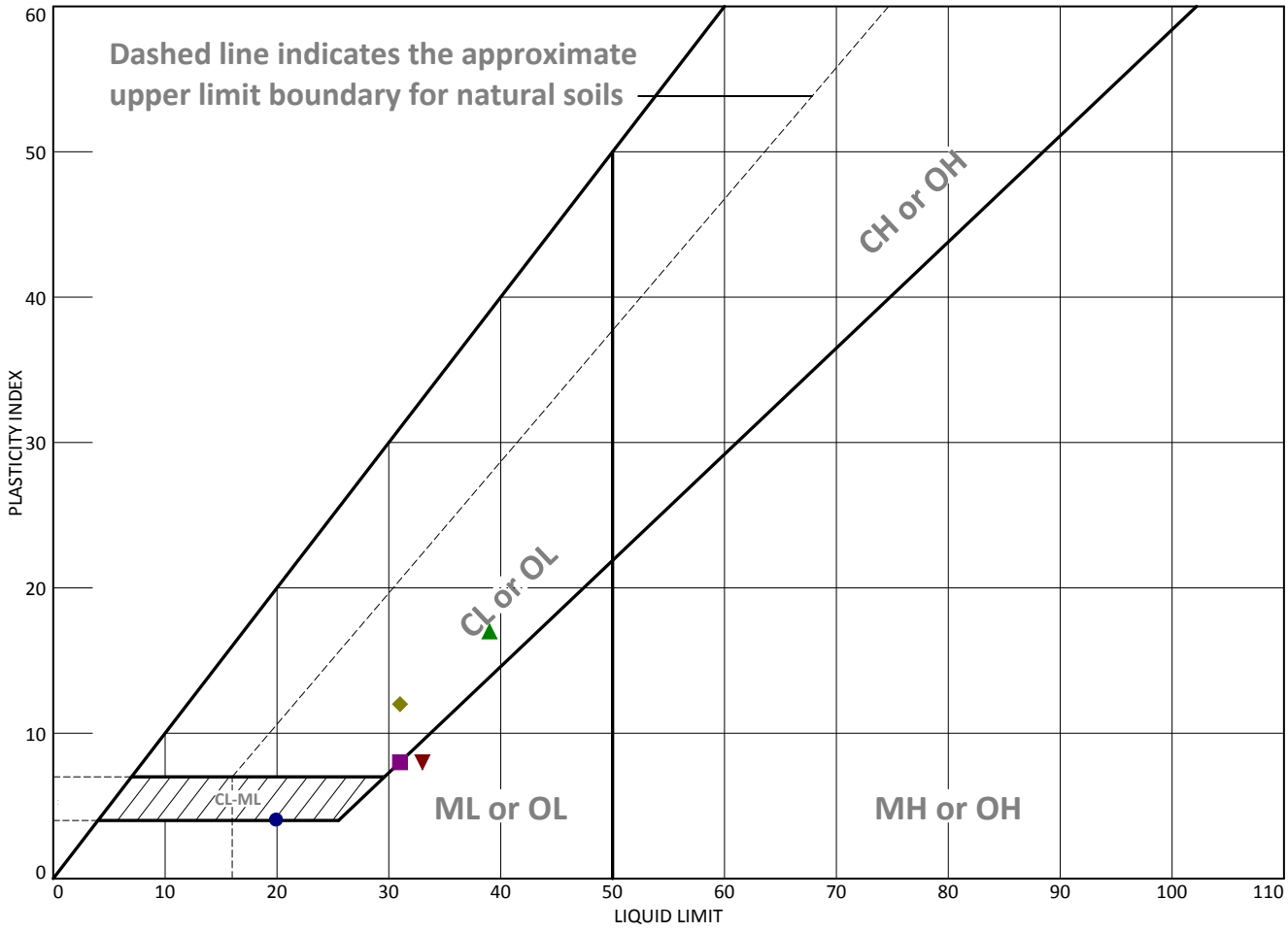
◆ Natural Moisture = 21.1%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-6

Tested By: ○ DAW □ DAW △ MAS ◇ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Moist	20	16	4			CL-ML
■	Lean Clay (CL/ML), Yellow Brown mottled Light Gray, Black Oxidation	31	23	8			CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty	39	22	17			CL
◆	Lean Clay (CL), Gray, Trace Organics	31	19	12			CL
▼	Silt (ML), Brown, Trace Sand	33	25	8			ML

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 2L **Depth:** 14½-16 **Sample Number:**

■ **Location:** Boring 4L **Depth:** 17-18½ ft. **Sample Number:**

▲ **Location:** Boring 5L **Depth:** 17-17½ ft. **Sample Number:**

◆ **Location:** Boring 6L **Depth:** 17½-19 ft. **Sample Number:** 7

▼ **Location:** Boring 7L **Depth:** 15-16½ ft. **Sample Number:** 6

Remarks:

● Natural Moisture = 23.6%

■ Natural Moisture = 27.4%

▲ Natural Moisture = 28.3%

◆ Natural Moisture = 35.9%

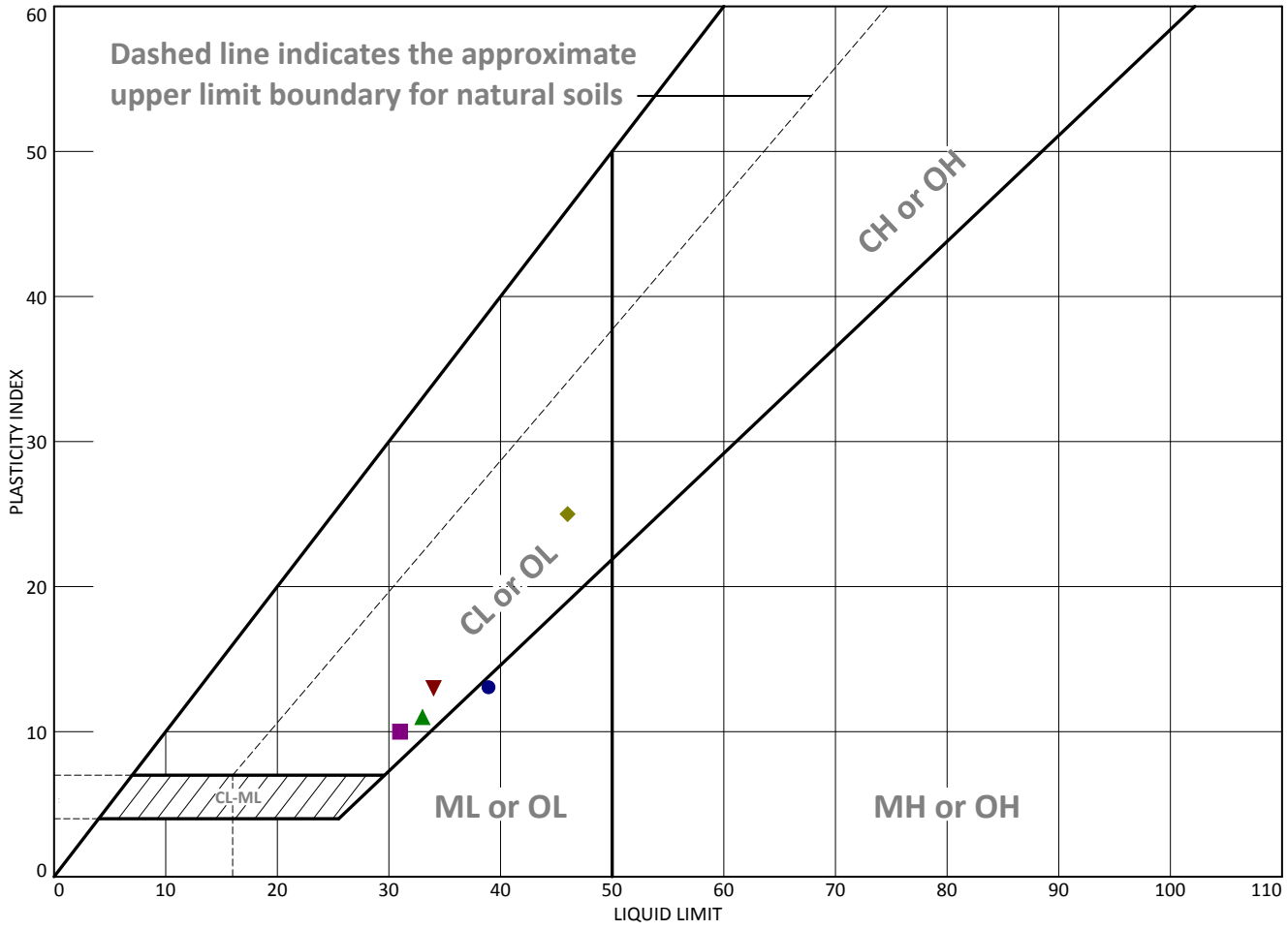
▼ Natural Moisture = 29.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-7

Tested By: DAW **Checked By:** NAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt (ML), Gray, With Lean Clay (CL) Seams	39	26	13			ML
■	Lean Clay (CL), Gray, Silty	31	21	10			CL
▲	Lean Clay (CL), Gray, Silty	33	22	11			CL
◆	Lean Clay (CL), Gray, Silty	46	21	25			CL
▼	Lean Clay (CL), Yellow Brown mottled Brown, Silty	34	21	13			CL

Project No. 23-1071 **Client:** Andrews Engineering

Project: Springfield, IL Ash Ponds

● **Location:** Boring 8L **Depth:** 20½-21 ft.
■ **Location:** Boring 8L **Depth:** 22½-23 ft.
▲ **Location:** Boring 9L **Depth:** 15½-16 ft.
◆ **Location:** Boring 9L **Depth:** 18-18½ ft.
▼ **Location:** Boring 11U **Depth:** 24½-26 ft.

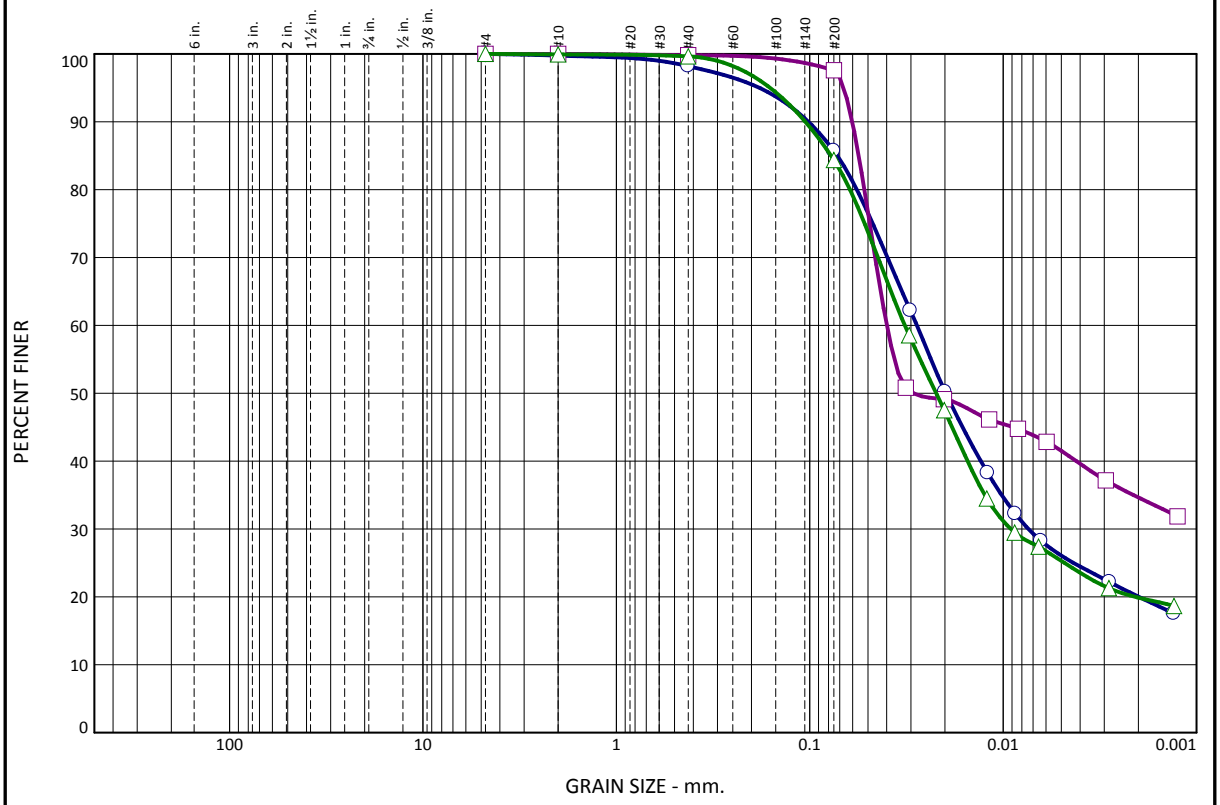
Remarks:
● Natural Moisture = 32.3%
■ Natural Moisture = 26.7%
▲ Natural Moisture = 28.1%
◆ Natural Moisture = 28.6%
▼ Natural Moisture = 28.3%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-8

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	14.3	65.7	20.0	CL	30	17	13
□	0.0	0.0	2.4	63.0	34.6	CL	43	21	22
△	0.0	0.0	15.6	64.5	19.9	CL	39	21	18

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0279	0.0399	0.0322
D_{30}	0.0074		0.0091
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	100.0	100.0
#10	99.7	100.0	99.9
#40	98.2	99.8	99.6
#200	85.7	97.6	84.4

Material Description

○ Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist

□ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist

△ Lean Clay with Sand (CL), Gray, Silty, Medium, Moist

REMARKS:

○ Natural Moisture = 27.9%

□ Natural Moisture = 30.7%

△ Natural Moisture = 24.7%

○ Location: Boring 1 Depth: 24½-26½ ft. Sample Number:

□ Location: Boring 1L Depth: 22-24 ft. Sample Number: 18

△ Location: Boring 1 LL Depth: 14½-16½ ft. Sample Number: 12

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

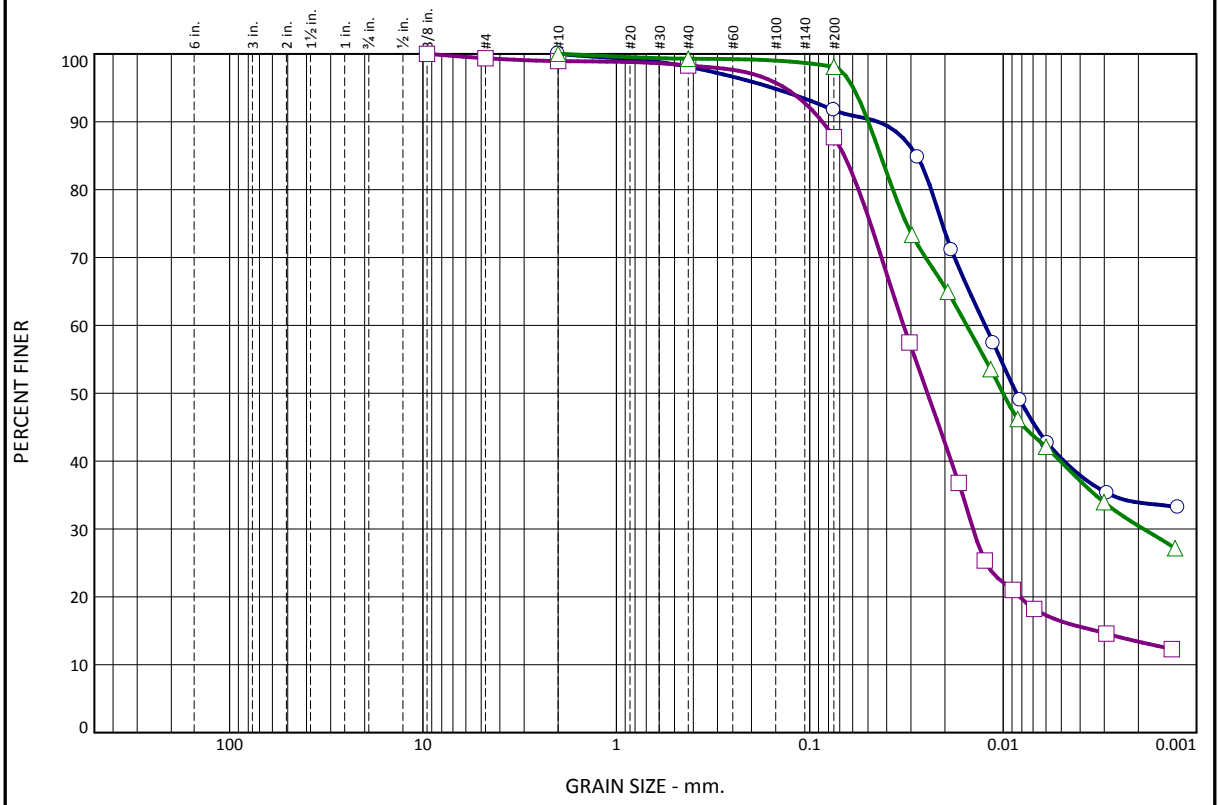
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-1

Tested By: DAW / DJS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	8.3	57.8	33.9	CH	57	21	36
□	0.0	0.6	11.7	74.3	13.4	CL-ML	27	21	6
△	0.0	0.0	1.9	67.6	30.5	CH	60	24	36

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
GRAIN SIZE			
D_{60}	0.0124	0.0328	0.0154
D_{30}		0.0143	0.0019
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4		99.4	
#10	100.0	98.9	100.0
#40	98.1	98.3	99.3
#200	91.7	87.7	98.1

Material Description

○ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

□ Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist

△ Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 26.8%

□ Natural Moisture = 25.5%

△ Natural Moisture = 25.8%

○ Location: Boring 2 Depth: 22-24 ft. Sample Number: 8

□ Location: Boring 2L Depth: 7-9 ft. Sample Number: 6

△ Location: Boring 3 ST8 Depth: 9½-11½ ft. Sample Number: 8

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

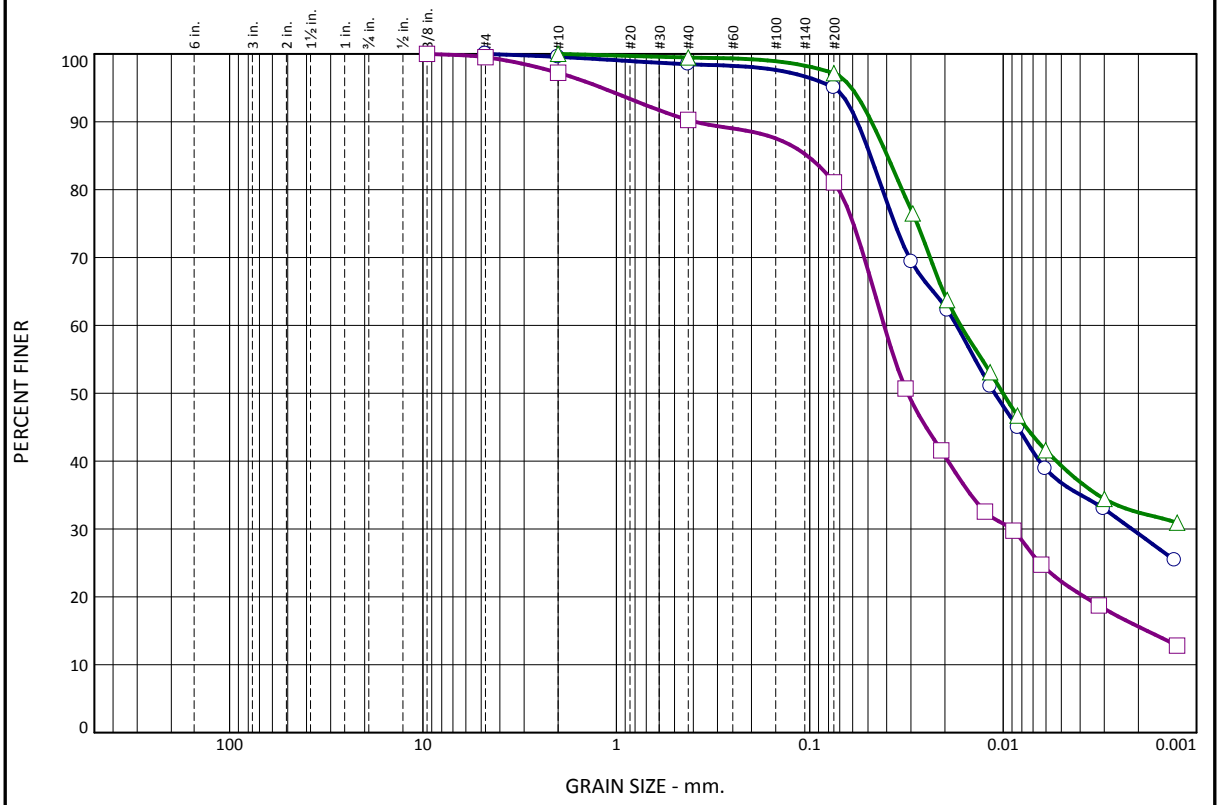
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-2

Tested By: ○ DAW □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.0	65.7	29.3	CL	43	20	23
□	0.0	0.5	18.4	65.5	15.6	CL	38	22	16
△	0.0	0.0	2.8	64.8	32.4	CL	49	22	27

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
	GRAIN SIZE		
D_{60}	0.0174	0.0413	0.0166
D_{30}	0.0022	0.0090	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.5	
#10	99.6	97.2	100.0
#40	98.5	90.3	99.5
#200	95.0	81.1	97.2

Material Description

○ Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist

△ Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 21.3%

△ Natural Moisture = 28.3%

○ Location: Boring 3 ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 3U ST8 Depth: 9½-11 ft. Sample Number: 8

△ Location: Boring 4 Depth: 19½-21½ ft. Sample Number:

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

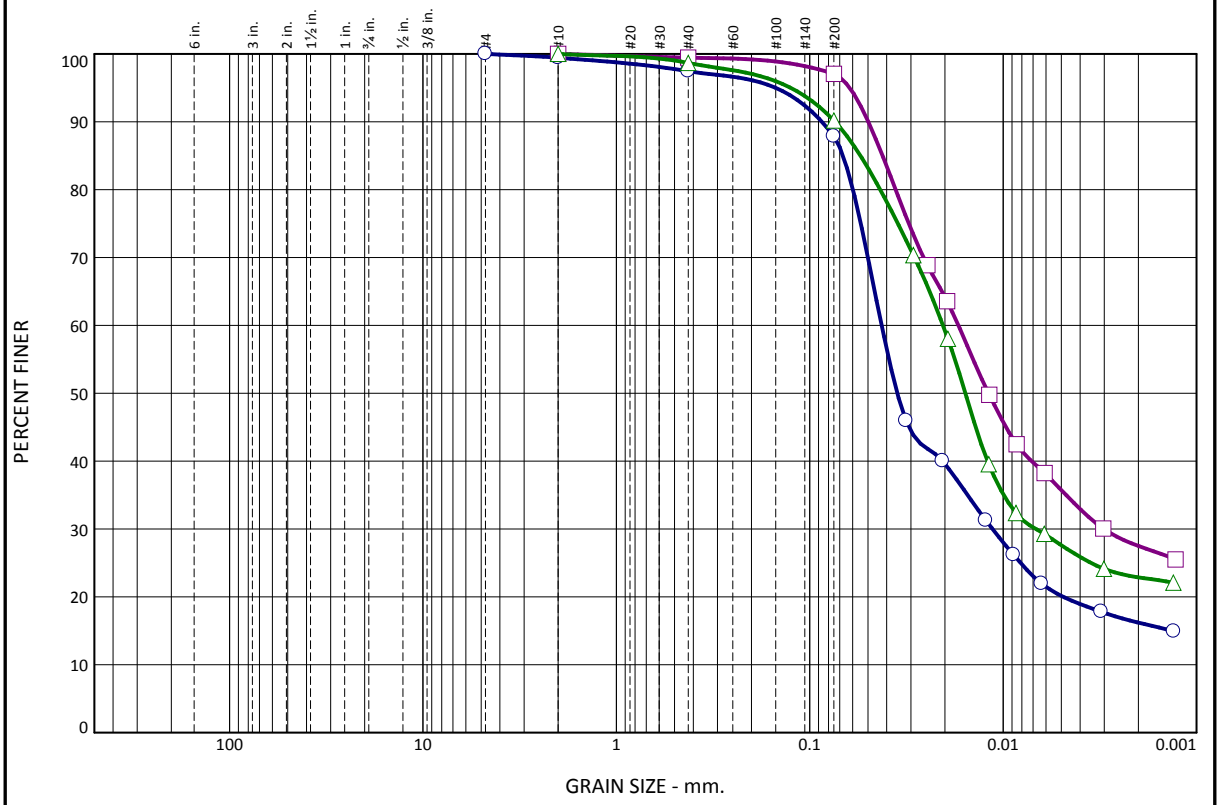
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-3

Tested By: ○ DAW □ DAW △ DAW / MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.1	71.7	16.2	CL	32	20	12
□	0.0	0.0	2.9	69.6	27.5	CH	62	24	38
△	0.0	0.0	9.8	67.3	22.9	CL	43	22	21

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0425	0.0170	0.0205
D_{30}	0.0114	0.0030	0.0068
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		
#10	99.4	100.0	100.0
#40	97.4	99.4	98.7
#200	87.9	97.1	90.2

Material Description

○ Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist

□ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Gray/ Yellow Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 27.4%

□ Natural Moisture = 26.9%

△ Natural Moisture = 24.3%

○ Location: Boring 4L Depth: 12-14 ft. Sample Number: 10

□ Location: Boring 4U Depth: 27-29 ft. Sample Number: 22

△ Location: Boring 5 Depth: 24½-26½ ft. Sample Number: 10

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

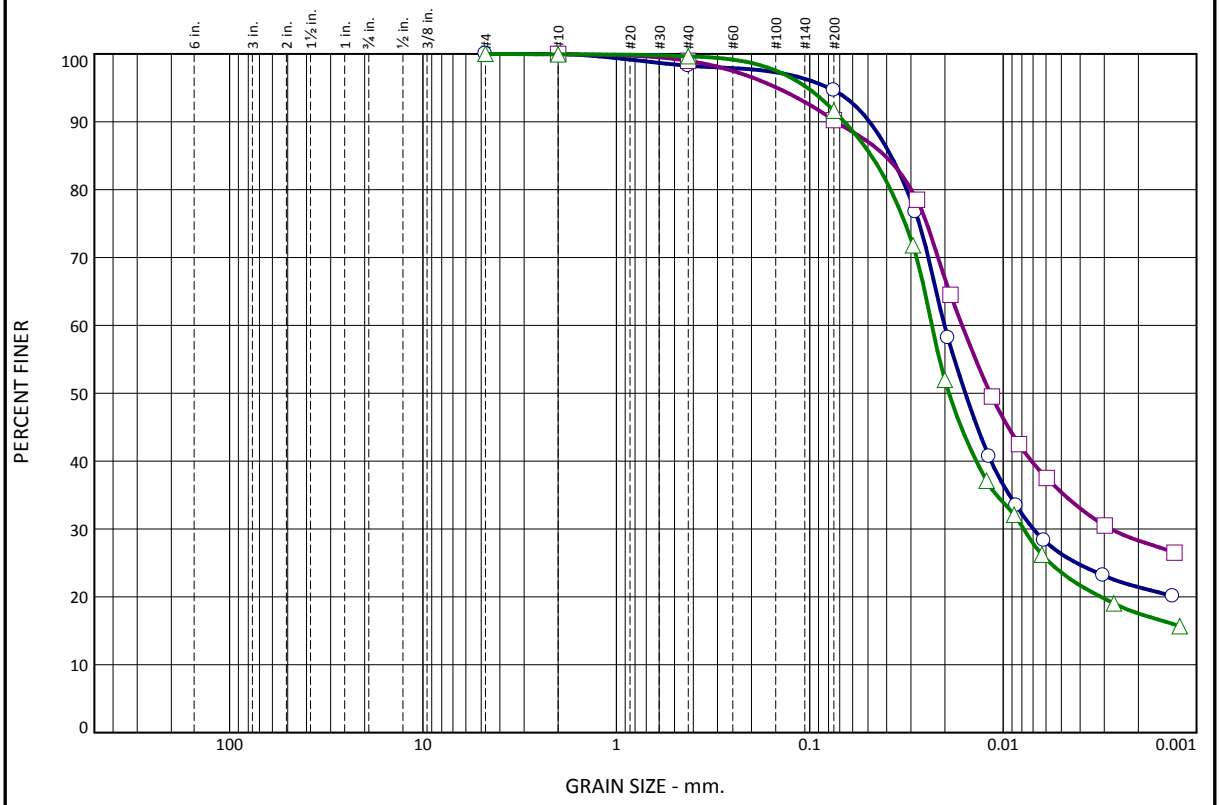
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-4

Tested By: ○ DAW / DJS □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.4	73.2	21.4	CL	46	24	22
□	0.0	0.0	9.8	61.9	28.3	CL	34	19	15
△	0.0	0.0	8.4	74.1	17.5	CL	41	23	18

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0201	0.0163	0.0234
D_{30}	0.0070	0.0028	0.0078
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	100.0	100.0	99.9
#40	98.3	99.0	99.6
#200	94.6	90.2	91.6

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 28.8%

□ Natural Moisture = 21.9%

△ Natural Moisture = 26.6%

○ Location: Boring 5L Depth: 9½-11 ft. Sample Number:

□ Location: Boring 6 Depth: 17-19 ft. Sample Number: 8

△ Location: Boring 6L Depth: 7½-9 ft. Sample Number: ST1

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

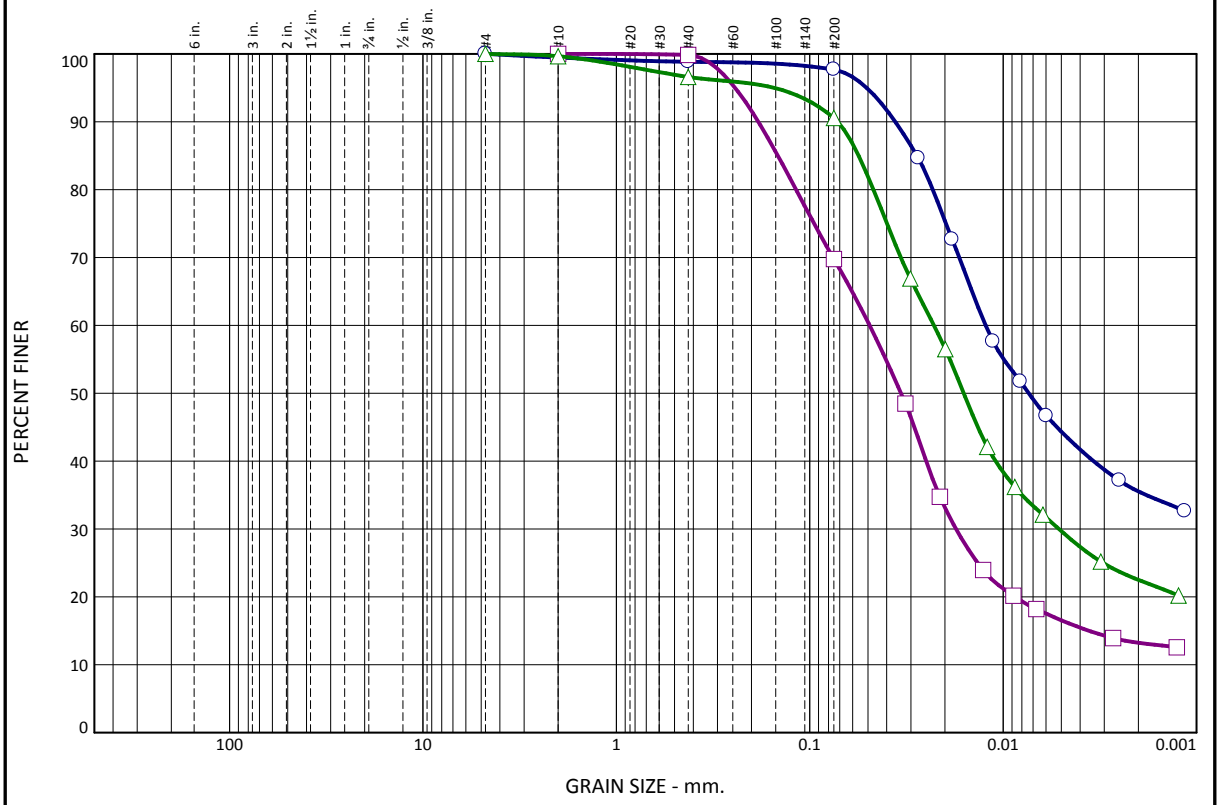
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-5

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	2.3	62.2	35.5	CH	63	20	43
□	0.0	0.0	30.2	56.6	13.2	CL-ML	26	19	7
△	0.0	0.0	9.4	68.1	22.5	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0123	0.0491	0.0228
D_{30}		0.0175	0.0052
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.5	100.0	99.6
#40	98.8	99.8	96.6
#200	97.7	69.8	90.6

Material Description

○ Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist

□ Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 23.8%

△ Natural Moisture = 24.0%

○ Location: Boring 7 Depth: 19½-21½ ft. Sample Number: 7

□ Location: Boring 8L Depth: 12-14 ft. Sample Number: 5

△ Location: Boring 8U ST8 Depth: 9½-11½ ft. Sample Number: 8

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

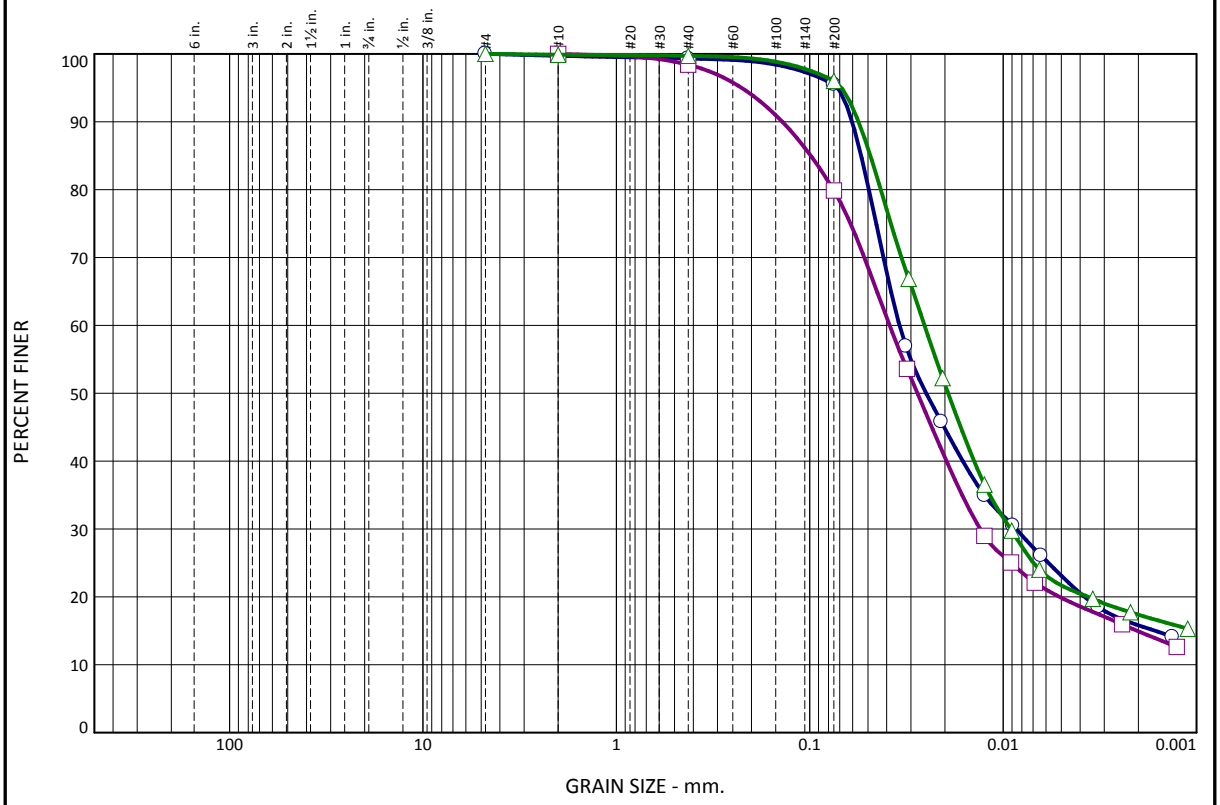
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-6

Tested By: DAW **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	4.5	79.7	15.8	CL	45	19	26
□	0.0	0.0	20.1	65.0	14.9	CL	26	17	9
△	0.0	0.0	4.0	78.6	17.4	CL	46	22	24

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0343	0.0386	0.0255
D_{30}	0.0086	0.0131	0.0091
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.7	100.0	99.9
#40	99.3	98.4	99.7
#200	95.5	79.9	96.0

Material Description

○ Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist

△ Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.7%

□ Natural Moisture = 28.0%

△ Natural Moisture = 22.4%

○ Location: Boring 8U ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 9L Depth: 7½-9 ft. Sample Number:

△ Location: Boring 9U ST16 Depth: 19½-21½ ft. Sample Number: 16

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

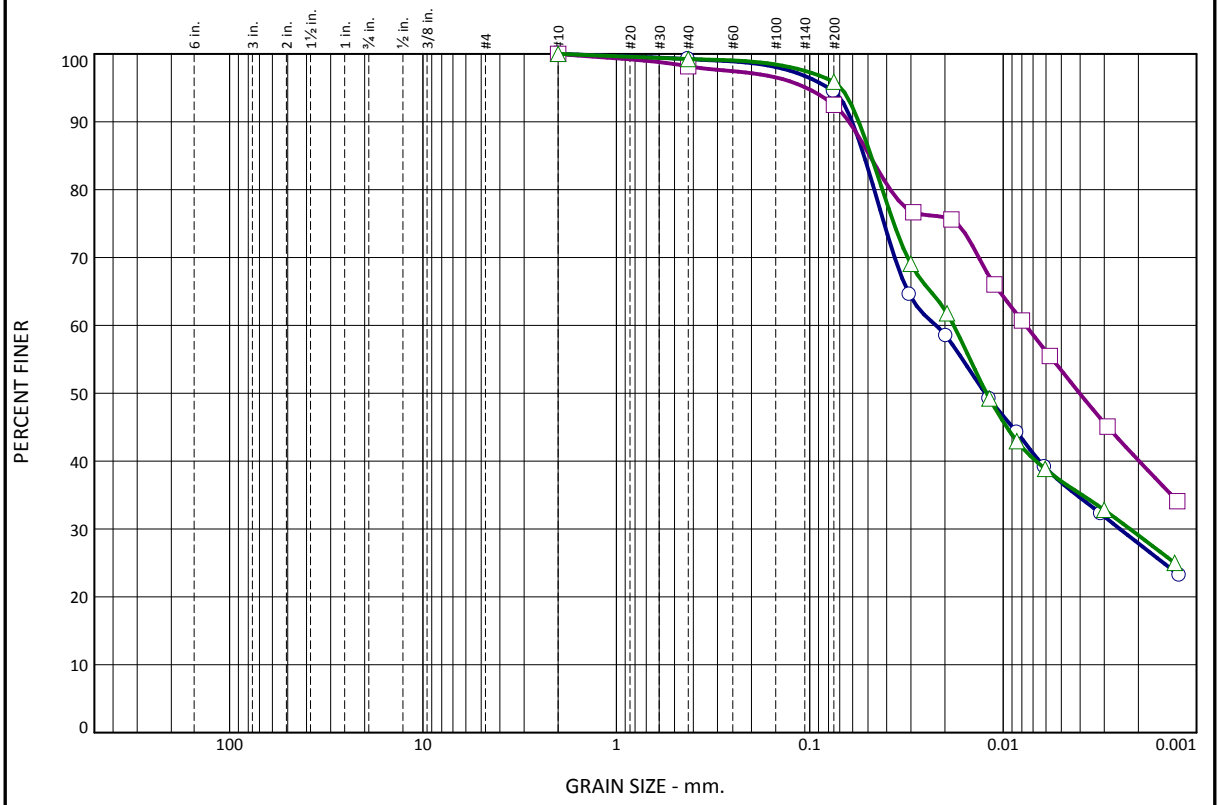
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-7

Tested By: ○ DAW □ DAW △ MAS **Checked By:** NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.5	66.6	27.9	CL	46	21	25
□	0.0	0.0	7.5	52.4	40.1	CL	36	20	16
△	0.0	0.0	4.1	66.8	29.1	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0222	0.0077	0.0180
D_{30}	0.0025		0.0022
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.2	98.2	99.2
#200	94.5	92.5	95.9

Material Description

○ Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 25.7%

○ Location: Boring 9 CCR ST8 Depth: 9½-11½ ft. Sample Number: 8

□ Location: Boring 11U ST8 Depth: 9½-11½ ft. Sample Number:

△ Location: Boring 11U ST16 Depth: 19½-21½ ft. Sample Number:

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

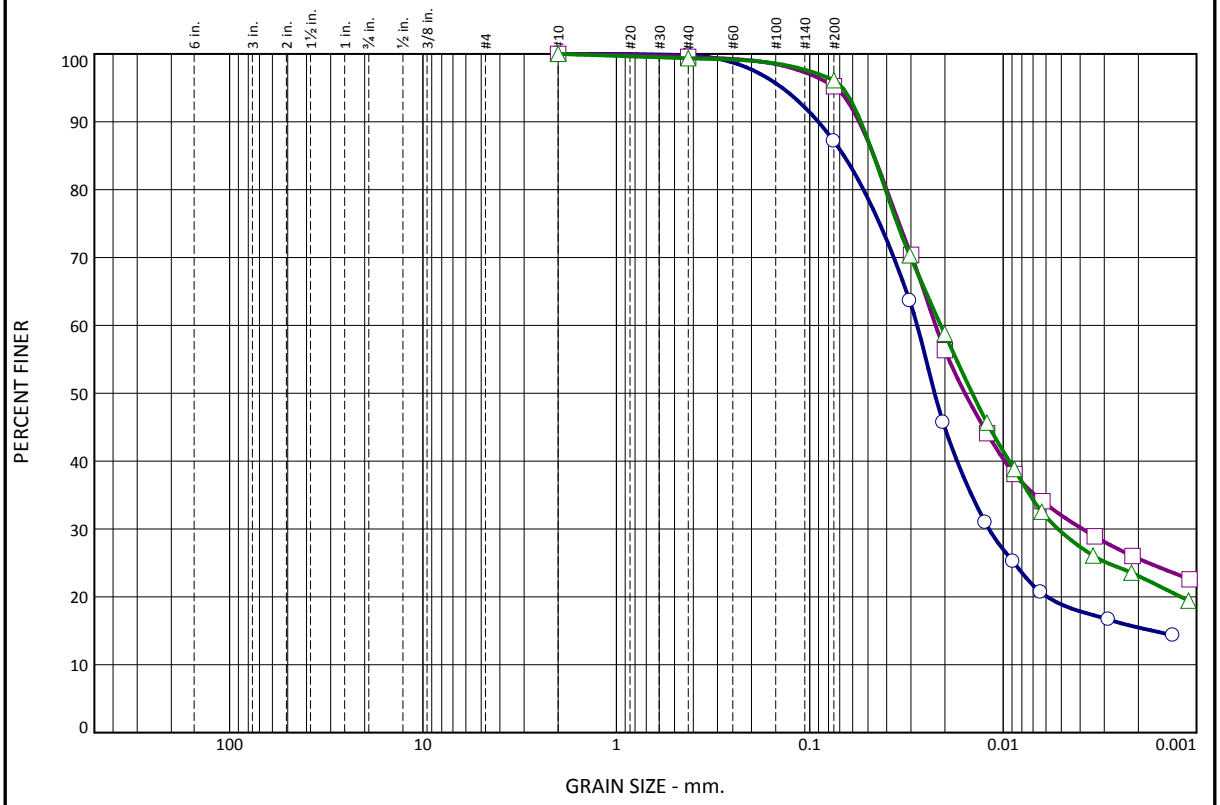
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-8

Tested By: DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.9	71.6	15.5	CL	30	19	11
□	0.0	0.0	4.8	69.6	25.6	CL	45	22	23
△	0.0	0.0	3.9	73.0	23.1	CL	42	22	20

SIEVE inches size	PERCENT FINER ○	□	△
	GRAIN SIZE		
D_{60}	0.0278	0.0224	0.0210
D_{30}	0.0119	0.0039	0.0052
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.8	99.6	99.3
#200	87.1	95.2	96.1

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 21.6%

○ Location: Boring 12L Depth: 14½-16 ft. Sample Number:

□ Location: Boring 12U ST8 Depth: 9½-11½ ft. Sample Number: 8

△ Location: Boring 12U ST16 Depth: 19½-21½ ft. Sample Number: 16

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

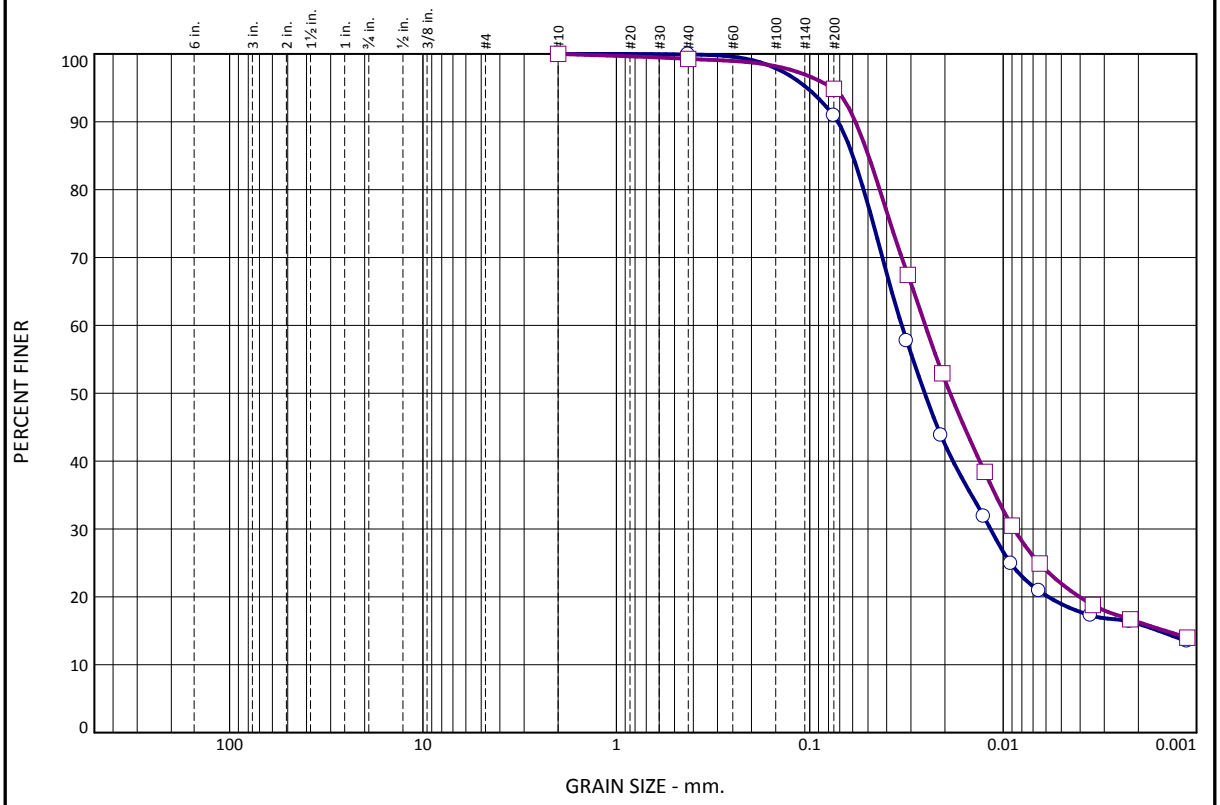
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-9

Tested By: ○ DAW □ MAS △ MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	9.1	74.9	16.0	CL	34	20	14
□	0.0	0.0	5.1	78.6	16.3	CH	52	25	27

SIEVE inches size	○	□
GRAIN SIZE		
D_{60}	0.0335	0.0253
D_{30}	0.0116	0.0088
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	○	□
#10	100.0	100.0
#40	99.9	99.3
#200	90.9	94.9

Material Description

○ Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 18.4%

□ Natural Moisture = 21.1%

○ Location: Boring 13 BN ST7 Depth: 8½-10½ ft. Sample Number: 7

□ Location: Boring 13 BS ST7 Depth: 8½-10½ ft. Sample Number: 7

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-10

Tested By: MAS

Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **17** P.I. **13**

BORING NO. **Boring 1** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **26.2%** INITIAL DRY DENSITY **100.8 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:12:00 PM		0.200	7.214	40.438		2.89	7.04	20.750	210.9		231.650		
3:12:00 PM	3:33:00 PM	0.200	7.214	40.438	1260	5.00	4.94	-0.300	210.9	1.00	210.600	1.35E-06	1.27E-06
3:33:00 PM	3:53:00 PM	0.200	7.214	40.438	1200	6.77	3.17	-18.000	210.9	1.00	192.900	1.31E-06	1.23E-06
3:53:00 PM	4:34:00 PM	0.200	7.214	40.438	2460	9.89	0.04	-49.250	210.9	1.00	161.650	1.28E-06	1.21E-06
													1.23E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.23 E-06 CM/SEC

REMARKS: Testing Completed 11/2/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **21** P.I. **22**

BORING NO. **Boring 1L** SAMPLE NO. **ST 18**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.4%** INITIAL DRY DENSITY **114.0 P.C.F.**

FINAL WATER CONTENT **16.1%** FINAL DRY DENSITY **117.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:42:00 PM		0.200	7.330	41.980		4.60	5.36	3.800	70.3		74.100		
12:42:00 PM	12:50:00 PM	0.200	7.330	41.980	480	5.82	4.15	-8.350	70.3	0.99	61.950	6.51E-06	6.14E-06
12:50:00 PM	1:32:00 PM	0.200	7.330	41.980	2520	9.50	0.50	-45.000	70.3	0.99	25.300	6.21E-06	5.85E-06
1:32:00 PM	1:42:30 PM	0.200	7.330	41.980	630	9.99	0.01	-49.900	70.3	1.00	20.400	5.97E-06	5.62E-06
													5.84E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.84 E-06 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Gray, Silty, Medium, Moist**

LIQUID LIMIT **39** PLASTIC LIMIT **21** P.I. **18**

BORING NO. **Boring 1LL** SAMPLE NO. **ST 12**

SAMPLE TYPE **ST** DEPTH **14½-16½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.8%** INITIAL DRY DENSITY **102.1 P.C.F.**

FINAL WATER CONTENT **22.8%** FINAL DRY DENSITY **103.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:32:00 PM		0.200	7.391	41.543		0.14	10.00	49.300	70.3		119.600		
2:32:00 PM	2:46:00 PM	0.200	7.391	41.543	840	3.35	6.78	17.150	70.3	1.00	87.450	6.63E-06	6.25E-06
2:46:00 PM	2:54:00 PM	0.200	7.391	41.543	480	4.75	5.38	3.150	70.3	1.00	73.450	6.47E-06	6.09E-06
2:54:00 PM	3:10:00 PM	0.200	7.391	41.543	960	6.82	3.31	-17.550	70.3	1.00	52.750	6.14E-06	5.78E-06
													6.02E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.02 E-06 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **57** PLASTIC LIMIT **21** P.I. **36**

BORING NO. **Boring 2** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.5%** INITIAL DRY DENSITY **101.8 P.C.F.**

FINAL WATER CONTENT **23.0%** FINAL DRY DENSITY **102.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:39:00 AM		0.200	6.980	41.931		4.53	4.63	0.500	210.9		211.400		
6:39:00 AM	6:52:00 AM	0.200	6.980	41.931	780	4.60	4.56	-0.200	210.9	1.00	210.700	7.08E-08	6.67E-08
6:52:00 AM	7:30:00 AM	0.200	6.980	41.931	2280	4.81	4.34	-2.350	210.9	1.05	208.550	7.49E-08	7.05E-08
7:30:00 AM	7:48:00 AM	0.200	6.980	41.931	1080	4.90	4.24	-3.300	210.9	1.11	207.600	7.04E-08	6.63E-08
													6.87E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.87 E-08 CM/SEC

REMARKS: Testing Completed 10/14/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist**

LIQUID LIMIT **27** PLASTIC LIMIT **21** P.I. **6**

BORING NO. **Boring 2L** SAMPLE NO. **6**

SAMPLE TYPE **ST** DEPTH **7.0-9.0 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **101.9 P.C.F.**

FINAL WATER CONTENT **23.5%** FINAL DRY DENSITY **103.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:28:00 PM		0.200	7.005	41.254		3.97	6.85	14.400	70.3		84.700		
3:28:00 PM	3:40:00 PM	0.200	7.005	41.254	720	6.71	4.10	-13.050	70.3	1.00	57.250	9.24E-06	8.70E-06
3:40:00 PM	3:50:00 PM	0.200	7.005	41.254	600	8.30	2.50	-29.000	70.3	1.01	41.300	9.24E-06	8.71E-06
3:50:00 PM	4:02:00 PM	0.200	7.005	41.254	720	9.47	1.33	-40.700	70.3	1.00	29.600	7.86E-06	7.40E-06
													8.24E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.24 E-06 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **60** PLASTIC LIMIT **24** P.I. **36**

BORING NO. **Boring 3** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **100.2 P.C.F.**

FINAL WATER CONTENT **26.1%** FINAL DRY DENSITY **99.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:53:00 AM		0.200	7.163	42.028		1.50	7.88	31.900	210.9		242.800		
5:53:00 AM	7:13:00 AM	0.200	7.163	42.028	4800	1.56	7.82	31.300	210.9	1.00	242.200	8.79E-09	8.28E-09
7:13:00 AM	7:38:00 AM	0.200	7.163	42.028	1500	1.58	7.80	31.100	210.9	1.00	242.000	9.39E-09	8.84E-09
7:38:00 AM	8:29:00 AM	0.200	7.163	42.028	3060	1.62	7.76	30.700	210.9	1.00	241.600	9.21E-09	8.68E-09
													8.50E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.50 E-09 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **20** P.I. **23**

BORING NO. **Boring 3** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.8%** INITIAL DRY DENSITY **95.1 P.C.F.**

FINAL WATER CONTENT **29.5%** FINAL DRY DENSITY **93.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:10:00 PM		0.200	7.432	42.077		5.34	4.67	-3.350	210.9		207.550		
12:10:00 PM	12:30:00 PM	0.200	7.432	42.077	1200	6.00	4.01	-9.950	210.9	1.00	200.950	4.76E-07	4.48E-07
12:30:00 PM	12:54:00 PM	0.200	7.432	42.077	1440	6.72	3.29	-17.150	210.9	1.00	193.750	4.48E-07	4.22E-07
12:54:00 PM	1:25:00 PM	0.200	7.432	42.077	1860	7.60	2.40	-26.000	210.9	1.01	184.900	4.44E-07	4.18E-07
													4.27E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.27 E-07 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist**

LIQUID LIMIT **38** PLASTIC LIMIT **22** P.I. **16**

BORING NO. **Boring 3U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.4%** INITIAL DRY DENSITY **101.2 P.C.F.**

FINAL WATER CONTENT **21.4%** FINAL DRY DENSITY **102.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:55:00 PM		0.200	7.483	41.834		2.21	6.92	23.550	351.5		375.050		
8:55:00 PM	7:04:00 AM	0.200	7.483	41.834	42180	3.58	5.53	9.750	351.5	1.01	361.250	1.59E-08	1.50E-08
7:04:00 AM	8:38:00 AM	0.200	7.483	41.834	5640	3.78	5.33	7.750	351.5	1.00	359.250	1.76E-08	1.66E-08
8:38:00 AM	12:03:00 PM	0.200	7.483	41.834	12300	4.18	4.92	3.700	351.5	1.03	355.200	1.65E-08	1.55E-08
													1.52E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.52 E-08 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **49** PLASTIC LIMIT **22** P.I. **27**

BORING NO. **Boring 4** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.5%** INITIAL DRY DENSITY **96.4 P.C.F.**

FINAL WATER CONTENT **23.8%** FINAL DRY DENSITY **100.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:09:00 PM		0.200	7.437	41.205		3.74	5.94	11.000	210.9		221.900		
7:09:00 PM	8:29:00 PM	0.200	7.437	41.205	4800	4.13	5.51	6.900	210.9	1.10	217.800	7.01E-08	6.61E-08
8:29:00 PM	9:00:00 PM	0.200	7.437	41.205	1860	4.30	5.34	5.200	210.9	1.00	216.100	7.60E-08	7.16E-08
9:00:00 PM	9:28:00 PM	0.200	7.437	41.205	1680	4.42	5.22	4.000	210.9	1.00	214.900	5.98E-08	5.64E-08
													6.53E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.53 E-08 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **32** PLASTIC LIMIT **20** P.I. **12**

BORING NO. **Boring 4L** SAMPLE NO. **ST 10**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.7%** INITIAL DRY DENSITY **100.7 P.C.F.**

FINAL WATER CONTENT **24.6%** FINAL DRY DENSITY **101.8 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:16:00 PM		0.200	7.397	41.013		1.20	8.82	38.100	140.6		178.700		
12:16:00 PM	1:03:00 PM	0.200	7.397	41.013	2820	3.75	6.23	12.400	140.6	1.02	153.000	9.93E-07	9.35E-07
1:03:00 PM	2:23:00 PM	0.200	7.397	41.013	4800	7.39	2.55	-24.200	140.6	1.01	116.400	1.03E-06	9.68E-07
2:23:00 PM	3:26:00 PM	0.200	7.397	41.013	3780	9.59	0.32	-46.350	140.6	1.01	94.250	1.01E-06	9.49E-07
													9.53E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.53 E-07 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS**

COMPUTED BY: **BJS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **62** PLASTIC LIMIT **24** P.I. **38**

BORING NO. **Boring 4U** SAMPLE NO. **ST 22**

SAMPLE TYPE **ST** DEPTH **27-29 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.8%** INITIAL DRY DENSITY **94.6 P.C.F.**

FINAL WATER CONTENT **28.1%** FINAL DRY DENSITY **95.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:47:00 PM		0.200	7.706	42.077		2.33	6.84	22.550	210.9		233.450		
12:47:00 PM	1:08:00 PM	0.200	7.706	42.077	1260	2.35	6.82	22.350	210.9	1.00	233.250	1.25E-08	1.17E-08
1:08:00 PM	2:20:00 PM	0.200	7.706	42.077	4320	2.42	6.74	21.600	210.9	1.14	232.500	1.37E-08	1.29E-08
2:20:00 PM	4:43:00 PM	0.200	7.706	42.077	8580	2.50	6.66	20.800	210.9	1.00	231.700	7.36E-09	6.93E-09
													9.17E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.17 E-09 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **22** P.I. **21**

BORING NO. **Boring 5** SAMPLE NO. **10**

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.5%** INITIAL DRY DENSITY **99.8 P.C.F.**

FINAL WATER CONTENT **23.7%** FINAL DRY DENSITY **100.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:59:00 PM		0.200	6.904	41.883		2.62	6.29	18.350	210.9		229.250		
1:59:00 PM	2:35:00 PM	0.200	6.904	41.883	2160	3.48	5.40	9.600	210.9	1.03	220.500	2.97E-07	2.80E-07
2:35:00 PM	3:06:00 PM	0.200	6.904	41.883	1860	4.16	4.69	2.650	210.9	1.04	213.550	2.84E-07	2.67E-07
3:06:00 PM	3:47:00 PM	0.200	6.904	41.883	2460	5.00	3.84	-5.800	210.9	1.01	205.100	2.71E-07	2.55E-07
													2.67E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.67 E-07 CM/SEC

REMARKS: Testing Completed 10/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **24** P.I. **22**

BORING NO. **Boring 5L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **29.0%** INITIAL DRY DENSITY **94.4 P.C.F.**

FINAL WATER CONTENT **28.4%** FINAL DRY DENSITY **94.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:33:00 PM		0.200	7.696	40.869		0.08	9.97	49.450	210.9		260.350		
12:33:00 PM	2:12:00 PM	0.200	7.696	40.869	5940	4.13	5.77	8.200	210.9	1.04	219.100	5.47E-07	5.15E-07
2:12:00 PM	2:38:00 PM	0.200	7.696	40.869	1560	5.12	4.77	-1.750	210.9	1.01	209.150	5.61E-07	5.28E-07
2:38:00 PM	3:21:00 PM	0.200	7.696	40.869	2580	6.62	3.24	-16.900	210.9	1.02	194.000	5.49E-07	5.17E-07
													5.18E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.18 E-07 CM/SEC

REMARKS: Testing Completed 10/16/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **19** P.I. **15**

BORING NO. **Boring 6** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **17-19 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.5%** INITIAL DRY DENSITY **106.8 P.C.F.**

FINAL WATER CONTENT **20.7%** FINAL DRY DENSITY **106.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:10:00 AM		0.200	8.199	42.418		3.33	6.20	14.350	210.9		225.250		
7:10:00 AM	8:01:00 AM	0.200	8.199	42.418	3060	3.49	6.04	12.750	210.9	1.00	223.650	4.50E-08	4.24E-08
8:01:00 AM	9:31:00 AM	0.200	8.199	42.418	5400	3.76	5.76	10.000	210.9	1.04	220.900	4.43E-08	4.17E-08
9:31:00 AM	10:31:00 AM	0.200	8.199	42.418	3600	3.95	5.57	8.100	210.9	1.00	219.000	4.64E-08	4.37E-08
													4.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.25 E-08 CM/SEC

REMARKS: Testing Completed 10/23/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **41** PLASTIC LIMIT **23** P.I. **18**

BORING NO. **Boring 6L-ST1** SAMPLE NO. **ST1**

SAMPLE TYPE **ST** DEPTH **7½-9ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **27.5%** INITIAL DRY DENSITY **95.2 P.C.F.**

FINAL WATER CONTENT **26.0%** FINAL DRY DENSITY **96.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:42:00 AM		0.200	7.625	39.301		1.80	7.77	29.850	210.9		240.750		
10:42:00 AM	11:10:00 AM	0.200	7.625	39.301	1680	2.98	6.56	17.900	210.9	1.03	228.800	5.88E-07	5.54E-07
11:10:00 AM	11:59:00 AM	0.200	7.625	39.301	2940	4.88	4.61	-1.350	210.9	1.03	209.550	5.80E-07	5.46E-07
11:59:00 AM	12:16:00 PM	0.200	7.625	39.301	1020	5.49	3.98	-7.550	210.9	1.03	203.350	5.71E-07	5.38E-07
													5.47E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.47 E-07 CM/SEC

REMARKS: Testing Completed 10/20/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **63** PLASTIC LIMIT **20** P.I. **43**

BORING NO. **Boring 7** SAMPLE NO. **7**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.4%** INITIAL DRY DENSITY **95.5 P.C.F.**

FINAL WATER CONTENT **27.4%** FINAL DRY DENSITY **94.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:32:00 PM		0.200	7.478	40.869		0.20	9.40	46.000	210.9		256.900		
1:32:00 PM	3:08:00 PM	0.200	7.478	40.869	5760	0.35	9.25	44.500	210.9	1.00	255.400	1.86E-08	1.75E-08
3:08:00 PM	3:45:00 PM	0.200	7.478	40.869	2220	0.40	9.20	44.000	210.9	1.00	254.900	1.62E-08	1.52E-08
3:45:00 PM	4:16:00 PM	0.200	7.478	40.869	1860	0.45	9.15	43.500	210.9	1.00	254.400	1.93E-08	1.82E-08
													1.71E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.71 E-08 CM/SEC

REMARKS: Testing Completed 10/26/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **19** P.I. **7**

BORING NO. **Boring 8L** SAMPLE NO. **5**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.0%** INITIAL DRY DENSITY **101.1 P.C.F.**

FINAL WATER CONTENT **24.7%** FINAL DRY DENSITY **101.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:24:00 PM		0.200	7.620	41.302		4.90	5.01	0.550	70.3		70.850		
2:24:00 PM	3:27:00 PM	0.200	7.620	41.302	3780	8.66	1.24	-37.100	70.3	1.00	33.200	3.70E-06	3.49E-06
3:27:00 PM	3:48:00 PM	0.200	7.620	41.302	1260	9.36	0.54	-44.100	70.3	1.00	26.200	3.47E-06	3.27E-06
3:48:00 PM	4:08:00 PM	0.200	7.620	41.302	1200	9.90	0.00	-49.500	70.3	1.00	20.800	3.55E-06	3.34E-06
													3.41E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.41 E-06 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yelllow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 8U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.0%** INITIAL DRY DENSITY **102.4 P.C.F.**

FINAL WATER CONTENT **23.3%** FINAL DRY DENSITY **102.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:58:00 AM		0.200	7.280	41.398		5.13	4.40	-3.650	210.9		207.250		
10:58:00 AM	12:10:00 PM	0.200	7.280	41.398	4320	5.25	4.27	-4.900	210.9	1.08	206.000	2.46E-08	2.32E-08
12:10:00 PM	3:07:00 PM	0.200	7.280	41.398	10620	5.54	3.96	-7.900	210.9	1.07	203.000	2.43E-08	2.29E-08
3:07:00 PM	3:54:00 PM	0.200	7.280	41.398	2820	5.61	3.89	-8.600	210.9	1.00	202.300	2.15E-08	2.03E-08
													2.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.25 E-08 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **19** P.I. **26**

BORING NO. **Boring 8U** SAMPLE NO. **ST16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **100.9 P.C.F.**

FINAL WATER CONTENT **25.4%** FINAL DRY DENSITY **100.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:39:00 AM		0.200	7.732	41.398		1.13	7.78	33.250	210.9		244.150		
8:39:00 AM	9:05:00 AM	0.200	7.732	41.398	1560	1.15	7.76	33.050	210.9	1.00	243.950	9.81E-09	9.24E-09
9:05:00 AM	10:02:00 AM	0.200	7.732	41.398	3420	1.19	7.72	32.650	210.9	1.00	243.550	8.96E-09	8.44E-09
10:02:00 AM	12:04:00 PM	0.200	7.732	41.398	7320	1.29	7.62	31.650	210.9	1.00	242.550	1.05E-08	9.89E-09
													9.40E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.40 E-09 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **21** P.I. **25**

BORING NO. **Boring 9CCR** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.9%** INITIAL DRY DENSITY **102.9 P.C.F.**

FINAL WATER CONTENT **23.2%** FINAL DRY DENSITY **103.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:05:00 AM		0.200	7.336	41.350		2.15	7.14	24.950	210.9		235.850		
9:05:00 AM	10:59:00 AM	0.200	7.336	41.350	6840	2.24	7.05	24.050	210.9	1.00	234.950	9.92E-09	9.34E-09
10:59:00 AM	12:10:00 PM	0.200	7.336	41.350	4260	2.30	6.99	23.450	210.9	1.00	234.350	1.06E-08	1.00E-08
12:10:00 PM	3:06:00 PM	0.200	7.336	41.350	10560	2.44	6.85	22.050	210.9	1.00	232.950	1.01E-08	9.48E-09
													9.55E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.55 E-09 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **17** P.I. **9**

BORING NO. **Boring 9L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **7½-9 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.3%** INITIAL DRY DENSITY **101.3 P.C.F.**

FINAL WATER CONTENT **20.1%** FINAL DRY DENSITY **106.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:24:00 PM		0.200	7.112	40.391		4.13	5.83	8.500	70.3		78.800		
5:24:00 PM	6:08:00 PM	0.200	7.112	40.391	2640	6.89	3.06	-19.150	70.3	1.00	51.150	2.88E-06	2.72E-06
6:08:00 PM	6:26:00 PM	0.200	7.112	40.391	1080	7.63	2.30	-26.650	70.3	1.03	43.650	2.59E-06	2.44E-06
6:26:00 PM	6:40:00 PM	0.200	7.112	40.391	840	8.09	1.85	-31.200	70.3	0.98	39.100	2.31E-06	2.17E-06
													2.55E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.55 E-06 CM/SEC

REMARKS: Testing Completed 11/9/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **22** P.I. **24**

BORING NO. **Boring 9U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **102.5 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.7 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:13:00 PM		0.200	7.681	42.077		0.88	8.68	39.000	210.9		249.900		
3:13:00 PM	3:58:00 PM	0.200	7.681	42.077	2700	0.99	8.57	37.900	210.9	1.00	248.800	2.98E-08	2.81E-08
3:58:00 PM	4:25:00 PM	0.200	7.681	42.077	1620	1.06	8.50	37.200	210.9	1.00	248.100	3.17E-08	2.99E-08
4:25:00 PM	4:58:00 PM	0.200	7.681	42.077	1980	1.12	8.44	36.600	210.9	1.00	247.500	2.23E-08	2.10E-08
													2.63E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.63 E-08 CM/SEC

REMARKS: Testing Completed 11/22/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **36** PLASTIC LIMIT **20** P.I. **16**

BORING NO. **Boring 11U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.1%** INITIAL DRY DENSITY **104.4 P.C.F.**

FINAL WATER CONTENT **22.3%** FINAL DRY DENSITY **105.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:46:00 AM		0.200	7.244	41.834		2.04	7.38	26.700	210.9		237.600		
7:46:00 AM	8:57:00 AM	0.200	7.244	41.834	4260	2.12	7.30	25.900	210.9	1.00	236.800	1.37E-08	1.29E-08
8:57:00 AM	9:30:00 AM	0.200	7.244	41.834	1980	2.16	7.26	25.500	210.9	1.00	236.400	1.48E-08	1.39E-08
9:30:00 AM	10:41:00 AM	0.200	7.244	41.834	4260	2.25	7.17	24.600	210.9	1.00	235.500	1.55E-08	1.46E-08
													1.38E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.38 E-08 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 11U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.2%** INITIAL DRY DENSITY **97.4 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:17:00 PM		0.200	7.498	42.028		0.50	9.38	44.400	210.9		255.300		
12:17:00 PM	12:30:00 PM	0.200	7.498	42.028	780	0.84	9.02	40.900	210.9	1.06	251.800	3.16E-07	2.97E-07
12:30:00 PM	12:40:00 PM	0.200	7.498	42.028	600	1.10	8.77	38.350	210.9	0.96	249.250	3.03E-07	2.85E-07
12:40:00 PM	1:03:00 PM	0.200	7.498	42.028	1380	1.73	8.12	31.950	210.9	1.03	242.850	3.36E-07	3.17E-07
													3.04E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.04 E-07 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yelllow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **19** P.I. **11**

BORING NO. **Boring 12L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **14½-16 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **104.3 P.C.F.**

FINAL WATER CONTENT **22.0%** FINAL DRY DENSITY **105.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:25:00 PM		0.200	7.203	41.447		5.54	3.60	-9.700	70.3		60.600		
5:25:00 PM	5:40:00 PM	0.200	7.203	41.447	900	5.83	3.30	-12.650	70.3	1.03	57.650	9.64E-07	9.08E-07
5:40:00 PM	5:52:00 PM	0.200	7.203	41.447	720	6.09	3.02	-15.350	70.3	1.08	54.950	1.16E-06	1.09E-06
5:52:00 PM	5:58:00 PM	0.200	7.203	41.447	360	6.20	2.92	-16.400	70.3	0.91	53.900	9.31E-07	8.77E-07
													9.69E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.69 E-07 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **22** P.I. **23**

BORING NO. **Boring 12U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.7%** INITIAL DRY DENSITY **107.5 P.C.F.**

FINAL WATER CONTENT **21.6%** FINAL DRY DENSITY **106.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:14:00 AM		0.200	7.457	41.785		1.48	7.91	32.150	210.9		243.050		
8:14:00 AM	9:34:00 AM	0.200	7.457	41.785	4800	1.50	7.89	31.950	210.9	1.00	242.850	3.06E-09	2.88E-09
9:34:00 AM	11:39:00 AM	0.200	7.457	41.785	7500	1.54	7.85	31.550	210.9	1.00	242.450	3.92E-09	3.70E-09
11:39:00 AM	1:09:00 PM	0.200	7.457	41.785	5400	1.56	7.83	31.350	210.9	1.00	242.250	2.73E-09	2.57E-09
													3.13E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.13 E-09 CM/SEC

REMARKS: Testing Completed 11/24/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **42** PLASTIC LIMIT **22** P.I. **20**

BORING NO. **Boring 12U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **100.1 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:31:00 AM		0.200	7.366	42.126		1.62	8.07	32.250	210.9		243.150		
6:31:00 AM	8:42:00 AM	0.200	7.366	42.126	7860	1.74	7.96	31.100	210.9	0.92	242.000	1.05E-08	9.93E-09
8:42:00 AM	10:53:00 AM	0.200	7.366	42.126	7860	1.86	7.84	29.900	210.9	1.00	240.800	1.11E-08	1.04E-08
10:53:00 AM	4:03:00 PM	0.200	7.366	42.126	18600	2.13	7.55	27.100	210.9	1.07	238.000	1.10E-08	1.04E-08
													1.03E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.03 E-08 CM/SEC

REMARKS: Testing Completed 11/25/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **20** P.I. **14**

BORING NO. **Boring 13BN** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.0%** INITIAL DRY DENSITY **109.7 P.C.F.**

FINAL WATER CONTENT **18.8%** FINAL DRY DENSITY **110.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:06:00 AM		0.200	7.219	41.785		5.27	4.64	-3.150	210.9		207.750		
9:06:00 AM	10:18:00 AM	0.200	7.219	41.785	4320	5.32	4.59	-3.650	210.9	1.00	207.250	9.64E-09	9.08E-09
10:18:00 AM	12:22:00 PM	0.200	7.219	41.785	7440	5.40	4.51	-4.450	210.9	1.00	206.450	8.98E-09	8.46E-09
12:22:00 PM	1:18:00 PM	0.200	7.219	41.785	3360	5.44	4.47	-4.850	210.9	1.00	206.050	9.97E-09	9.39E-09
													8.84E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.84 E-09 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **52** PLASTIC LIMIT **25** P.I. **27**

BORING NO. **Boring 13BS** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.1%** INITIAL DRY DENSITY **109.6 P.C.F.**

FINAL WATER CONTENT **18.2%** FINAL DRY DENSITY **110.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:54:00 PM		0.200	5.476	41.013		1.24	8.79	37.750	210.9		248.650		
12:54:00 PM	2:26:00 PM	0.200	5.476	41.013	5520	1.51	8.52	35.050	210.9	1.00	245.950	2.64E-08	2.49E-08
2:26:00 PM	4:58:00 PM	0.200	5.476	41.013	9120	1.90	8.12	31.100	210.9	1.03	242.000	2.37E-08	2.23E-08
4:58:00 PM	6:40:00 PM	0.200	5.476	41.013	6120	2.18	7.86	28.400	210.9	0.93	239.300	2.45E-08	2.31E-08
													2.32E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.32 E-08 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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APPENDIX C:
PACKER TEST DATA

PACKER TESTING
DATA FROM 2024 INVESTIGATION

Packer Test Summary Table
CWLP Ash Pond Investigation

Boring	Bottom of Top Packer (ft. BGS)	Top of Bottom Packer (ft. BGS)	Hydraulic Conductivity	Formation	Comment
B100	93	103.5	1.00E-09	shale w/ claystone, limestone interbeddings	No take
B100	93	103.5	2.69E-07	shale w/ claystone, limestone interbeddings	took .05 gallons during test
B100	93	103.5	1.00E-09	shale w/ claystone, limestone interbeddings	No take
B100	93	103.5	1.00E-09	shale w/ claystone, limestone interbeddings	No take
B100	93	103.5	1.00E-09	shale w/ claystone, limestone interbeddings	No take
B100	82.5	93	1.00E-09	shale w/ claystone interbeddings	No take, switch gauges from 0-200 psi to 0-100 psi prior to test.
B100	82.5	93	1.00E-09	shale w/ claystone interbeddings	No take
B100	82.5	93	1.00E-09	shale w/ claystone interbeddings	No take
B100	82.5	93	1.00E-09	shale w/ claystone interbeddings	No take
B100	82.5	93	1.00E-09	shale w/ claystone interbeddings	No take
B100	72	82.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	72	82.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	72	82.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	72	82.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	72	82.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	61.5	72	1.00E-09	shale w/ claystone interbeddings	No take
B100	61.5	72	1.00E-09	shale w/ claystone interbeddings	No take
B100	61.5	72	2.60E-07	shale w/ claystone interbeddings	
B100	61.5	72	4.33E-07	shale w/ claystone interbeddings	
B100	61.5	72	2.60E-07	shale w/ claystone interbeddings	
B100	51	61.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	51	61.5	1.00E-09	shale w/ claystone interbeddings	No take
B100	51	61.5	1.20E-06	shale w/ claystone interbeddings	pressure drpped on 60 psi test so next test terminated.
B100	40.5	51	1.28E-05	shale w/ claystone interbeddings	
B100	40.5	51	3.17E-04	shale w/ claystone interbeddings	pressure drpped on 45 psi test so next test terminated.
B100	38.5	49	3.91E-05	shale	packer blowout. Replace backer and resumed test.
B100	38.5	49	4.26E-04	shale	could only maintain 28 psi on the planned 30 psi test.

Packer Test Solution - CWLP Ash Ponds - Springfield, IL.
"Methods and procedures for defining aquifer parameters" (by John Sevee);
in Practical Handbook of Ground-Water Monitor`
Friction loss calculation using Hazen-Williams formula.
[Hf = (3.022)(v)^1.85(L) / (C)^1.85(D)^1.165]

Shale
Date: 5/23/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
4.9 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	93	103.5	98.25	10.5	2711.65	2711.65	0	15	0	93.35	15	34.5	0	130.52	≦	1.00E-09	4.32	4.32	0.00E+00
1b	93	103.5	98.25	10.5	2711.8	2711.95	0	15	0.01	93.35	30	69	4.08E-05	165.02	≦	2.69E-07	4.32	4.32	2.23E-05
1c	93	103.5	98.25	10.5	2711.9	2711.9	0	15	0	93.35	45	103.5	0	199.52	≦	1.00E-09	4.32	4.32	0.00E+00
1d	93	103.5	98.25	10.5	2711.95	2711.95	0	15	0	93.35	60	138	0	234.02	≦	1.00E-09	4.32	4.32	0.00E+00
1e	93	103.5	98.25	10.5	2711.9	2711.9	0	15	0	93.35	45	103.5	0	199.52	≦	1.00E-09	4.32	4.32	0.00E+00
														mean K (cm/sec)		5.47E-08			

Shale
Date: 5/23/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
2.4 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	82.5	93	87.75	10.5	2712.35	2712.35	0	15	0	85.35	15	34.5	0	122.52	≦	1.00E-09	4.32	4.32	0.00E+00
1b	82.5	93	87.75	10.5	2712.4	2712.4	0	15	0	85.35	30	69	0	157.02	≦	1.00E-09	4.32	4.32	0.00E+00
1c	82.5	93	87.75	10.5	2712.4	2712.4	0	15	0	85.35	45	103.5	0	191.52	≦	1.00E-09	4.32	4.32	0.00E+00
1d	82.5	93	87.75	10.5	2712.4	2712.4	0	15	0	85.35	60	138	0	226.02	≦	1.00E-09	4.32	4.32	0.00E+00
1e	82.5	93	87.75	10.5	2712.4	2712.4	0	15	0	85.35	45	103.5	0	191.52	≦	1.00E-09	4.32	4.32	0.00E+00
														mean K (cm/sec)		1.00E-09			

Packer Test Solution - CWLP Ash Ponds - Springfield, IL.
"Methods and procedures for defining aquifer parameters" (by John Sevee);
in Practical Handbook of Ground-Water Monitor`
Friction loss calculation using Hazen-Williams formula.
[Hf = (3.022)(v)^1.85(L) / (C)^1.85(D)^1.165]

Shale
Date: 5/24/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
1.2 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	72	82.5	77.25	10.5	2717.85	2717.85	0	15	0	76.05	15	34.5	0	113.22	≦	1.00E-09	4.32	4.32	0.00E+00
1b	72	82.5	77.25	10.5	2717.85	2717.85	0	15	0	76.05	30	69	0	147.72	≦	1.00E-09	4.32	4.32	0.00E+00
1c	72	82.5	77.25	10.5	2717.85	2717.85	0	15	0	76.05	45	103.5	0	182.22	≦	1.00E-09	4.32	4.32	0.00E+00
1d	72	82.5	77.25	10.5	2717.85	2717.85	0	15	0	76.05	60	138	0	216.72	≦	1.00E-09	4.32	4.32	0.00E+00
1e	72	82.5	77.25	10.5	2717.85	2717.85	0	15	0	76.05	45	103.5	0	182.22	≦	1.00E-09	4.32	4.32	0.00E+00
														mean K (cm/sec)		1.00E-09			

Shale
Date: 5/24/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
2.2 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	61.5	72	66.75	10.5	2724.05	2724.05	0	15	0	64.55	15	34.5	0	101.72	≦	1.00E-09	4.32	4.32	0.00E+00
1b	61.5	72	66.75	10.5	2724.05	2724.05	0	15	0	64.55	30	69	0	136.22	≦	1.00E-09	4.32	4.32	0.00E+00
1c	61.5	72	66.75	10.5	2724.05	2724.2	0	15	0.01	64.55	45	103.5	2.77E-05	170.72	≦	2.60E-07	4.32	4.32	2.23E-05
1d	61.5	72	66.75	10.5	2724.2	2724.5	0	15	0.02	64.55	60	138	1.00E-04	205.22	≦	4.33E-07	4.32	4.32	4.46E-05
1e	61.5	72	66.75	10.5	2724.5	2724.65	0	15	0.01	64.55	45	103.5	2.77E-05	170.72	≦	2.60E-07	4.32	4.32	2.23E-05
														mean K (cm/sec)		1.91E-07			

Packer Test Solution - CWLP Ash Ponds - Springfield, IL.
"Methods and procedures for defining aquifer parameters" (by John Sevee);
in Practical Handbook of Ground-Water Monitor`
Friction loss calculation using Hazen-Williams formula.
[Hf = (3.022)(v)^1.85(L) / (C)^1.85(D)^1.165]

Shale
Date: 5/24/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
2.1 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	51	61.5	56.25	10.5	2732	2732	0	15	0	54.15	15	34.5	0	91.32	≦	1.00E-09	4.32	4.32	0.00E+00
1b	51	61.5	56.25	10.5	2732	2732	0	15	0	54.15	30	69	0	125.82	≦	1.00E-09	4.32	4.32	0.00E+00
1c	51	61.5	56.25	10.5	2732	2732.65	0	15	0.04	54.15	45	103.5	3.52E-04	160.32	≦	1.20E-06	4.32	4.32	9.65E-05
														mean K (cm/sec)		4.01E-07			

Shale
Date: 5/24/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
1.9 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	40.5	51	45.75	10.5	2814.4	2817.9	0	15	0.23	43.65	15	34.5	0.01	80.81	≦	1.28E-05	4.32	4.32	5.20E-04
1b	40.5	51	45.75	10.5	2718.8	2837.5	0	15	7.91	43.65	30	69	4.38	110.94	≦	3.17E-04	4.32	4.32	1.76E-02
														mean K (cm/sec)		1.65E-04			

Packer Test Solution - CWLP Ash Ponds - Springfield, IL.
"Methods and procedures for defining aquifer parameters" (by John Sevee);
in Practical Handbook of Ground-Water Monitor`
Friction loss calculation using Hazen-Williams formula.
[Hf = (3.022)(v)^1.85(L) / (C)^1.85(D)^1.165]

Shale
Date: 5/24/2024
Boring B100
0.14 Radius of test hole (in ft.)
2.67 Gauge height above ground (in ft.)
1.2 Depth to Water Below Ground (in ft.) - Water level after filling boring before testing.

Test No.	Bottom of Top Packer (ft)	Top of Bottom Packer (ft)	Depth [interval midpoint] (ft)	Length of Interval (ft)	Initial Gauge Reading (gal)	End Gauge Reading (gal)	Begin Time (min)	End Time (min)	Constant flow rate Q (in gal/min)	Static Head Hs (in feet)	Gauge pressure p (in psi)	Fluid head Hp = p * 2.3 (in feet)	Friction loss Hf (in feet)	Differential head Hs+Hp+Hg-Hf (in feet)		Hydraulic Cond K (in cm/sec)	Nat Log ln(L/r)	Inv Hyp Sin sinh-1 (L/2r)	Convert Q gal/min to cu ft/sec
1a	38.5	49	43.75	10.5	2914	2924.4	0	15	0.69	41.65	15	34.5	0.05	78.77	≦	3.91E-05	4.32	4.32	1.54E-03
1b	38.5	49	43.75	10.5	2925.8	3073	0	15	9.81	41.65	28	64.4	6.23	102.49	≦	4.26E-04	4.32	4.32	2.19E-02
														mean K (cm/sec)		2.32E-04			

APPENDIX D:
GEOLOGIC CROSS-SECTIONS

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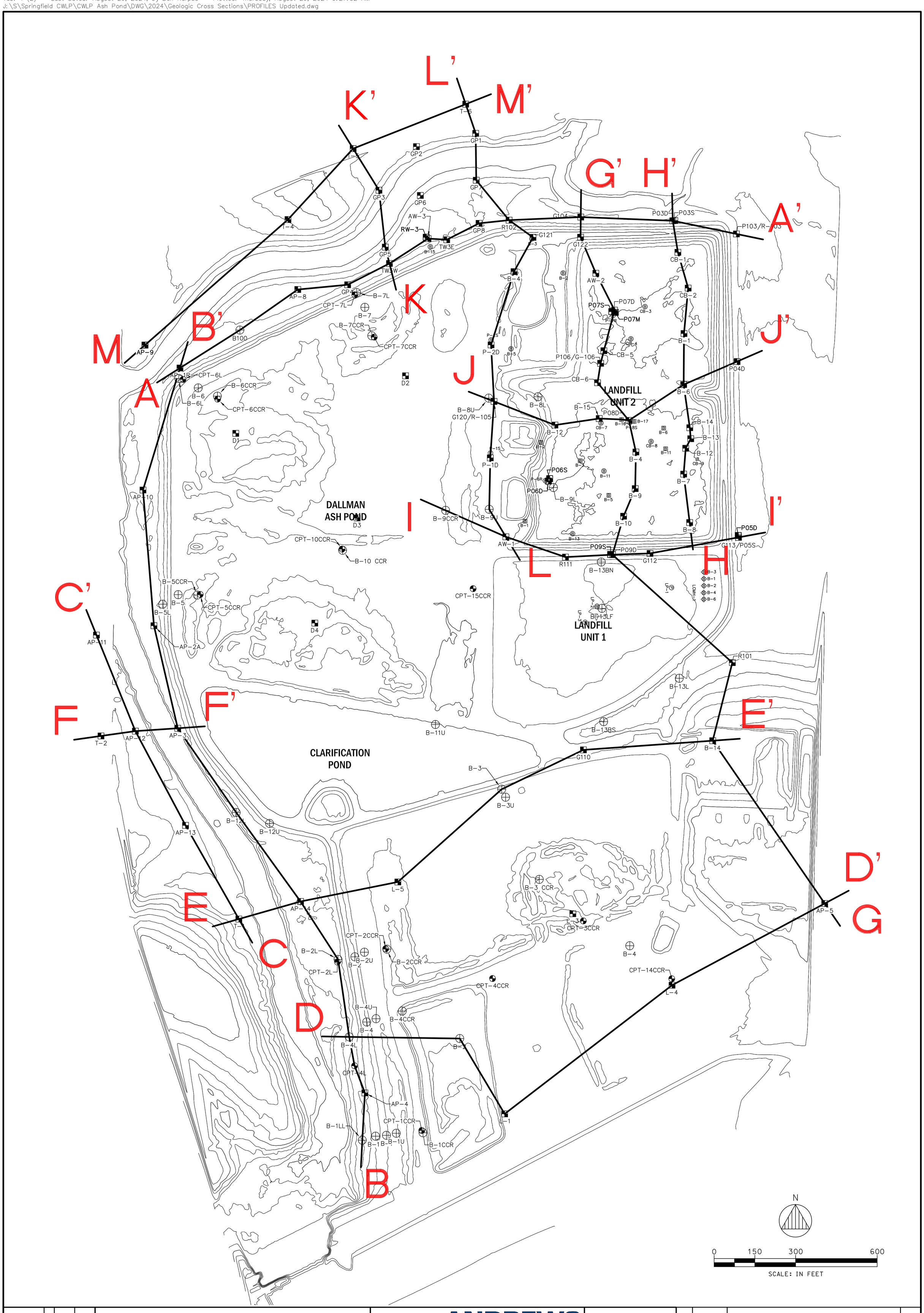

FIG. 1

GEOLOGIC CROSS-SECTION LOCATIONS MAP

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

NO.	DATE	REVISION DESCRIPTION	BY

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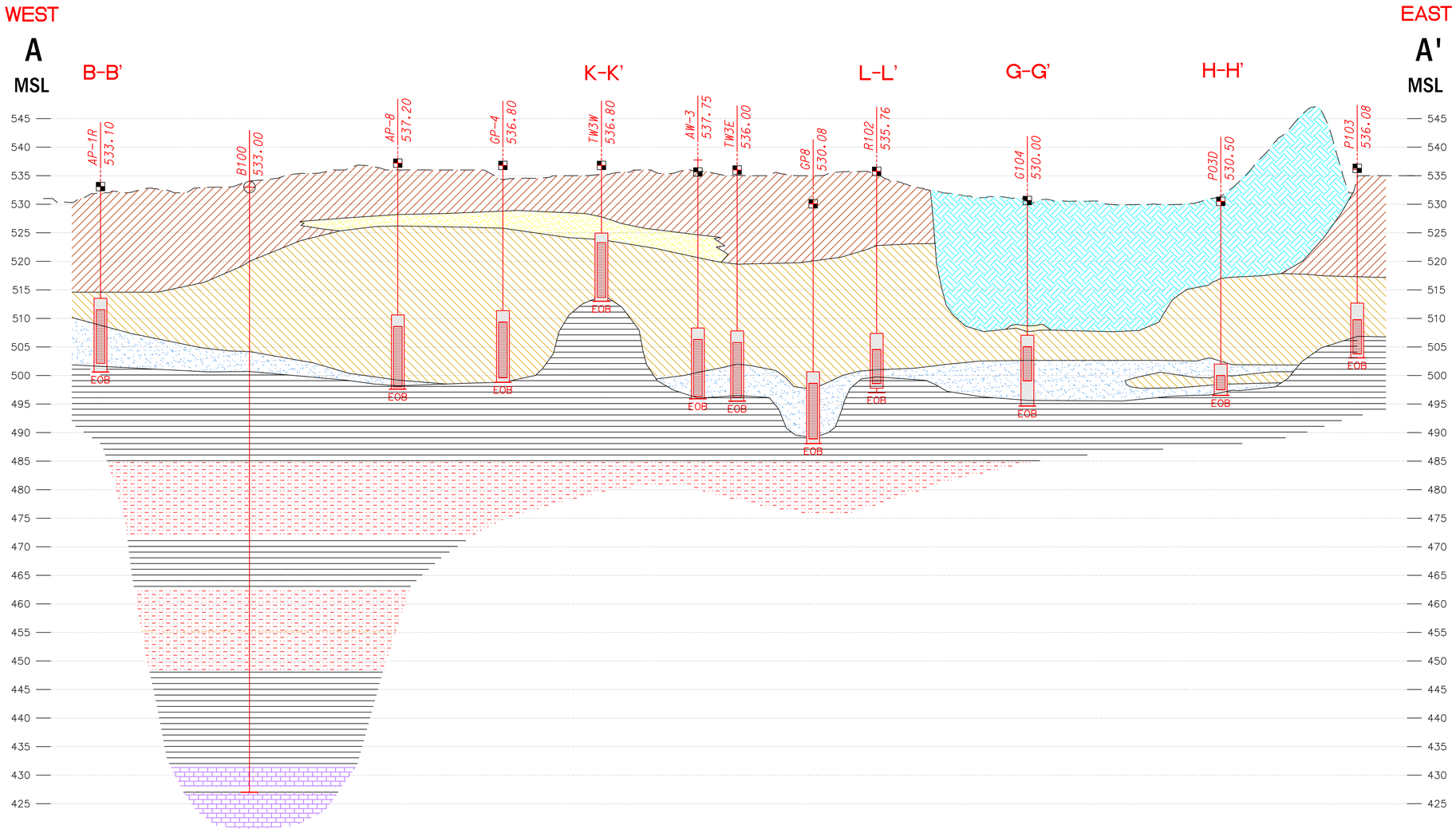
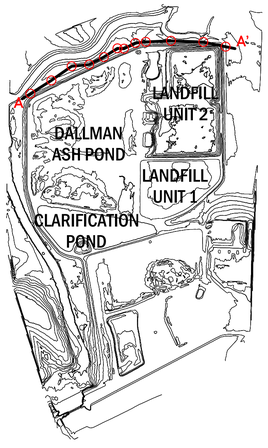


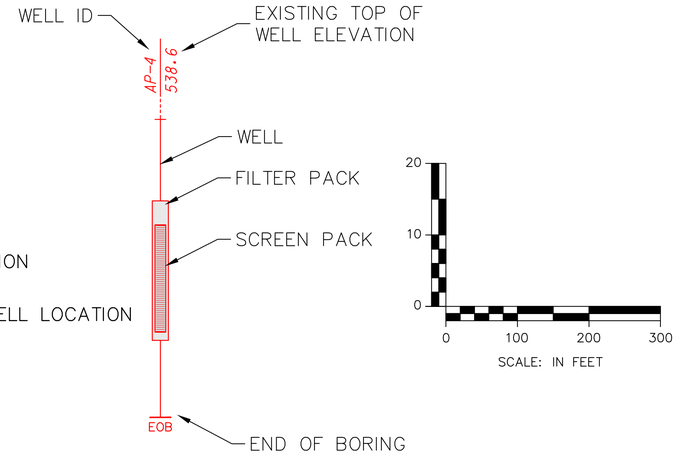


NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- CLAYSTONE
- SANDSTONE
- LIMESTONE
- BORING LOCATION
- MONITORING WELL LOCATION



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PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION A-A'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

A-A'

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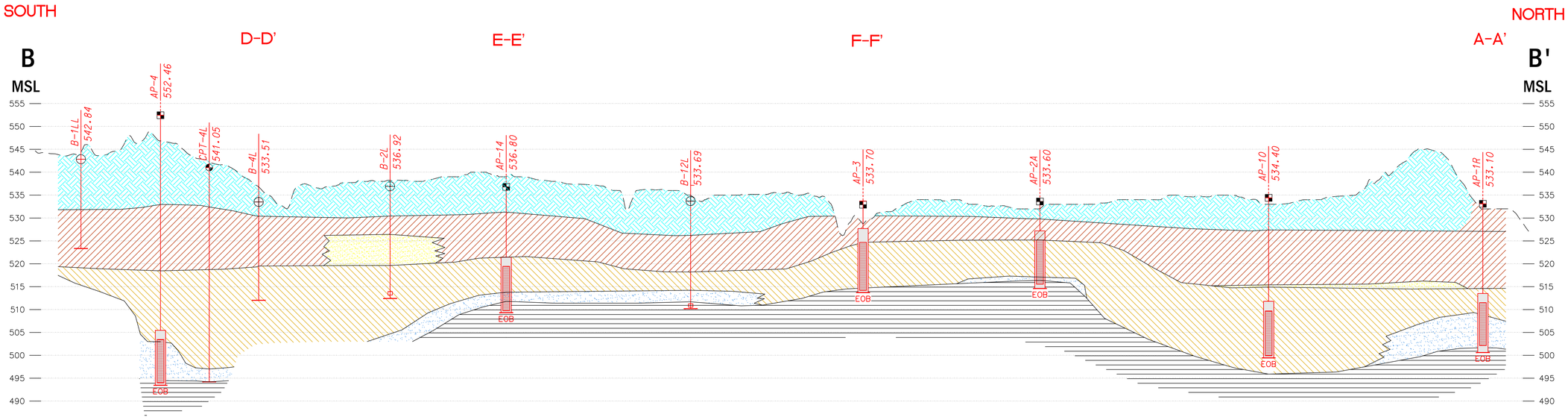
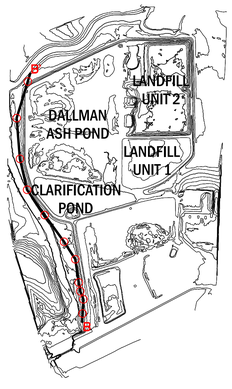


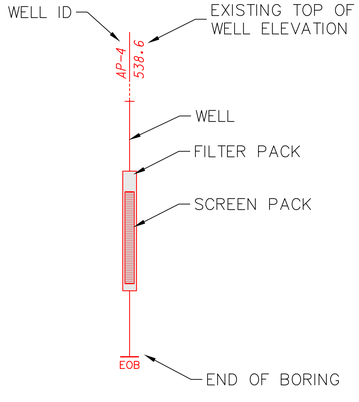


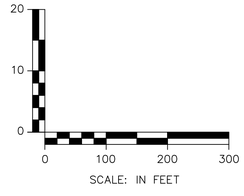
NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- SHALLOW SAND
- BORING LOCATION
- MONITORING WELL LOCATION
- CPT BORING LOCATION





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PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

GEOLOGIC CROSS-SECTION B-B'

PLANS PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

B-B'

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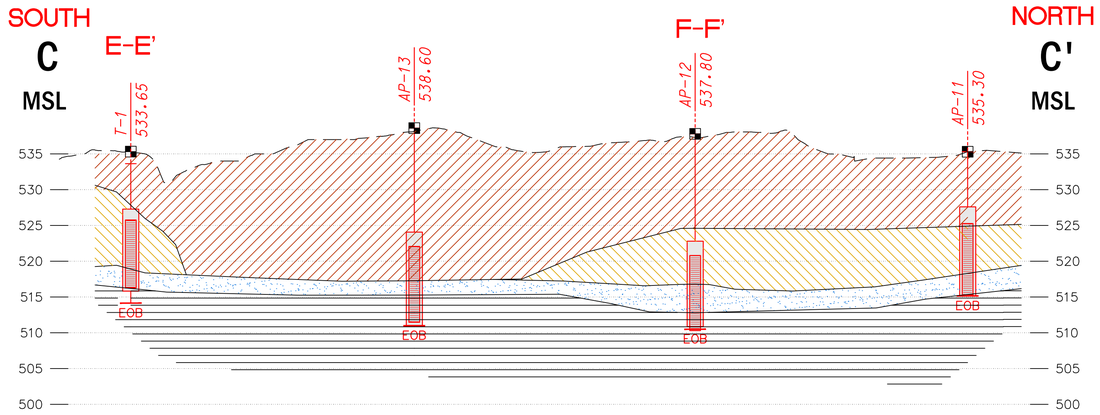
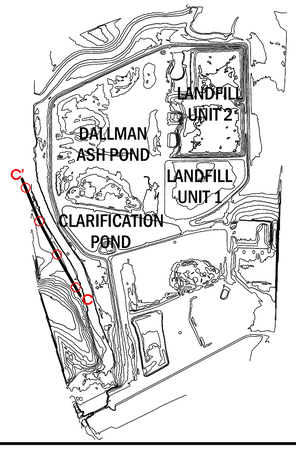




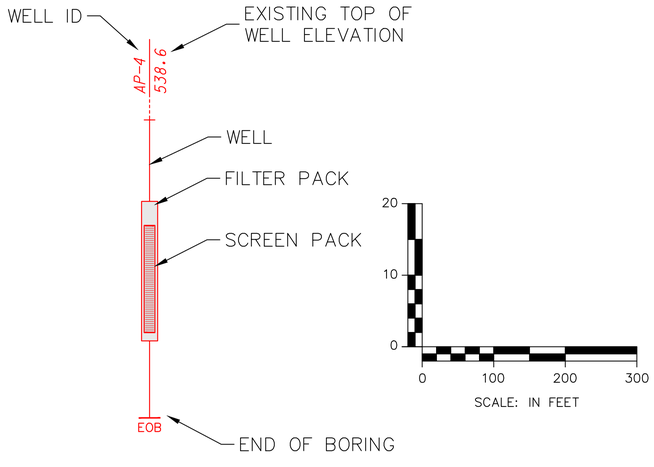
NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.

2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- MONITORING WELL LOCATION



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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION C-C'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

C-C'

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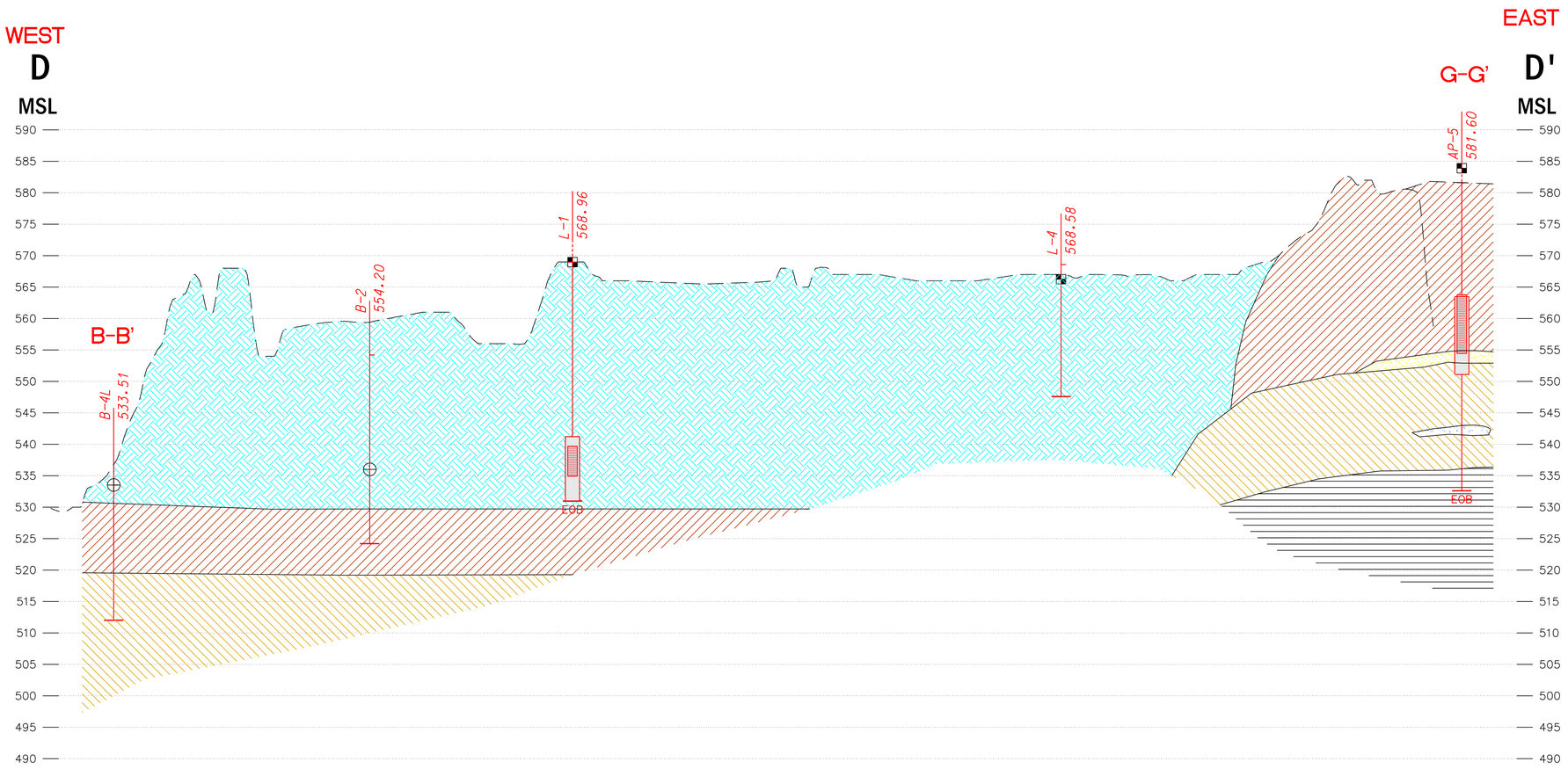
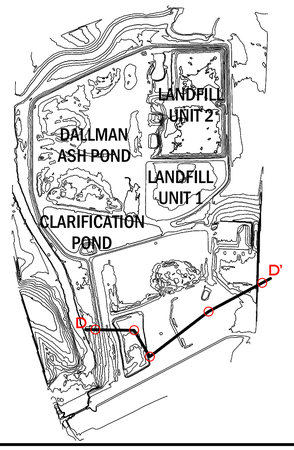


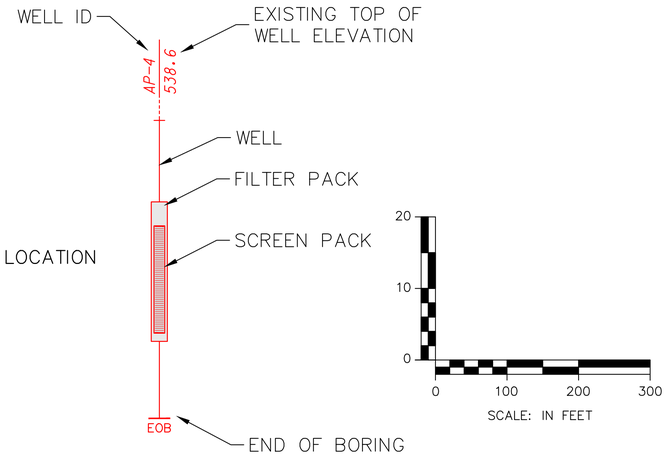


NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- BORING LOCATION
- MONITORING WELL LOCATION



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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION D-D'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

D-D'

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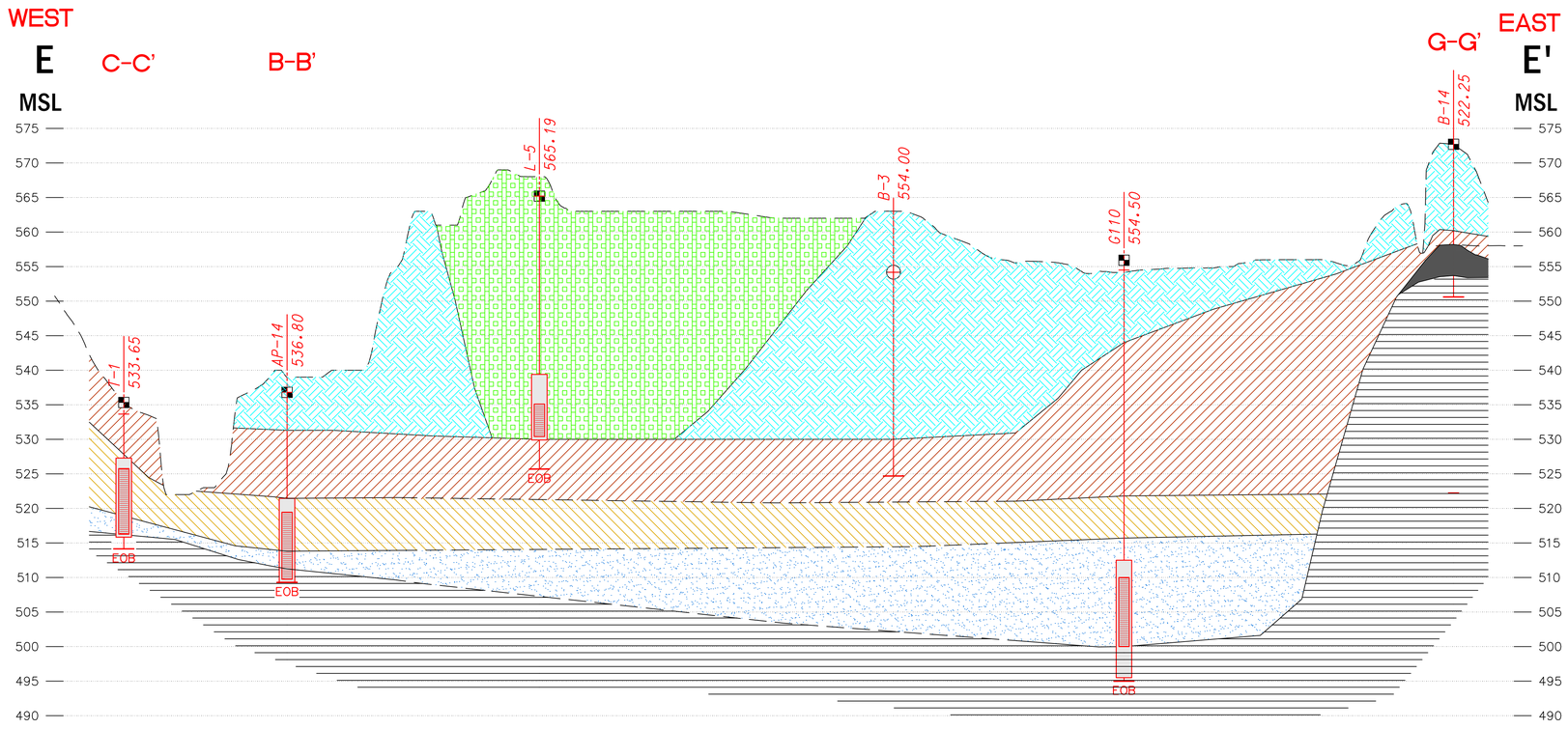
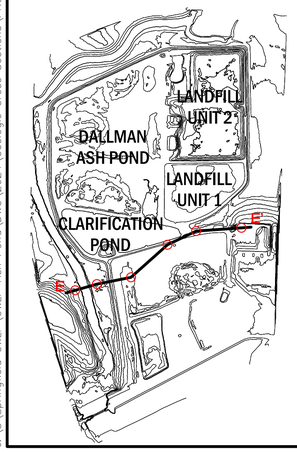


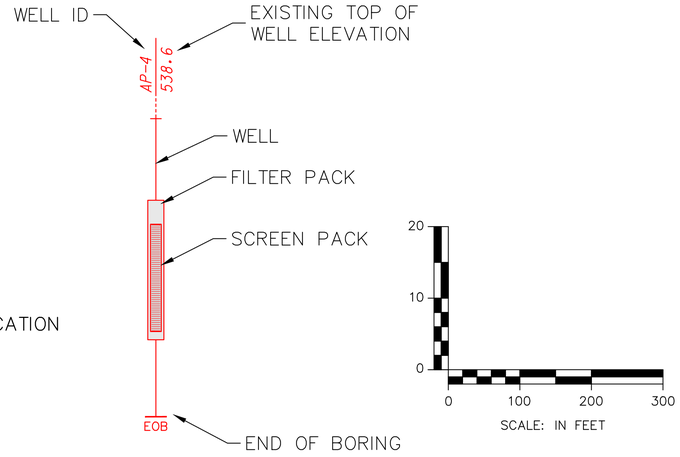


NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- CCR ASH
- COAL
- BORING LOCATION
- MONITORING WELL LOCATION



NO.	DATE	REVISION DESCRIPTION	BY

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SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION E-E'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

E-E'

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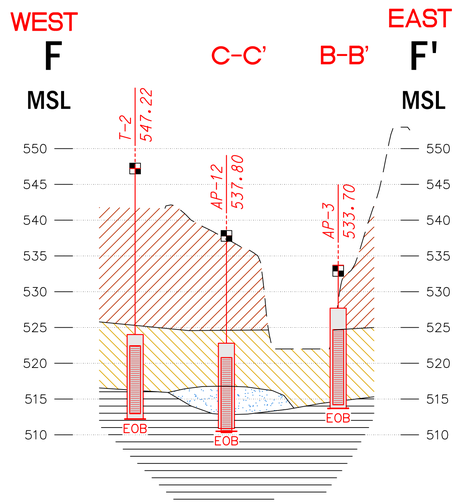
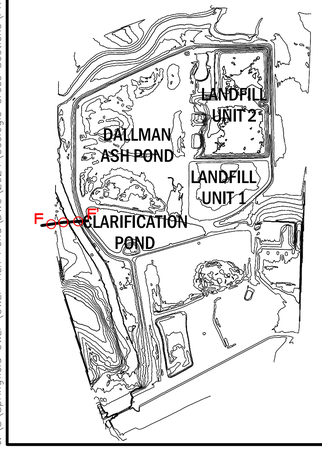


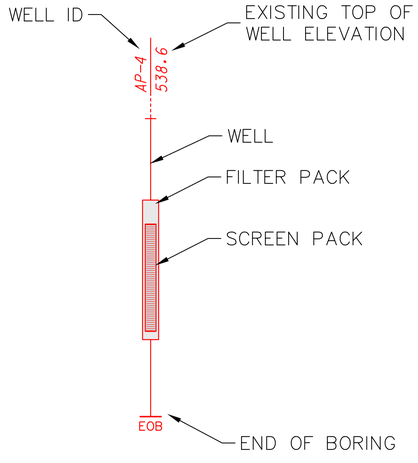


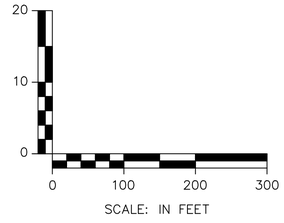
NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- MONITORING WELL LOCATION





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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION F-F'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER: F-F'

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SOUTH

G

MSL

D–D’

E–E’

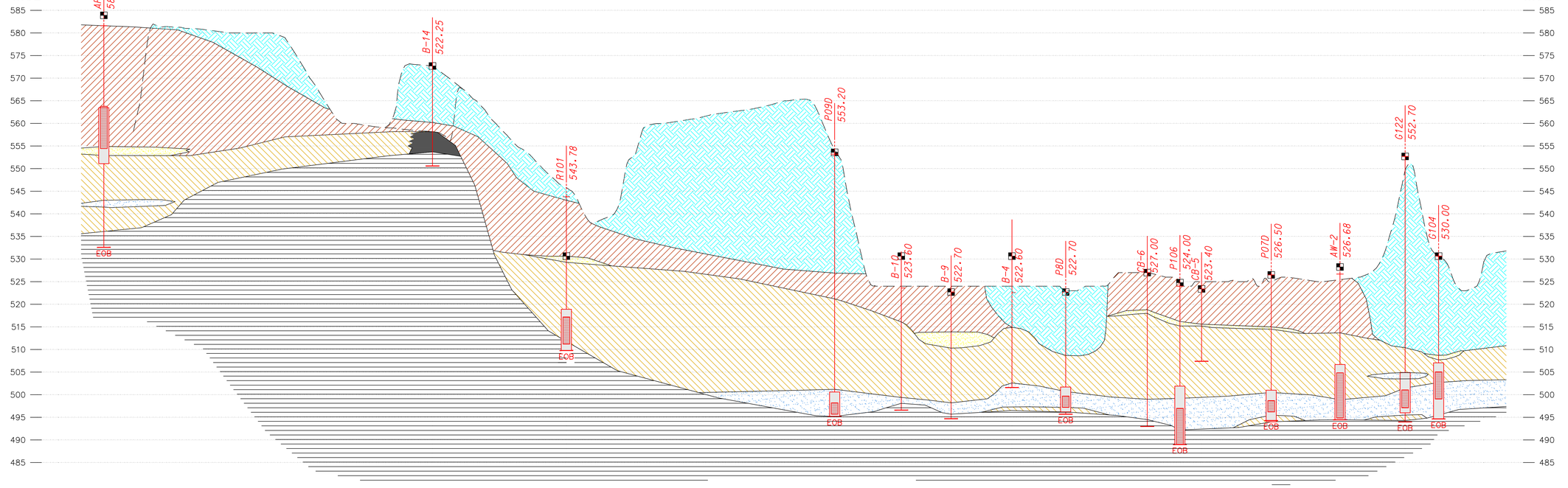
I–I’

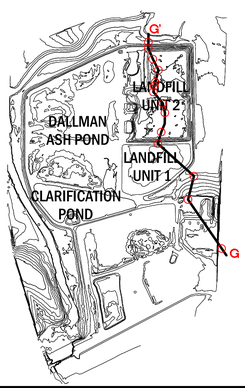
J–J’

A–A’

G'

NORTH



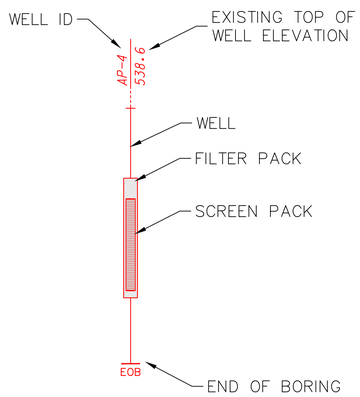


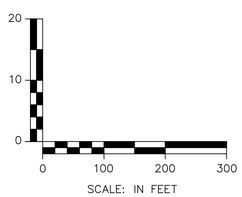
NOTES

1. DEPTH AND THICKNESS OF SUBSURFACE STRATA WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE BORING. SEE BORING LOGS FOR DETAILED DESCRIPTION.
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- COAL
- MONITORING WELL LOCATION





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GEOLOGIC CROSS-SECTION G–G’

PLANS PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

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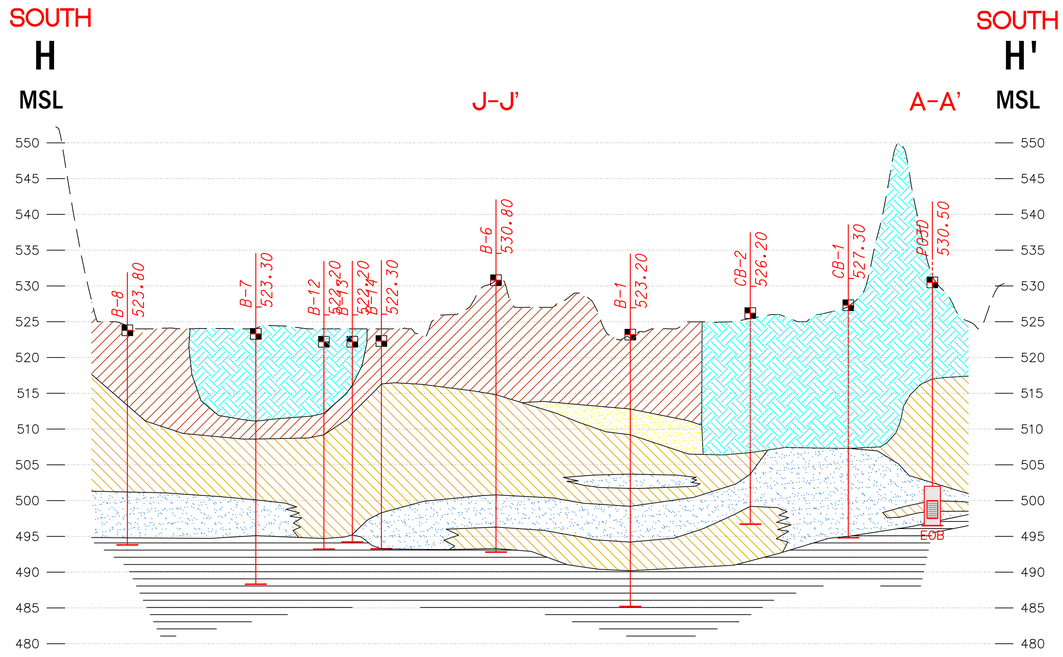

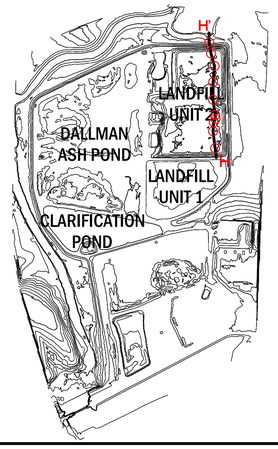

NOTES

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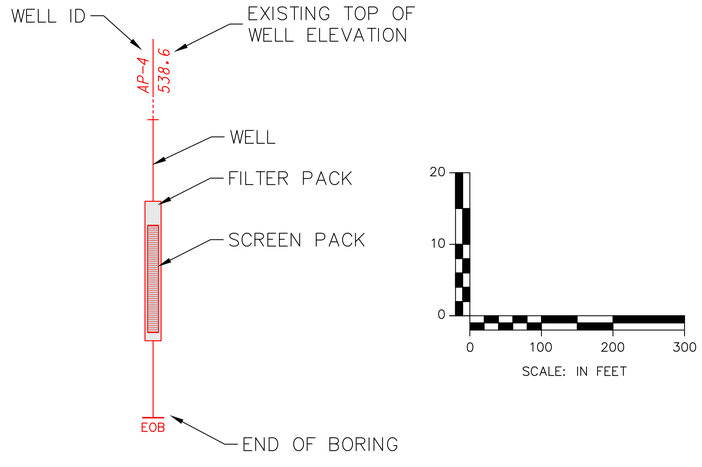
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- MONITORING WELL LOCATION



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GEOLOGIC CROSS-SECTION H-H'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

H-H'

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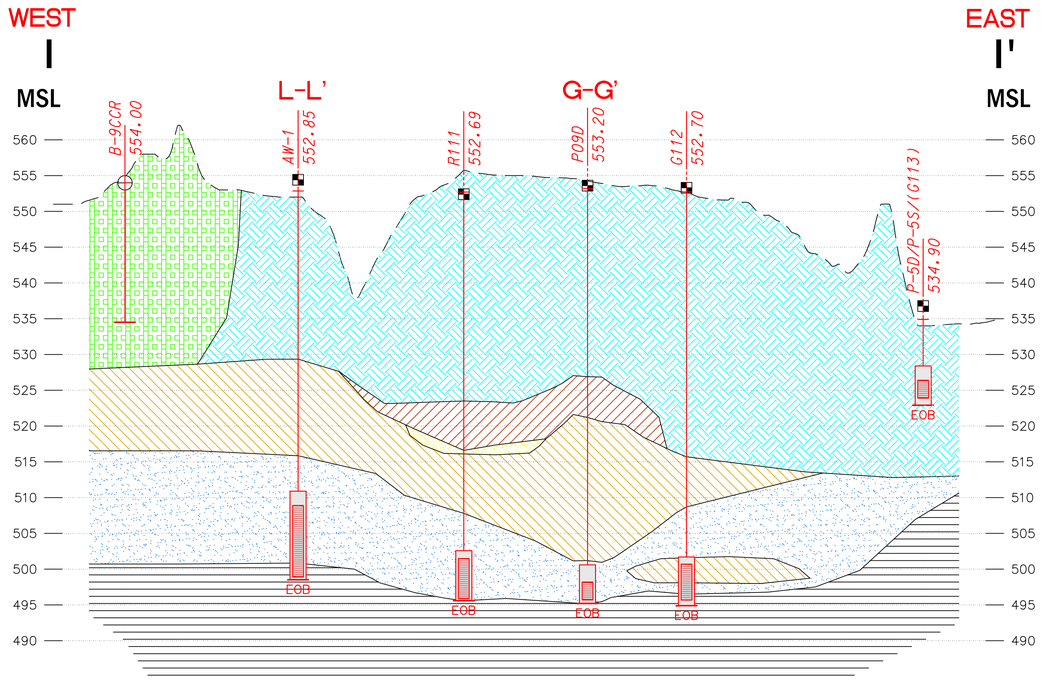

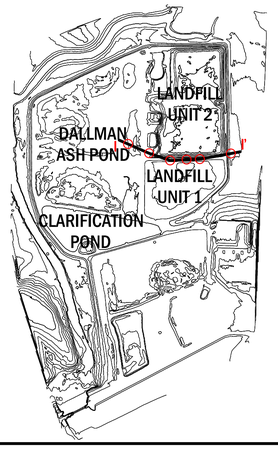

NOTES

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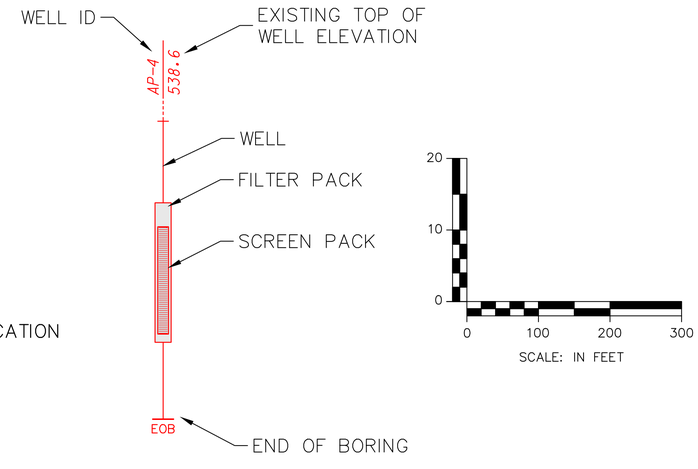
LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- CCR ASH
- BORING LOCATION
- MONITORING WELL LOCATION



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GEOLOGIC CROSS-SECTION I-I'

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

I-I'

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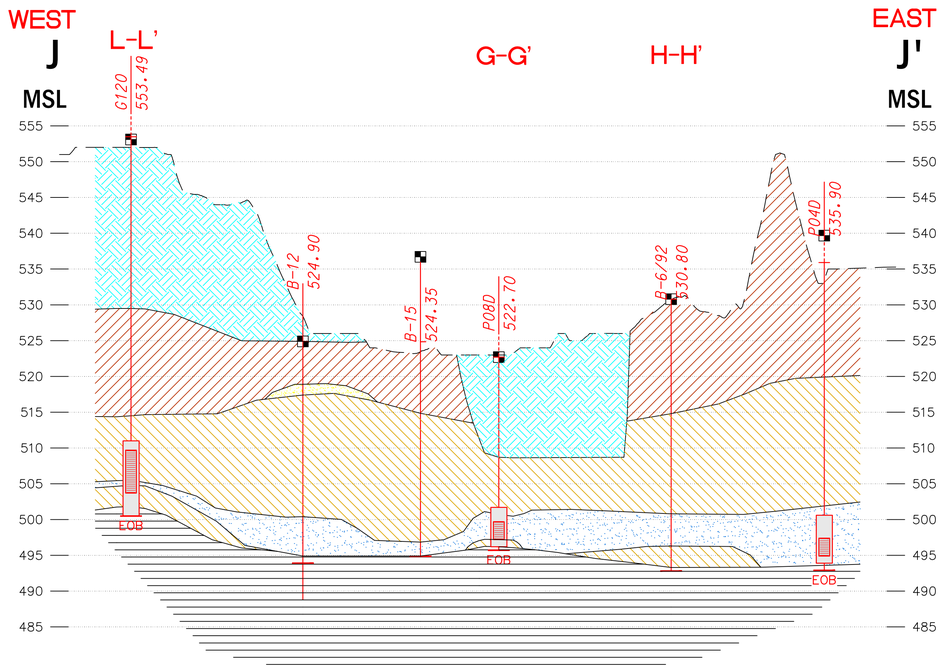

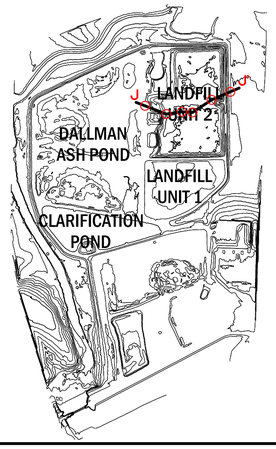

NOTES

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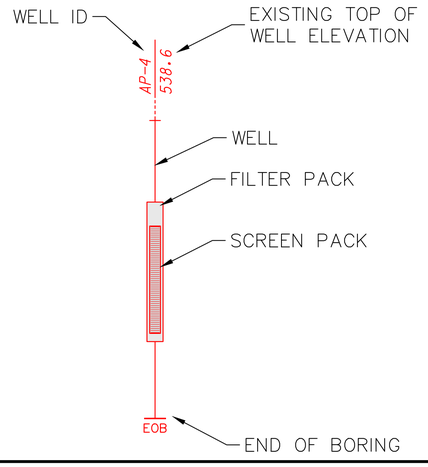
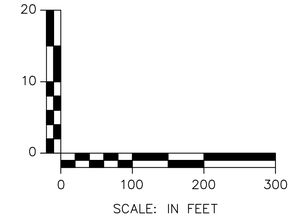
LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- SHALLOW SAND
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- MONITORING WELL LOCATION





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GEOLOGIC CROSS-SECTION J-J'

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

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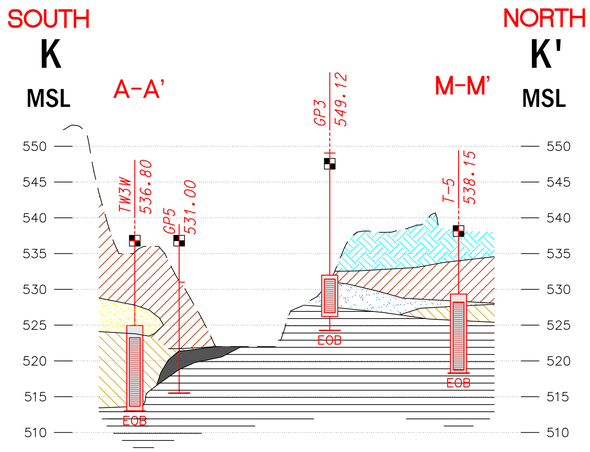

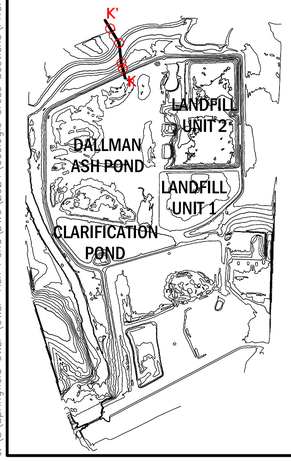

NOTES

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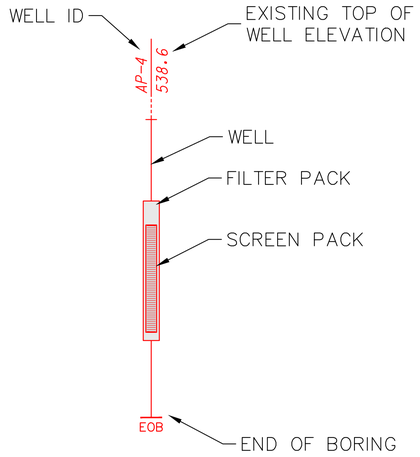
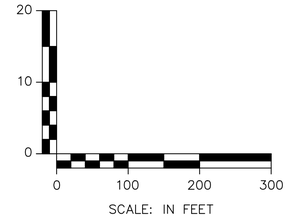
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- COAL
- MONITORING WELL LOCATION





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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION K-K'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

K-K'

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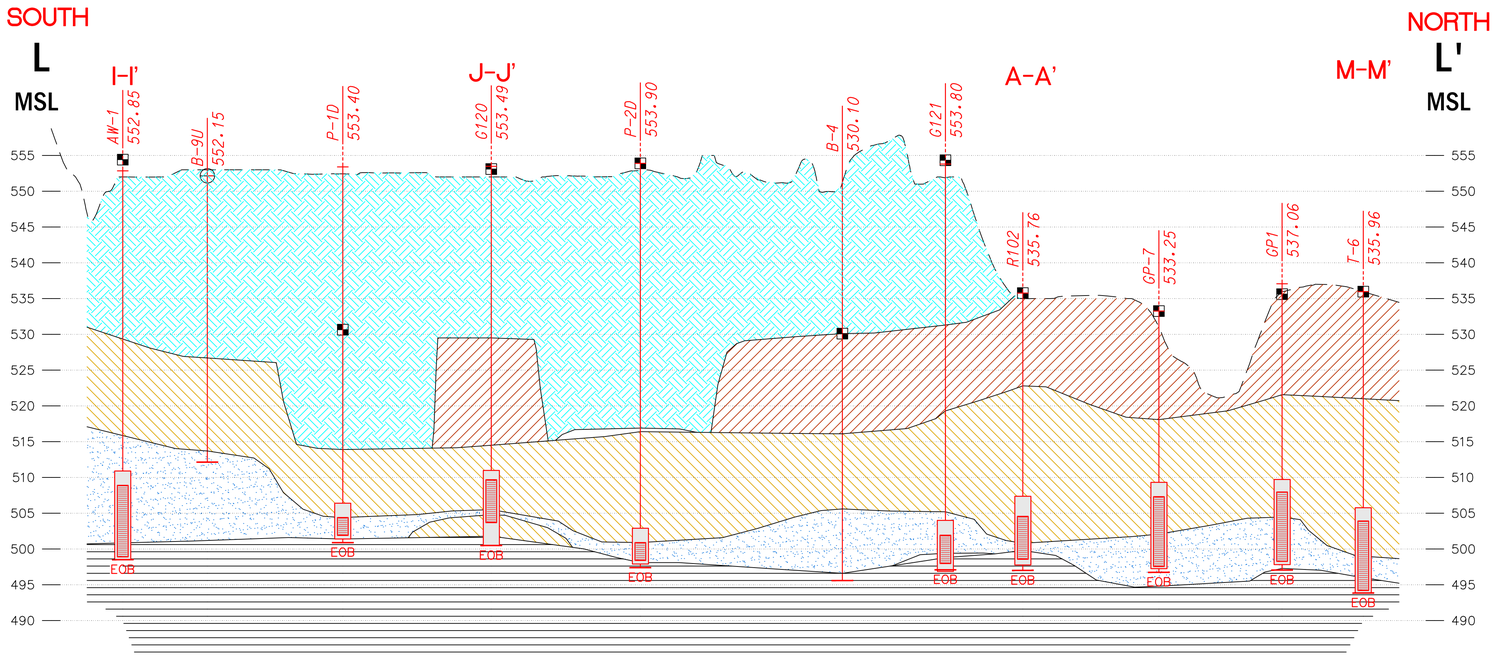

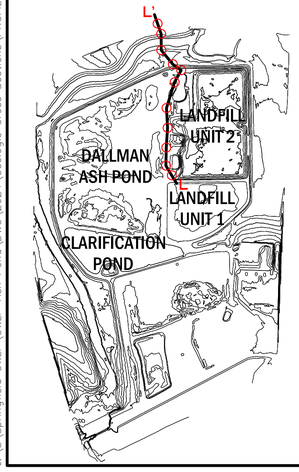

NOTES

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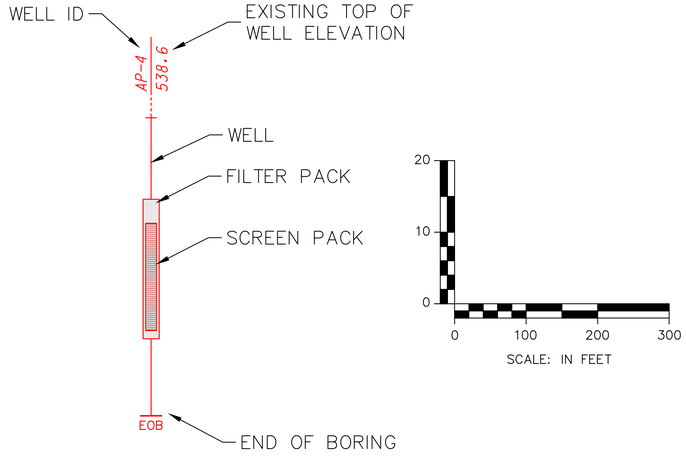
2. SURFACE GENERATED FROM LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

LEGEND

- FILL
- UPPER COHESIVE DEPOSIT
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- BORING LOCATION
- MONITORING WELL LOCATION



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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION L-L'

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

L-L'

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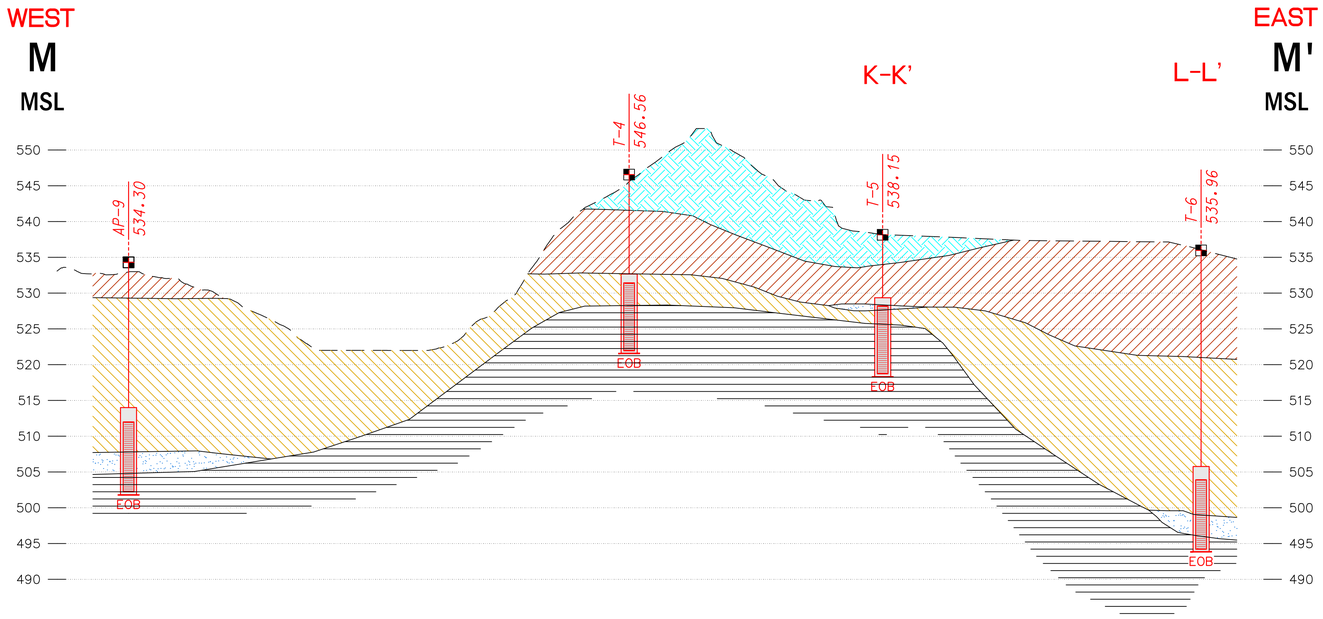

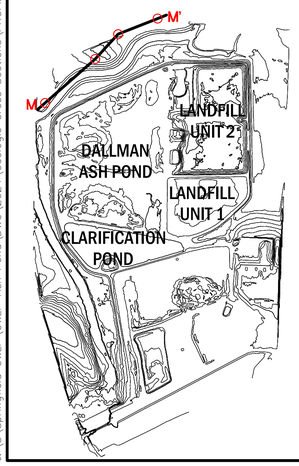

NOTES

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LEGEND

- FILL
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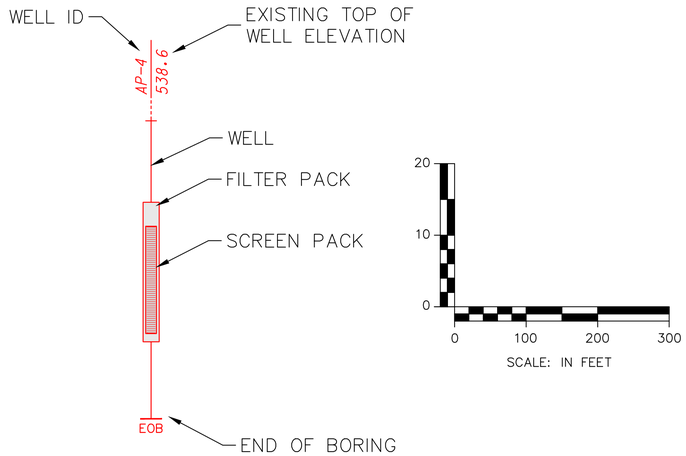
- LOWER COHESIVE DEPOSIT
- BASAL SAND
- SHALE
- MONITORING WELL LOCATION



NO.	DATE	REVISION DESCRIPTION	BY

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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

GEOLOGIC CROSS-SECTION M-M'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: AUGUST 2024

PROJECT ID: 240227/0010

SHEET NUMBER:

M-M'

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APPENDIX E:
SWAP Query

ATTACHMENT 1

POTABLE WATER WELL SURVEY

CITY WATER, LIGHT AND POWER

POTABLE WATER WELL SURVEY - CCR SURFACE IMPOUNDMENTS

A potable water well survey was completed in the vicinity of the Dallman and Lakeside Ash Ponds. Based on groundwater elevation data from numerous monitoring wells and piezometers located between and adjacent to the CWLP CCR impoundments, groundwater movement in the vicinity of the CCR impoundments is generally from the south-southwest to the north-northeast, approximately paralleling the Sugar Creek basin. The search extended to the first water well encountered hydraulically downgradient of the impoundments, located near Illinois Route 29 at a distance of approximately 3,400 feet.

The survey was conducted using the Illinois EPA's web-based Geographic Information System (GIS) database[1] in the Source Water Assessment Program (SWAP) for potable water wells downgradient of the CCR impoundments.

The Illinois EPA's SWAP GIS database system identifies community water supply wells and other potable wells (private, semi-private and non-community water supply wells) include data from the following sources:

- Illinois EPA, Division of Public Water Supplies;
- Illinois State Geological Survey (ISGS);
- Illinois State Water Survey; and
- Illinois Department of Public Health.

Based upon this potable water well search, no private, semi-private and non-community water supply wells are located within 2,500 feet downgradient of the CCR impoundments. This search distance is based upon the maximum allowable setback zone for a potable water well as identified in Section 14.3(f) of the Illinois Environmental Protection Act. Appendix A includes screen-captures of the Illinois EPA's SWAP GIS database system well query for the subject CCR impoundments. These screen captures depict the two closest well locations. These wells are discussed below.

Within the Sugar Creek basin, the nearest downgradient potable water well is located approximately 3,400 feet north-northeast of the CWLP CCR impoundments. The owner of this well at the time of installation, as identified on the ISGS well record, was William Bartels (API 121672620900). Installed September 25, 2001, this well is 55 feet deep and screened within material described as "shale fracture/clay." The ISGS boring log for this well is included in Appendix A. The Sangamon County Tax Parcel Viewer & Property Tax Web Site (http://gismaps.co.sangamon.il.us/tpv/) identifies this well as being located on improved commercial property.

The other potable water well is located a little more than 2,500 feet north-northwest of the CCR impoundments (API 121670148100). The well was installed December 1, 1965, is 24 feet deep, and screened within material described as "hardpan." The ISGS boring log for this well is included in Appendix A. A review of the Sangamon County Tax Parcel Viewer & Property Tax Web Site identified the current property owner as the State of Illinois Department of Transportation. While this well is located north of the CCR impoundments, it appears to be just west and outside of the Sugar Creek basin, and as such most likely not hydraulically downgradient of the CCR impoundments.

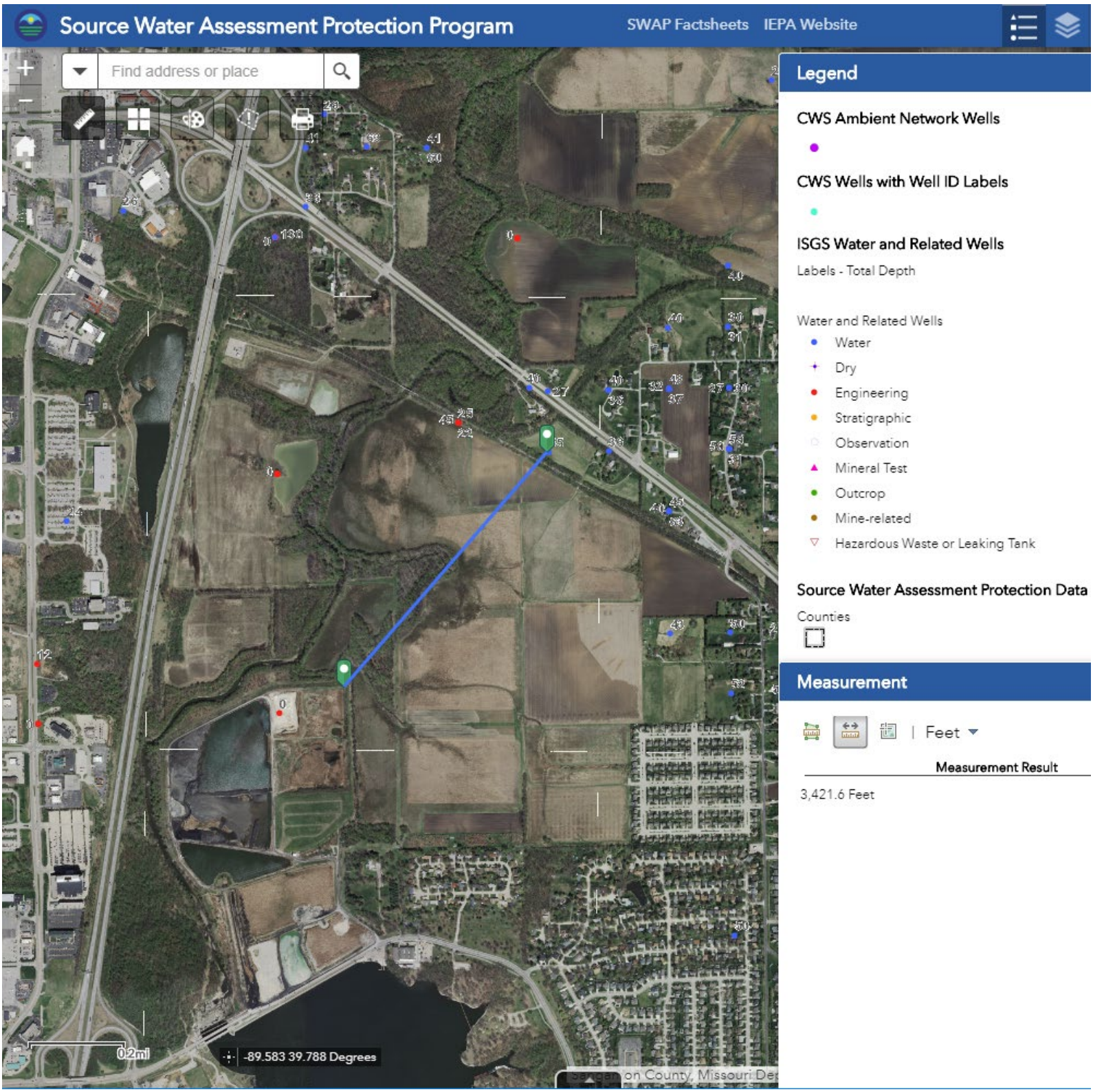
There is no reason to believe that potable wells exist within 2,500 feet hydraulically downgradient of the CCR impoundments that were not identified as part of this potable water well survey.

[1] (http://illinois-epa.maps.arcgis.com/apps/webappviewer/index.html?id=4d37a05f5ba441f1b30dab54ccb81fc8)

APPENDIX A

SWAP GIS Database Query and ISGS Boring Log

Illinois EPA SWAP GIS Database Query
CWLP – Springfield, Illinois
William Bartels - API 121672620900



ILLINOIS STATE GEOLOGICAL SURVEY

Private Water Well	Top	Bottom
black topsoil	0	5
gray silt	5	11
brown clay (H2o @ 18'-22')	11	22
brown till	22	25
soft gray shale	25	32
hard gray shale fracture @ 43'	32	55
Total Depth		**55**

Casing: 6" PVC SDR 21 from -1' to 18'
36" CONCRETE from 18' to 55'

Grout: HOLE PLUG from 16 to 17.

Grout: BUCKSHOT from 17 to 55.

Water from shale fracture/clay at 18' to 43'.

Owner Address: 3596 East State Rt. 29 Springfield, IL

Address of well: Rt. 29
Springfield, IL

Location source: Location from permit

Permit Date: August 13, 2001 **Permit #:**

COMPANY Wiesenhofer, Andrew

FARM Bartels, William

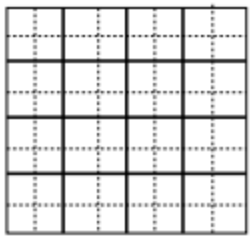
DATE DRILLED September 25, 2001 **NO.**

ELEVATION 0 **COUNTY NO.** 26209

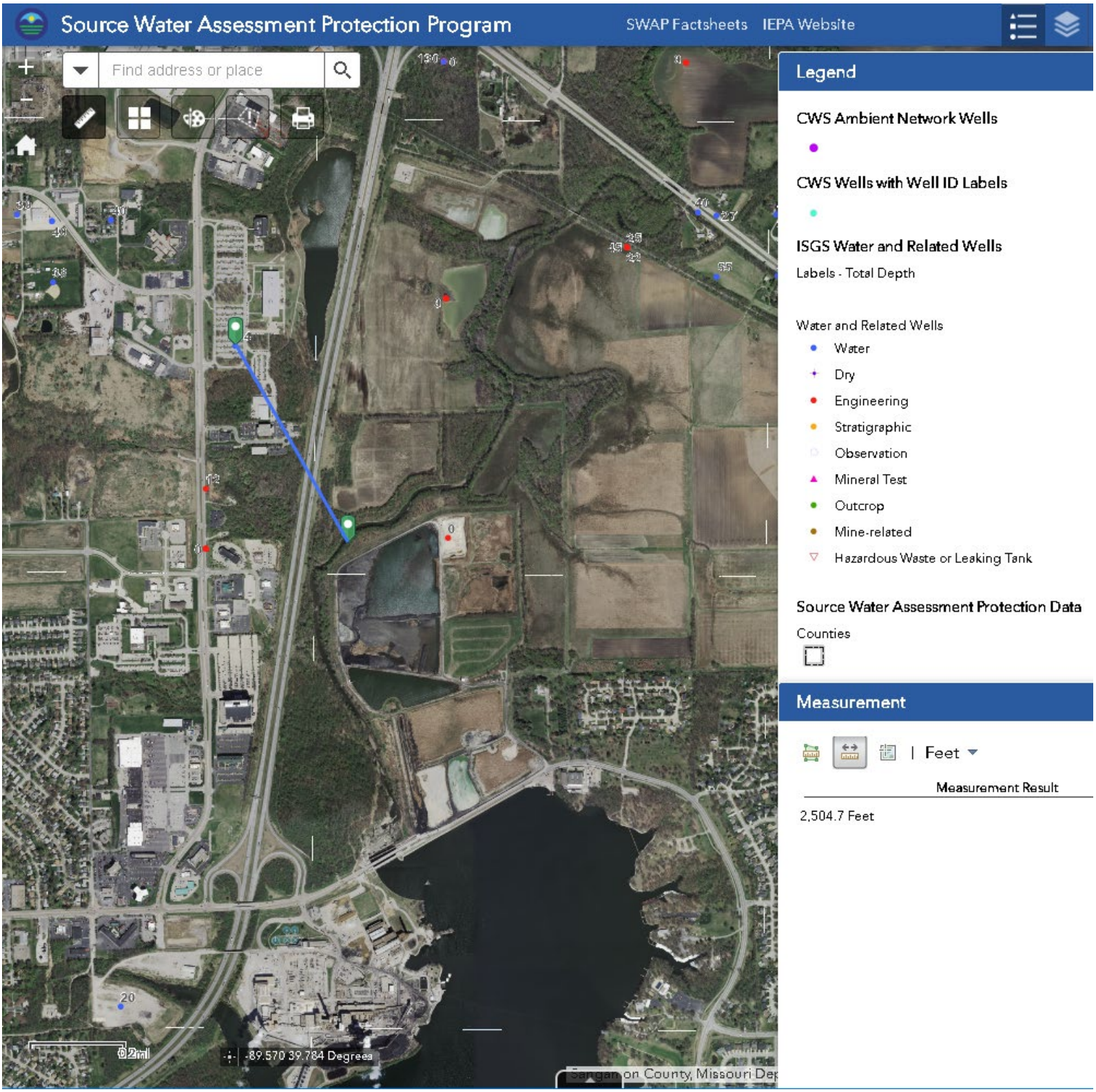
LOCATION SW NE SW

LATITUDE 39.777352 **LONGITUDE** -89.587243

COUNTY Sangamon **API** 121672620900 **6 - 15N - 4W**



Illinois EPA SWAP GIS Database Query
CWLP – Springfield, Illinois
IDOT - API 121670148100



ILLINOIS STATE GEOLOGICAL SURVEY

Water Well	Top	Bottom
s.s. #52306	0	0
top soil	0	3
yellow clay	3	18
brown clay	18	19
hardpan	19	24
Total Depth		**24**

Casing: 36" CONCRETE from 0' to 20'

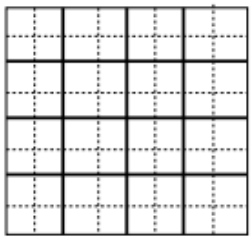
Water from hardpan at 19' to 24'.
Static level 10' below casing top which is 0' above GL
Pumping level 0' when pumping at 20 gpm for 0 hours

Driller's Log filed
Sample set # 52306 (1' - 24')

Owner Address: ,
Location source: Location from the driller

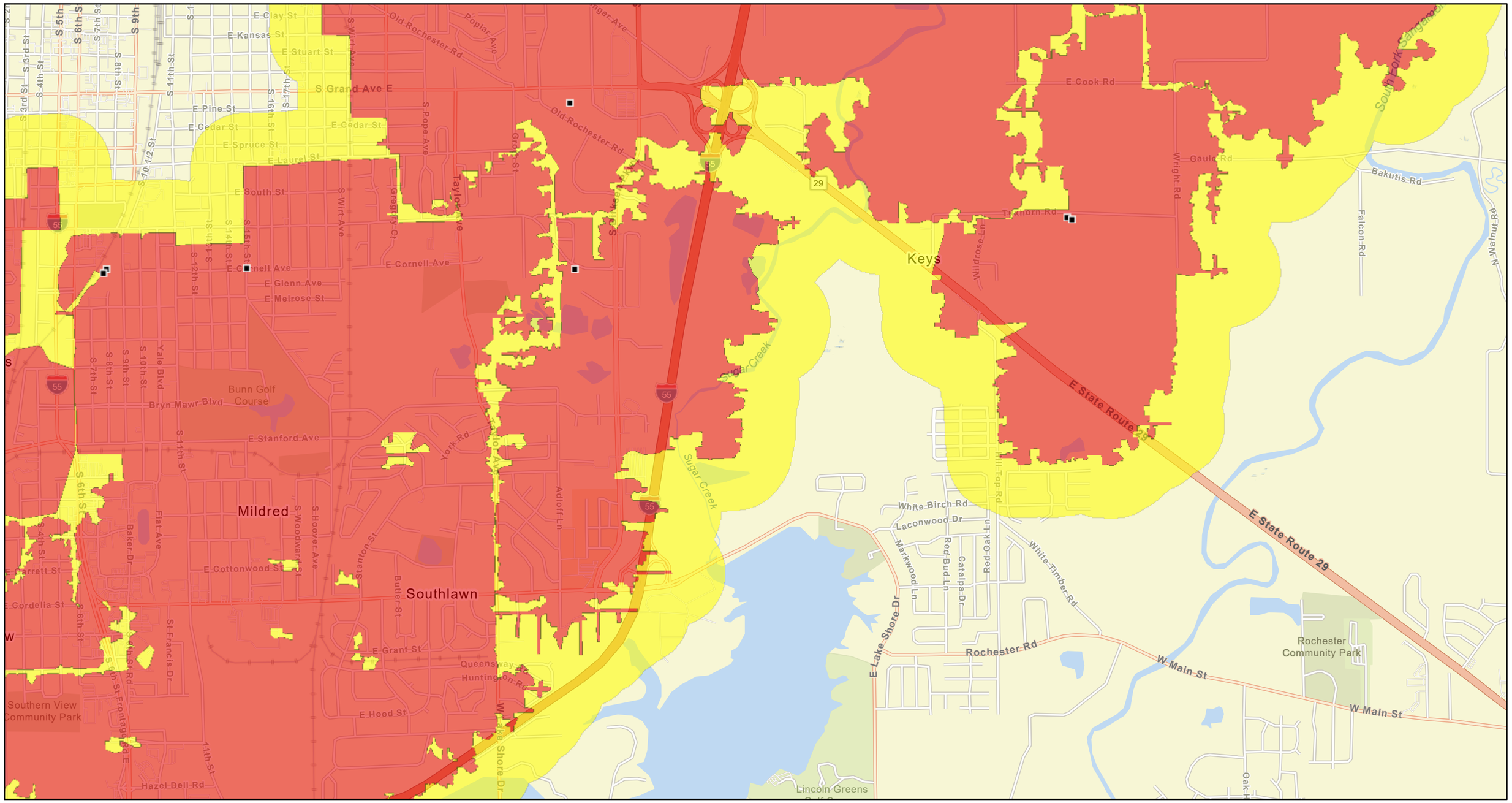
Permit Date: **Permit #:**

COMPANY owner
FARM Fiskas, Raymond L.
DATE DRILLED January 1, 1965 **NO.** 1
ELEVATION 0 **COUNTY NO.** 01481
LOCATION 430'N line, 320'E line of NW SE SW
LATITUDE 39.775264 **LONGITUDE** -89.606181
COUNTY **Sangamon** **API 121670148100** **1 - 15N - 5W**



ATTACHMENT 2
UNDERGROUND MINES QUERY

Illinois State Geological Survey -- ILMINES



10/11/2021, 2:48:19 PM

- Underground Mine Buffer Region
- Non Coal Mines

Underground Coal Mines

- Underground
- Indefinite Underground Mine Boundary
- Surface
- Non Coal Mine Shaft

1:31,640

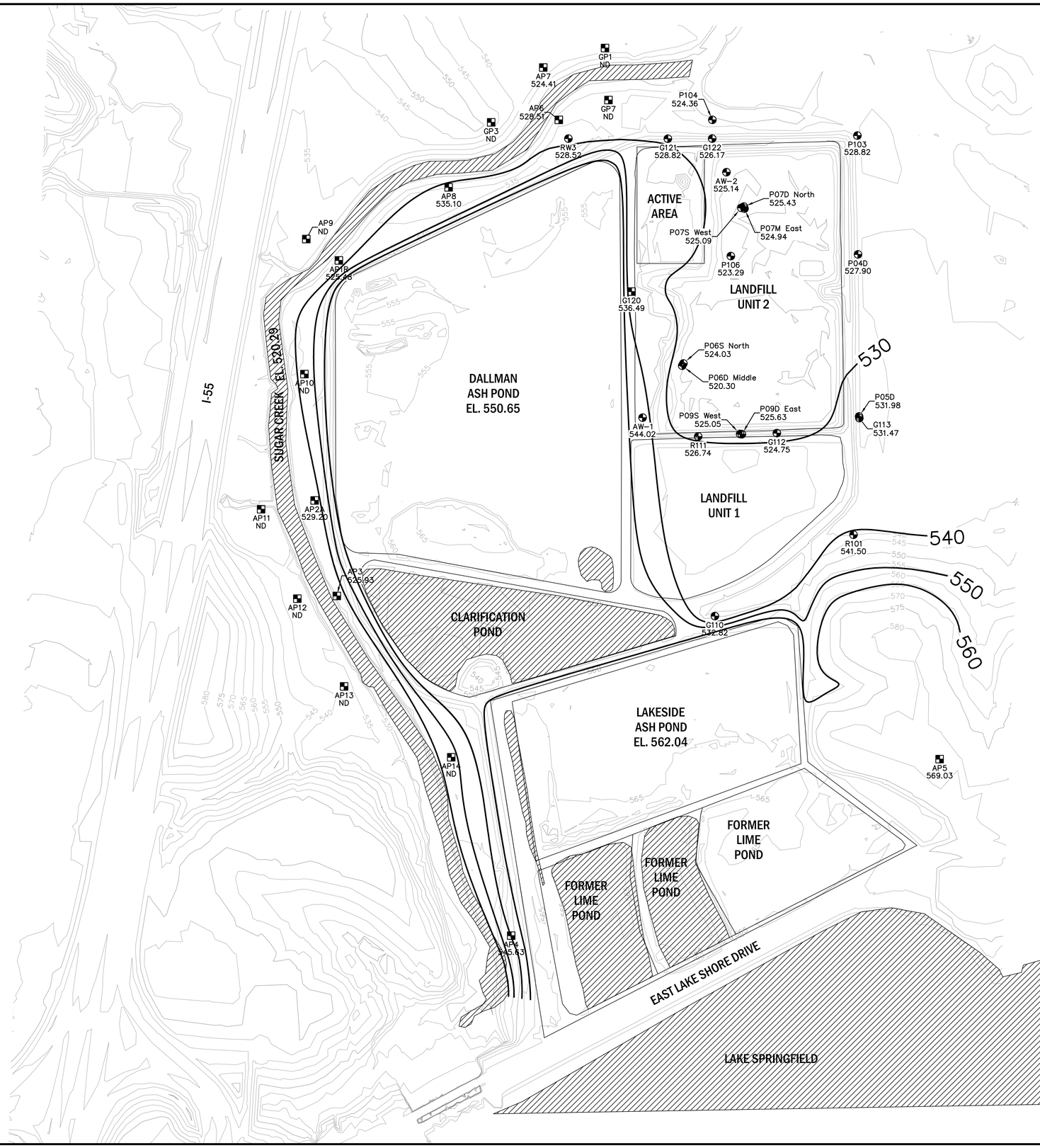
0 1,500 3,000 6,000 ft

0 490 980 1,960 m

Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, PRI - ISGS

Illinois State Geological Survey -- ILMINES
Prairie Research Institute;University of Illinois

APPENDIX F:
POTENTIOMETRIC SURFACE MAPS



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 1/27/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 1/27/2023.
6. "NM" – NOT MEASURED. WELL FROZEN AND GROUNDWATER ELEVATION COULD NOT BE COLLECTED.
7. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK: MTH

POTENTIOMETRIC SURFACE MAP
JANUARY 27, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 1

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Tab: Layout1 Last Saved: September 5, 2024, by Mike Nguyen Plotted: Thursday, September 5, 2024 7:46:19 AM
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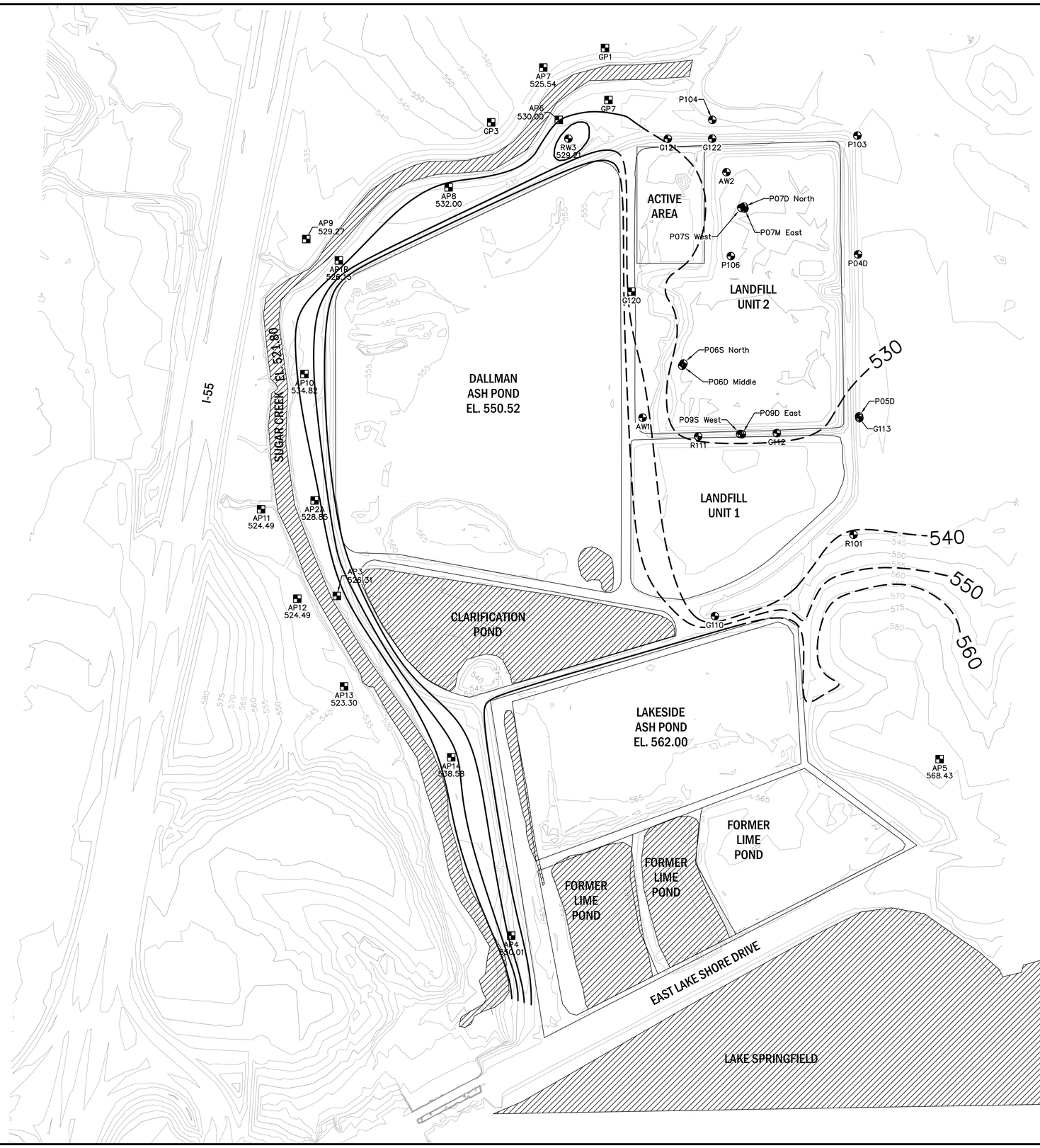

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 2/16/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 2/16/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
FEBRUARY 16, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 2

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 9:30:33 AM
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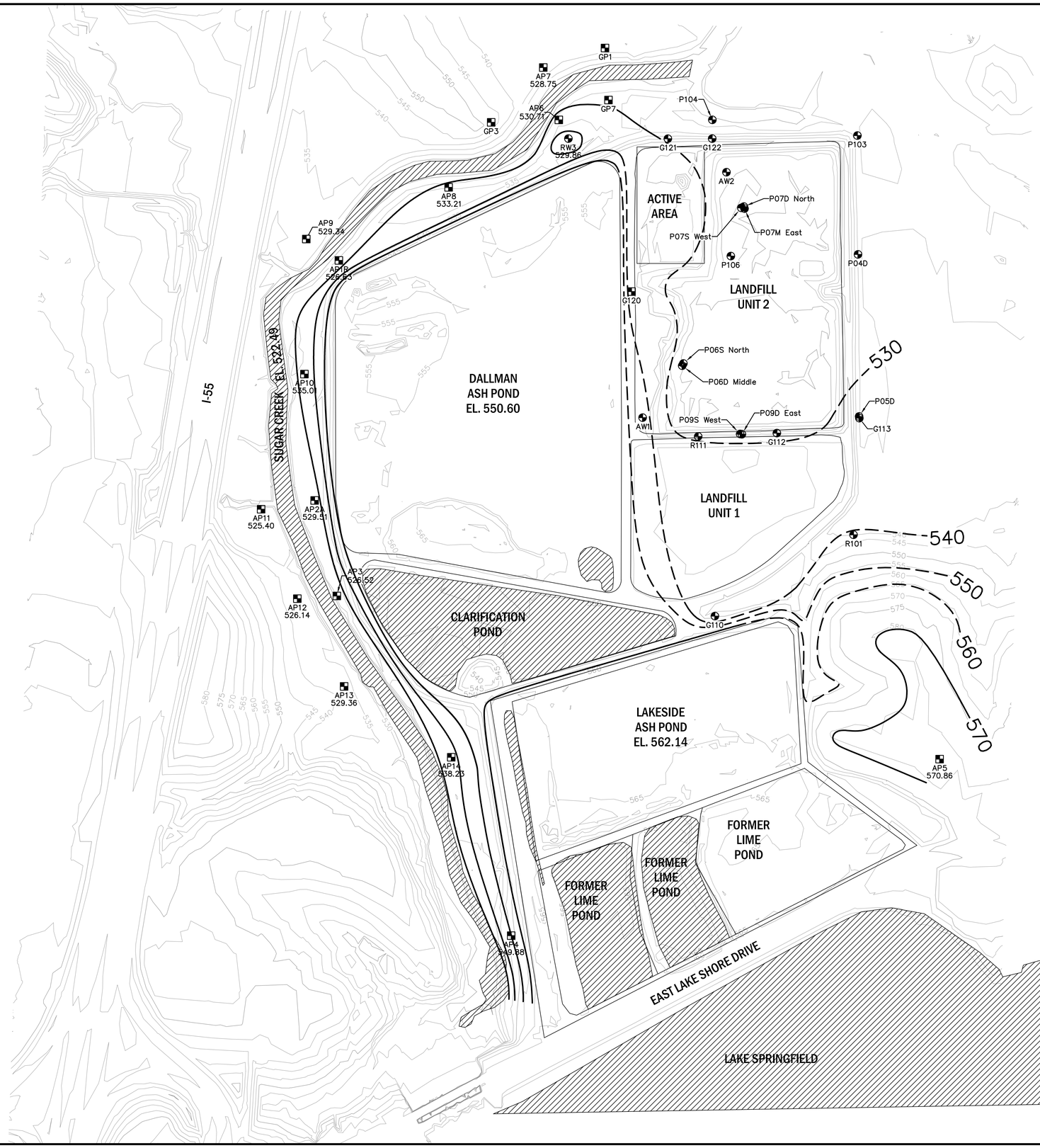

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 3/29/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 3/29/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
MARCH 29, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 3

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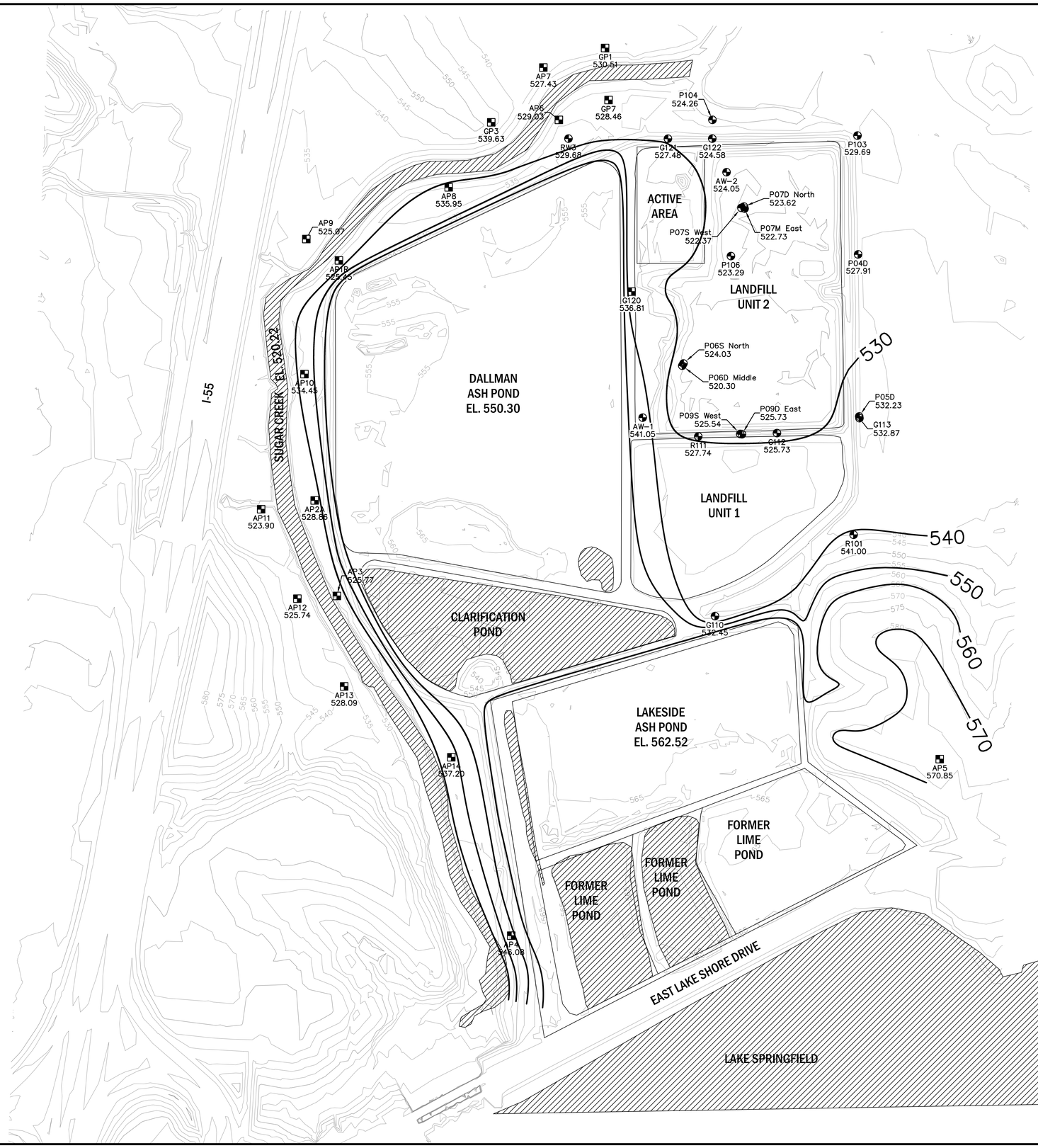

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 4/12/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 4/12/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
APRIL 12, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 4

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Tab: Layout1 Last Saved: September 5, 2024, by Mike Nguyen Plotted: Thursday, September 5, 2024 7:44:50 AM
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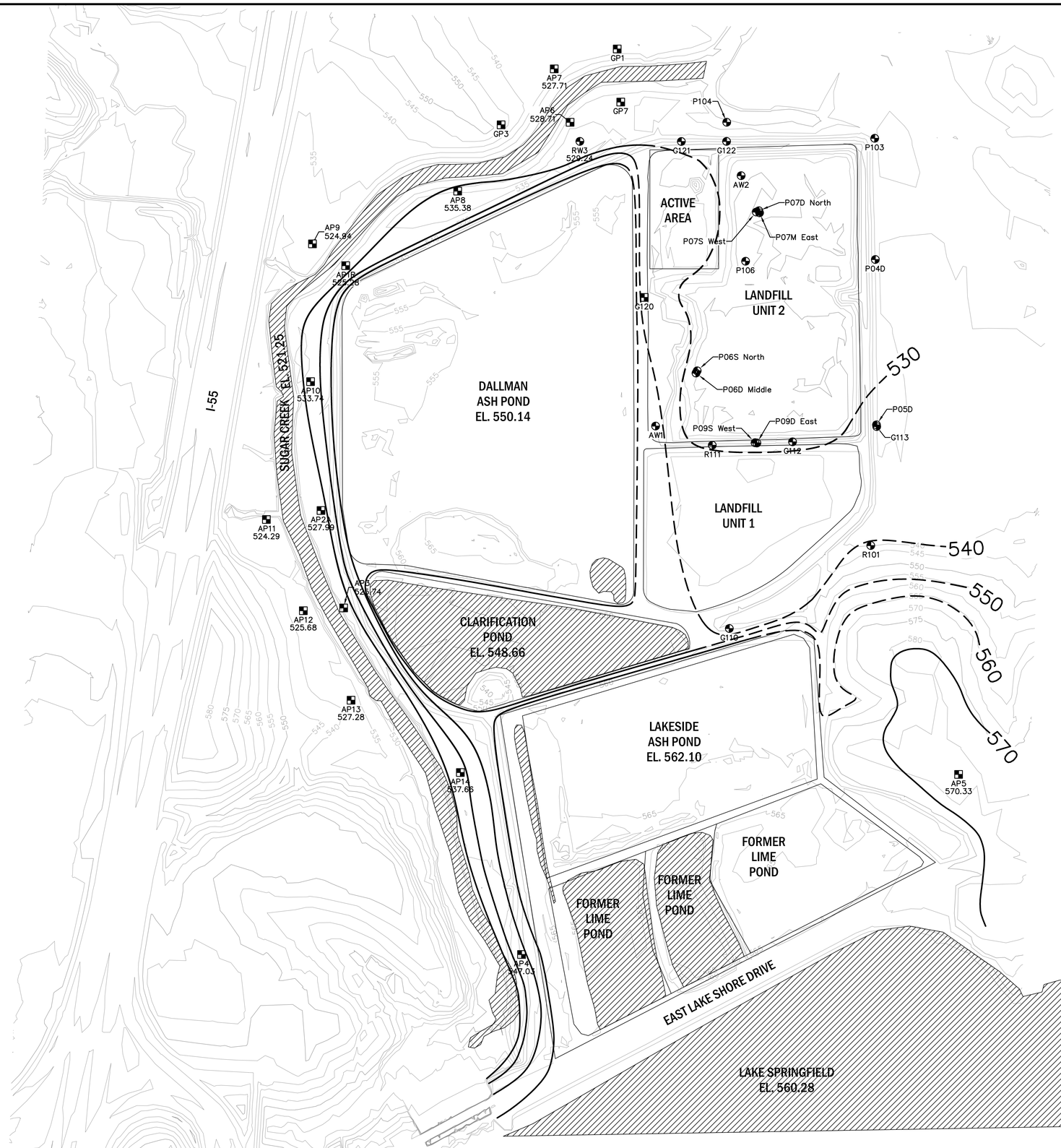

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 5/30/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 5/30/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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POTENTIOMETRIC SURFACE MAP
MAY 30, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 5

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:10:28 AM
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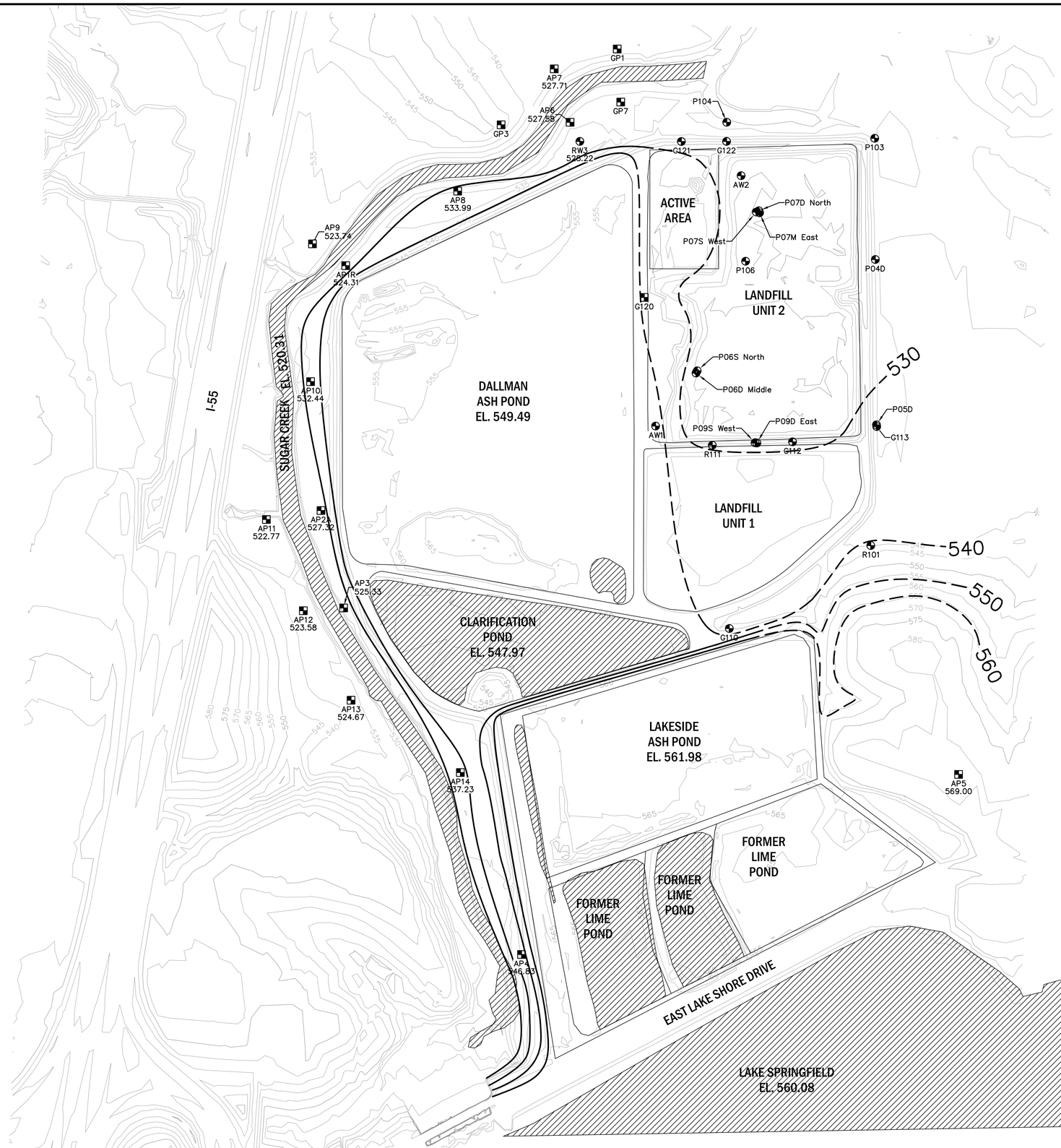

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 6/15/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 6/15/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
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SPRINGFIELD, ILLINOIS 62711-7233
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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
JUNE 15, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 6

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:11:25 AM
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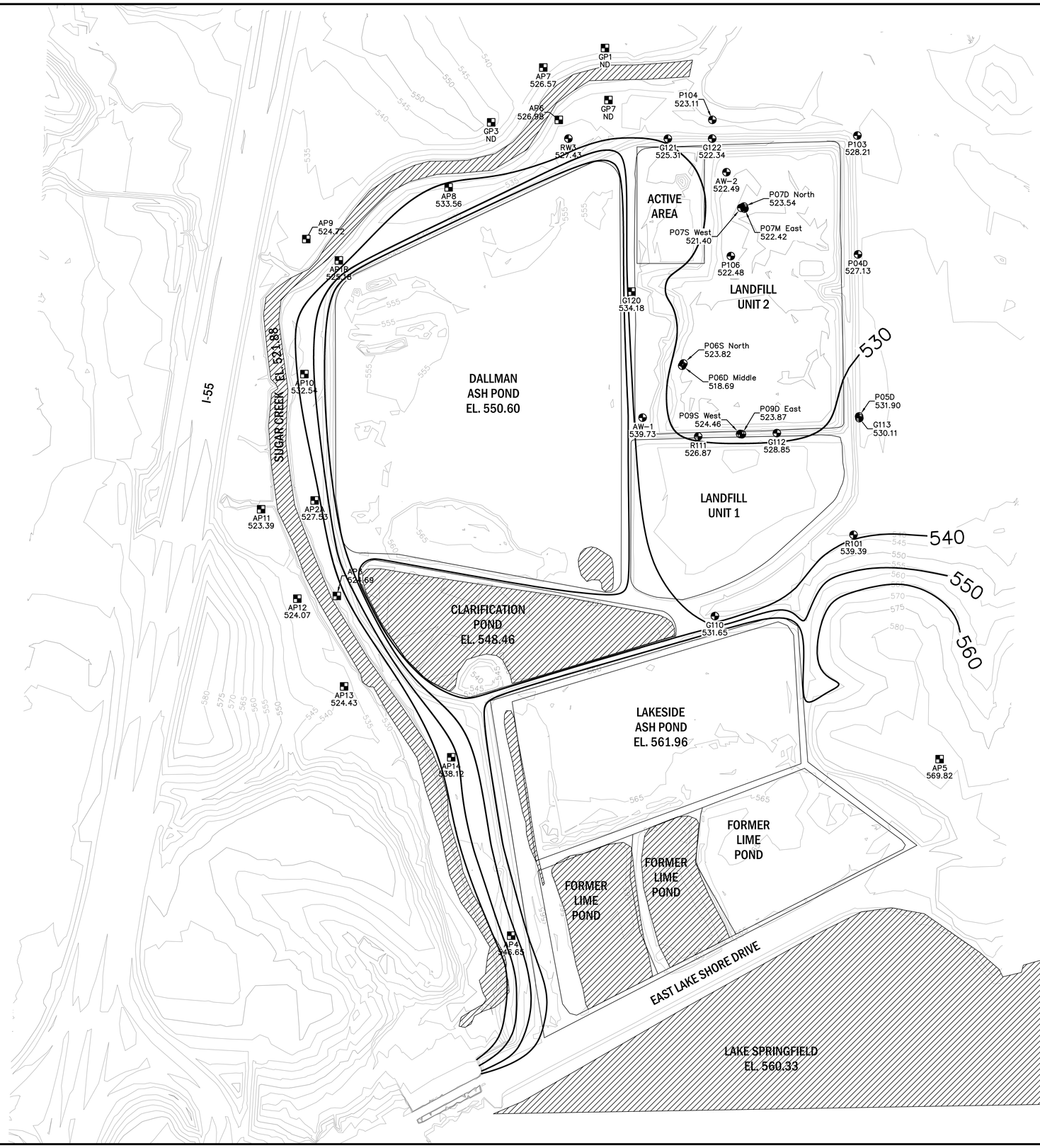

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 7/6/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 7/6/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
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POTENTIOMETRIC SURFACE MAP
JULY 6, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 7

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Tab: Layout1 Last Saved: September 5, 2024, by Mike Nguyen Plotted: Thursday, September 5, 2024 7:42:50 AM
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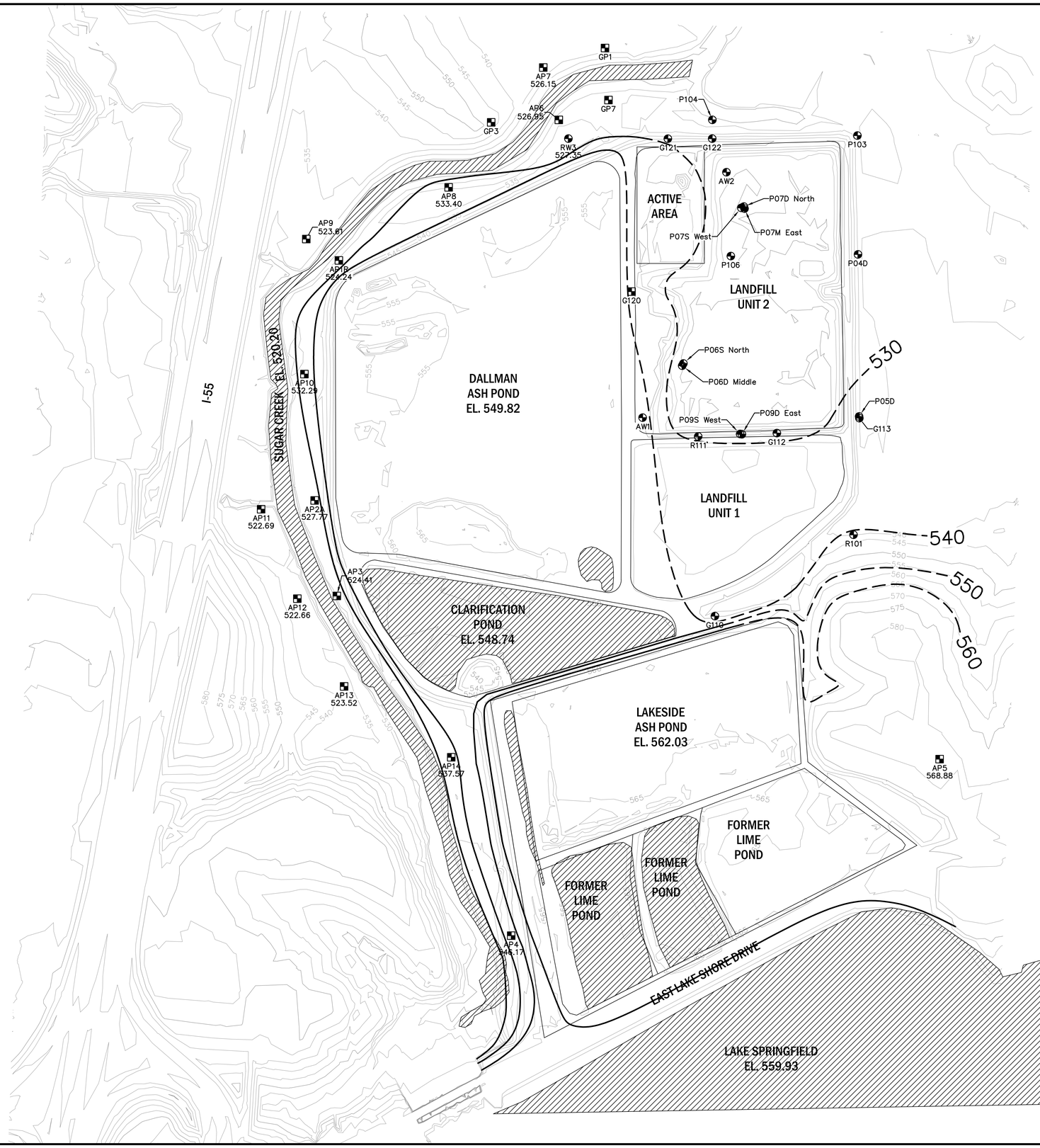

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 8/31/2022.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 8/31/2022.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO
APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
AUGUST 31, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 8

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:12:09 AM
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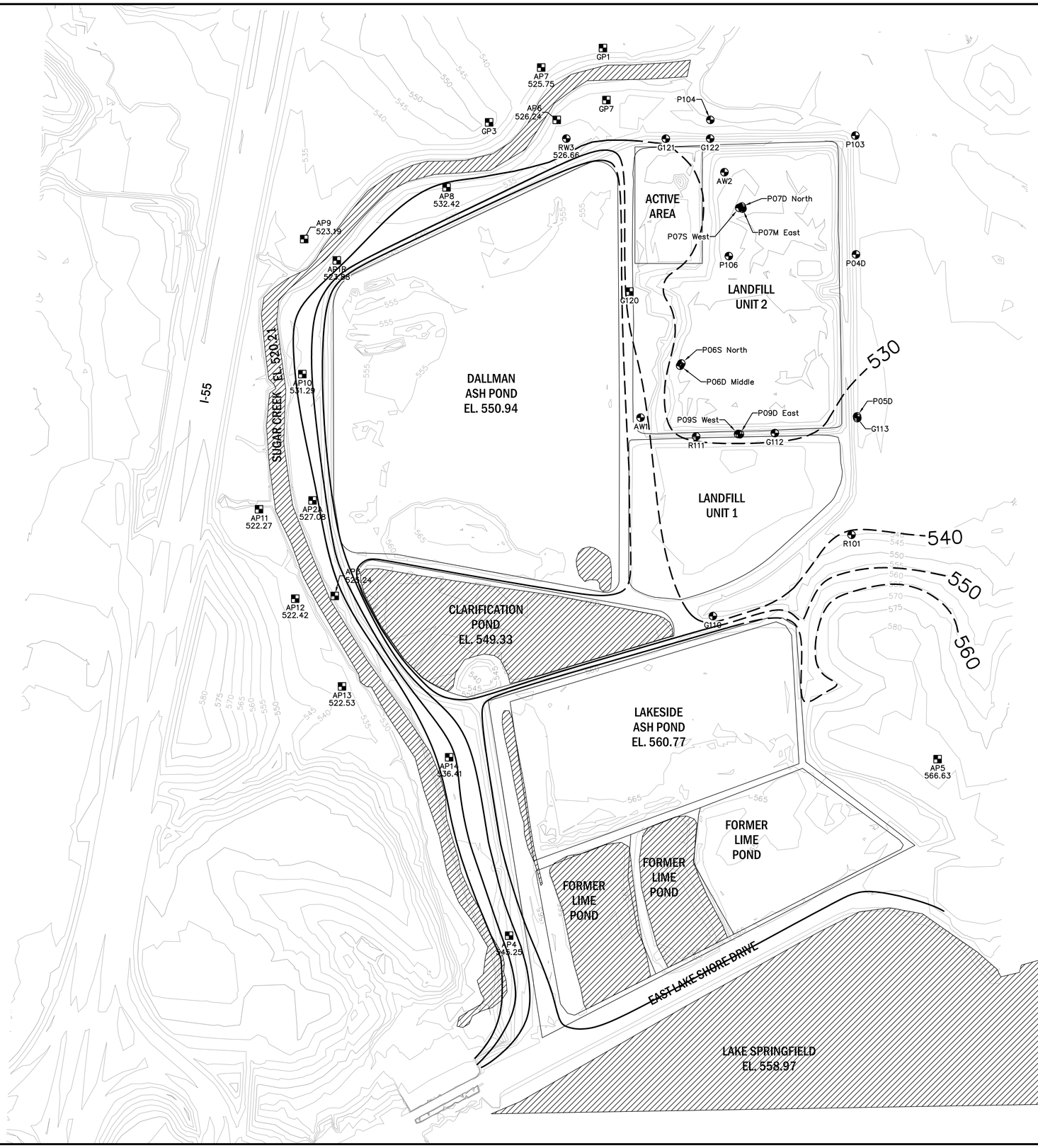

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 9/16/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 9/16/2023.
6. "NM" – NOT MEASURED
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO
APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
SEPTEMBER 16, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 9

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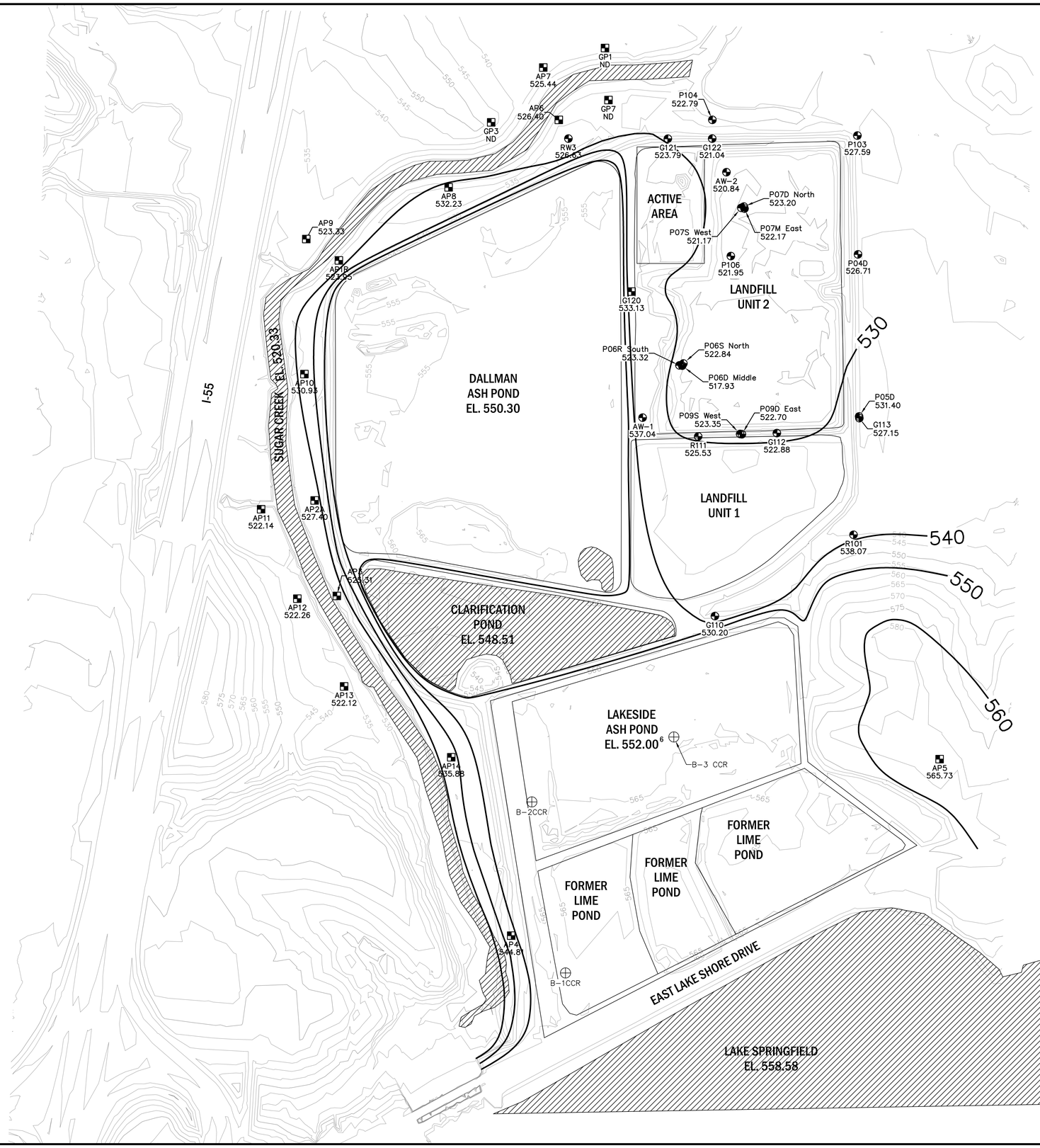
Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:13:31 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2024\9-16-23.dwg



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- VIBRATING WIRE PIEZOMETER

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 10/26/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 10/26/2023.
6. ESTIMATED GROUNDWATER ELEVATION OF 552 FT MSL IS BASED ON VIBRATING WIRE PIEZOMETERS B-1CCR, B-2CCR, AND B-3CCR INSTALLED IN AND ADJACENT TO THE LAKESIDE ASH POND.
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
OCTOBER 26, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 10

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Tab: Layout1 Last Saved: September 5, 2024, by Mike Nguyen Plotted: Thursday, September 5, 2024 7:43:25 AM
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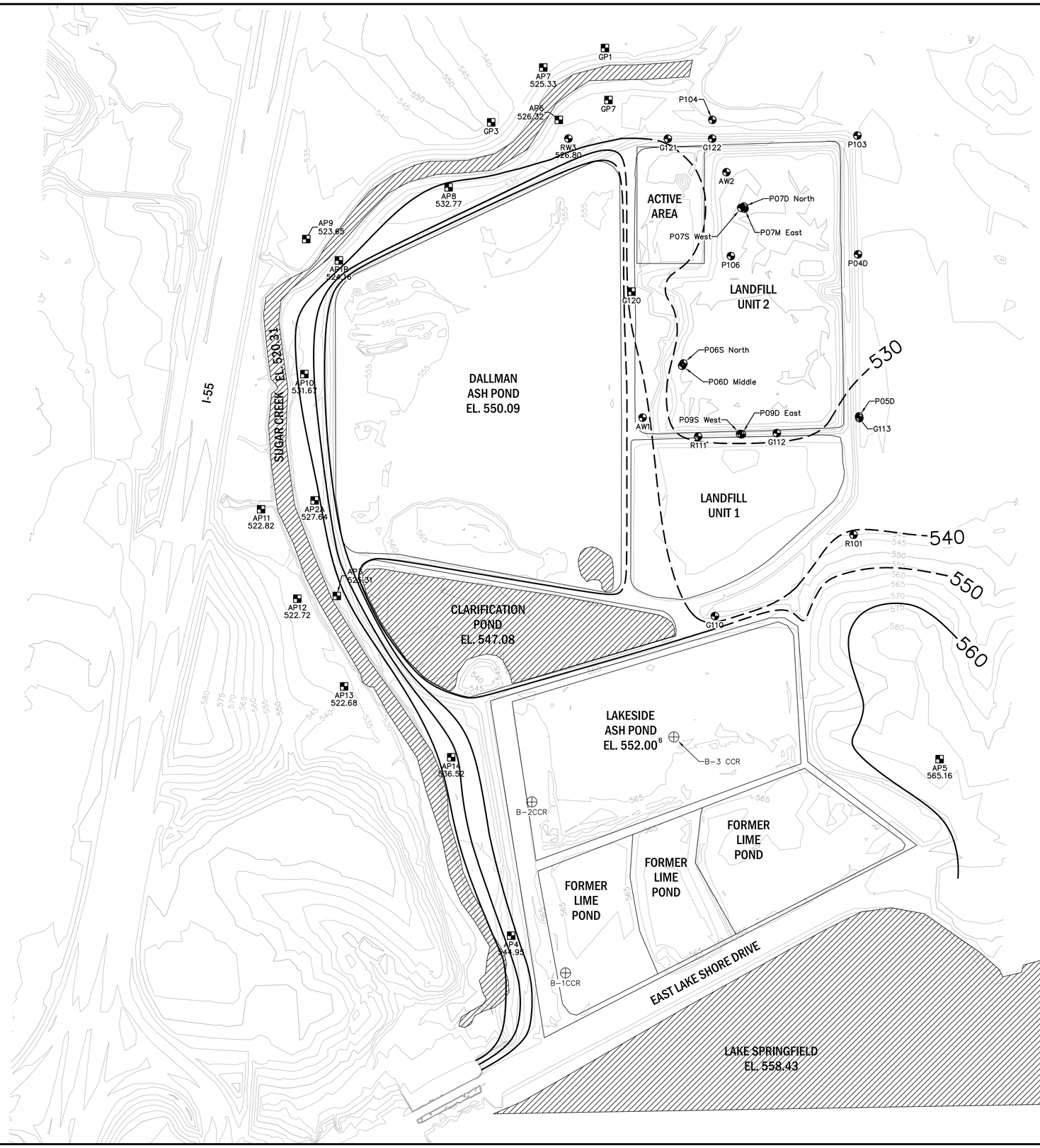

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- VIBRATING WIRE PIEZOMETER
- --540-- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 11/27/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 11/27/2023.
6. ESTIMATED GROUNDWATER ELEVATION OF 552 FT MSL IS BASED ON VIBRATING WIRE PIEZOMETERS B-1CCR, B-2CCR, AND B-3CCR INSTALLED IN AND ADJACENT TO THE LAKESIDE ASH POND.
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
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APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
NOVEMBER 27, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 11

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:14:25 AM
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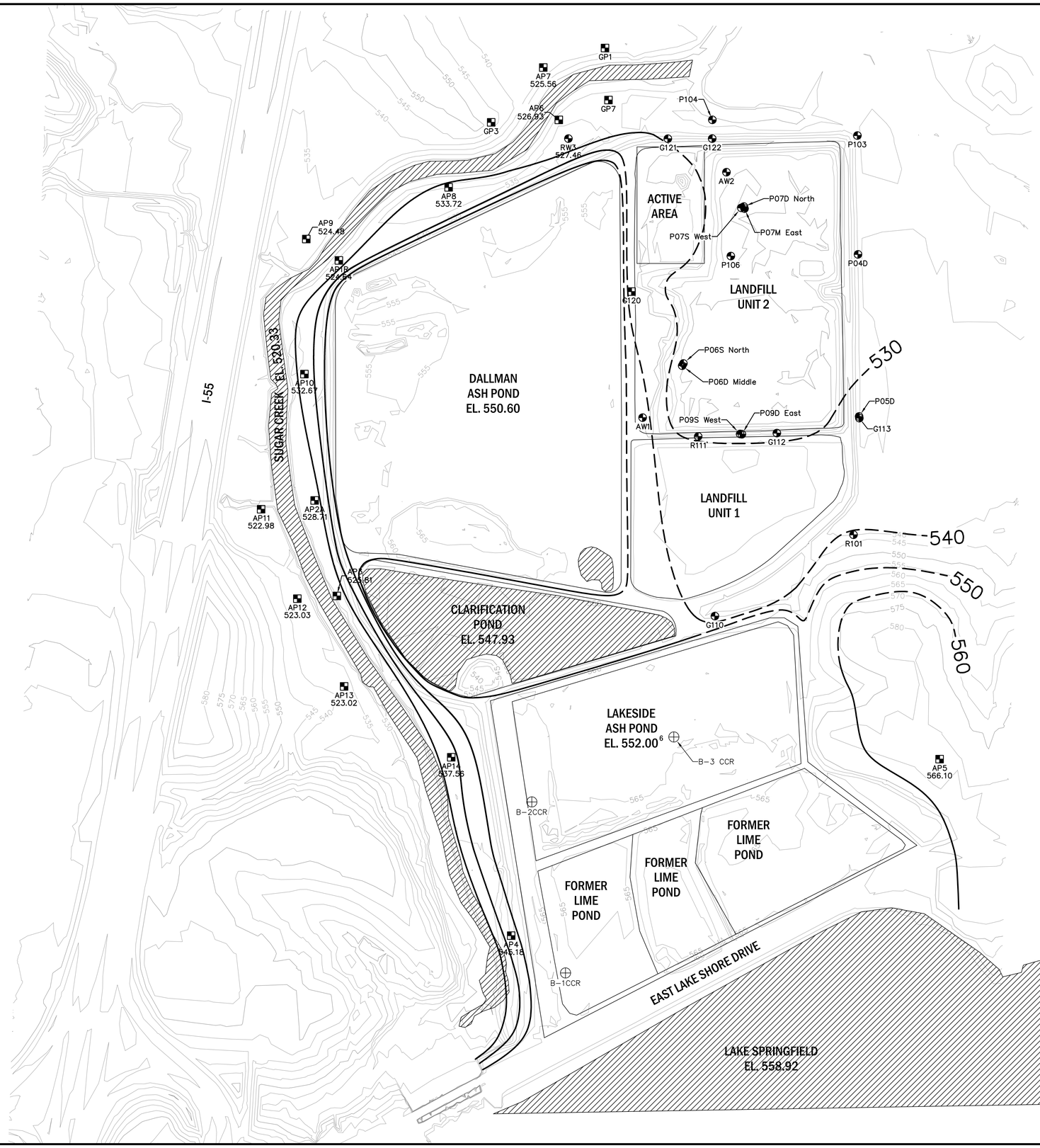

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL
- APPROXIMATE LIMITS OF SURFACE WATER BODY
- VIBRATING WIRE PIEZOMETER
- ASSUMED CONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 10 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 12/27/2023.
5. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON AVERAGE OF USGS GAGE 05576250 FOR 12/27/2023.
6. ESTIMATED GROUNDWATER ELEVATION OF 552 FT MSL IS BASED ON VIBRATING WIRE PIEZOMETERS B-1CCR, B-2CCR, AND B-3CCR INSTALLED IN AND ADJACENT TO THE LAKESIDE ASH POND.
7. BOUNDARIES OF THE SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO
APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK | CHK'D BY: MTH

POTENTIOMETRIC SURFACE MAP
DECEMBER 27, 2023

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2024

PROJECT ID: 240227/0029

SHEET NUMBER:

FIG. 12

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Tab: Layout1 Last Saved: September 5, 2024, by Ben Korpus Plotted: Thursday, September 5, 2024 10:15:06 AM
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APPENDIX G:
STATISTICAL METHOD FOR DETERMINATION OF BACKGROUNDS

Professional Engineer Certification – Statistical Analysis Plan

35 I.A.C. § 845.640(f)(2) Statistical Method Certification

In accordance with Title 35 Illinois Administrative Code (35 I.A.C.) Part 845, Subpart F, Section 845.640(f)(2), the owner or operator of a coal combustion residual (CCR) unit must obtain a certification from a qualified professional engineer that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR management area.

This certification is based on the description of the statistical methods selected to evaluate groundwater as presented in the Statistical Analysis Plan, prepared for City Water, Light, and Power, and dated February 6, 2024. The procedures described in the plan will be used to establish background conditions and implement groundwater, assessment, and corrective action monitoring as necessary and required by 35 I.A.C. § 845 Subpart F. The Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640, with reference to the acceptable statistical procedures provided in USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (March 2009), and is intended to provide a logical process and framework for conducting the statistical analysis of the data obtained during groundwater monitoring. In accordance with 35 I.A.C. § 845.640(f) the statistical method chosen for analysis of groundwater monitoring data will initially be the prediction interval procedure or control chart approach for each 35 I.A.C. § 845.600 constituent in which the interval is established from the background data and compared to the confidence interval of each 35 I.A.C. § 845.600 constituent in each compliance well.

I, Karl W. Finke, a qualified professional engineer in good standing in the State of Illinois, certify that the statistical methods described in this document, as supported by the Statistical Analysis Plan in the facility's Operating Record, are appropriate for evaluating the groundwater monitoring data for the CCR management area.

Signature: Karl Finke

Illinois P.E. No: 062.068571

Date: 09/06/24

Statistical Analyses Plan

1. Introduction

The US Environmental Protection Agency (EPA) published the final rule for the management of Coal Combustion Residuals (CCR) on April 17, 2015. The CCR rule is formally promulgated in the U.S. Code of Federal Regulations, Title 40, Parts 257 and 261 (EPA, 2015) along with amendments to the rule published in July, 2018 (EPA, 2018) and August, 2020 (EPA, 2020).

This rule is applicable to the CCR surface impoundments identified as the Lakeside Ash Pond and the Dallman Ash Pond. These CCR surface impoundments are owned and operated by City Water, Light and Power (CWLP) and are located north and east of the former Lakeside Power Generating Station and Dallman Power Generating Station in the Eastern ½ of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1).

Pursuant to the 40 CFR §257.90(b)(1), a groundwater sampling and analysis program must be developed in accordance with 40 CFR, §257.93. The program must address the selection of statistical methods, and the selected statistical method(s) must be certified by a Qualified Professional Engineer.

This Statistical Analysis Plan (Plan) describes the method(s) to be used in identifying a statistically significant increase (SSI) over the upgradient or background groundwater quality. This plan is included as Appendix C of the Groundwater Monitoring Program. The Groundwater Monitoring Program contains additional information on the site-specific hydrogeology, groundwater monitoring system, sampling and analysis procedures, and reporting requirements.

2. Statistical Method

The statistical methods will evaluate if a statistically significant increase (SSI) of contaminant concentrations has occurred in groundwater samples when comparing a compliance monitoring sample analytical result with background (baseline) groundwater analytical results.

The chosen statistical methods will be in compliance with 40 CFR 257.93 and the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (EPA, March 2009). The primary software that will be used to conduct the statistical evaluations is the U.S.EPA's ProUCL (v. 5.2) software package. ProUCL was developed for analysis of environmental data sets with and without non-detect (ND) observations. ProUCL is a comprehensive statistical software package with statistical methods and graphical tools to address many environmental sampling and statistical issues.

The requirements for statistical analysis of groundwater quality data collected under the CCR Rule are given in 40 CFR 257.93(f)-(h). The owner or operator of a CCR unit must select one of the statistical methods specified in the Section to evaluate the groundwater data. The methods include:

1. A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures;
2. An ANOVA based on ranks followed by multiple comparisons procedures to identify significant evidence of contamination;
3. A tolerance or prediction interval procedure;
4. A control chart approach that gives control limits for each constituent; or
5. Another statistical test method that meets the performance standards specified by the CCR rule.

As groundwater monitoring progresses, the use of the selected statistical method will be subject to ongoing review. CWLP reserves the right to use other statistical tests in place of, or in addition to, the methods specified in this Plan if such methods are better suited for analysis of future results. Additionally, the methods in this Plan have been developed in accordance with the requirements of the CCR rule as published on April 17, 2015 (EPA, 2015), and as amended, and modifications to this Plan may occur if further revisions or amendments are made to the CCR rule. If test methods are changed this work plan will be revised, as appropriate, and its certification updated.

3. Statistical Analysis

Using the Unified Guidance and ProUCL, a preliminary statistical analysis was performed on the eight rounds of baseline groundwater quality data to assess the background constituent data and determine the most appropriate statistical method(s) for data analysis and comparisons. The following sections present a summary of the statistical analyses methodology.

3.1. Data Distribution Testing

The pooled background data for each parameter were tested using statistical software (ProUCL v.5.2) to determine the underlying data distribution (normal, lognormal, or unknown/no discernable distribution). Data distribution testing was conducted using the Shapiro-Wilks test test for datasets with less than or equal to 50 values. The data distribution tests were conducted at a 95 percent significance level.

If data were found to be normally or lognormally (test of lognormal transformed data) distributed at a 95 percent significance level, and the data contain less than or equal to 50 percent non-detects, parametric statistical methods are applied. If data were found to be not normally or lognormally distributed (unknown or no discernable distribution), or the data contain greater less than 50 percent non-detects non-parametric statistical methods are applied.

3.2. Outlier Testing

Prior to statistical analyses the background dataset was pooled and parameter was screened for the existence of outliers using the Grubbs test. Outliers are defined as data points that vary significantly from the mean value for that data set. Outliers may represent sampling error, contamination from surface run-off, analytical laboratory error, or anomalous site conditions. Outliers, if not removed from the data set, can erroneously increase the calculated background value and minimize the occurrence of an

exceedances related to a release from a waste unit. Once a statistical outlier has been identified, the concentrations are evaluated to determine the cause. If a valid reason has been determined for the outlier, the data point will be removed from the data set. If no specific reason can be documented, the point will considered representative and included in the analysis.

3.3. Handling of Non-Detects (NDs)

Non-detect values (NDs) were handled according to the percentage of on-detects (%ND) present in the background sampling. The %ND was calculated for each parameter from the pooled background data of each well set. The data treatment was done according to the following criteria:

a) For under 0% NDs, no adjustment is made to the values in the data set.

b) For under 15% NDs, the value of one-half (½) the reported Detection Limit (DL) was substituted for the ND value, and the mean and standard deviation were calculated using detected values with the substituted ND values.

c) For 15-50% NDs, Cohen's Adjustment was used to adjust the mean and standard deviation. The adjusted mean and standard deviation was then used to calculate the prediction limit.

d) For over 50% but not 100% NDs, the highest recorded concentration was substituted for the prediction limit.

e) For 100% NDs, the Practical Quantitation Limit (PQL) will be substituted for the ND value. The mean and standard deviation was calculated using the substituted ND values.

3.4. Tolerance or Prediction Interval Procedure

The prediction limit for each parameter was calculated using the mean, standard deviation, and the appropriate t value. The statistical analysis uses a one-tailed test to determine an upper limit of significance. The upper prediction limit is the concentration for the probability that the constituent can be measured without constituting a statistical increase above the background. Any concentration found below this limit is regarded as falling within the normal statistical population.

3.5. Prediction Limit

The statistical procedure was conducted according to the following steps:

a) Calculate arithmetic mean - the arithmetic mean was calculated using the pooled data for each parameter.

   The arithmetic mean (X_b) was calculated using the following equation:

$$X_b = \frac{X_1 + X_2 + ... + X_n}{n}$$

where: X_b = Average background value
X_n = Individual background value for *n* sample
n = Number of background values

b) Calculate standard deviation - the standard deviation was calculated using the pooled data for each parameter.

The standard deviation was calculated using the following equation:

$$S_b = \sqrt{\frac{(X_1 - X_b) + (X_2 - X_b) + ... + (X_n - X_b)}{n - 1}}$$

where: S_b = Population standard deviation
X_n = Individual background value for *n* sample
X_b = Mean (1)
n = Number of background samples

c) Calculate the Upper Prediction Limit - the Upper Prediction Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value.

The Student's t value σ, is determined by the facility permit whether it is $\sigma = 0.05$ (95% Confidence). The Student's t value also varies upon the number of background samples utilized in the calculations. For those parameters with 15% to 50%% NDs, the Cohen Method was utilized to calculate the Prediction Limit. The methodology described in the Unified Guidance was used to calculate the Cohen Prediction Limit. The Upper Prediction Limit for the remaining parameters was calculated using the following equation:

$$PL = X_b \pm S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$

where: PL = Upper Prediction Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.05 significance
n = Number of background samples

4. References

1. Andrews Engineering, Inc., 2024. Groundwater Monitoring Program, City Water, Light and Power, CCR Ash Impoundments, Springfield, Illinois.

2. Code of Federal Regulations (CFR), Title 40: Protection of the Environment. Part 257: Criteria for Classification of Solid Waste Disposal Facilities and Practices. Subpart D: Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.

3. USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance. EPA 530/R-09-007. March 2009.

4. USEPA. 2022. ProUCL: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Version 5.2. https://www.epa.gov/land-research/proucl-software.

APPENDIX H:
BACKGROUND CONCENTRATIONS AND CALCULATIONS

City Water, Light and Power
35 Ill. Adm. Code 845 Groundwater Protection Standard

Parameter	Units	35 IAC 845.600(a) Groundwater Protection Standard	Calculated Background Concentration	Proposed 35 IAC 845 Groundwater Protection Standard
pH	s.u.	6.5 - 9	6.7 - 7.87	6.5 - 9
Specific Conductance	umhos/cm	NA	NA	NA
Turbidity	NTU	NA	NA	NA
Antimony, total	mg/L	0.006	0.001	0.006
Arsenic, total	mg/L	0.01	0.0266 [1]	0.01
Barium, total	mg/L	2	0.519	2
Beryllium, total	mg/L	0.004	0.0025	0.004
Boron, total	mg/L	2	0.15	2
Cadmium, total	mg/L	0.005	0.0025	0.005
Calcium, total	mg/L	--	181.6	181.6
Chloride, total	mg/L	200	12.3	200
Chromium, total	mg/L	0.1	0.0653	0.1
Cobalt, total	mg/L	0.006	0.0052	0.006
Fluoride, total	mg/L	4	0.5	4
Lead, total	mg/L	0.0075	15 [1]	0.0075
Lithium	mg/L	0.04	0.0124	0.04
Mercury, total	mg/L	0.002	0.0005	0.002
Molybdenum, total	mg/L	0.1	0.025	0.1
Radium-226 + Radium-228	pCi/L	5	3.79	5
Selenium, total	mg/L	0.05	0.025	0.05
Sulfate, total	mg/L	400	55.5	400
Thallium, total	mg/L	0.002	0.002	0.002
Total Dissolved Solids	mg/L	1200	609.21	1200

Note:

1. Background value calculated using non-detect analytical results with practical quantitation limit (PQL) above the 35 IAC 845.600 Groundwater Protection Standard.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix III Parameters
Raw Data Summary

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Distribution[1]	Proposed Background Value
AP-4	Boron, total	ug/L	78.3	123	131	136	117	120	105	129	Normal Dataset - Calculate Interwell Prediction Limit	149.73
AP-5	Boron, total	ug/L	69.9	53.7	77.9	73.3	48.3	44.3	40.7	73		
AP-4	Calcium, total	mg/L	125	118	118	117	136	117	150	141	Normal Dataset - Calculate Interwell Prediction Limit	181.60
AP-5	Calcium, total	mg/L	98.1	77.3	158	201	155	83.5	105	118		
AP-4	Chloride, total	mg/L	11.3	12.3	11.3	9.8	10.6	12	11.9	12.1	Non-Parametric - Propose Highest Detected Concentration as Prediction Limit/Background	12.30
AP-5	Chloride, total	mg/L	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 30		
AP-4	Fluoride, total	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	100% NDs - Interwell value set at the laboratory PQL	0.50
AP-5	Fluoride, total	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
AP-4	pH	s.u.	7.39	7.18	7.13	7.01	7.02	7.08	7.29	7.12	Normal Dataset - Calculate Interwell Prediction Limit	6.70 - 7.87
AP-5	pH	s.u.	7.66	7.56	6.83	7.62	7.42	7.36	7.77	7.19		
AP-4	Sulfate, total	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	Non-Parametric - Propose Highest Detected Concentration as Prediction Limit/Background	55.50
AP-5	Sulfate, total	mg/L	54.3	46.8	50.8	52.5	55.5	54.8	48.4	55.3		
AP-4	Total Dissolved Solids	mg/L	492	514	554	558	482	538	526	544	Normal Dataset - Calculate Interwell Prediction Limit	609.21
AP-5	Total Dissolved Solids	mg/L	358	292	474	344	406	426	392	470		

Notes:
1. Shapiro-Wilk method utilized to determine if the data set follows a normal distribution. ProUCL 5.2 was used for the calculations. ProUCL 5.2 outputs are provided.
2. In accordance with Chapter 18.3 of the March 2009 Unified Guidance (Statistical Analysis of Groundwater at RCRA Facilities), the maximum detected concentration is utilized as the interwell prediction limit and proposed background when the dataset does not follow a normal distribution.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix III Parameters
Outlier Analysis

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Number of Samples	Mean	Standard Deviation	Critical Values
AP-4	Boron, total	ug/L	78.3	123	131	136	117	120	105	129	16	88.775	33.73203	2.747
AP-5	Boron, total	ug/L	69.9	53.7	77.9	73.3	48.3	44.3	40.7	73				
AP-4	Calcium, total	mg/L	125	118	118	117	136	117	150	141	16	126.11875	30.70627	2.747
AP-5	Calcium, total	mg/L	98.1	77.3	158	201	155	83.5	105	118				
AP-4	pH	s.u.	7.39	7.18	7.13	7.01	7.02	7.08	7.29	7.12	16	7.289375	0.266395	2.747
AP-5	pH	s.u.	7.66	7.56	6.83	7.62	7.42	7.36	7.77	7.19				
AP-4	Total Dissolved Solids	mg/L	492	514	554	558	482	538	526	544	16	460.625	82.23128	2.747
AP-5	Total Dissolved Solids	mg/L	358	292	474	344	406	426	392	470				

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4
AP-4	Boron, total	ug/L	-0.310536	1.0146142	1.2517775	1.4000046	0.8367418	0.925678	0.4809968	1.1924867
AP-5	Boron, total	ug/L	-0.559557	-1.039813	-0.322394	-0.458763	-1.199898	-1.31848	-1.425203	-0.467656
AP-4	Calcium, total	mg/L	-0.036434	-0.2644	-0.2644	-0.296967	0.3217991	-0.296967	0.7777321	0.4846323
AP-5	Calcium, total	mg/L	-0.912477	-1.589863	1.0382652	2.4386307	0.9405653	-1.387949	-0.687767	-0.2644
AP-4	pH	s.u.	0.3777287	-0.410575	-0.598266	-1.048725	-1.011187	-0.785957	0.0023461	-0.635804
AP-5	pH	s.u.	1.3912615	1.015879	-1.724414	1.2411085	0.4903434	0.2651139	1.8041823	-0.373036
AP-4	Total Dissolved Solids	mg/L	0.3815458	0.6490839	1.1355168	1.1841601	0.2599376	0.9409436	0.7950138	1.0139086
AP-5	Total Dissolved Solids	mg/L	-1.248004	-2.050619	0.162651	-1.418256	-0.664285	-0.421068	-0.834536	0.1140077

Notes:
1. Outlier method presented above outlined is in ASTM paper E178-75 (Grubb's Test).
2. No outliers are observed.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix III Parameters
Non-Detect Percentage Analysis

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Number of Samples	Number of ND's	% ND	ND Treatment
AP-4	Boron, total	ug/L	78.3	123	131	136	117	120	105	129	16	0	0%	No Adjustment
AP-5	Boron, total	ug/L	69.9	53.7	77.9	73.3	48.3	44.3	40.7	73				
AP-4	Calcium, total	mg/L	125	118	118	117	136	117	150	141	16	0	0%	No Adjustment
AP-5	Calcium, total	mg/L	98.1	77.3	158	201	155	83.5	105	118				
AP-4	pH	s.u.	7.39	7.18	7.13	7.01	7.02	7.08	7.29	7.12	16	0	0%	No Adjustment
AP-5	pH	s.u.	7.66	7.56	6.83	7.62	7.42	7.36	7.77	7.19				
AP-4	Total Dissolved Solids	mg/L	492	514	554	558	482	538	526	544	16	0	0%	No Adjustment
AP-5	Total Dissolved Solids	mg/L	358	292	474	344	406	426	392	470				

Notes:
1. For datasets with a fraction of non-detect values from 25% to 50%, adjustments to the mean and standard deviation (SD) are required.
2. For datasets with a single censoring point (RL), Cohen's Ajustment may be used to adjust the mean and SD or a substitution of 1/2 the RL may be used for small datasets (<5) in accordance with Section 15.2 of the March 2009 Unified Guidance (Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities).
3. Kaplan-Meier may be used to adjust the mean and SD for datasets with single or multiple censoring points (RL). The Kaplan-Meier adjusted mean and SD were calculated using ProUCL 5.2.
4. For datasets that do not include non-detect values, no adjustment to the mean and standard deviation are required prior to calculating the prediction limit.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits

40 CFR 257 Appendix III Parameters

Prediction Limit Calculation

Prediction Limit = x + st[1+(1/n)]^*½

Confidence Level = 95%

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	ND Treatment	Mean [x]	Standard Deviation [s]	Number of Samples	T Value [t]	Prediction Limit
AP-4	Boron, total	ug/L	78.3	123	131	136	117	120	105	129	No Adj.	88.775	33.73	16	1.753	149.7271
AP-5	Boron, total	ug/L	69.9	53.7	77.9	73.3	48.3	44.3	40.7	73						
AP-4	Calcium, total	mg/L	125	118	118	117	136	117	150	141	No Adj.	126.11875	30.71	16	1.753	181.6035
AP-5	Calcium, total	mg/L	98.1	77.3	158	201	155	83.5	105	118						
AP-4	Chloride, total	mg/L	11.3	12.3	11.3	9.8	10.6	12	11.9	12.1	Highest Detected Value	Non-parametric dataset				12.3000
AP-5	Chloride, total	mg/L	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 30						
AP-4	Fluoride, total	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	PQL	100% Non-detects				0.5000
AP-5	Fluoride, total	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5						
AP-4	pH	s.u.	7.39	7.18	7.13	7.01	7.02	7.08	7.29	7.12	No Adj.	7.289375	0.27	16	2.131	6.7042 – 7.8745
AP-5	pH	s.u.	7.66	7.56	6.83	7.62	7.42	7.36	7.77	7.19						
AP-4	Sulfate, total	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	Highest Detected Value	Non-parametric dataset				55.5000
AP-5	Sulfate, total	mg/L	54.3	46.8	50.8	52.5	55.5	54.8	48.4	55.3						
AP-4	Total Dissolved Solids	mg/L	492	514	554	558	482	538	526	544	No Adj.	460.625	82.23	16	1.753	609.2129
AP-5	Total Dissolved Solids	mg/L	358	292	474	344	406	426	392	470						

City Water, Light and Power

Power Plant Ash Impoundment
Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Distribution[1]	Proposed Background Value
AP-4	Arsenic, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	26.6	> 50% NDs - Propose Highest Detected Concentration as Prediction Limit/Background	~~26.6~~ 10 [3]
AP-5	Arsenic, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25		
AP-4	Barium, total	ug/L	322	373	381	357	413	405	391	410	Normal Dataset - Calculate Interwell Prediction Limit	519.18
AP-5	Barium, total	ug/L	61.8	62.8	251	201	137	80.7	43	308		
AP-4	Beryllium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	100% NDs - Interwell value set at the laboratory PQL	2.5
AP-5	Beryllium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5		
AP-4	Cadmium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	100% NDs - Interwell value set at the laboratory PQL	2.5
AP-5	Cadmium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5		
AP-4	Chromium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	> 50% NDs - Propose Highest Detected Concentration as Prediction Limit/Background	65.3
AP-5	Chromium, total	ug/L	< 25	< 25	60.5	43.2	< 25	< 25	< 25	65.3		
AP-4	Mercury, total	ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	100% NDs - Interwell value set at the laboratory PQL	0.5
AP-5	Mercury, total	ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
AP-4	Molybdenum, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	100% NDs - Interwell value set at the laboratory PQL	25
AP-5	Molybdenum, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25		
AP-4	Radium-226	pCi/L	< 1	< 0.57	0.3	0.91	0.82	0.63	0.53	0.69	Normal Dataset - Calculate Interwell Prediction Limit	1.41
AP-5	Radium-226	pCi/L	< 1	< 0.42	0.3	0.34	0.34	0.55	1.9	1.3		
AP-4	Radium-228	pCi/L	2.2	< 0.58	1.3	1.4	1.7	0.73	1.5	1.3	Normal Dataset - Calculate Interwell Prediction Limit	2.38
AP-5	Radium-228	pCi/L	< 1	< -0.06	1	2.2	0.85	1.2	1	1.9		
AP-4	Selenium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	100% NDs - Interwell value set at the laboratory PQL	25
AP-5	Selenium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25		

Notes:
1. Shapiro-Wilk method utilized to determine if the data set follows a normal distribution. ProUCL 5.2 was used for the calculations. ProUCL 5.2 outputs are provided.
2. In accordance with Section 18.3 of the March 2009 Unified Guidance (Statistical Analysis of Groundwater at RCRA Facilities), the maximum detected concentration is utilized as the interwell prediction limit and proposed background when the dataset does not follow a normal distribution.
3. Laboratory analyses of total arsenic used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. Additional groundwater samples are being collected to recalculate the background concentration.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters
Outlier Analysis

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Number of Samples	Mean	Standard Deviation	Critical Values
AP-4	Barium, total	ug/L	322	373	381	357	413	405	391	410	16	262.33125	142.1442	2.747
AP-5	Barium, total	ug/L	61.8	62.8	251	201	137	80.7	43	308				
AP-4	Radium-226	pCi/L	< 1	< 0.57	0.3	0.91	0.82	0.63	0.53	0.69	16	0.725	0.428906	2.747
AP-5	Radium-226	pCi/L	< 1	< 0.42	0.3	0.34	0.34	0.55	1.9	1.3				
AP-4	Radium-228	pCi/L	2.2	< 0.58	1.3	1.4	1.7	0.73	1.5	1.3	16	1.2375	0.594581	2.747
AP-5	Radium-228	pCi/L	< 1	< -0.06	1	2.2	0.85	1.2	1	1.9				

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4
AP-4	Barium, total	ug/L	0.419776	0.778567	0.834848	0.666005	1.059971	1.00369	0.905199	1.038866
AP-5	Barium, total	ug/L	-1.41076	-1.40372	-0.07972	-0.43147	-0.88172	-1.2778	-1.54302	0.321285
AP-4	Radium-226	pCi/L	0.641167	-0.36138	-0.99089	0.43133	0.221494	-0.22149	-0.45465	-0.0816
AP-5	Radium-226	pCi/L	0.641167	-0.71111	-0.99089	-0.89763	-0.89763	-0.40802	2.739531	1.340621
AP-4	Radium-228	pCi/L	1.618787	-1.10582	0.105116	0.273302	0.777859	-0.85354	0.441487	0.105116
AP-5	Radium-228	pCi/L	-0.39944	0	-0.39944	1.618787	-0.65172	-0.06307	-0.39944	1.11423

Notes:
1. Outlier method presented above outlined is in ASTM paper E178-75 (Grubb's Test).
2. No outliers are observed.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits

40 CFR 257 Appendix IV Parameters

Non-Detect Percentage Analysis

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	Number of Samples	Number of ND's	% ND	ND Treatment
AP-4	Barium, total	ug/L	322	373	381	357	413	405	391	410	16	0	0%	NO ADJ
AP-5	Barium, total	ug/L	61.8	62.8	251	201	137	80.7	43	308				
AP-4	Radium-226	pCi/L	< 1	< 0.57	0.3	0.91	0.82	0.63	0.53	0.69	16	4	25%	Kaplan-Meier
AP-5	Radium-226	pCi/L	< 1	< 0.42	0.3	0.34	0.34	0.55	1.9	1.3				
AP-4	Radium-228	pCi/L	2.2	< 0.58	1.3	1.4	1.7	0.73	1.5	1.3	16	3	19%	Kaplan-Meier
AP-5	Radium-228	pCi/L	< 1	< -0.06	1	2.2	0.85	1.2	1	1.9				

Notes:

1. For datasets with a fraction of non-detect values from 25% to 50%, adjustments to the mean and standard deviation (SD) are required.
2. For datasets with a single censoring point (RL), Cohen's Ajustment may be used to adjust the mean and SD or a substitution of 1/2 the RL may be used for small datasets (<5) in accordance with Section 15.2 of the March 2009 Unified Guidance (Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities).
3. Kaplan-Meier may be used to adjust the mean and SD for datasets with single or multiple censoring points (RL). The Kaplan-Meier adjusted mean and SD were calculated using ProUCL 5.2.
4. For datasets that do not include non-detect values, no adjustment to the mean and standard deviation are required prior to calculating the prediction limit.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters
Prediction Limit Calculation

Prediction Limit = x + st[1+(1/n)]^*½
Confidence Level = 95%

Well	Parameter	Units	2016-Q1	2016-Q2	2016-Q3	2016-Q4	2017-Q1	2017-Q2	2017-Q3	2017-Q4	ND Treatment	Mean [x]	Standard Deviation [s]	Number of Samples	T Value [t]	Prediction Limit Limit
AP-4	Arsenic, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	26.6	Highest Detected Value	Non-parametric dataset				~~26.6~~ 10 [2]
AP-5	Arsenic, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25						
AP-4	Barium, total	ug/L	322	373	381	357	413	405	391	410	No Adj.	262.3313	142.14	16	1.753	519.1789
AP-5	Barium, total	ug/L	61.8	62.8	251	201	137	80.7	43	308						
AP-4	Beryllium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	PQL	100% Non-detects				2.5
AP-5	Beryllium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5						
AP-4	Cadmium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	PQL	100% Non-detects				2.5
AP-5	Cadmium, total	ug/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5						
AP-4	Chromium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	Highest Detected Value	Non-parametric dataset				65.3
AP-5	Chromium, total	ug/L	< 25	< 25	60.5	43.2	< 25	< 25	< 25	65.3						
AP-4	Mercury, total	ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	PQL	100% Non-detects				0.5
AP-5	Mercury, total	ug/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5						
AP-4	Molybdenum, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	PQL	100% Non-detects				25
AP-5	Molybdenum, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25						
AP-4	Radium-226	pCi/L	< 1	< 0.57	0.3	0.91	0.82	0.63	0.53	0.69	[1] Kaplan-Meier	0.646	0.42	16	1.753	1.4103
AP-5	Radium-226	pCi/L	< 1	< 0.42	0.3	0.34	0.34	0.55	1.9	1.3						
AP-4	Radium-228	pCi/L	2.2	< 0.58	1.3	1.4	1.7	0.73	1.5	1.3	[1] Kaplan-Meier	1.158	0.68	16	1.753	2.3813
AP-5	Radium-228	pCi/L	< 1	< -0.06	1	2.2	0.85	1.2	1	1.9						
AP-4	Selenium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	PQL	100% Non-detects				25
AP-5	Selenium, total	ug/L	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25						

Note:
1. Multiple censoring points (RL's) were observed. Therefore, Kaplan-Meier was utilized to adjust the mean and SD.
2. Laboratory analyses of total arsenic used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 845.600. Additional groundwater samples are being collected to recalculate the background concentration.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters
Raw Data Summary

Well	Parameter	Units	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	Distribution[1]	Proposed Background Value
AP-4	Antimony, total	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100% NDs - Interwell value set at the laboratory PQL	1.00
AP-5	Antimony, total	ug/L	< 1	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1		
AP-4	Cobalt, total	ug/L	< 5	5.2	5	< 5	< 5	< 5	< 5	< 5	> 50% NDs - Propose Highest Detected Concentration as Prediction Limit/Background	5.20
AP-5	Cobalt, total	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		
AP-4	Lithium, total	mg/L	0.0087	0.0108	0.0113	0.0079	0.0092	0.0092	0.0077		[2] Non-Parametric - Propose Highest Detected Concentration as Prediction Limit/Background	0.0124
AP-5	Lithium, total	mg/L	0.005	0.006	0.0068	0.009	0.0053	< 0.005	0.0104			
AP-4	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	100% NDs - Interwell value set at the laboratory PQL	~~15.00~~ 7.5 [3]
AP-5	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15		
AP-4	Thallium, total	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	100% NDs - Interwell value set at the laboratory PQL	2.00
AP-5	Thallium, total	ug/L	< 2	< 2		< 2	< 2	< 2	< 2	< 2		

Notes:
1. Shapiro-Wilk method utilized to determine if the data set follows a normal distribution. ProUCL 5.2 was used for the calculations. ProUCL 5.2 outputs are provided.
2. In accordance with Chapter 18.3 of the March 2009 Unified Guidance (Statistical Analysis of Groundwater at RCRA Facilities), the maximum detected concentration is utilized as the interwell prediction limit and proposed background when the dataset does not follow a normal distribution.
3. Laboratory analyses of total lead used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 257. Additional groundwater samples are being collected to recalculate the background concentration.

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Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters
Outlier Analysis

Well	Parameter	Units	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	Number of Samples	Mean	Standard Deviation	Critical Values
AP-4	Antimony, total	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	16	0.96875	0.125	2.747
AP-5	Antimony, total	ug/L	< 1	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1				
AP-4	Cobalt, total	ug/L	< 5	5.2	5	< 5	< 5	< 5	< 5	< 5	16	5.0125	0.05	2.747
AP-5	Cobalt, total	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5				
AP-4	Lithium, total	mg/L	0.0087	0.0108	0.0113	0.0079	0.0092	0.0092	0.0077	< 0.05	16	0.01326875	0.014476	2.747
AP-5	Lithium, total	mg/L	0.005	0.006	0.0068	0.009	0.0053	< 0.005	0.0104	< 0.05				
AP-4	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	16	15	0	2.747
AP-5	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15				
AP-4	Thallium, total	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	16	1.99375	0.025	2.747
AP-5	Thallium, total	ug/L	< 2	< 2	1.9	< 2	< 2	< 2	< 2	< 2				

Well	Parameter	Units	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4
AP-4	Antimony, total	ug/L	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
AP-5	Antimony, total	ug/L	0.25	0.25	-3.75	0.25	0.25	0.25	0.25	0.25
AP-4	Cobalt, total	mg/L	-0.25	3.75	-0.25	-0.25	-0.25	-0.25	-0.25	-0.25
AP-5	Cobalt, total	mg/L	-0.25	-0.25	-0.25	-0.25	-0.25	-0.25	-0.25	-0.25
AP-4	Lithium, total	mg/L	-0.315598	-0.170535	-0.135996	-0.37086	-0.281059	-0.281059	-0.384675	2.5373024
AP-5	Lithium, total	mg/L	-0.571184	-0.502107	-0.446845	-0.294875	-0.550461	-0.571184	-0.198166	2.5373024
AP-4	Lead, total	ug/L	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
AP-5	Lead, total	ug/L	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
AP-4	Thallium, total	ug/L	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
AP-5	Thallium, total	ug/L	0.25	0.25	-3.75	0.25	0.25	0.25	0.25	0.25

Notes:
1. Outlier method presented above outlined is in ASTM paper E178-75 (Grubb's Test).
2. - The 3Q21 detection of 1.9 ug/L is an outlier. The outlier will be removed.
3. The 4Q22 Lithium reporting limit (0.05 mg/L) is 10 times higher than the standard reporting limit (0.005 mg/L). The data set has been removed from the evaluation.

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Background Calculations - Interwell Prediction Limits
40 CFR 257 Appendix IV Parameters
Non-Detect Percentage Analysis

Well	Parameter	Units	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	Number of Samples	Number of ND's	% ND	ND Treatment
AP-4	Antimony, total	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	16	16	100%	PQL
AP-5	Antimony, total	ug/L	< 1	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1				
AP-4	Cobalt, total	ug/L	< 5	5.2	5	< 5	< 5	< 5	< 5	< 5	16	14	88%	Highest Detection
AP-5	Cobalt, total	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5				
AP-4	Lithium, total	mg/L	0.0087	0.0108	0.0113	0.0079	0.0092	0.0092	0.0077		14	1	7%	½ PQL
AP-5	Lithium, total	mg/L	0.005	0.006	0.0068	0.009	0.0053	< 0.005	0.0104					
AP-4	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	16	16	100%	PQL
AP-5	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15				
AP-4	Thallium, total	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	15	15	100%	PQL
AP-5	Thallium, total	ug/L	< 2	< 2		< 2	< 2	< 2	< 2	< 2				

Notes:
1. For datasets with a fraction of non-detect values from 25% to 50%, adjustments to the mean and standard deviation (SD) are required. Monitoring Data at RCRA Facilities).
2. For datasets that do not include non-detect values, no adjustment to the mean and standard deviation are required prior to calculating the prediction limit.

City Water, Light and Power

Power Plant Ash Impoundment

Background Calculations - Interwell Prediction Limits

40 CFR 257 Appendix IV Parameters

Prediction Limit Calculation

Prediction Limit = x + st[1+(1/n)]^*½

Confidence Level = 95%

Well	Parameter	Units	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	ND Treatment	Mean [x]	Standard Deviation [s]	Number of Samples	T Value [t]	Prediction Limit Limit
AP-4	Antimony, total	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	PQL	100% Non-detects				1.0000
AP-5	Antimony, total	ug/L	< 1	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1						
AP-4	Cobalt, total	ug/L	< 5	5.2	5	< 5	< 5	< 5	< 5	< 5	Highest Detection					5.2000
AP-5	Cobalt, total	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5						
AP-4	Lithium, total [1]	mg/L	0.0087	0.0108	0.0113	0.0079	0.0092	0.0092	0.0077		½ PQL	0.00784286	0.0025	14	1.7709	0.0124
AP-5	Lithium, total	mg/L	0.005	0.006	0.0068	0.009	0.0053	< 0.0025	0.0104							
AP-4	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	PQL	100% Non-detects				~~15.0000~~ 7.5 [2]
AP-5	Lead, total	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15						
AP-4	Thallium, total	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	PQL	100% Non-detects				2.0000
AP-5	Thallium, total	ug/L	< 2	< 2		< 2	< 2	< 2	< 2	< 2						

1. The lithium 4Q22 reporting limit (0.05 mg/L) is 10 times higher than the standard reporting limit (0.005 mg/L). Data set has been removed from the evaluation.
2. The laboratory analyses of total lead used a reporting limit above the groundwater protection standards listed in 35 Ill Adm. Code 257. Additional groundwater samples are being collected to recalculate the background concentration.

APPENDIX I:
LABORATORY ANALYTICAL REPORTS

Environmental Monitoring and Technologies, Inc.

8100 N. Austin Avenue Morton Grove, IL 60053-3203 P 847.967.6666 800.246.0663 F 847.967.6735 www.emt.com

Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2016
Work Order: 16A0149

Client Sample ID: AP-4
Report Date: 03/28/2016
Collection Date: 02/26/2016 07:50
Matrix: Groundwater
Lab ID: 16A0149-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**786**			uS/cm	02/26/16 07:50	B6C0037	PB
Method: SM2550-B							
Temperature	**49.7**			°F	02/26/16 07:50	B6C0037	PB
Method: SM4500-H							
pH	**7.39**	0.05		pH Units	02/26/16 07:50	B6C0037	PB
Metals by ICP-MS							
Method: SW6020B / SW3015							
Antimony	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Arsenic	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Barium	**322**	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Beryllium	< 2.50	2.50		ug/L	03/01/16 17:02	B6B1253	AG
Boron	**78.3**	12.5		ug/L	03/01/16 17:02	B6B1253	AG
Cadmium	< 2.50	2.50		ug/L	03/01/16 17:02	B6B1253	AG
Calcium	**125**	1.25		mg/L	03/01/16 18:08	B6B1253	AG
Chromium	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Cobalt	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Copper	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Iron	**12200**	125		ug/L	03/01/16 17:02	B6B1253	AG
Lead	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Manganese	**259**	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Molybdenum	< 0.0250	0.0250		mg/L	03/01/16 17:02	B6B1253	AG
Nickel	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Selenium	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Silver	< 2.50	2.50		ug/L	03/01/16 17:02	B6B1253	AG
Thallium	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Zinc	< 25.0	25.0		ug/L	03/01/16 17:02	B6B1253	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	02/29/16 15:05	B6B1220	MB1
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**11.3**	3.00		mg/L	02/27/16 21:26	B6B1174	DZ1
Fluoride	< 0.500	0.500		mg/L	02/27/16 21:26	B6B1174	DZ1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	02/27/16 21:26	B6B1174	DZ1
Sulfate	< 5.00	5.00		mg/L	02/27/16 21:26	B6B1174	DZ1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**492**	10.0		mg/L	03/01/16 07:50	B6C0002	DN1

Environmental Monitoring and Technologies, Inc.

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2016
Work Order: 16A0149

Client Sample ID: AP-4
Report Date: 03/28/2016
Collection Date: 02/26/2016 07:50
Matrix: Groundwater
Lab ID: 16A0149-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		03/10/16 07:36	B6C0208	JN1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 113%*	*Limits: 20-200*	*03/10/16 07:36*	*B6C0208*	*JN1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 0.659	0.659		ug/L		03/04/16 05:52	B6C0131	JN1
o-Dichlorobenzene	< 0.659	0.659		ug/L		03/04/16 05:52	B6C0131	JN1
p-Dichlorobenzene	< 0.659	0.659		ug/L		03/04/16 05:52	B6C0131	JN1
Benzo(a)pyrene	< 1.32	1.32		ug/L		03/04/16 05:52	B6C0131	JN1
Di(2-ethylhexyl)phthalate	< 1.32	1.32		ug/L		03/04/16 05:52	B6C0131	JN1
Hexachlorocyclopentadiene	< 3.30	3.30		ug/L		03/04/16 05:52	B6C0131	JN1
Pentachlorophenol	< 13.2	13.2		ug/L		03/04/16 05:52	B6C0131	JN1
Surrogate: 2-Fluorophenol				*Recovery: 18%*	*Limits: 4-108*	*03/04/16 05:52*	*B6C0131*	*JN1*
Surrogate: Phenol-d5				*Recovery: 12%*	*Limits: 1-101*	*03/04/16 05:52*	*B6C0131*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 47%*	*Limits: 23-119*	*03/04/16 05:52*	*B6C0131*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 52%*	*Limits: 28-124*	*03/04/16 05:52*	*B6C0131*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 51%*	*Limits: 11-102*	*03/04/16 05:52*	*B6C0131*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 84%*	*Limits: 79-162*	*03/04/16 05:52*	*B6C0131*	*JN1*

Eurofins (Underwriters Laboratory), Subcontract

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
Subcontracted Analyses							
Method: SM7500							
Radium-226	**0.45**	1		pCi/L	03/23/16 00:00	16A0149-05	UL
Radium-228	**2.2**	1		pCi/L	03/23/16 00:00	16A0149-05	UL

Test America, Irvine, CA, Subcontract

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
Subcontracted Analyses							
Method: SW 846 6010B							
Lithium	< 0.05	0.05		mg/L	03/07/16 00:00	16A0149-05	TEST

Environmental Monitoring and Technologies, Inc.

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2016
Work Order: 16A0149

Client Sample ID: AP-5
Report Date: 03/28/2016
Collection Date: 02/26/2016 07:05
Matrix: Groundwater
Lab ID: 16A0149-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**543**			uS/cm	02/26/16 07:05	B6C0037	PB
Method: SM2550-B							
Temperature	**52.8**			°F	02/26/16 07:05	B6C0037	PB
Method: SM4500-H							
pH	**7.66**	0.05		pH Units	02/26/16 07:05	B6C0037	PB
Metals by ICP-MS							
Method: SW6020B / SW3015							
Antimony	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Arsenic	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Barium	**61.8**	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Beryllium	< 2.50	2.50		ug/L	03/01/16 17:30	B6B1253	AG
Boron	**69.9**	12.5		ug/L	03/01/16 17:30	B6B1253	AG
Cadmium	< 2.50	2.50		ug/L	03/01/16 17:30	B6B1253	AG
Calcium	**98.1**	1.25		mg/L	03/01/16 18:17	B6B1253	AG
Chromium	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Cobalt	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Copper	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Iron	**2970**	125		ug/L	03/01/16 17:30	B6B1253	AG
Lead	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Manganese	**116**	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Molybdenum	< 0.0250	0.0250		mg/L	03/01/16 17:30	B6B1253	AG
Nickel	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Selenium	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Silver	< 2.50	2.50		ug/L	03/01/16 17:30	B6B1253	AG
Thallium	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Zinc	< 25.0	25.0		ug/L	03/01/16 17:30	B6B1253	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	03/09/16 12:46	B6C0342	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	02/27/16 21:54	B6B1174	DZ1
Fluoride	< 0.500	0.500		mg/L	02/27/16 21:54	B6B1174	DZ1
Nitrogen, Nitrate	**1.32**	0.500		mg/L	02/27/16 21:54	B6B1174	DZ1
Sulfate	**54.3**	5.00		mg/L	02/27/16 21:54	B6B1174	DZ1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**358**	10.0		mg/L	03/02/16 10:00	B6C0087	DN1

Environmental Monitoring and Technologies, Inc.

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2016
Work Order: 16A0149

Client Sample ID: AP-5
Report Date: 03/28/2016
Collection Date: 02/26/2016 07:05
Matrix: Groundwater
Lab ID: 16A0149-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		03/10/16 13:04	B6C0208	JN1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 88%*	*Limits: 20-200*	*03/10/16 13:04*	*B6C0208*	*JN1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 0.657	0.657		ug/L		03/04/16 06:33	B6C0131	JN1
o-Dichlorobenzene	< 0.657	0.657		ug/L		03/04/16 06:33	B6C0131	JN1
p-Dichlorobenzene	< 0.657	0.657		ug/L		03/04/16 06:33	B6C0131	JN1
Benzo(a)pyrene	< 1.31	1.31		ug/L		03/04/16 06:33	B6C0131	JN1
Di(2-ethylhexyl)phthalate	< 1.31	1.31		ug/L		03/04/16 06:33	B6C0131	JN1
Hexachlorocyclopentadiene	< 3.29	3.29		ug/L		03/04/16 06:33	B6C0131	JN1
Pentachlorophenol	< 13.1	13.1		ug/L		03/04/16 06:33	B6C0131	JN1
Surrogate: 2-Fluorophenol				*Recovery: 15%*	*Limits: 4-108*	*03/04/16 06:33*	*B6C0131*	*JN1*
Surrogate: Phenol-d5				*Recovery: 9%*	*Limits: 1-101*	*03/04/16 06:33*	*B6C0131*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 35%*	*Limits: 23-119*	*03/04/16 06:33*	*B6C0131*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 41%*	*Limits: 28-124*	*03/04/16 06:33*	*B6C0131*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 43%*	*Limits: 11-102*	*03/04/16 06:33*	*B6C0131*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 87%*	*Limits: 79-162*	*03/04/16 06:33*	*B6C0131*	*JN1*
Eurofins (Underwriters Laboratory), Subcontract								
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.26**	1		pCi/L		03/23/16 00:00	16A0149-06	UL
Radium-228	**-2.9**	1		pCi/L		03/23/16 00:00	16A0149-06	UL
Test America, Irvine, CA, Subcontract								
Subcontracted Analyses								
Method: SW 846 6010B								
Lithium	< 0.05	0.05		mg/L		03/07/16 00:00	16A0149-06	TEST

Environmental Monitoring and Technologies, Inc.

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2016
Work Order: 16E0241

Client Sample ID: AP-4
Report Date: 06/17/2016
Collection Date: 05/13/2016 07:30
Matrix: Groundwater
Lab ID: 16E0241-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**779**			uS/cm	05/13/16 07:30	B6E0750	AS5
Method: SM2550-B							
Temperature	**59.5**			°F	05/13/16 07:30	B6E0750	AS5
Method: SM4500-H							
pH	**7.18**	0.05		pH Units	05/13/16 07:30	B6E0750	AS5
Metals by ICP-MS							
Method: SW6020B / SW3015							
Antimony	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Arsenic	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Barium	**373**	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Beryllium	< 2.50	2.50		ug/L	05/20/16 12:05	B6E0766	AG
Boron	**123**	12.5		ug/L	05/20/16 12:05	B6E0766	AG
Cadmium	< 2.50	2.50		ug/L	05/20/16 12:05	B6E0766	AG
Calcium	**118**	2.50		mg/L	05/20/16 12:24	B6E0766	AG
Chromium	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Cobalt	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Copper	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Iron	**13000**	125		ug/L	05/20/16 12:05	B6E0766	AG
Lead	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Manganese	**156**	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Molybdenum	< 0.0250	0.0250		mg/L	05/20/16 12:05	B6E0766	AG
Nickel	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Selenium	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Silver	< 2.50	2.50		ug/L	05/20/16 12:05	B6E0766	AG
Thallium	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Zinc	< 25.0	25.0		ug/L	05/20/16 12:05	B6E0766	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	05/20/16 12:01	B6E0776	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**12.3**	3.00		mg/L	05/14/16 04:25	B6E0542	DZ1
Fluoride	< 0.500	0.500		mg/L	05/14/16 04:25	B6E0542	DZ1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	05/14/16 04:25	B6E0542	DZ1
Sulfate	< 5.00	5.00		mg/L	05/14/16 04:25	B6E0542	DZ1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**514**	10.0		mg/L	05/19/16 16:00	B6E0753	TB2

Environmental Monitoring and Technologies, Inc.

8100 N. Austin Avenue Morton Grove, IL 60053-3203 P 847.967.6666 800.246.0663 F 847.967.6735 www.emt.com

Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2016
Work Order: 16E0241

Client Sample ID: AP-4
Report Date: 06/17/2016
Collection Date: 05/13/2016 07:30
Matrix: Groundwater
Lab ID: 16E0241-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		05/24/16 17:01	B6E0802	jn1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 172%*	*Limits: 20-200*	*05/24/16 17:01*	*B6E0802*	*jn1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 5.06	5.06		ug/L		06/01/16 23:59	B6E0801	JN1
o-Dichlorobenzene	< 5.06	5.06		ug/L		06/01/16 23:59	B6E0801	JN1
p-Dichlorobenzene	< 5.06	5.06		ug/L		06/01/16 23:59	B6E0801	JN1
Benzo(a)pyrene	< 10.1	10.1		ug/L		06/01/16 23:59	B6E0801	JN1
Di(2-ethylhexyl)phthalate	< 10.1	10.1		ug/L		06/01/16 23:59	B6E0801	JN1
Hexachlorocyclopentadiene	< 25.3	25.3		ug/L		06/01/16 23:59	B6E0801	JN1
Pentachlorophenol	< 101	101		ug/L		06/01/16 23:59	B6E0801	JN1
Surrogate: 2-Fluorophenol				*Recovery: 22%*	*Limits: 4-108*	*06/01/16 23:59*	*B6E0801*	*JN1*
Surrogate: Phenol-d5				*Recovery: 12%*	*Limits: 1-101*	*06/01/16 23:59*	*B6E0801*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 35%*	*Limits: 23-119*	*06/01/16 23:59*	*B6E0801*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 43%*	*Limits: 28-124*	*06/01/16 23:59*	*B6E0801*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 25%*	*Limits: 11-102*	*06/01/16 23:59*	*B6E0801*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 89%*	*Limits: 79-162*	*06/01/16 23:59*	*B6E0801*	*JN1*
Eurofins (Underwriters Laboratory), Subcontract								
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.57**	1		pCi/L		06/08/16 00:00	16E0241-05	UL
Radium-228	**0.58**	1		pCi/L		06/08/16 00:00	16E0241-05	UL
Test America, Irvine, CA, Subcontract								
Subcontracted Analyses								
Method: SW 846 6010D								
Lithium	< 0.05	0.05		mg/L		05/20/16 00:00	16E0241-05	TEST

Environmental Monitoring and Technologies, Inc.

8100 N. Austin Avenue Morton Grove, IL 60053-3203 P 847.967.6666 800.246.0663 F 847.967.6735 www.emt.com

Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2016
Work Order: 16E0241

Client Sample ID: AP-5
Report Date: 06/17/2016
Collection Date: 05/13/2016 07:35
Matrix: Groundwater
Lab ID: 16E0241-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**636**			uS/cm	05/13/16 07:35	B6E0750	MAJ
Method: SM2550-B							
Temperature	**53.7**			°F	05/13/16 07:35	B6E0750	MAJ
Method: SM4500-H							
pH	**7.56**	0.05		pH Units	05/13/16 07:35	B6E0750	MAJ
Metals by ICP-MS							
Method: SW6020B / SW3015							
Antimony	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Arsenic	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Barium	**62.8**	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Beryllium	< 2.50	2.50		ug/L	05/20/16 12:07	B6E0766	AG
Boron	**53.7**	12.5		ug/L	05/20/16 12:07	B6E0766	AG
Cadmium	< 2.50	2.50		ug/L	05/20/16 12:07	B6E0766	AG
Calcium	**77.3**	2.50		mg/L	05/20/16 12:26	B6E0766	AG
Chromium	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Cobalt	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Copper	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Iron	**4120**	125		ug/L	05/20/16 12:07	B6E0766	AG
Lead	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Manganese	**58.4**	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Molybdenum	< 0.0250	0.0250		mg/L	05/20/16 12:07	B6E0766	AG
Nickel	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Selenium	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Silver	< 2.50	2.50		ug/L	05/20/16 12:07	B6E0766	AG
Thallium	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Zinc	< 25.0	25.0		ug/L	05/20/16 12:07	B6E0766	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	05/18/16 13:11	B6E0654	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	05/14/16 06:16	B6E0542	DZ1
Fluoride	< 0.500	0.500		mg/L	05/14/16 06:16	B6E0542	DZ1
Nitrogen, Nitrate	**1.55**	0.500		mg/L	05/14/16 06:16	B6E0542	DZ1
Sulfate	**46.8**	5.00		mg/L	05/14/16 06:16	B6E0542	DZ1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**292**	10.0		mg/L	05/19/16 16:00	B6E0753	TB2

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2016
Work Order: 16E0241

Client Sample ID: AP-5
Report Date: 06/17/2016
Collection Date: 05/13/2016 07:35
Matrix: Groundwater
Lab ID: 16E0241-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		05/24/16 17:35	B6E0802	jn1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 146%*	*Limits: 20-200*	*05/24/16 17:35*	*B6E0802*	*jn1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 5.19	5.19		ug/L		06/02/16 00:42	B6E0801	JN1
o-Dichlorobenzene	< 5.19	5.19		ug/L		06/02/16 00:42	B6E0801	JN1
p-Dichlorobenzene	< 5.19	5.19		ug/L		06/02/16 00:42	B6E0801	JN1
Benzo(a)pyrene	< 10.4	10.4		ug/L		06/02/16 00:42	B6E0801	JN1
Di(2-ethylhexyl)phthalate	< 10.4	10.4		ug/L		06/02/16 00:42	B6E0801	JN1
Hexachlorocyclopentadiene	< 25.9	25.9		ug/L		06/02/16 00:42	B6E0801	JN1
Pentachlorophenol	< 104	104		ug/L		06/02/16 00:42	B6E0801	JN1
Surrogate: 2-Fluorophenol				*Recovery: 35%*	*Limits: 4-108*	*06/02/16 00:42*	*B6E0801*	*JN1*
Surrogate: Phenol-d5				*Recovery: 22%*	*Limits: 1-101*	*06/02/16 00:42*	*B6E0801*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 53%*	*Limits: 23-119*	*06/02/16 00:42*	*B6E0801*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 61%*	*Limits: 28-124*	*06/02/16 00:42*	*B6E0801*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 28%*	*Limits: 11-102*	*06/02/16 00:42*	*B6E0801*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 87%*	*Limits: 79-162*	*06/02/16 00:42*	*B6E0801*	*JN1*

Eurofins (Underwriters Laboratory), Subcontract

Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.42**	1		pCi/L		06/08/16 00:00	16E0241-06	UL
Radium-228	**-0.06**	1		pCi/L		06/08/16 00:00	16E0241-06	UL

Test America, Irvine, CA, Subcontract

Subcontracted Analyses								
Method: SW 846 6010D								
Lithium	< 0.05	0.05		mg/L		05/20/16 00:00	16E0241-06	TEST

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2016
Work Order: 16H0152

Client Sample ID: AP-4
Report Date: 09/07/2016
Collection Date: 08/04/2016 10:15
Matrix: Groundwater
Lab ID: 16H0152-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**920**			uS/cm	08/04/16 10:15	B6H1314	CD
Method: SM2550-B							
Temperature	**70.8**			°F	08/04/16 10:15	B6H1314	CD
Method: SM4500-H							
pH	**7.13**	0.05		pH Units	08/04/16 10:15	B6H1314	CD
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Arsenic	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Barium	**381**	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Beryllium	< 2.50	2.50		ug/L	08/11/16 18:00	B6H0473	AG
Boron	**131**	12.5		ug/L	08/11/16 18:00	B6H0473	AG
Cadmium	< 2.50	2.50		ug/L	08/11/16 18:00	B6H0473	AG
Calcium	**118**	0.125		mg/L	08/11/16 18:00	B6H0473	AG
Chromium	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Cobalt	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Copper	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Iron	**11700**	125		ug/L	08/11/16 18:00	B6H0473	AG
Lead	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Manganese	**153**	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Molybdenum	< 0.0250	0.0250		mg/L	08/11/16 18:00	B6H0473	AG
Nickel	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Selenium	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Silver	< 2.50	2.50		ug/L	08/11/16 18:00	B6H0473	AG
Thallium	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Zinc	< 25.0	25.0		ug/L	08/11/16 18:00	B6H0473	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	08/23/16 12:52	B6H1223	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**11.3**	3.00		mg/L	08/05/16 23:54	B6H0291	NB1
Fluoride	< 0.500	0.500		mg/L	08/05/16 23:54	B6H0291	NB1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	08/05/16 23:54	B6H0291	NB1
Sulfate	< 5.00	5.00		mg/L	08/05/16 23:54	B6H0291	NB1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**554**	10.0		mg/L	08/10/16 13:25	B6H0564	CP1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2016
Work Order: 16H0152

Client Sample ID: AP-4
Report Date: 09/07/2016
Collection Date: 08/04/2016 10:15
Matrix: Groundwater
Lab ID: 16H0152-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		08/13/16 02:17	B6H0589	JN1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 127%*	*Limits: 20-200*	*08/13/16 02:17*	*B6H0589*	*JN1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 5.37	5.37		ug/L		08/09/16 18:28	B6H0433	JN1
o-Dichlorobenzene	< 5.37	5.37		ug/L		08/09/16 18:28	B6H0433	JN1
p-Dichlorobenzene	< 5.37	5.37		ug/L		08/09/16 18:28	B6H0433	JN1
Benzo(a)pyrene	< 10.7	10.7		ug/L		08/09/16 18:28	B6H0433	JN1
Di(2-ethylhexyl)phthalate	< 10.7	10.7		ug/L		08/09/16 18:28	B6H0433	JN1
Hexachlorocyclopentadiene	< 26.8	26.8		ug/L		08/09/16 18:28	B6H0433	JN1
Pentachlorophenol	< 107	107		ug/L		08/09/16 18:28	B6H0433	JN1
Surrogate: 2-Fluorophenol				*Recovery: 35%*	*Limits: 4-108*	*08/09/16 18:28*	*B6H0433*	*JN1*
Surrogate: Phenol-d5				*Recovery: 22%*	*Limits: 1-101*	*08/09/16 18:28*	*B6H0433*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 50%*	*Limits: 23-119*	*08/09/16 18:28*	*B6H0433*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 68%*	*Limits: 28-124*	*08/09/16 18:28*	*B6H0433*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 42%*	*Limits: 11-102*	*08/09/16 18:28*	*B6H0433*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 113%*	*Limits: 79-162*	*08/09/16 18:28*	*B6H0433*	*JN1*

Eurofins (Underwriters Laboratory), Subcontract

Subcontracted Analyses

Method: SM7500							
Radium-226	**0.3**	1		pCi/L	08/30/16 00:00	16H0152-05	UL
Radium-228	**1.3**	1		pCi/L	08/30/16 00:00	16H0152-05	UL

Test America, Irvine, CA, Subcontract

Subcontracted Analyses

Method: SW 846 6010D							
Lithium	< 0.05	0.05		mg/L	08/14/16 00:00	16H0152-05	TEST

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2016
Work Order: 16H0152

Client Sample ID: AP-5
Report Date: 09/07/2016
Collection Date: 08/04/2016 10:55
Matrix: Groundwater
Lab ID: 16H0152-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**648**			uS/cm	08/04/16 10:55	B6H1314	JJ1
Method: SM2550-B							
Temperature	**60.4**			°F	08/04/16 10:55	B6H1314	JJ1
Method: SM4500-H							
pH	**6.83**	0.05		pH Units	08/04/16 10:55	B6H1314	JJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Arsenic	< 25.0	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Barium	**251**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Beryllium	< 2.50	2.50		ug/L	08/11/16 18:02	B6H0473	AG
Boron	**77.9**	12.5		ug/L	08/11/16 18:02	B6H0473	AG
Cadmium	< 2.50	2.50		ug/L	08/11/16 18:02	B6H0473	AG
Calcium	**158**	0.125		mg/L	08/11/16 18:02	B6H0473	AG
Chromium	**60.5**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Cobalt	**29.0**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Copper	**47.4**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Iron	**63900**	125		ug/L	08/11/16 18:02	B6H0473	AG
Lead	**28.6**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Manganese	**1400**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Molybdenum	< 0.0250	0.0250		mg/L	08/11/16 18:02	B6H0473	AG
Nickel	**69.6**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Selenium	< 25.0	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Silver	< 2.50	2.50		ug/L	08/11/16 18:02	B6H0473	AG
Thallium	< 25.0	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Zinc	**169**	25.0		ug/L	08/11/16 18:02	B6H0473	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	08/23/16 12:54	B6H1223	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	08/06/16 00:22	B6H0291	NB1
Fluoride	< 0.500	0.500		mg/L	08/06/16 00:22	B6H0291	NB1
Nitrogen, Nitrate	**1.51**	0.500		mg/L	08/06/16 00:22	B6H0291	NB1
Sulfate	**50.8**	5.00		mg/L	08/06/16 00:22	B6H0291	NB1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**474**	10.0		mg/L	08/10/16 13:25	B6H0564	CP1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2016
Work Order: 16H0152

Client Sample ID: AP-5
Report Date: 09/07/2016
Collection Date: 08/04/2016 10:55
Matrix: Groundwater
Lab ID: 16H0152-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		08/12/16 18:55	B6H0589	JN1
Surrogate: 2,4,6-Tribromophenol				*Recovery: 128%*	*Limits: 20-200*	*08/12/16 18:55*	*B6H0589*	*JN1*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 5.43	5.43		ug/L		08/10/16 17:08	B6H0433	hhe
o-Dichlorobenzene	< 5.43	5.43		ug/L		08/10/16 17:08	B6H0433	hhe
p-Dichlorobenzene	< 5.43	5.43		ug/L		08/10/16 17:08	B6H0433	hhe
Benzo(a)pyrene	< 10.9	10.9		ug/L		08/10/16 17:08	B6H0433	hhe
Di(2-ethylhexyl)phthalate	< 10.9	10.9		ug/L		08/10/16 17:08	B6H0433	hhe
Hexachlorocyclopentadiene	< 27.2	27.2		ug/L		08/10/16 17:08	B6H0433	hhe
Pentachlorophenol	< 109	109		ug/L		08/10/16 17:08	B6H0433	hhe
Surrogate: 2-Fluorophenol				*Recovery: 36%*	*Limits: 4-108*	*08/10/16 17:08*	*B6H0433*	*hhe*
Surrogate: Phenol-d5				*Recovery: 23%*	*Limits: 1-101*	*08/10/16 17:08*	*B6H0433*	*hhe*
Surrogate: Nitrobenzene-d5				*Recovery: 54%*	*Limits: 23-119*	*08/10/16 17:08*	*B6H0433*	*hhe*
Surrogate: 2-Fluorobiphenyl				*Recovery: 64%*	*Limits: 28-124*	*08/10/16 17:08*	*B6H0433*	*hhe*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 47%*	*Limits: 11-102*	*08/10/16 17:08*	*B6H0433*	*hhe*
Surrogate: 4-Terphenyl-d14				*Recovery: 123%*	*Limits: 79-162*	*08/10/16 17:08*	*B6H0433*	*hhe*

Eurofins (Underwriters Laboratory), Subcontract

Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.3**	1		pCi/L		08/30/16 00:00	16H0152-06	UL
Radium-228	**1**	1		pCi/L		08/30/16 00:00	16H0152-06	UL

Test America, Irvine, CA, Subcontract

Subcontracted Analyses								
Method: SW 846 6010D								
Lithium	< 0.05	0.05		mg/L		08/14/16 00:00	16H0152-06	TEST

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q 2016
Work Order: 16K0303

Client Sample ID: AP-4
Report Date: 12/30/2016
Collection Date: 11/18/2016 10:10
Matrix: Groundwater
Lab ID: 16K0303-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**873**			uS/cm	11/18/16 10:10	B6K0853	CD
Method: SM2550-B							
Temperature	**61.0**			°F	11/18/16 10:10	B6K0853	CD
Method: SM4500-H							
pH	**7.01**	0.05		pH Units	11/18/16 10:10	B6K0853	CD
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Arsenic	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Barium	**357**	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Beryllium	< 2.50	2.50		ug/L	11/23/16 14:39	B6K0988	AG
Boron	**136**	12.5		ug/L	11/23/16 14:39	B6K0988	AG
Cadmium	< 2.50	2.50		ug/L	11/23/16 14:39	B6K0988	AG
Calcium	**117**	2.50		mg/L	11/23/16 15:00	B6K0988	AG
Chromium	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Cobalt	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Copper	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Iron	**11600**	125		ug/L	11/23/16 14:39	B6K0988	AG
Lead	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Manganese	**142**	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Molybdenum	< 0.0250	0.0250		mg/L	11/23/16 14:39	B6K0988	AG
Nickel	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Selenium	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Silver	< 2.50	2.50		ug/L	11/23/16 14:39	B6K0988	AG
Thallium	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Zinc	< 25.0	25.0		ug/L	11/23/16 14:39	B6K0988	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	11/29/16 11:54	B6K1097	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**9.80**	3.00		mg/L	11/19/16 09:36	B6K0855	NB1
Fluoride	< 0.500	0.500		mg/L	11/19/16 09:36	B6K0855	NB1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	11/19/16 09:36	B6K0855	NB1
Sulfate	< 5.00	5.00		mg/L	11/19/16 09:36	B6K0855	NB1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**558**	10.0		mg/L	11/22/16 11:01	B6K0936	CP1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q 2016
Work Order: 16K0303

Client Sample ID: AP-4
Report Date: 12/30/2016
Collection Date: 11/18/2016 10:10
Matrix: Groundwater
Lab ID: 16K0303-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS (Continued)								
Method: SW8270D / SW3510 (Continued)								
Surrogate: 2,4,6-Tribromophenol				*Recovery: 86%*	*Limits: 11-102*	*11/23/16 19:52*	*B6K0947*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 102%*	*Limits: 79-162*	*11/23/16 19:52*	*B6K0947*	*JN1*
Eurofins (Underwriters Laboratory), Subcontract								
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.91**	0.2		pCi/L		12/19/16 00:00	16K0303-05	UL
Radium-228	**1.4**	0.43		pCi/L		12/19/16 00:00	16K0303-05	UL
Test America, Irvine, CA, Subcontract								
Subcontracted Analyses								
Method: SW 846 6010D								
Lithium	< 0.05	0.05		mg/L		11/28/16 00:00	16K0303-05	TEST

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q 2016
Work Order: 16K0303

Client Sample ID: AP-5
Report Date: 12/30/2016
Collection Date: 11/18/2016 10:00
Matrix: Groundwater
Lab ID: 16K0303-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**728**			uS/cm	11/18/16 10:00	B6K0853	JJ1
Method: SM2550-B							
Temperature	**57.5**			°F	11/18/16 10:00	B6K0853	JJ1
Method: SM4500-H							
pH	**7.62**	0.05		pH Units	11/18/16 10:00	B6K0853	JJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Arsenic	< 25.0	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Barium	**201**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Beryllium	< 2.50	2.50		ug/L	11/23/16 14:41	B6K0988	AG
Boron	**73.3**	12.5		ug/L	11/23/16 14:41	B6K0988	AG
Cadmium	< 2.50	2.50		ug/L	11/23/16 14:41	B6K0988	AG
Calcium	**201**	2.50		mg/L	11/23/16 14:44	B6K0988	AG
Chromium	**43.2**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Cobalt	< 25.0	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Copper	**38.0**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Iron	**59400**	2500		ug/L	11/23/16 14:44	B6K0988	AG
Lead	**25.4**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Manganese	**1360**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Molybdenum	< 0.0250	0.0250		mg/L	11/23/16 14:41	B6K0988	AG
Nickel	**59.5**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Selenium	< 25.0	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Silver	< 2.50	2.50		ug/L	11/23/16 14:41	B6K0988	AG
Thallium	< 25.0	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Zinc	**148**	25.0		ug/L	11/23/16 14:41	B6K0988	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	11/29/16 12:40	B6K1097	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	11/19/16 10:04	B6K0855	NB1
Fluoride	< 0.500	0.500		mg/L	11/19/16 10:04	B6K0855	NB1
Nitrogen, Nitrate	**1.45**	0.500		mg/L	11/19/16 10:04	B6K0855	NB1
Sulfate	**52.5**	5.00		mg/L	11/19/16 10:04	B6K0855	NB1
Wet Chemistry							
Method: SM2540C							
Total Dissolved Solids (Residue, Filterable)	**344**	10.0		mg/L	11/22/16 11:01	B6K0936	CP1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q 2016
Work Order: 16K0303

Client Sample ID: AP-5
Report Date: 12/30/2016
Collection Date: 11/18/2016 10:00
Matrix: Groundwater
Lab ID: 16K0303-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/MS (Continued)								
Method: SW8270D / SW3510 (Continued)								
Surrogate: 2,4,6-Tribromophenol				*Recovery: 84%*	*Limits: 11-102*	*11/23/16 20:25*	*B6K0947*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 102%*	*Limits: 79-162*	*11/23/16 20:25*	*B6K0947*	*JN1*
Eurofins (Underwriters Laboratory), Subcontract								
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.34**	0.16		pCi/L		12/19/16 00:00	16K0303-06	UL
Radium-228	**2.2**	0.41		pCi/L		12/19/16 00:00	16K0303-06	UL
Test America, Irvine, CA, Subcontract								
Subcontracted Analyses								
Method: SW 846 6010D								
Lithium	< 0.05	0.05		mg/L		11/28/16 00:00	16K0303-06	TEST

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2017
Work Order: 17B0310

Client Sample ID: AP-4
Report Date: 03/22/2017
Collection Date: 02/16/2017 07:25
Matrix: Groundwater
Lab ID: 17B0310-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**1010**			uS/cm	02/16/17 07:25	B7B0677	PB
Method: SM2550-B							
Temperature	**56.5**			°F	02/16/17 07:25	B7B0677	PB
Method: SM4500-H							
pH	**7.02**	0.05		pH Units	02/16/17 07:25	B7B0677	PB
Metals by ICP-AES							
Method: SW6010C/D / SW3015							
Lithium	< 0.0500	0.0500		mg/L	02/21/17 17:12	B7B0719	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Arsenic	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Barium	**413**	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Beryllium	< 2.50	2.50		ug/L	02/17/17 14:22	B7B0589	AG
Boron	**117**	12.5		ug/L	02/17/17 14:22	B7B0589	AG
Cadmium	< 2.50	2.50		ug/L	02/17/17 14:22	B7B0589	AG
Calcium	**136**	1.25		mg/L	02/20/17 18:45	B7B0589	AG
Chromium	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Cobalt	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Copper	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Iron	**12100**	125		ug/L	02/17/17 14:22	B7B0589	AG
Lead	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Manganese	**146**	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Molybdenum	< 0.0250	0.0250		mg/L	02/17/17 14:22	B7B0589	AG
Nickel	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Selenium	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Silver	< 2.50	2.50		ug/L	02/17/17 14:22	B7B0589	AG
Thallium	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Zinc	< 25.0	25.0		ug/L	02/17/17 14:22	B7B0589	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	03/02/17 11:53	B7C0062	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**10.6**	3.00		mg/L	02/18/17 04:05	B7B0577	NB1
Fluoride	< 0.500	0.500		mg/L	02/18/17 04:05	B7B0577	NB1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	02/18/17 04:05	B7B0577	NB1
Sulfate	< 5.00	5.00		mg/L	02/18/17 04:05	B7B0577	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2017
Work Order: 17B0310

Client Sample ID: AP-4
Report Date: 03/22/2017
Collection Date: 02/16/2017 07:25
Matrix: Groundwater
Lab ID: 17B0310-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.1								
Dalapon	< 8.00	8.00		ug/L		02/24/17 14:30	B7B0931	LP
Surrogate: 2,4-Dichlorophenylacetic acid				*Recovery: 130%*	*Limits: 70-130*	*02/24/17 14:30*	*B7B0931*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		03/06/17 21:20	B7B0758	HHE
Surrogate: 2,4,6-Tribromophenol				*Recovery: 69%*	*Limits: 20-200*	*03/06/17 21:20*	*B7B0758*	*HHE*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.18	4.18		ug/L		02/28/17 21:27	B7B0795	JN1
o-Dichlorobenzene	< 2.09	2.09		ug/L		02/28/17 21:27	B7B0795	JN1
p-Dichlorobenzene	< 2.09	2.09		ug/L		02/28/17 21:27	B7B0795	JN1
Benzo(a)pyrene	< 4.18	4.18		ug/L		02/28/17 21:27	B7B0795	JN1
Di(2-ethylhexyl)phthalate	< 26.2	26.2		ug/L		02/28/17 21:27	B7B0795	JN1
Hexachlorocyclopentadiene	< 10.5	10.5		ug/L		02/28/17 21:27	B7B0795	JN1
Pentachlorophenol	< 52.3	52.3		ug/L		02/28/17 21:27	B7B0795	JN1
Surrogate: 2-Fluorophenol				*Recovery: 41%*	*Limits: 4-108*	*02/28/17 21:27*	*B7B0795*	*JN1*
Surrogate: Phenol-d5				*Recovery: 34%*	*Limits: 1-101*	*02/28/17 21:27*	*B7B0795*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 57%*	*Limits: 23-119*	*02/28/17 21:27*	*B7B0795*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 54%*	*Limits: 28-124*	*02/28/17 21:27*	*B7B0795*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 65%*	*Limits: 11-102*	*02/28/17 21:27*	*B7B0795*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 101%*	*Limits: 79-147*	*02/28/17 21:27*	*B7B0795*	*JN1*

Eurofins (Underwriters Laboratory), Subcontract

Subcontracted Analyses							
Method: SM7500							
Radium-226	**0.82**	0.16	pCi/L		03/09/17 00:00	17B0310-05	UL
Radium-228	**1.7**	0.47	pCi/L		03/09/17 00:00	17B0310-05	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2017
Work Order: 17B0310

Client Sample ID: AP-5
Report Date: 03/22/2017
Collection Date: 02/16/2017 10:05
Matrix: Groundwater
Lab ID: 17B0310-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**549**			uS/cm	02/16/17 10:05	B7B0677	CD
Method: SM2550-B							
Temperature	**52.1**			°F	02/16/17 10:05	B7B0677	CD
Method: SM4500-H							
pH	**7.42**	0.05		pH Units	02/16/17 10:05	B7B0677	CD
Metals by ICP-AES							
Method: SW6010C/D / SW3015							
Lithium	< 0.0500	0.0500		mg/L	02/21/17 17:32	B7B0719	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Arsenic	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Barium	**137**	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Beryllium	< 2.50	2.50		ug/L	02/17/17 14:24	B7B0589	AG
Boron	**48.3**	12.5		ug/L	02/17/17 14:24	B7B0589	AG
Cadmium	< 2.50	2.50		ug/L	02/17/17 14:24	B7B0589	AG
Calcium	**155**	1.25		mg/L	02/20/17 18:46	B7B0589	AG
Chromium	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Cobalt	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Copper	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Iron	**17000**	125		ug/L	02/17/17 14:24	B7B0589	AG
Lead	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Manganese	**593**	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Molybdenum	< 0.0250	0.0250		mg/L	02/17/17 14:24	B7B0589	AG
Nickel	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Selenium	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Silver	< 2.50	2.50		ug/L	02/17/17 14:24	B7B0589	AG
Thallium	< 25.0	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Zinc	**118**	25.0		ug/L	02/17/17 14:24	B7B0589	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	03/02/17 11:59	B7C0062	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	02/18/17 04:33	B7B0577	NB1
Fluoride	< 0.500	0.500		mg/L	02/18/17 04:33	B7B0577	NB1
Nitrogen, Nitrate	**1.73**	0.500		mg/L	02/18/17 04:33	B7B0577	NB1
Sulfate	**55.5**	5.00		mg/L	02/18/17 04:33	B7B0577	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
1Q 2017
Work Order: 17B0310

Client Sample ID: AP-5
Report Date: 03/22/2017
Collection Date: 02/16/2017 10:05
Matrix: Groundwater
Lab ID: 17B0310-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.1								
Dalapon	< 8.00	8.00		ug/L		02/24/17 15:07	B7B0931	LP
Surrogate: 2,4-Dichlorophenylacetic acid				*Recovery: 126%*	*Limits: 70-130*	*02/24/17 15:07*	*B7B0931*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		03/06/17 17:38	B7B0758	HHE
Surrogate: 2,4,6-Tribromophenol				*Recovery: 54%*	*Limits: 20-200*	*03/06/17 17:38*	*B7B0758*	*HHE*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.13	4.13		ug/L		02/28/17 22:00	B7B0795	JN1
o-Dichlorobenzene	< 2.07	2.07		ug/L		02/28/17 22:00	B7B0795	JN1
p-Dichlorobenzene	< 2.07	2.07		ug/L		02/28/17 22:00	B7B0795	JN1
Benzo(a)pyrene	< 4.13	4.13		ug/L		02/28/17 22:00	B7B0795	JN1
Di(2-ethylhexyl)phthalate	< 25.8	25.8		ug/L		02/28/17 22:00	B7B0795	JN1
Hexachlorocyclopentadiene	< 10.3	10.3		ug/L		02/28/17 22:00	B7B0795	JN1
Pentachlorophenol	< 51.6	51.6		ug/L		02/28/17 22:00	B7B0795	JN1
Surrogate: 2-Fluorophenol				*Recovery: 33%*	*Limits: 4-108*	*02/28/17 22:00*	*B7B0795*	*JN1*
Surrogate: Phenol-d5				*Recovery: 22%*	*Limits: 1-101*	*02/28/17 22:00*	*B7B0795*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 50%*	*Limits: 23-119*	*02/28/17 22:00*	*B7B0795*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 46%*	*Limits: 28-124*	*02/28/17 22:00*	*B7B0795*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 52%*	*Limits: 11-102*	*02/28/17 22:00*	*B7B0795*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 97%*	*Limits: 79-147*	*02/28/17 22:00*	*B7B0795*	*JN1*

Eurofins (Underwriters Laboratory), Subcontract

Subcontracted Analyses							
Method: SM7500							
Radium-226	**0.34**	0.12	pCi/L		03/09/17 00:00	17B0310-06	UL
Radium-228	**0.85**	0.49	pCi/L		03/09/17 00:00	17B0310-06	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2017
Work Order: 17E0123

Client Sample ID: AP-4
Report Date: 07/10/2017
Collection Date: 05/05/2017 09:30
Matrix: Groundwater
Lab ID: 17E0123-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**949**			uS/cm	05/05/17 09:30	B7F0066	CL1
Method: SM2550-B							
Temperature	**59.8**			°F	05/05/17 09:30	B7F0066	CL1
Method: SM4500-H							
pH	**7.08**	0.05		pH Units	05/05/17 09:30	B7F0066	CL1
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	05/09/17 19:45	B7E0315	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Arsenic	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Barium	**405**	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Beryllium	< 2.50	2.50		ug/L	05/08/17 14:42	B7E0267	AG
Boron	**120**	12.5		ug/L	05/08/17 14:42	B7E0267	AG
Cadmium	< 2.50	2.50		ug/L	05/08/17 14:42	B7E0267	AG
Calcium	**117**	1.25		mg/L	05/08/17 15:26	B7E0267	AG
Chromium	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Cobalt	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Copper	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Iron	**11600**	125		ug/L	05/08/17 14:42	B7E0267	AG
Lead	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Manganese	**152**	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Molybdenum	< 0.0250	0.0250		mg/L	05/08/17 14:42	B7E0267	AG
Nickel	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Selenium	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Silver	< 2.50	2.50		ug/L	05/08/17 14:42	B7E0267	AG
Thallium	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Zinc	< 25.0	25.0		ug/L	05/08/17 14:42	B7E0267	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	05/10/17 14:42	B7E0356	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**12.0**	3.00		mg/L	05/05/17 20:11	B7E0194	NB1
Fluoride	< 0.500	0.500		mg/L	05/05/17 20:11	B7E0194	NB1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	05/05/17 20:11	B7E0194	NB1
Sulfate	< 5.00	5.00		mg/L	05/05/17 20:11	B7E0194	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2017
Work Order: 17E0123

Client Sample ID: AP-4
Report Date: 07/10/2017
Collection Date: 05/05/2017 09:30
Matrix: Groundwater
Lab ID: 17E0123-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.3								
Dalapon	< 8.00	8.00		ug/L		06/23/17 11:26	B7F0495	LP
Surrogate: 2,4-Dichlorophenylacetic acid			*S*	*Recovery: 68%*	*Limits: 70-130*	*06/23/17 11:26*	*B7F0495*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		05/16/17 08:12	B7E0284	HHE
Surrogate: 2,4,6-Tribromophenol				*Recovery: 79%*	*Limits: 20-200*	*05/16/17 08:12*	*B7E0284*	*HHE*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.05	4.05		ug/L		05/11/17 15:23	B7E0396	JN1
o-Dichlorobenzene	< 2.02	2.02		ug/L		05/11/17 15:23	B7E0396	JN1
p-Dichlorobenzene	< 2.02	2.02		ug/L		05/11/17 15:23	B7E0396	JN1
Benzo(a)pyrene	< 4.05	4.05		ug/L		05/11/17 15:23	B7E0396	JN1
Di(2-ethylhexyl)phthalate	< 25.3	25.3		ug/L		05/11/17 15:23	B7E0396	JN1
Hexachlorocyclopentadiene	< 10.1	10.1		ug/L		05/11/17 15:23	B7E0396	JN1
Pentachlorophenol	< 50.6	50.6		ug/L		05/11/17 15:23	B7E0396	JN1
Surrogate: 2-Fluorophenol				*Recovery: 52%*	*Limits: 4-108*	*05/11/17 15:23*	*B7E0396*	*JN1*
Surrogate: Phenol-d5				*Recovery: 41%*	*Limits: 1-101*	*05/11/17 15:23*	*B7E0396*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 69%*	*Limits: 23-119*	*05/11/17 15:23*	*B7E0396*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 77%*	*Limits: 28-124*	*05/11/17 15:23*	*B7E0396*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 69%*	*Limits: 11-102*	*05/11/17 15:23*	*B7E0396*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 113%*	*Limits: 79-147*	*05/11/17 15:23*	*B7E0396*	*JN1*
Eurofins-Eaton (Underwriters), Subcontract								
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.63**	0.16		pCi/L		06/01/17 00:00	17E0123-05	UL
Radium-228	**0.73**	0.57		pCi/L		06/01/17 00:00	17E0123-05	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2017
Work Order: 17E0123

Client Sample ID: AP-5
Report Date: 07/10/2017
Collection Date: 05/05/2017 10:40
Matrix: Groundwater
Lab ID: 17E0123-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**616**			uS/cm	05/05/17 10:40	B7F0066	CL1
Method: SM2550-B							
Temperature	**54.8**			°F	05/05/17 10:40	B7F0066	CL1
Method: SM4500-H							
pH	**7.36**	0.05		pH Units	05/05/17 10:40	B7F0066	CL1
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	05/09/17 19:49	B7E0315	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Arsenic	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Barium	**80.7**	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Beryllium	< 2.50	2.50		ug/L	05/08/17 14:44	B7E0267	AG
Boron	**44.3**	12.5		ug/L	05/08/17 14:44	B7E0267	AG
Cadmium	< 2.50	2.50		ug/L	05/08/17 14:44	B7E0267	AG
Calcium	**83.5**	1.25		mg/L	05/08/17 15:28	B7E0267	AG
Chromium	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Cobalt	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Copper	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Iron	**7630**	125		ug/L	05/08/17 14:44	B7E0267	AG
Lead	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Manganese	**154**	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Molybdenum	< 0.0250	0.0250		mg/L	05/08/17 14:44	B7E0267	AG
Nickel	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Selenium	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Silver	< 2.50	2.50		ug/L	05/08/17 14:44	B7E0267	AG
Thallium	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Zinc	< 25.0	25.0		ug/L	05/08/17 14:44	B7E0267	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	05/10/17 14:44	B7E0356	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	05/05/17 22:06	B7E0194	NB1
Fluoride	< 0.500	0.500		mg/L	05/05/17 22:06	B7E0194	NB1
Nitrogen, Nitrate	**1.53**	0.500		mg/L	05/05/17 22:06	B7E0194	NB1
Sulfate	**54.8**	5.00		mg/L	05/05/17 22:06	B7E0194	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
2Q 2017
Work Order: 17E0123

Client Sample ID: AP-5
Report Date: 07/10/2017
Collection Date: 05/05/2017 10:40
Matrix: Groundwater
Lab ID: 17E0123-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.3								
Dalapon	< 8.00	8.00		ug/L		06/23/17 12:03	B7F0495	LP
Surrogate: 2,4-Dichlorophenylacetic acid				*Recovery: 96%*	*Limits: 70-130*	*06/23/17 12:03*	*B7F0495*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 31.0	31.0		ug/L		05/16/17 08:42	B7E0284	HHE
Surrogate: 2,4,6-Tribromophenol				*Recovery: 82%*	*Limits: 20-200*	*05/16/17 08:42*	*B7E0284*	*HHE*
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.12	4.12		ug/L		05/11/17 15:56	B7E0396	JN1
o-Dichlorobenzene	< 2.06	2.06		ug/L		05/11/17 15:56	B7E0396	JN1
p-Dichlorobenzene	< 2.06	2.06		ug/L		05/11/17 15:56	B7E0396	JN1
Benzo(a)pyrene	< 4.12	4.12		ug/L		05/11/17 15:56	B7E0396	JN1
Di(2-ethylhexyl)phthalate	< 25.8	25.8		ug/L		05/11/17 15:56	B7E0396	JN1
Hexachlorocyclopentadiene	< 10.3	10.3		ug/L		05/11/17 15:56	B7E0396	JN1
Pentachlorophenol	< 51.5	51.5		ug/L		05/11/17 15:56	B7E0396	JN1
Surrogate: 2-Fluorophenol				*Recovery: 38%*	*Limits: 4-108*	*05/11/17 15:56*	*B7E0396*	*JN1*
Surrogate: Phenol-d5				*Recovery: 26%*	*Limits: 1-101*	*05/11/17 15:56*	*B7E0396*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 56%*	*Limits: 23-119*	*05/11/17 15:56*	*B7E0396*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 67%*	*Limits: 28-124*	*05/11/17 15:56*	*B7E0396*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 50%*	*Limits: 11-102*	*05/11/17 15:56*	*B7E0396*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 115%*	*Limits: 79-147*	*05/11/17 15:56*	*B7E0396*	*JN1*

Eurofins-Eaton (Underwriters), Subcontract

Subcontracted Analyses							
Method: SM7500							
Radium-226	**0.55**	0.15	pCi/L		06/01/17 00:00	17E0123-06	UL
Radium-228	**1.2**	0.53	pCi/L		06/01/17 00:00	17E0123-06	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2017
Work Order: 17H0132

Client Sample ID: AP-4
Report Date: 10/04/2017
Collection Date: 08/02/2017 10:05
Matrix: Groundwater
Lab ID: 17H0132-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**884**			uS/cm	08/02/17 10:05	B7H0619	JJ1
Method: SM2550-B							
Temperature	**65.9**			°F	08/02/17 10:05	B7H0619	JJ1
Method: SM4500-H							
pH	**7.29**	0.05		pH Units	08/02/17 10:05	B7H0619	JJ1
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	08/08/17 18:02	B7H0278	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Arsenic	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Barium	**391**	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Beryllium	< 2.50	2.50		ug/L	08/14/17 11:56	B7H0226	AG
Boron	**105**	12.5		ug/L	08/14/17 11:56	B7H0226	AG
Cadmium	< 2.50	2.50		ug/L	08/14/17 11:56	B7H0226	AG
Calcium	**150**	2.50		mg/L	08/14/17 12:55	B7H0226	AG
Chromium	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Cobalt	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Copper	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Iron	**12600**	125		ug/L	08/14/17 11:56	B7H0226	AG
Lead	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Manganese	**146**	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Molybdenum	< 0.0250	0.0250		mg/L	08/14/17 11:56	B7H0226	AG
Nickel	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Selenium	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Silver	< 2.50	2.50		ug/L	08/14/17 11:56	B7H0226	AG
Thallium	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Zinc	< 25.0	25.0		ug/L	08/14/17 11:56	B7H0226	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	08/09/17 16:48	B7H0333	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**11.9**	3.00		mg/L	08/03/17 11:57	B7H0106	NB1
Fluoride	< 0.500	0.500		mg/L	08/03/17 11:57	B7H0106	NB1
Nitrogen, Nitrate	< 0.500	0.500		mg/L	08/03/17 11:57	B7H0106	NB1
Sulfate	< 5.00	5.00		mg/L	08/05/17 08:56	B7H0150	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2017
Work Order: 17H0132

Client Sample ID: AP-4
Report Date: 10/04/2017
Collection Date: 08/02/2017 10:05
Matrix: Groundwater
Lab ID: 17H0132-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.3								
Dalapon	< 1.60	1.60		ug/L		08/29/17 15:45	B7H1061	LP
Surrogate: 2,4-Dichlorophenylacetic acid				*Recovery: 115%*	*Limits: 70-130*	*08/29/17 15:45*	*B7H1061*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.34	4.34		ug/L		08/10/17 15:10	B7H0414	JN1
o-Dichlorobenzene	< 2.17	2.17		ug/L		08/10/17 15:10	B7H0414	JN1
p-Dichlorobenzene	< 2.17	2.17		ug/L		08/10/17 15:10	B7H0414	JN1
Benzo(a)pyrene	< 4.34	4.34		ug/L		08/10/17 15:10	B7H0414	JN1
Di(2-ethylhexyl)phthalate	< 27.1	27.1		ug/L		08/10/17 15:10	B7H0414	JN1
Hexachlorocyclopentadiene	< 10.8	10.8		ug/L		08/10/17 15:10	B7H0414	JN1
Pentachlorophenol	< 54.2	54.2		ug/L		08/10/17 15:10	B7H0414	JN1
Surrogate: 2-Fluorophenol				*Recovery: 36%*	*Limits: 4-108*	*08/10/17 15:10*	*B7H0414*	*JN1*
Surrogate: Phenol-d5				*Recovery: 28%*	*Limits: 1-101*	*08/10/17 15:10*	*B7H0414*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 41%*	*Limits: 23-119*	*08/10/17 15:10*	*B7H0414*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 47%*	*Limits: 28-124*	*08/10/17 15:10*	*B7H0414*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 37%*	*Limits: 11-102*	*08/10/17 15:10*	*B7H0414*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 103%*	*Limits: 79-147*	*08/10/17 15:10*	*B7H0414*	*JN1*
Eurofins-Eaton (Underwriters), Subcontract								
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 9.0	9		ug/L		08/10/17 00:00	17H0132-05	UL
Subcontracted Analyses								
Method: SM7500								
Radium-226	**0.53**	0.19		pCi/L		08/31/17 00:00	17H0132-05	UL
Radium-228	**1.5**	0.6		pCi/L		08/31/17 00:00	17H0132-05	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2017
Work Order: 17H0132

Client Sample ID: AP-5
Report Date: 10/04/2017
Collection Date: 08/03/2017 11:00
Matrix: Groundwater
Lab ID: 17H0132-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**633**			uS/cm	08/03/17 11:00	B7H0619	AS5
Method: SM2550-B							
Temperature	**57.4**			°F	08/03/17 11:00	B7H0619	AS5
Method: SM4500-H							
pH	**7.77**	0.05		pH Units	08/03/17 11:00	B7H0619	AS5
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	08/08/17 18:06	B7H0278	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Arsenic	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Barium	**43.0**	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Beryllium	< 2.50	2.50		ug/L	08/14/17 11:58	B7H0226	AG
Boron	**40.7**	12.5		ug/L	08/14/17 11:58	B7H0226	AG
Cadmium	< 2.50	2.50		ug/L	08/14/17 11:58	B7H0226	AG
Calcium	**105**	2.50		mg/L	08/14/17 12:56	B7H0226	AG
Chromium	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Cobalt	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Copper	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Iron	**1510**	125		ug/L	08/14/17 11:58	B7H0226	AG
Lead	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Manganese	**30.9**	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Molybdenum	< 0.0250	0.0250		mg/L	08/14/17 11:58	B7H0226	AG
Nickel	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Selenium	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Silver	< 2.50	2.50		ug/L	08/14/17 11:58	B7H0226	AG
Thallium	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Zinc	< 25.0	25.0		ug/L	08/14/17 11:58	B7H0226	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	08/09/17 16:50	B7H0333	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 3.00	3.00		mg/L	08/04/17 20:31	B7H0150	NB1
Fluoride	< 0.500	0.500		mg/L	08/04/17 20:31	B7H0150	NB1
Nitrogen, Nitrate	**2.26**	0.500		mg/L	08/04/17 20:31	B7H0150	NB1
Sulfate	**48.4**	5.00		mg/L	08/04/17 20:31	B7H0150	NB1

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
3Q 2017
Work Order: 17H0132

Client Sample ID: AP-5
Report Date: 10/04/2017
Collection Date: 08/03/2017 11:00
Matrix: Groundwater
Lab ID: 17H0132-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units		Date/Time Analyzed	Batch	Analyst
Semivolatile Organic Compounds by GC/FID								
Method: E552.3								
Dalapon	< 1.60	1.60		ug/L		08/29/17 16:21	B7H1061	LP
Surrogate: 2,4-Dichlorophenylacetic acid				*Recovery: 107%*	*Limits: 70-130*	*08/29/17 16:21*	*B7H1061*	*LP*
Semivolatile Organic Compounds by GC/MS								
Method: SW8270D / SW3510								
1,2,4-Trichlorobenzene	< 4.04	4.04		ug/L		08/10/17 15:43	B7H0414	JN1
o-Dichlorobenzene	< 2.02	2.02		ug/L		08/10/17 15:43	B7H0414	JN1
p-Dichlorobenzene	< 2.02	2.02		ug/L		08/10/17 15:43	B7H0414	JN1
Benzo(a)pyrene	< 4.04	4.04		ug/L		08/10/17 15:43	B7H0414	JN1
Di(2-ethylhexyl)phthalate	< 25.3	25.3		ug/L		08/10/17 15:43	B7H0414	JN1
Hexachlorocyclopentadiene	< 10.1	10.1		ug/L		08/10/17 15:43	B7H0414	JN1
Pentachlorophenol	< 50.6	50.6		ug/L		08/10/17 15:43	B7H0414	JN1
Surrogate: 2-Fluorophenol				*Recovery: 31%*	*Limits: 4-108*	*08/10/17 15:43*	*B7H0414*	*JN1*
Surrogate: Phenol-d5				*Recovery: 24%*	*Limits: 1-101*	*08/10/17 15:43*	*B7H0414*	*JN1*
Surrogate: Nitrobenzene-d5				*Recovery: 37%*	*Limits: 23-119*	*08/10/17 15:43*	*B7H0414*	*JN1*
Surrogate: 2-Fluorobiphenyl				*Recovery: 46%*	*Limits: 28-124*	*08/10/17 15:43*	*B7H0414*	*JN1*
Surrogate: 2,4,6-Tribromophenol				*Recovery: 32%*	*Limits: 11-102*	*08/10/17 15:43*	*B7H0414*	*JN1*
Surrogate: 4-Terphenyl-d14				*Recovery: 102%*	*Limits: 79-147*	*08/10/17 15:43*	*B7H0414*	*JN1*
Eurofins-Eaton (Underwriters), Subcontract								
Semivolatile Organic Compounds by GC/MS								
Method: E548.1								
Endothall	< 9.0	9		ug/L		08/10/17 00:00	17H0132-06	UL
Subcontracted Analyses								
Method: SM7500								
Radium-226	**1.9**	0.93		pCi/L		08/31/17 00:00	17H0132-06	UL
Radium-228	**1**	0.54		pCi/L		08/31/17 00:00	17H0132-06	UL

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q2017
Work Order: 17K0134

Client Sample ID: AP-4
Report Date: 01/09/2018
Collection Date: 11/09/2017 12:35
Matrix: Groundwater
Lab ID: 17K0134-05

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**826**			uS/cm	11/09/17 12:35	B7K0999	SDS
Method: SM2550-B							
Temperature	**60.4**			°F	11/09/17 12:35	B7K0999	SDS
Method: SM4500-H							
pH	**7.12**	0.05		pH Units	11/09/17 12:35	B7K0999	SDS
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	11/29/17 21:32	B7K0971	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Arsenic	**26.6**	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Barium	**410**	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Beryllium	< 2.50	2.50		ug/L	11/21/17 11:08	B7K0447	AG
Boron	**129**	12.5		ug/L	11/21/17 11:08	B7K0447	AG
Cadmium	< 2.50	2.50		ug/L	11/21/17 11:08	B7K0447	AG
Calcium	**141**	1.25		mg/L	01/08/18 14:01	B8A0185	AG
Chromium	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Cobalt	< 25.0	25.0		ug/L	11/28/17 16:01	B7K0798	MLB
Copper	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Iron	**14100**	125		ug/L	11/21/17 11:08	B7K0447	AG
Lead	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Manganese	**190**	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Molybdenum	< 0.0250	0.0250		mg/L	11/28/17 16:01	B7K0798	MLB
Nickel	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Selenium	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Silver	< 2.50	2.50		ug/L	11/21/17 11:08	B7K0447	AG
Thallium	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Vanadium	< 25.0	25.0		ug/L	11/28/17 16:01	B7K0798	MLB
Zinc	< 25.0	25.0		ug/L	11/21/17 11:08	B7K0447	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	11/14/17 12:46	B7K0442	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	**12.1**	3.00		mg/L	11/11/17 03:04	B7K0328	SK2
Fluoride	< 0.500	0.500		mg/L	11/11/17 03:04	B7K0328	SK2
Nitrogen, Nitrate	< 0.500	0.500		mg/L	11/11/17 03:04	B7K0328	SK2
Sulfate	< 5.00	5.00		mg/L	11/11/17 03:04	B7K0328	SK2

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q2017
Work Order: 17K0134

Client Sample ID: AP-4
Report Date: 01/09/2018
Collection Date: 11/09/2017 12:35
Matrix: Groundwater
Lab ID: 17K0134-05 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
Eurofins-Eaton (Underwriters), Subcontract							
Semivolatile Organic Compounds by GC/MS							
Method: E548.1							
Endothall	< 9.0	9		ug/L	11/06/17 00:00	17K0134-05	UL
Subcontracted Analyses							
Method: SM7500							
Radium-226	**0.69**	0.09		pCi/L	11/28/17 00:00	17K0134-05	UL
Radium-228	**1.3**	0.46		pCi/L	11/28/17 00:00	17K0134-05	UL
Test America, Denver, CO, Subcontract							
Subcontracted Analyses							
Method: SW6860							
Perchlorate	< 4	4		µg/L	11/14/17 00:00	17K0134-05	TEST

Environmental Monitoring and Technologies, Inc.

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q2017
Work Order: 17K0134

Client Sample ID: AP-5
Report Date: 01/09/2018
Collection Date: 11/09/2017 11:25
Matrix: Groundwater
Lab ID: 17K0134-06

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
On Site Analysis							
Method: SM2510B							
Specific Conductance	**550**			uS/cm	11/09/17 11:25	B7K0999	SDS
Method: SM2550-B							
Temperature	**56.1**			°F	11/09/17 11:25	B7K0999	SDS
Method: SM4500-H							
pH	**7.19**	0.05		pH Units	11/09/17 11:25	B7K0999	SDS
Metals by ICP-AES							
Method: SW6010C / SW3015							
Lithium	< 0.0500	0.0500		mg/L	11/29/17 21:28	B7K0971	GJ1
Metals by ICP-MS							
Method: SW6020A / SW3015							
Antimony	< 25.0	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Arsenic	< 25.0	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Barium	**308**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Beryllium	< 2.50	2.50		ug/L	11/21/17 11:10	B7K0447	AG
Boron	**73.0**	12.5		ug/L	11/21/17 11:10	B7K0447	AG
Cadmium	< 2.50	2.50		ug/L	11/21/17 11:10	B7K0447	AG
Calcium	**118**	1.25		mg/L	01/08/18 14:11	B8A0185	AG
Chromium	**65.3**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Cobalt	**27.7**	25.0		ug/L	11/28/17 16:02	B7K0798	MLB
Copper	**45.6**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Iron	**62800**	1250		ug/L	11/21/17 12:06	B7K0447	AG
Lead	**28.7**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Manganese	**1460**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Molybdenum	< 0.0250	0.0250		mg/L	11/28/17 16:02	B7K0798	MLB
Nickel	**67.7**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Selenium	< 25.0	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Silver	< 2.50	2.50		ug/L	11/21/17 11:10	B7K0447	AG
Thallium	< 25.0	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Vanadium	**56.8**	25.0		ug/L	11/28/17 16:02	B7K0798	MLB
Zinc	**184**	25.0		ug/L	11/21/17 11:10	B7K0447	AG
Mercury by CVAA							
Method: SW7470A							
Mercury	< 0.50	0.50		ug/L	11/14/17 12:49	B7K0442	GSB
Anions by Ion Chromatography							
Method: SW9056A							
Chloride	< 30.0	30.0		mg/L	11/14/17 00:47	B7K0328	SK2
Fluoride	< 0.500	0.500		mg/L	11/11/17 03:32	B7K0328	SK2
Nitrogen, Nitrate	**1.57**	0.500		mg/L	11/11/17 03:32	B7K0328	SK2
Sulfate	**55.3**	50.0		mg/L	11/14/17 00:47	B7K0393	SK2

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Client Sample Results

(Continued)

Client: City, Water, Light & Power
Project: List G20
4Q2017
Work Order: 17K0134

Client Sample ID: AP-5
Report Date: 01/09/2018
Collection Date: 11/09/2017 11:25
Matrix: Groundwater
Lab ID: 17K0134-06 (Continued)

Analyses	Result	EMT Reporting Limit	Qual	Units	Date/Time Analyzed	Batch	Analyst
Eurofins-Eaton (Underwriters), Subcontract							
Semivolatile Organic Compounds by GC/MS							
Method: E548.1							
Endothall	< 9.0	9		ug/L	11/06/17 00:00	17K0134-06	UL
Subcontracted Analyses							
Method: SM7500							
Radium-226	**1.3**	0.1		pCi/L	11/28/17 00:00	17K0134-06	UL
Radium-228	**1.9**	0.48		pCi/L	11/28/17 00:00	17K0134-06	UL
Test America, Denver, CO, Subcontract							
Subcontracted Analyses							
Method: SW6860							
Perchlorate	**0.31 J**	4		µg/L	11/14/17 00:00	17K0134-06	TEST

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21010971
Client Project: Ash Pond Monitoring Wells
Report Date: 10-Feb-21
Lab ID: 21010971-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 01/21/2021 13:11

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.65**	ft	1	01/21/2021 13:11	R286611
Depth to water	*	-5.00		**7.40**	ft	1	01/21/2021 13:11	R286611
Depth to water from measuring point	*	0		**10.56**	ft	1	01/21/2021 13:11	R286611
Elevation of groundwater surface	*	0		**546.50**	ft	1	01/21/2021 13:11	R286611
Measuring Point Elevation	*	0		**557.06**	ft	1	01/21/2021 13:11	R286611
Measuring Point Height Above Land Surface	*	0		**3.16**	ft	1	01/21/2021 13:11	R286611
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.9**	°F	1	01/21/2021 13:11	R286611
SW-846 9040B								
pH, Field	*	1.00		**6.97**		1	01/21/2021 13:11	R286611
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**876**	µmhos/cm @25C	1	01/21/2021 13:11	R286611
STANDARD METHODS 2540 C (TOTAL) 1997								
Total Dissolved Solids	NELAP	20		**492**	mg/L	1	01/27/2021 16:36	R286820
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	01/25/2021 18:37	R286658
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.12**	mg/L	1	01/25/2021 13:51	R286676
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**13**	mg/L	1	01/25/2021 18:38	R286659
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**0.0359**	mg/L	1	01/25/2021 19:18	173168
Barium	NELAP	0.0025		**0.474**	mg/L	1	01/25/2021 19:18	173168
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	01/25/2021 19:18	173168
Boron	NELAP	0.0200		**0.0996**	mg/L	1	01/27/2021 12:57	173168
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	01/25/2021 19:18	173168
Calcium	NELAP	0.100		**117**	mg/L	1	01/25/2021 19:18	173168
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	01/25/2021 19:18	173168
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	01/25/2021 19:18	173168
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	01/25/2021 19:18	173168
Lithium	NELAP	0.0050		**0.0087**	mg/L	1	01/25/2021 19:18	173168
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	01/25/2021 19:18	173168
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	01/26/2021 8:09	173169
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/26/2021 8:09	173169
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	01/26/2021 8:09	173169
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	01/25/2021 12:30	173162
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	02/05/2021 0:00	R287302
Radium-228	*	0		**See attached**	pci/L	1	02/05/2021 0:00	R287302

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21010971
Client Project: Ash Pond Monitoring Wells
Report Date: 10-Feb-21
Lab ID: 21010971-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 01/21/2021 13:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	01/21/2021 13:55	R286611
Depth to water	*	-5.00		**18.26**	ft	1	01/21/2021 13:55	R286611
Depth to water from measuring point	*	0		**20.56**	ft	1	01/21/2021 13:55	R286611
Elevation of groundwater surface	*	0		**563.34**	ft	1	01/21/2021 13:55	R286611
Measuring Point Elevation	*	0		**583.90**	ft	1	01/21/2021 13:55	R286611
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	01/21/2021 13:55	R286611
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.0**	°F	1	01/21/2021 13:55	R286611
SW-846 9040B								
pH, Field	*	1.00		**7.27**		1	01/21/2021 13:55	R286611
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**597**	µmhos/cm @25C	1	01/21/2021 13:55	R286611
STANDARD METHODS 2540 C (TOTAL) 1997								
Total Dissolved Solids	NELAP	20		**362**	mg/L	1	01/27/2021 16:37	R286820
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**46**	mg/L	1	01/25/2021 18:59	R286658
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.34**	mg/L	1	01/25/2021 13:53	R286676
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**< 4**	mg/L	1	01/25/2021 18:59	R286659
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	01/25/2021 19:21	173168
Barium	NELAP	0.0025		**0.0429**	mg/L	1	01/25/2021 19:21	173168
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	01/25/2021 19:21	173168
Boron	NELAP	0.0200		**0.0256**	mg/L	1	01/27/2021 13:20	173168
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	01/25/2021 19:21	173168
Calcium	NELAP	0.100		**75.4**	mg/L	1	01/25/2021 19:21	173168
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	01/25/2021 19:21	173168
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	01/25/2021 19:21	173168
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	01/25/2021 19:21	173168
Lithium	NELAP	0.0050		**< 0.0050**	mg/L	1	01/25/2021 19:21	173168
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	01/25/2021 19:21	173168
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	01/26/2021 8:17	173169
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	01/26/2021 8:17	173169
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	01/26/2021 8:17	173169
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	01/25/2021 12:32	173162
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	02/05/2021 0:00	R287302
Radium-228	*	0		**See attached**	pci/L	1	02/05/2021 0:00	R287302

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21050932
Client Project: Ash Pond Monitoring Wells
Report Date: 28-Jun-21
Lab ID: 21050932-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 05/27/2021 11:24

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.65**	ft	1	05/27/2021 11:24	R293158
Depth to water	*	-5.00		**6.61**	ft	1	05/27/2021 11:24	R293158
Depth to water from measuring point	*	0		**9.77**	ft	1	05/27/2021 11:24	R293158
Elevation of groundwater surface	*	0		**547.29**	ft	1	05/27/2021 11:24	R293158
Measuring Point Elevation	*	0		**557.06**	ft	1	05/27/2021 11:24	R293158
Measuring Point Height Above Land Surface	*	0		**3.16**	ft	1	05/27/2021 11:24	R293158
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**120**	NTU	1	05/27/2021 11:24	R293158
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.3**	°F	1	05/27/2021 11:24	R293158
SW-846 9040B								
pH, Field	*	1.00		**6.74**		1	05/27/2021 11:24	R293158
The LCS was outside of control limits for pH at 102.7%. The acceptable range is 98.57- 101.4 % recovery.								
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1050**	µmhos/cm @25C	1	05/27/2021 11:24	R293158
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**486**	mg/L	1	06/02/2021 14:30	R291754
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	06/02/2021 2:07	R291767
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.16**	mg/L	1	06/01/2021 19:46	R291748
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**13**	mg/L	1	06/02/2021 2:08	R291768
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	06/02/2021 15:36	177441
Barium	NELAP	0.0025		**0.454**	mg/L	1	06/02/2021 15:36	177441
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/02/2021 15:36	177441
Boron	NELAP	0.0200		**0.0928**	mg/L	1	06/02/2021 15:36	177441
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/02/2021 15:36	177441
Calcium	NELAP	0.100		**128**	mg/L	1	06/02/2021 15:36	177441
Chromium	NELAP	0.0050		**0.0062**	mg/L	1	06/02/2021 15:36	177441
Cobalt	NELAP	0.0050		**0.0052**	mg/L	1	06/02/2021 15:36	177441
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	06/02/2021 15:36	177441
Lithium	NELAP	0.0050		**0.0108**	mg/L	1	06/02/2021 15:36	177441
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/02/2021 15:36	177441
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	06/01/2021 16:28	177442
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	06/01/2021 16:28	177442
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	06/01/2021 16:28	177442
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	06/02/2021 11:48	177478
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	06/25/2021 0:00	R293748
Radium-228	*	0		**See attached**	pci/L	1	06/25/2021 0:00	R293748

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21050932
Client Project: Ash Pond Monitoring Wells
Report Date: 28-Jun-21
Lab ID: 21050932-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 05/27/2021 11:48

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	05/27/2021 11:48	R293158
Depth to water	*	-5.00		**7.82**	ft	1	05/27/2021 11:48	R293158
Depth to water from measuring point	*	0		**10.12**	ft	1	05/27/2021 11:48	R293158
Elevation of groundwater surface	*	0		**573.78**	ft	1	05/27/2021 11:48	R293158
Measuring Point Elevation	*	0		**583.90**	ft	1	05/27/2021 11:48	R293158
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	05/27/2021 11:48	R293158
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**1.8**	NTU	1	05/27/2021 11:48	R293158
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.3**	°F	1	05/27/2021 11:48	R293158
SW-846 9040B								
pH, Field	*	1.00		**7.05**		1	05/27/2021 11:48	R293158
The LCS was outside of control limits for pH at 102.7%. The acceptable range is 98.57- 101.4 % recovery.								
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**801**	µmhos/cm @25C	1	05/27/2021 11:48	R293158
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**358**	mg/L	1	06/02/2021 14:31	R291754
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		**53**	mg/L	2	06/03/2021 17:50	R291837
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.35**	mg/L	1	06/01/2021 19:49	R291748
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**3**	mg/L	1	06/02/2021 2:29	R291768
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	06/02/2021 15:46	177441
Barium	NELAP	0.0025		**0.0552**	mg/L	1	06/02/2021 15:46	177441
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/02/2021 15:46	177441
Boron	NELAP	0.0200		**< 0.0200**	mg/L	1	06/02/2021 15:46	177441
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/02/2021 15:46	177441
Calcium	NELAP	0.100		**89.1**	mg/L	1	06/02/2021 15:46	177441
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	06/02/2021 15:46	177441
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	06/02/2021 15:46	177441
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	06/02/2021 15:46	177441
Lithium	NELAP	0.0050		**0.0060**	mg/L	1	06/02/2021 15:46	177441
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/02/2021 15:46	177441
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	06/01/2021 16:36	177442
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	06/01/2021 16:36	177442
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	06/01/2021 16:36	177442
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	06/02/2021 11:50	177478
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	06/25/2021 0:00	R293748
Radium-228	*	0		**See attached**	pci/L	1	06/25/2021 0:00	R293748

Teklab, Inc. Environmental Laboratory

Laboratory Results

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Client: City Water, Light & Power
Work Order: 21080889
Client Project: Ash Pond Monitoring Wells
Report Date: 28-Sep-21
Lab ID: 21080889-004
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 08/24/2021 16:07

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.65**	ft	1	08/24/2021 16:07	R298344
Depth to water	*	-5.00		**5.69**	ft	1	08/24/2021 16:07	R298344
Depth to water from measuring point	*	0		**8.85**	ft	1	08/24/2021 16:07	R298344
Elevation of groundwater surface	*	0		**548.21**	ft	1	08/24/2021 16:07	R298344
Measuring Point Elevation	*	0		**557.06**	ft	1	08/24/2021 16:07	R298344
Measuring Point Height Above Land Surface	*	0		**3.16**	ft	1	08/24/2021 16:07	R298344
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**93**	NTU	1	08/24/2021 16:07	R298344
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.1**	°F	1	08/24/2021 16:07	R298344
SW-846 9040B								
pH, Field	*	1.00		**6.92**		1	08/24/2021 16:07	R298344
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**788**	µmhos/cm @25C	1	08/24/2021 16:07	R298344
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**494**	mg/L	1	08/27/2021 14:26	R298340
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	08/30/2021 15:00	R298338
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**14**	mg/L	1	08/26/2021 18:28	R297212
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	09/01/2021 14:35	181352
Barium	NELAP	0.0025		**0.456**	mg/L	1	09/01/2021 14:35	181352
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	09/01/2021 14:35	181352
Boron	NELAP	0.0200		**0.0949**	mg/L	1	09/02/2021 14:21	181352
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	09/01/2021 14:35	181352
Calcium	NELAP	0.100		**126**	mg/L	1	09/01/2021 14:35	181352
Chromium	NELAP	0.0050		**0.0068**	mg/L	1	09/01/2021 14:35	181352
Cobalt	NELAP	0.0050		**0.0050**	mg/L	1	09/01/2021 14:35	181352
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	09/01/2021 14:35	181352
Lithium	NELAP	0.0050		**0.0113**	mg/L	1	09/01/2021 14:35	181352
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	09/01/2021 14:35	181352
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	09/08/2021 2:22	181353
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	09/08/2021 2:22	181353
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	09/02/2021 22:05	181353
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	09/02/2021 12:15	181421
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	09/21/2021 0:00	R299386
Radium-228	*	0		**See attached**	pci/L	1	09/21/2021 0:00	R299386

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21080889
Client Project: Ash Pond Monitoring Wells
Report Date: 28-Sep-21
Lab ID: 21080889-005
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 08/24/2021 16:31

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	08/24/2021 16:31	R298344
Depth to water	*	-5.00		**11.89**	ft	1	08/24/2021 16:31	R298344
Depth to water from measuring point	*	0		**14.19**	ft	1	08/24/2021 16:31	R298344
Elevation of groundwater surface	*	0		**569.71**	ft	1	08/24/2021 16:31	R298344
Measuring Point Elevation	*	0		**583.90**	ft	1	08/24/2021 16:31	R298344
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	08/24/2021 16:31	R298344
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**5.0**	NTU	1	08/24/2021 16:31	R298344
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.1**	°F	1	08/24/2021 16:31	R298344
SW-846 9040B								
pH, Field	*	1.00		**7.08**		1	08/24/2021 16:31	R298344
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**604**	µmhos/cm @25C	1	08/24/2021 16:31	R298344
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**422**	mg/L	1	08/27/2021 14:26	R298340
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		**65**	mg/L	2	08/26/2021 18:57	R297211
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**5**	mg/L	1	08/26/2021 18:52	R297212
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	09/03/2021 9:15	181452
Barium	NELAP	0.0025		**0.0473**	mg/L	1	09/03/2021 9:15	181452
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	09/03/2021 9:15	181452
Boron	NELAP	0.0200		**< 0.0200**	mg/L	1	09/03/2021 9:15	181452
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	09/07/2021 12:57	181508
Calcium	NELAP	0.100	S	**77.8**	mg/L	1	09/03/2021 9:15	181452
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	09/07/2021 12:57	181508
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	09/07/2021 12:57	181508
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	09/03/2021 9:15	181452
Lithium	NELAP	0.0050		**0.0068**	mg/L	1	09/07/2021 12:57	181508
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	09/07/2021 12:57	181508
Matrix spike control limits for Ca are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0005		**< 0.0005**	mg/L	5	09/13/2021 16:56	181668
Selenium	NELAP	0.0005		**< 0.0005**	mg/L	5	09/13/2021 16:56	181668
Thallium	NELAP	0.0010		**0.0019**	mg/L	5	09/13/2021 16:56	181668
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	09/02/2021 12:17	181421
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	09/21/2021 0:00	R299386
Radium-228	*	0		**See attached**	pci/L	1	09/21/2021 0:00	R299386

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 21110022
Client Project: Ash Pond Monitoring Wells
Report Date: 25-Jan-22
Lab ID: 21110022-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 11/09/2021 13:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.79**	ft	1	11/09/2021 13:10	R303134
Depth to water	*	-5.00		**3.91**	ft	1	11/09/2021 13:10	R303134
Depth to water from measuring point	*	0		**9.21**	ft	1	11/09/2021 13:10	R303134
Elevation of groundwater surface	*	0		**549.99**	ft	1	11/09/2021 13:10	R303134
Measuring Point Elevation	*	0		**559.20**	ft	1	11/09/2021 13:10	R303134
Measuring Point Height Above Land Surface	*	0		**5.30**	ft	1	11/09/2021 13:10	R303134
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**19**	NTU	1	11/09/2021 13:10	R303134
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.2**	°F	1	11/09/2021 13:10	R303134
SW-846 9040B								
pH, Field	*	1.00		**6.75**		1	11/09/2021 13:10	R303134
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**892**	µmhos/cm @25C	1	11/09/2021 13:10	R303134
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	*	20		**494**	mg/L	1	11/12/2021 15:02	R302666
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	11/16/2021 2:37	R302737
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.15**	mg/L	1	11/11/2021 11:02	R302521
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**13**	mg/L	1	11/16/2021 2:37	R302744
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**0.0305**	mg/L	1	11/12/2021 21:10	184917
Barium	NELAP	0.0025		**0.417**	mg/L	1	11/12/2021 21:10	184917
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	11/12/2021 21:10	184917
Boron	NELAP	0.0200		**0.0946**	mg/L	1	11/16/2021 13:13	184917
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	11/12/2021 21:10	184917
Calcium	NELAP	0.100		**117**	mg/L	1	11/12/2021 21:10	184917
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	11/12/2021 21:10	184917
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	11/12/2021 21:10	184917
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	11/12/2021 21:10	184917
Lithium	NELAP	0.0050		**0.0079**	mg/L	1	11/12/2021 21:10	184917
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	11/12/2021 21:10	184917
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	11/18/2021 1:54	184917
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	11/18/2021 1:54	184917
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	11/17/2021 3:02	184917
CCV recovered outside the upper control limits for Se. Sample results are below the reporting limit. Data is reportable per the TNI standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	11/14/2021 15:50	184918
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	01/18/2022 0:00	R306320
Radium-228	*	0		**See attached**	pci/L	1	01/18/2022 0:00	R306320

Teklab, Inc.
Environmental Laboratory

Laboratory Results

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Client: City Water, Light & Power
Work Order: 21110022
Client Project: Ash Pond Monitoring Wells
Report Date: 25-Jan-22
Lab ID: 21110022-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 11/10/2021 16:01

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	11/10/2021 16:01	R303134
Depth to water	*	-5.00		**11.04**	ft	1	11/10/2021 16:01	R303134
Depth to water from measuring point	*	0		**13.34**	ft	1	11/10/2021 16:01	R303134
Elevation of groundwater surface	*	0		**570.56**	ft	1	11/10/2021 16:01	R303134
Measuring Point Elevation	*	0		**583.90**	ft	1	11/10/2021 16:01	R303134
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	11/10/2021 16:01	R303134
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**< 1.0**	NTU	1	11/10/2021 16:01	R303134
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.8**	°F	1	11/10/2021 16:01	R303134
SW-846 9040B								
pH, Field	*	1.00		**6.97**		1	11/10/2021 16:01	R303134
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**780**	µmhos/cm @25C	1	11/10/2021 16:01	R303134
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	*	20		**468**	mg/L	1	11/12/2021 15:02	R302666
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		**70**	mg/L	2	11/16/2021 2:45	R302737
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.30**	mg/L	1	11/11/2021 11:05	R302521
SW-846 9251 (TOTAL)								
Chloride	NELAP	2		**6**	mg/L	2	11/16/2021 2:45	R302744
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	11/12/2021 21:13	184917
Barium	NELAP	0.0025		**0.0696**	mg/L	1	11/12/2021 21:13	184917
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	11/12/2021 21:13	184917
Boron	NELAP	0.0200		**< 0.0200**	mg/L	1	11/16/2021 13:22	184917
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	11/12/2021 21:13	184917
Calcium	NELAP	0.100		**94.2**	mg/L	1	11/12/2021 21:13	184917
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	11/12/2021 21:13	184917
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	11/12/2021 21:13	184917
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	11/12/2021 21:13	184917
Lithium	NELAP	0.0050		**0.0090**	mg/L	1	11/12/2021 21:13	184917
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	11/12/2021 21:13	184917
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	11/18/2021 2:40	184917
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	11/18/2021 2:40	184917
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	11/17/2021 3:09	184917
CCV recovered outside the upper control limits for Se. Sample results are below the reporting limit. Data is reportable per the TNI standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	11/15/2021 13:22	184918
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	01/18/2022 0:00	R306320
Radium-228	*	0		**See attached**	pci/L	1	01/18/2022 0:00	R306320

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22011434
Client Project: Ash Pond Monitoring Wells
Report Date: 16-Mar-22
Lab ID: 22011434-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 02/16/2022 10:05

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.79**	ft	1	02/16/2022 10:05	R307535
Depth to water	*	-5.00		**3.12**	ft	1	02/16/2022 10:05	R307535
Depth to water from measuring point	*	0		**8.42**	ft	1	02/16/2022 10:05	R307535
Elevation of groundwater surface	*	0		**550.78**	ft	1	02/16/2022 10:05	R307535
Measuring Point Elevation	*	0		**559.20**	ft	1	02/16/2022 10:05	R307535
Measuring Point Height Above Land Surface	*	0		**5.30**	ft	1	02/16/2022 10:05	R307535
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**49**	NTU	1	02/16/2022 10:05	R307535
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.0**	°F	1	02/16/2022 10:05	R307535
SW-846 9040B								
pH, Field	*	1.00		**6.92**		1	02/16/2022 10:05	R307535
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1350**	µmhos/cm @25C	1	02/16/2022 10:05	R307535
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	*	20		**496**	mg/L	1	02/17/2022 12:58	R307297
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	02/22/2022 20:05	R307405
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.14**	mg/L	1	02/17/2022 10:01	R307231
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**12**	mg/L	1	02/23/2022 13:44	R307435
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**0.0306**	mg/L	1	02/18/2022 15:54	187816
Barium	NELAP	0.0025		**0.413**	mg/L	1	02/18/2022 15:54	187816
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/18/2022 15:54	187816
Boron	NELAP	0.0200		**0.0954**	mg/L	1	02/18/2022 15:54	187816
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/18/2022 15:54	187816
Calcium	NELAP	0.100		**123**	mg/L	1	02/18/2022 15:54	187816
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/18/2022 15:54	187816
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/18/2022 15:54	187816
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	02/18/2022 15:54	187816
Lithium	NELAP	0.0050		**0.0092**	mg/L	1	02/18/2022 15:54	187816
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/18/2022 15:54	187816
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	03/05/2022 3:36	187816
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2022 3:26	187816
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/25/2022 3:26	187816
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/17/2022 14:26	187817
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	03/03/2022 0:00	R308076
Radium-228	*	0		**See attached**	pci/L	1	03/03/2022 0:00	R308076

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22011434
Client Project: Ash Pond Monitoring Wells
Report Date: 16-Mar-22
Lab ID: 22011434-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 02/16/2022 10:37

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	02/16/2022 10:37	R307535
Depth to water	*	-5.00		**10.11**	ft	1	02/16/2022 10:37	R307535
Depth to water from measuring point	*	0		**12.41**	ft	1	02/16/2022 10:37	R307535
Elevation of groundwater surface	*	0		**571.49**	ft	1	02/16/2022 10:37	R307535
Measuring Point Elevation	*	0		**583.90**	ft	1	02/16/2022 10:37	R307535
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	02/16/2022 10:37	R307535
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.4**	NTU	1	02/16/2022 10:37	R307535
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.7**	°F	1	02/16/2022 10:37	R307535
SW-846 9040B								
pH, Field	*	1.00		**7.01**		1	02/16/2022 10:37	R307535
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1010**	µmhos/cm @25C	1	02/16/2022 10:37	R307535
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	*	20		**406**	mg/L	1	02/17/2022 12:58	R307297
SW-846 9036 (TOTAL)								
Sulfate	NELAP	20		**57**	mg/L	2	02/22/2022 20:35	R307405
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.33**	mg/L	1	02/17/2022 10:03	R307231
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**< 4**	mg/L	1	02/23/2022 13:55	R307435
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	02/18/2022 15:56	187816
Barium	NELAP	0.0025		**0.0505**	mg/L	1	02/18/2022 15:56	187816
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/18/2022 15:56	187816
Boron	NELAP	0.0200		**< 0.0200**	mg/L	1	02/18/2022 15:56	187816
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/18/2022 15:56	187816
Calcium	NELAP	0.100		**87.2**	mg/L	1	02/18/2022 15:56	187816
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/18/2022 15:56	187816
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/18/2022 15:56	187816
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	02/18/2022 15:56	187816
Lithium	NELAP	0.0050		**0.0053**	mg/L	1	02/18/2022 15:56	187816
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/18/2022 15:56	187816
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	03/05/2022 3:42	187816
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2022 3:34	187816
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/25/2022 3:34	187816
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/17/2022 14:29	187817
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	03/03/2022 0:00	R308076
Radium-228	*	0		**See attached**	pci/L	1	03/03/2022 0:00	R308076

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22051753
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jul-22
Lab ID: 22051753-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 05/31/2022 16:28

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.79**	ft	1	05/31/2022 16:28	R313064
Depth to water	*	-5.00		**3.78**	ft	1	05/31/2022 16:28	R313064
Depth to water from measuring point	*	0		**9.08**	ft	1	05/31/2022 16:28	R313064
Elevation of groundwater surface	*	0		**550.12**	ft	1	05/31/2022 16:28	R313064
Measuring Point Elevation	*	0		**559.20**	ft	1	05/31/2022 16:28	R313064
Measuring Point Height Above Land Surface	*	0		**5.30**	ft	1	05/31/2022 16:28	R313064
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**61**	NTU	1	05/31/2022 16:28	R313064
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.8**	°F	1	05/31/2022 16:28	R313064
SW-846 9040B								
pH, Field	*	1.00		**6.86**		1	05/31/2022 16:28	R313064
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**829**	µmhos/cm @25C	1	05/31/2022 16:28	R313064
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**516**	mg/L	1	06/02/2022 12:03	R312777
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	06/07/2022 14:46	R312927
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.15**	mg/L	1	06/08/2022 9:35	R312973
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**16**	mg/L	1	06/07/2022 14:46	R312931
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	06/03/2022 14:28	193267
Barium	NELAP	0.0025		**0.422**	mg/L	1	06/03/2022 14:28	193267
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/03/2022 14:28	193267
Boron	NELAP	0.0200		**0.0968**	mg/L	1	06/06/2022 19:50	193267
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/03/2022 14:28	193267
Calcium	NELAP	0.100		**122**	mg/L	1	06/03/2022 14:28	193267
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2022 14:28	193267
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2022 14:28	193267
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	06/03/2022 14:28	193267
Lithium	NELAP	0.0050		**0.0092**	mg/L	1	06/03/2022 14:28	193267
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/03/2022 14:28	193267
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	06/03/2022 22:39	193267
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	06/03/2022 22:39	193267
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	06/03/2022 22:39	193267
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	06/03/2022 11:30	193269
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	06/28/2022 0:00	R314337
Radium-228	*	0		**See attached**	pci/L	1	06/28/2022 0:00	R314337

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22051753
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jul-22
Lab ID: 22051753-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 05/31/2022 16:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	05/31/2022 16:55	R313064
Depth to water	*	-5.00		**7.75**	ft	1	05/31/2022 16:55	R313064
Depth to water from measuring point	*	0		**10.05**	ft	1	05/31/2022 16:55	R313064
Elevation of groundwater surface	*	0		**573.85**	ft	1	05/31/2022 16:55	R313064
Measuring Point Elevation	*	0		**583.90**	ft	1	05/31/2022 16:55	R313064
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	05/31/2022 16:55	R313064
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**2.0**	NTU	1	05/31/2022 16:55	R313064
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.2**	°F	1	05/31/2022 16:55	R313064
SW-846 9040B								
pH, Field	*	1.00		**7.17**		1	05/31/2022 16:55	R313064
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**513**	µmhos/cm @25C	1	05/31/2022 16:55	R313064
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**354**	mg/L	1	06/02/2022 12:03	R312777
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**35**	mg/L	1	06/07/2022 14:54	R312927
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.38**	mg/L	1	06/08/2022 9:37	R312973
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**2**	mg/L	1	06/07/2022 14:54	R312931
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	06/03/2022 14:30	193267
Barium	NELAP	0.0025		**0.0345**	mg/L	1	06/03/2022 14:30	193267
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/03/2022 14:30	193267
Boron	NELAP	0.0200		**0.0341**	mg/L	1	06/03/2022 14:30	193267
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/03/2022 14:30	193267
Calcium	NELAP	0.100		**74.3**	mg/L	1	06/03/2022 14:30	193267
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2022 14:30	193267
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2022 14:30	193267
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	06/03/2022 14:30	193267
Lithium	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2022 14:30	193267
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/03/2022 14:30	193267
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	06/03/2022 22:45	193267
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	06/03/2022 22:45	193267
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	06/03/2022 22:45	193267
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	06/03/2022 10:50	193269
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	06/28/2022 0:00	R314337
Radium-228	*	0		**See attached**	pci/L	1	06/28/2022 0:00	R314337

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22081061
Client Project: Ash Pond Monitoring Wells
Report Date: 11-Oct-22
Lab ID: 22081061-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 08/23/2022 14:44

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.79**	ft	1	08/23/2022 14:44	R316831
Depth to water	*	-5.00		**3.55**	ft	1	08/23/2022 14:44	R316831
Depth to water from measuring point	*	0		**8.85**	ft	1	08/23/2022 14:44	R316831
Elevation of groundwater surface	*	0		**550.35**	ft	1	08/23/2022 14:44	R316831
Measuring Point Elevation	*	0		**559.20**	ft	1	08/23/2022 14:44	R316831
Measuring Point Height Above Land Surface	*	0		**5.30**	ft	1	08/23/2022 14:44	R316831
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**41**	NTU	1	08/23/2022 14:44	R316831
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.9**	°F	1	08/23/2022 14:44	R316831
SW-846 9040B								
pH, Field	*	1.00		**6.89**		1	08/23/2022 14:44	R316831
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**814**	µmhos/cm @25C	1	08/23/2022 14:44	R316831
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	50		**540**	mg/L	2.5	08/26/2022 12:13	R316361
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	08/31/2022 11:19	R316499
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.15**	mg/L	1	08/30/2022 17:00	R316443
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**13**	mg/L	1	08/29/2022 14:46	R316398
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**0.0309**	mg/L	1	08/29/2022 16:15	196039
Barium	NELAP	0.0025		**0.392**	mg/L	1	08/29/2022 16:15	196039
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/29/2022 16:15	196039
Boron	NELAP	0.0200		**0.0927**	mg/L	1	08/30/2022 13:20	196039
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/29/2022 16:15	196039
Calcium	NELAP	0.100		**116**	mg/L	1	08/29/2022 16:15	196039
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/29/2022 16:15	196039
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/29/2022 16:15	196039
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	08/29/2022 16:15	196039
Lithium	NELAP	0.0050		**0.0077**	mg/L	1	08/29/2022 16:15	196039
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/29/2022 16:15	196039
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/30/2022 18:20	196039
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/30/2022 18:20	196039
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/30/2022 18:20	196039
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/29/2022 11:01	196051
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	09/28/2022 0:00	R319286
Radium-228	*	0		**See attached**	pci/L	1	09/28/2022 0:00	R319286

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22081061
Client Project: Ash Pond Monitoring Wells
Report Date: 11-Oct-22
Lab ID: 22081061-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 08/23/2022 15:08

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	08/23/2022 15:08	R316831
Depth to water	*	-5.00		**12.05**	ft	1	08/23/2022 15:08	R316831
Depth to water from measuring point	*	0		**14.35**	ft	1	08/23/2022 15:08	R316831
Elevation of groundwater surface	*	0		**569.55**	ft	1	08/23/2022 15:08	R316831
Measuring Point Elevation	*	0		**583.90**	ft	1	08/23/2022 15:08	R316831
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	08/23/2022 15:08	R316831
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**< 1.0**	NTU	1	08/23/2022 15:08	R316831
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.0**	°F	1	08/23/2022 15:08	R316831
SW-846 9040B								
pH, Field	*	1.00		**7.16**		1	08/23/2022 15:08	R316831
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**577**	µmhos/cm @25C	1	08/23/2022 15:08	R316831
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**488**	mg/L	1	08/26/2022 12:13	R316361
SW-846 9036 (TOTAL)								
Sulfate	NELAP	50		**66**	mg/L	5	08/31/2022 11:24	R316499
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.29**	mg/L	1	08/30/2022 17:02	R316443
SW-846 9251 (TOTAL)								
Chloride	NELAP	1		**6**	mg/L	1	08/29/2022 14:57	R316398
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	08/29/2022 16:18	196039
Barium	NELAP	0.0025		**0.0908**	mg/L	1	08/29/2022 16:18	196039
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/29/2022 16:18	196039
Boron	NELAP	0.0200		**< 0.0200**	mg/L	1	08/30/2022 12:54	196039
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/29/2022 16:18	196039
Calcium	NELAP	0.100		**102**	mg/L	1	08/29/2022 16:18	196039
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/29/2022 16:18	196039
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/29/2022 16:18	196039
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	08/29/2022 16:18	196039
Lithium	NELAP	0.0050		**0.0104**	mg/L	1	08/29/2022 16:18	196039
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/29/2022 16:18	196039
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/30/2022 18:27	196039
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/30/2022 18:27	196039
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/30/2022 18:27	196039
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/29/2022 11:08	196051
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See attached**	pci/L	1	09/28/2022 0:00	R319286
Radium-228	*	0		**See attached**	pci/L	1	09/28/2022 0:00	R319286

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22110359
Client Project: Ash Pond Monitoring Wells
Report Date: 19-Dec-22
Lab ID: 22110359-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 11/08/2022 12:51

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.79**	ft	1	11/08/2022 12:51	R321096
Depth to water	*	-5.00		**3.52**	ft	1	11/08/2022 12:51	R321096
Depth to water from measuring point	*	0		**8.82**	ft	1	11/08/2022 12:51	R321096
Elevation of groundwater surface	*	0		**550.38**	ft	1	11/08/2022 12:51	R321096
Measuring Point Elevation	*	0		**559.20**	ft	1	11/08/2022 12:51	R321096
Measuring Point Height Above Land Surface	*	0		**5.30**	ft	1	11/08/2022 12:51	R321096
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**31**	NTU	1	11/08/2022 12:51	R321096
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.3**	°F	1	11/08/2022 12:51	R321096
SW-846 9040B								
pH, Field	*	1.00		**6.95**		1	11/08/2022 12:51	R321096
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1210**	µmhos/cm @25C	1	11/08/2022 12:51	R321096
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	50		**495**	mg/L	2.5	11/15/2022 7:07	R321202
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10		**< 10**	mg/L	1	11/23/2022 14:57	R321591
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.13**	mg/L	1	11/14/2022 15:02	R321052
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**14**	mg/L	1	11/23/2022 11:34	R321589
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**0.0270**	mg/L	1	11/14/2022 19:19	199975
Barium	NELAP	0.0025		**0.399**	mg/L	1	11/14/2022 19:19	199975
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	11/14/2022 19:19	199975
Boron	NELAP	0.0200		**0.102**	mg/L	1	11/16/2022 21:09	199975
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	11/14/2022 19:19	199975
Calcium	NELAP	0.100		**121**	mg/L	1	11/14/2022 19:19	199975
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	11/14/2022 19:19	199975
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	11/14/2022 19:19	199975
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	11/14/2022 19:19	199975
Lithium	NELAP	0.0500		**< 0.0500**	mg/L	1	11/14/2022 19:19	199975
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	11/14/2022 19:19	199975
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	11/15/2022 11:43	199975
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	11/15/2022 11:43	199975
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	11/15/2022 11:43	199975
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	11/11/2022 21:46	199972
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	12/06/2022 0:00	R322549
Radium-228	*	0		**See Attached**	pci/L	1	12/06/2022 0:00	R322549

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 22110359
Client Project: Ash Pond Monitoring Wells
Report Date: 19-Dec-22
Lab ID: 22110359-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 11/08/2022 12:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	11/08/2022 12:20	R321096
Depth to water	*	-5.00		**9.40**	ft	1	11/08/2022 12:20	R321096
Depth to water from measuring point	*	0		**11.70**	ft	1	11/08/2022 12:20	R321096
Elevation of groundwater surface	*	0		**572.20**	ft	1	11/08/2022 12:20	R321096
Measuring Point Elevation	*	0		**583.90**	ft	1	11/08/2022 12:20	R321096
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	11/08/2022 12:20	R321096
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**< 1.0**	NTU	1	11/08/2022 12:20	R321096
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.3**	°F	1	11/08/2022 12:20	R321096
SW-846 9040B								
pH, Field	*	1.00		**7.16**		1	11/08/2022 12:20	R321096
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**805**	µmhos/cm @25C	1	11/08/2022 12:20	R321096
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**358**	mg/L	1	11/15/2022 7:07	R321202
SW-846 9036 (TOTAL)								
Sulfate	NELAP	10	S	**36**	mg/L	1	11/23/2022 11:45	R321591
Matrix spike did not recover within control limits due to matrix interference.								
SW-846 9214 (TOTAL)								
Fluoride	NELAP	0.10		**0.31**	mg/L	1	11/14/2022 15:05	R321052
SW-846 9251 (TOTAL)								
Chloride	NELAP	4		**< 4**	mg/L	1	11/23/2022 11:45	R321589
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Arsenic	NELAP	0.0250		**< 0.0250**	mg/L	1	11/14/2022 19:23	199975
Barium	NELAP	0.0025		**0.0420**	mg/L	1	11/14/2022 19:23	199975
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	11/14/2022 19:23	199975
Boron	NELAP	0.0200		**0.0450**	mg/L	1	11/16/2022 21:13	199975
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	11/14/2022 19:23	199975
Calcium	NELAP	0.100		**80.2**	mg/L	1	11/14/2022 19:23	199975
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	11/14/2022 19:23	199975
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	11/14/2022 19:23	199975
Lead	NELAP	0.0150		**< 0.0150**	mg/L	1	11/14/2022 19:23	199975
Lithium	NELAP	0.0500		**< 0.0500**	mg/L	1	11/14/2022 19:23	199975
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	11/14/2022 19:23	199975
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	11/15/2022 11:49	199975
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	11/15/2022 11:49	199975
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	11/15/2022 11:49	199975
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	11/11/2022 21:48	199972
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	11/25/2022 0:00	R322549
Radium-228	*	0		**See Attached**	pci/L	1	11/25/2022 0:00	R322549

APPENDIX J:
GROUNDWATER SAMPLING AND ANALYSES PROCEDURE

City Water, Light & Power
Springfield, Illinois

Groundwater Sampling and Analyses Procedures

September 2024

Prepared for:
City Water, Light & Power
201 E. Lake Shore Drive
Springfield, Illinois

ANDREWS ENGINEERING

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ILLINOIS | MISSOURI | INDIANA

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ATTACHMENTS

Attachment 1: Monitoring Well Forms

1. INTRODUCTION

This Groundwater Sampling and Analyses Procedures (SAP) describes the methods and procedures to be used for conducting groundwater monitoring at the City Water, Light and Power (CWLP) CCR Units. This SAP is subject to periodic revision as circumstances and/or new regulations dictate. Revisions to the SAP must be approved by a qualified professional engineer before placed in effect. The most up-to-date version of the SAP shall be kept in the Operating Records for use by CWLP and subcontractor personnel.

1.1 OBJECTIVE AND PURPOSE

The objective of the groundwater monitoring program is to provide analytical data for groundwater collected from monitoring wells as required by the CCR Rule (35 IAC §845 Subpart F). The SAP describes the procedures and techniques associated with the following:

- Pre-field activities,
- Record keeping and chain-of-custody,
- Well assessment prior to purging,
- Groundwater sampling procedures,
- Decontamination and waste management,
- Sample packing and shipping,
- Analytical procedures, and
- Quality assurance.

The purpose of the sampling protocol described herein is to provide the basis for sampling consistency and scientific credibility in obtaining the desired analyses. Groundwater sampling will be conducted in general accordance with applicable procedures established in the RCRA Groundwater Monitoring: Technical Enforcement Guidance Document (TEGD) (EPA 530-R-93 001, November 1992 and subsequent updates).

2. PRE-FIELD ACTIVITIES

At the beginning of each groundwater monitoring event, the necessary field equipment will be obtained. Sampling equipment that may be needed for collecting representative sample of groundwater is:

- Temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity meters or multi-meter (2)
- Peristaltic pumps (2)
- Submersible pump (1), with flow controller

- 100-foot Water level indicator probe (2)
- 3/16” (I.D.) silicon tubing (initial installation) for use with peristaltic pump.
  - Note – Have 5 feet on hand in case tubing replacement needed.
- 0.17” (I.D.) LDPE tubing (initial installation) for use with peristaltic pump.
  - Note – Have 200 – 300 feet on hand for in case tubing replacement needed.
- 3/8” (I.D.) LDPE tubing (initial installation) for use with peristaltic pump.
  - Note – Have 200 – 300 feet on hand for in case tubing replacement needed.
- Field logbooks (2), clipboards (2), black ink pens/pencils
- Powder-free nitrile gloves
- Graduated 5-gallon bucket (2)
- One sampling bottle kit per well, plus QA/QC samples, and extras in case of breakage
- Sample bottle labels, custody seals, and chain-of-custodies
- Waterproof marking pen for labeling sample bottles (pre-labeling of bottles is preferred)
- Sample shipping coolers
- Ice for each cooler
- Distilled or de-ionized water – five gallons (quantity may vary)Scrub brush (or sponge) and spray wash bottles
- Phosphate–free cleaner (e.g., Liquinox)
- Box of large plastic garbage bags and paper towel rolls
- 5-gallon buckets with lids (8), for temporarily containerizing purge water and submersible pump decontamination if necessary

Sampling personnel (CWLP personnel and/or subcontractors) must comply with all safety and health guidelines for the facility.

The levels of personal protective equipment (PPE) to be used for work tasks will be selected based on known or anticipated physical hazards, as well as the types, concentrations and exposure routes of contaminants that may be encountered on site. Currently, it is anticipated that work will be initially conducted in Level D PPE.

3. RECORD KEEPING AND CHAIN OF CUSTODY

This section of the SAP provides information on field recording, field instrument calibration and chain of custody procedures.

3.1 FIELD RECORDING

Documentation of activities associated with groundwater monitoring events will be recorded each day in a bound field logbook with hard cover, water resistant paper, and sequentially numbered pages. Documentation will be completed in waterproof, black or blue ink and written errors will be crossed out with a single line, initialed, and dated. The logbooks will remain on-site during use

and then will be stored off-site. Entries in the logbook will be chronological and will include, where applicable and appropriate, such information as the following:

- Date and times,
- Locations of particular events,
- Instrument calibrations,
- Weather (temperature and wind direction) and significant changes in climatic conditions that may affect monitoring activities or results, and
- Other information/observations pertinent to the well inspection, well gauging, and sampling event.

Each page of the field logbook will be signed by the person(s) making entries in the logbook.

Three separate field report forms have been developed as an extension to the field logbook. These include the following:

- Monitoring Well Inspection Record (Form 1),
- Monitoring Well Gauging Record (Form 2), and
- Monitoring Well Sampling Record (Form 3).

These forms (or equivalent) may be used for recording water level data, well purging volumes, and sampling data. The field report forms or logbook may include, but not be limited to the following:

- Names of members of the gauging or sampling team,
- Date and time,
- Specific activity being performed,
- Well identification,
- Sample identification number,
- Sample volume,
- Sampling method,
- Preservative type,
- Analyses to be performed, and
- Measured field water quality parameters and readings (when applicable).

3.2 FIELD INSTRUMENT CALIBRATION

The following meters/probes may be used to analyze groundwater samples in the field:

- Temperature and pH,

- Specific conductance (SC),
- Oxidation-reduction potential (ORP),
- Dissolved oxygen (DO), and
- Turbidity.

The quality of data generated by these measurements will be verified through qualitative means, such as regular calibrations, compliance with operating instructions, and decontamination between uses. A calibration procedure establishes the relationship between a known calibration standard and the accuracy of a measurement made by an instrument according to that standard. Calibration indicates absolute physical or electronic calibration and is not to be confused with chemical standardization.

The calibration for field monitoring equipment will be checked in accordance with manufacturer's specifications, but at least daily. Instrument calibration may be checked prior to entering the site or in the field prior to use. The time, date and location of instrument calibration and verification will be recorded in the field logbook. If an instrument is out of calibration, then the calibration will be performed as needed.

3.3 CHAIN-OF-CUSTODY

Possession of samples will be traceable from the time of sample collection through check-in at the laboratory. Documentation begins immediately following sample collection and proper labeling and is accomplished using a standard chain-of-custody form. This document traces possession of each sample from the time of collection through time of analysis. For the purpose of these procedures, a sample is considered in custody if it is:

- In sampler's physical possession;
- In view, after being in physical possession;
- Locked to prevent tampering, after having been in physical possession; or
- In a secured area, restricted to authorized personnel.

The chain-of-custody form contains the following information:

- Project number, site name, and company address;
- Number of samples;
- Preservatives used for sample collection;
- Sample description (e.g., water, etc.);
- Sample ID number;
- Date and time of sample collection;
- Number of containers for the sample;
- Name of sampler responsible for sample transmittal;

- Signatures of all persons involved in the chain-of-custody;
- Type of analysis requested;
- Requested turnaround time and level of quality control documentation; and
- Pertinent comments about sample or sample conditions.

This information is entered onto the chain-of-custody form. Upon receipt of samples, the analytical laboratory will initiate its own chain-of-custody procedures. The sampler shall be responsible for properly packaging and dispatching samples to the analytical laboratory. When transferring samples, the sampler shall sign and record the date and time on the first Relinquished By line on the chain-of-custody form. The person to whom custody is being transferred shall sign on the first Accepted By line of the chain-of-custody form, indicating that custody is being accepted by that person for all the samples listed on the sheet. When samples are shipped via courier, the chain-of-custody form is attached to the inside of the shipping container and the shipping container is sealed using tape. For subsequent transfers of custody, the succeeding Relinquish and Receipt lines are used. To reduce custody records, the number of custodians in the chain-of-custody is minimized.

The following record keeping items will supplement the chain-of-custody form:

- Field Logbook,
- Monitoring Well Sampling Record, and
- Sample Receipt Checklist (typically provided by the laboratory).

4. WELL ASSESSMENT PRIOR TO PURGING

This section of the SAP provides information about inspecting monitoring wells, gauging fluid levels, and weather conditions. To reduce potential cross contamination during fluid level measurements, one of the following two options are recommended:

1. Activities begin at the upgradient wells and then proceed to downgradient wells, with water that is potentially affected; or
2. Each well sampling team carries dedicated well gauging equipment (one set for potentially affected wells and one set for non-affected wells). The determination as to which equipment is used at a particular well should be based on historical data.

As required, PPE will be worn at all times during the performance of the described procedures.

4.1 MONITORING WELL INSPECTION

The sampling team shall perform a visual inspection of each monitoring well and record the results in the field logbook or on a Monitoring Well Inspection Record (Form 1). The inspection of each well will include the following:

- Inspecting the casing and cap for cracks, signs of deterioration, or tampering;
- Verifying the identification information on the well is correct and clearly visible;
- Determining whether the cap and monitoring well are secure (via locks, bolted vault covers, in addition to general facility security);
- Inspecting the well pad for cracks, signs of deterioration, erosion, settling, and/or animal and insect burrowing; and
- Where appropriate, inspecting any dedicated equipment for signs of cleanliness, structural integrity, and deterioration.

4.2 WATER LEVEL AND TOTAL DEPTH INFORMATION

The depth to groundwater (DTW) and total depth (TD) in each well will be measured at the beginning of each sampling event before undertaking any purging or sampling activities and will be recorded in the field log book or on a Monitoring Well Gauging Record (Form 2). The distance from the designated measuring point at the top-of-casing (TOC) to the water surface will be measured to the nearest 0.01-foot with an electric water level indicator. Measurements including DTW and TD will be taken from the TOC on the true north side of the well.

Total well depth will be measured by allowing the probe to drop to the bottom of the well and determining the depth where the tape becomes slack. The reading will be recorded to the nearest 0.01-foot. These measurements will be compared with previous measurements and the original well depth to determine if sediment has accumulated within the screened interval, (i.e., "silted in"). Wells which have sediment in the screened interval will be redeveloped.

See Section 9.0 for equipment decontamination procedures, investigation-derived waste (IDW) management, and IDW sampling.

4.3 WEATHER CONDITIONS

Weather conditions at the time of gauging/sampling activities (e.g., precipitation, temperature, wind speed and direction) will be recorded in the field logbook or the Monitoring Well Sampling Record (Form 3).

5. GROUNDWATER SAMPLING PROCEDURES

This section of the SAP provides information about purging and sampling groundwater collected from monitoring wells. Micropurging will be the preferred method of sampling for all the monitoring wells at CWLP CCR landfill groundwater monitoring wells.

As required, PPE will be worn at all times during the performance of the described procedures.

5.1 MICROPURGING OF WELLS

To establish a common point of reference, low-flow refers to the flow rate at which water enters the pump intake and is the rate that is imparted to the formation pore water in the immediate vicinity of the well screen. The pump intake should be set:

1. Just above the mid-point of the screened interval if the transmissive zone is thicker than the screened section; or
2. Mid-point of the transmissive interval when the screened section is greater than the thickness of transmissive zone.

Water level drawdown provides the best indication of the stress (drawdown) imparted by a given flow rate for a given hydrogeological situation. Flow rates during low-flow purging will be used to regulate drawdown to less than 0.1 meter (0.3 feet). While these flow rates will typically range between 0.1 to 0.5 liter/minute (L/min), the flow rate for an individual well may vary due to site-specific hydrogeology. For example, sand channel lenses may support flow rates of up to 1 L/min without causing drawdown greater than 0.3 feet. Alternatively, wells that screen clayey, silty layers may not produce groundwater at 0.1 L/min without having drawdown greater than 0.3 feet.

For monitoring wells with low water productivity that have drawdown greater than 0.3 feet, there are two possible situations:

- Drawdown is greater than 0.3 feet, but stabilizes at a level above the pump intake; or
- Drawdown continues to occur even at the slowest possible pumping rate.

For these situations, the following purging and sampling procedures will be followed and documented on the sampling record.

- If drawdown is greater than 0.3 feet, but stabilizes at a level above the pump intake; record water levels in well and continue to monitoring water quality indicator parameters until they stabilize. Collect groundwater sample upon stabilization of water quality indicator parameters.

- If drawdown is greater than 0.3 feet and continues to drop, then pump the well until the water level reaches the bottom of the screened interval. Stop pumping and allow recovery to a minimum of 80% of the original water level before collecting a groundwater sample using the same low flow rate. If the water level drops to the bottom of the screened section before all sample bottles have been filled, allow the well to recovery to a minimum of 80% of the original water level before continuing to fill the remaining sample bottles. If possible, the well should be sampled no more than 24 hours after the completion of purging, regardless of the recovery.

Groundwater samples will be collected from the monitoring wells using the following low-flow (micropurge) procedures.

- Non-submersible peristaltic pump – Where DTW is less than 29 ft the well may be purged and sampled using a non-submersible a peristaltic pump. To purge and sample the well, insert clean disposable polyethylene tubing into the well casing with the intake placed at the appropriate depth discussed above. Remember to include enough slack in tubing to allow for drawdown of the water level to the bottom of screen. Silicon tubing will be connected to the polyethylene tubing and threaded through the pumping apparatus on the peristaltic pump.
- Submersible pump – Where DTW is greater than 29 ft the well may be purged and sampled using a submersible pump. To purge and sample the well, the submersible pump should be fitted with clean disposable polyethylene tubing and the tubing inserted into the well with the intake placed at the appropriate depth discussed above.
- If dedicated polyethylene and silicon tubing were utilized and left in the monitoring well from a previous groundwater sampling event, skip the first two bullets above. Before sampling, check tubing for any damage and replace as necessary using the above mentioned methodology.
- The selected pump will be used to purge groundwater at a low-flow rate, generally less than approximately 0.5 L/min (100-500 milliliter/min).
- The well should be pumped at a sustainable flow rate to allow the lowest drawdown of water level (see above) until water quality parameters stabilize or the water level drops below the bottom of the screened interval.
- Groundwater quality indicator parameters will be monitored during low-flow purging to determine stabilization. The water quality indicator parameters to be monitored and their stability criteria are identified on the Monitoring Well Sampling Record (Form 3).

Measurements of water quality indicator parameters will be recorded every 3 to 5 minutes until stabilization is achieved. These measurements, along with flow rate and depth to water, will be recorded be recorded in the field log book or on a Monitoring Well Sampling Record (Form 3). Stabilization is achieved when at least 3 of the 5 parameters have stabilized for three successive

readings. If the minimum three water quality indicator parameters do not stabilize within 45 minutes of low-flow purging, a groundwater analytical sample will be collected from the well.

See Section 9.0 for equipment decontamination procedures, investigation derived waste (IDW) management, and IDW sampling.

5.2 SAMPLE COLLECTION

Groundwater will be collected from the well and transferred to the appropriate sampling containers in a manner that reduces the amount of exposure to the ambient environment. The sequence of sample collection will be as follows:

- Metals,
- Water Chemistry (cations, anions, TDS, pH, etc.), and
- Radioactive elements (if required).

All samples will be collected in clean, laboratory-supplied sample containers with the appropriate preservative for the analytical method.

Metals analysis will measure total recoverable metals, which captures both particulate and dissolved fractions. Groundwater samples will not be field filtered prior to analysis. Samples will be collected and analyzed for constituents identified in a given groundwater monitoring program's list of analytes. Any required preservatives will be added to the bottles by the laboratory prior to delivery to the sampling personnel.

A sample label will be affixed to each sample container. Complete the label on each sample container with the typical information:

- Project name,
- Sample identification (well ID),
- Date and time of collection,
- Sample type, requested analysis,
- Type of preservative (if any), and
- Sampler's initials.

Sampler shall record the sample ID, sampling procedure, date, and time of sample collection on the Monitoring Well Sampling Record (Form 3) or field log book. Sampler shall record the sample ID (well ID), time and date of collection, sample media, and specified analyses to be conducted by the laboratory, if not already provided, on the chain-of-custody record. See Section 3.3 for details on sample custody information.

Sampler shall check that the sample container caps are tight; then place the filled sample containers into a sample cooler containing bagged ice in a manner to prevent breakage. The cooler will be packed with sufficient ice to maintain the proper preservation temperature. See Section 6.0 for details on sample packing and shipment.

After sampling is completed at a particular well, the tubing will be removed from the well and placed in an appropriate disposal container (See Section 9.0). The well will be secured before proceeding to the next well.

See Section 9.0 for equipment decontamination procedures, IDW management, and IDW sampling.

5.3 QUALITY CONTROL SAMPLING

Quality control (QC) and quality assurance (QA) samples will be collected and analyzed along with monitoring well samples to assess the variability introduced in sampling, handling, shipping, and analyses. The analytical program for the QC samples will follow the analytical program for the associated investigative samples. The following sample types will be collected.

- Blind Duplicate - One duplicate sample will be collected at each CCR Unit for each sampling event; a total of three blind duplicates will be collected per event. The blind duplicate will be analyzed for identical parameters as the monitoring well samples. The duplicate sample(s) will be collected from randomly selected wells; and will be labeled with an appropriate identification number other than the well number. The sample bottles for regular and duplicate analysis will be filled in alternate succession for each required analysis (e.g. fill the metals sample container, then the metals duplicate container). The identification number will be recorded in the field log book, or in a separate Monitoring Well Sampling Record (Form 3).
- Matrix Spike/Matrix Spike Duplicates (MS/MSDs) – One MS/MSD will be collected during each sampling event to test the potential effects of matrix interference on the laboratory results. To reduce the possible adverse impact to the laboratory equipment, wells selected for the MS/MSD samples will be those that historically have shown low or non-detect constituent concentrations (to the extent practical). The sample is collected as a triplicate (the original sample plus two additional sets). The matrix spike sample will be labeled with the well number followed by an “MS”. Similarly, the matrix spike duplicate will be labeled with the well number followed by “MSD”.
- Field Blank - One field blank sample will be collected for each sampling event. Field blank samples provide information about potential contamination of the samples during exposure to ambient conditions at the site during sample collection. Field blanks will be prepared at a specified well site by pouring commercially-available distilled water into sample bottles and vials in the same quantities as the groundwater samples. The samples

should be labeled appropriately and stored in the same manner as the groundwater samples.

- Equipment Blank – An equipment blank sample will be collected during the groundwater sampling event only if non-dedicated sampling equipment is used. After the non-dedicated equipment has been cleaned and rinsed (see Section 9.0 for decontamination procedures), distilled water will be passed over (e.g., poured over) the decontaminated equipment and the water will be collected in appropriate sample containers. The equipment blanks will be analyzed for the same suite of parameters as the monitoring well samples. Equipment blanks will not be collected if dedicated equipment is used for sample collection.

6. SAMPLE PACKING AND SHIPPING

Samples for chemical analyses will be placed into the correct laboratory-supplied sample containers, labeled appropriately, and immediately placed in a cooler with ice. The field sampler will document the appropriate information on the chain-of-custody form (see Section 3.3 for details). Prior to packing coolers and shipping to the laboratory, the outside surfaces of the sample containers will be cleaned if necessary (by wiping carefully with a paper towel) and repacked in the cooler. Sample containers will not be opened after they have been sealed. The containers will be placed inside a sealed plastic Ziploc-style bag and will then be placed in coolers containing sufficient ice (or packs of frozen gel) to maintain a sample temperature of approximately 4° C. Sample coolers should be lined with a new, large plastic trash bag to reduce the potential of melt water leaks. Care must be taken to avoid leakage of water from melted ice because overnight delivery service (e.g., FedEx) will not accept leaking coolers.

The sampler will be responsible for properly packaging and dispatching samples to the analytical laboratory. This responsibility includes using the proper shipping container, shipping labels, shipping papers, and filling out, dating, and signing the appropriate portion of the chain-of-custody form. Samples will be packed with cushioning material sufficient to reduce the potential for breakage of glass sample containers during transport. The chain-of-custody form will be placed inside a sealed plastic Ziploc-style bag and the bag placed inside the cooler on top of the cushioning material.

If a laboratory with a local or nearby field-service center is contracted to perform analytical services, samples and coolers will be transported directly to the laboratory service-center or to a secure drop-off location by field personnel on the same day as sampling. The insulated coolers containing groundwater samples will be delivered to or picked-up by the laboratory and signed over to the laboratory personnel in accordance with chain of custody procedures for storage and analyses.

If a distant laboratory is contracted to perform analytical services, then samples and coolers will be shipped via overnight delivery service (e.g., FedEx). Shipments will be accompanied by the chain-of-custody form and it will be sealed in an airtight, resealable plastic bag inside the cooler. The cooler will be taped shut with clear packaging tape and a tamper-evident custody seal will be attached across the lid. This seal will only be broken by the recipient at the laboratory.

7. ANALYTICAL PROCEDURES

Groundwater samples collected under the Groundwater Monitoring Program will be analyzed for the constituents in 35 IAC *845.600(a)(1)*, calcium and turbidity. A NELAC-accredited laboratory will perform the groundwater analyses.

Groundwater analyses will be performed in accordance with the most recent edition of Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA SW 846), ASTM Standard Test Methods, or other EPA-approved methods. Detection limits will be those recommended for the procedure and analytical instrument specified.

8. QUALITY ASSURANCE

This section briefly summarizes the quality assurance measures during field and laboratory activities associated with groundwater monitoring.

8.1 FIELD QUALITY ASSURANCE

Sample collection will be conducted according to the procedures outlined in Section 5.2. These procedures are designed to minimize potential sources of contamination and include the following key elements:

- Using dedicated or disposable tubing for each well to reduce the potential for cross-contamination between wells.
- Completing purging using low-flow (micropurge) sampling techniques. If the screened water-bearing unit has low hydraulic conductivity that results in drawdown greater than the guidelines for low-flow sampling, the well should be allowed to recover to at least 80 percent of the static water level prior to sampling.
- Using duplicates, matrix spikes, matrix spike duplicates, field blanks, and equipment blank samples to assess potential cross-contamination during sample collection, transport, and analyses as well as providing a check on the data quality from the laboratory (see Section 5.3).
- Handling samples, preservatives, and sample containers carefully to minimize exposure time and potential for evaporative loss and/or airborne contamination.

- Using containerized ice whenever possible to maintain 4°C sample temperatures during transit and cushioning materials to minimize breakage.

8.2 LABORATORY QUALITY ASSURANCE

The laboratory documentation system will comply with the requirements of the USEPA analytical protocols, as appropriate. The laboratory will perform internal QC checks for the analytical method. Depending on the analytical method, the QC checks may include analyzing sample spikes, surrogate spikes, reference samples, laboratory control samples, storage blanks, and/or method blanks.

The laboratory will document internally that instrument and analytical QC criteria have been met. The data package will contain all of the information required to evaluate compliance with the analytical methods' required and recommended QC checks, instrument tuning, calibration, and sample analyses. If errors or deficiencies are identified in an analytical system, corrective actions are implemented to return the system to normal operation.

8.3 DATA REVIEW AND EVALUATION

A data validation will be performed to assess whether the dataset meet the project requirements in terms of following the appropriate analytical methods, sample locations, and sampling procedures. All sample collection procedures and laboratory reports will be reviewed to verify that the field and laboratory QA/QC requirements have been met.

The final reportable data, laboratory checklist, associated exception report(s), laboratory quality control data, and chain-of-custody will be reviewed in accordance with applicable EPA guidance, including, but not limited to the National Functional Guidelines for Inorganic Superfund Data Review (EPA 540-R-013-001), August 2014. Data precision and accuracy will be assessed based on control limits of 70-130% for laboratory control samples (except for antimony which will be assessed based on control limits of 50-150%) and 75-125% for spike sample analysis. A control limit of 20% for the relative percent difference (RPD) shall be used for original and duplicate sample values.

9. DECONTAMINATION AND WASTE MANAGEMENT

This section of the SAP provides information about equipment cleaning procedures and management of IDW during monitoring events.

9.1 EQUIPMENT DECONTAMINATION PROCEDURES

The decontamination of sampling equipment is necessary to reduce the potential for the spread of constituents to clean areas, to reduce exposure of personnel to constituents of concern, and to reduce the potential cross-contamination when equipment is used more than once. The water

level indicator will be rinsed with deionized water between wells, or cleaned with Alconox® or other equivalent solution and rinsed with deionized water as necessary.

To reduce the potential for cross-contamination between monitoring wells during purging and sampling, well-dedicated or disposable equipment will be used to the extent practical. If non-dedicated pumps, discharge, and safety lines are used at a well, such equipment will be washed with non-phosphate detergent and distilled water solution, then rinsed with distilled water.

9.2 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Common IDW from the groundwater sampling events are purge water, decontamination water, and trash (i.e., non-reusable plastic tubing, nitrile gloves, paper towels, etc.).

Well purge water will be discarded on the ground away from the well. Collection of purge water is not necessary. Collection of decontamination water is not necessary either and should be discarded in the same manner as the purge water.

Disposable equipment and supplies (i.e., domestic trash) will be placed in heavy duty plastic bags and the full bags placed in facility-designated receptacles. If it becomes necessary to place affected materials in a 55-gallon DOT-approved drum(s), then the drums will be labeled and secured. Further management of the drums and containerized waste will be handled by CWLP. Disposal may also occur at other receptacles managed by CWLP.

ATTACHMENTS:
MONITORING WELL FORMS

FORM 1:
MONITORING WELL GAUGING RECORD

FORM 1

MONITORING WELL GAUGING RECORD
Groundwater Monitoring Program
City Water, Light, and Power
Springfield, Illinois

PROJECT INFORMATION
City Water, Light and Power
Springfield, Illinois
CCR Unit Groundwater Monitoring
Sampler(s):
Date:
Weather Conditions:

GAUGING RECORD
Measuring Pont: Top of Casing
Instrument ID:

Well ID	Depth To Water (ft)	Total Depth (ft)	Notes

FORM 2:
MONITORING WELL INSPECTION RECORD

FORM 2

MONITORING WELL INSPECTION RECORD
Groundwater Monitoring Program
City Water, Light, and Power
Springfield, Illinois

PROJECT INFORMATION	
City Water, Light and Power	
Springfield, Illinois	
CCR Unit Groundwater Monitoring	
Sampler:	Signature:
Company:	Date/Time:
WELL ID	
Stick-Up: ☐	
Flush-Mounted ☐	
Is the well site clear of weeds and debris? Comment:	Yes No
Has the grass been mowed? Comment:	Yes No
Are there bollards or protective barriers around the well? Comment:	Yes No
Is the well identification clearly visible and in good condition? Comment:	Yes No
Is the protective casing or vault in good condition? Comment:	Yes No
Is the protective casing (or vault) equipped with a protective cap? Comment:	Yes No
Does the well have a concrete pad? Comment:	Yes No
If yes, what is the condition of the pad? Comment:	Good Cracked Broken
What is the condition of the inner casing? Comment:	Good Cracked Broken
Does the inner casing have a cap? Comment:	Yes No
Is the well locked? Comment:	Yes No
If yes, what is the condition of the lock? Comment:	Yes No
Is the annulus between the inner and outer casing free of standing water? Comment:	Yes No
Is the survey measuring point marked on the TOC? Comment:	Yes No
Expected Depth of Well:	
Measured Depth of Well:	
General Observations:	

FORM 3:
MONITORING WELL SAMPLING RECORD

FORM 3

MONITORING WELL SAMPLING RECORD
Groundwater Monitoring Program
City Water, Light, and Power
Springfield, Illinois

PROJECT INFORMATION
City Water, Light and Power
Springfield, Illinois
CCR Unit Groundwater Monitoring
Well ID:
Well Diameter:
Sampler(s):
Date:
Weather Conditions:

INITIAL MEASUREMENT	
Measuring Pont: Top of Casing	Water Column Ht. (H1=D2-D1):
Measuring Point Elevation:	Max. Drawdown (D1+0.33 ft):
Depth to Water (D1):	DTW at 80% Rec. (D2-(0.8xH1):
Total Well Depth (D2):	Tubing Intake Depth:

PURGING RECORD								
Purge Method:				Instrument ID:				
Time (Hr:Mn)	**Pump Rate (mL/min)**	**DTW (ft below TOC)**	**Temp (°C)**	**pH (Std Units)**	**ORP (mV)**	**SC (mS/cm2)**	**DO (mg/L)**	**Turbidity (NTU)**
Stabilization Criteria		± 0.3 ft	-	± 0.1 Units	± 10 mV	± 3%	± 10%	± 10%
				Total groundwater purged (gallons):				

SAMPLING RECORD		
Analysis Requested	Container/Preservative	Sample Date/Time:
		Sampling Remarks:

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