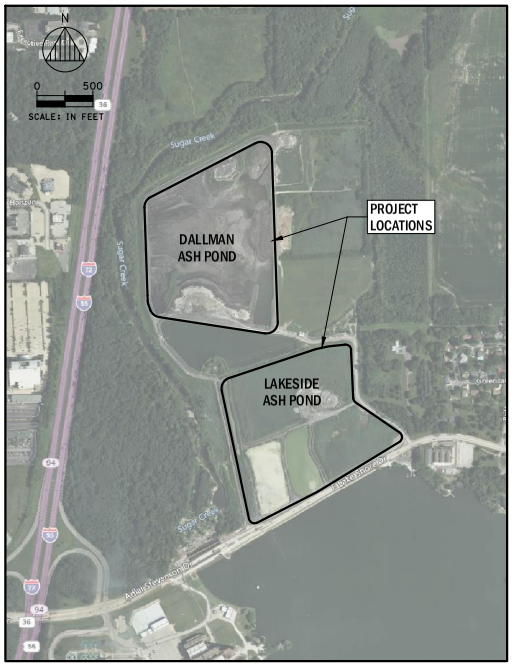
ATTACHMENT 8

PLANS AND SPECIFICATIONS
AND
CONSTRUCTION QUALITY ASSURANCE PLAN

PLANS AND SPECIFICATIONS

PDF 0492

CLOSURE PLANS
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS
FEBRUARY 2022



VICINITY MAP

INDEX OF SHEETS

PREPARED FOR:

CITY WATER, LIGHT, AND POWER
3100 STEVENSON DRIVE
SPRINGFIELD, ILLINOIS 62702

PREPARED BY:

ANDREWS ENGINEERING
215 W. WASHINGTON STREET
PONTIAC, ILLINOIS 61764-1805
PH (815) 842-2042 FAX (815) 842-2159
SPRINGFIELD, IL ◆ LOMBARD, IL ◆ INDIANAPOLIS, IN ◆ WARRENTON, MO

I HEREBY AFFIRM THAT ALL INFORMATION CONTAINED ON THESE DRAWINGS ARE TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

PAUL VAN METRE, P.E. DATE
ILLINOIS LICENSE NO. 062-064175

SEAL:

EXPIRATION DATE: 11/30/2023

DATE: FEBRUARY 2022
PROJECT ID: 200387/0032
SHEET NUMBER: 1

NO. | DATE | REVISION DESCRIPTION | BY

Tab: Layout1 Last Saved: January 28, 2022, by Mike Nguyen Plotted: Friday, January 28, 2022 11:22:10 AM
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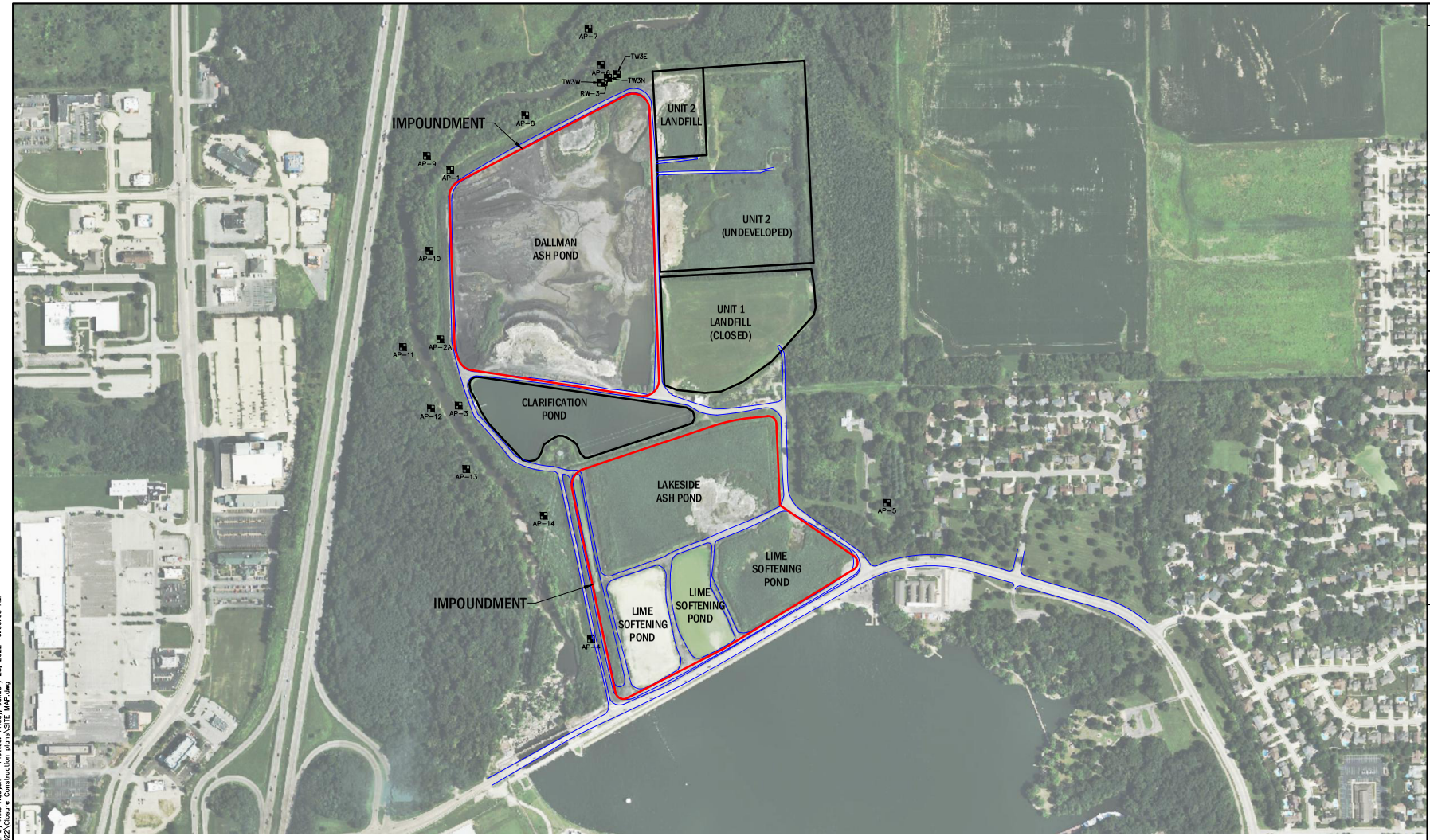

NOTES

1. ALL BOUNDARIES SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD.
2. ALL WEATHER ROADWAYS SHALL BE PROVIDED TO PREVENT TRACKING OF MUD ONTO OFFSITE ROADS. LOCATION AND SIZE OF ROADS ARE APPROXIMATE AND MAY DIFFER DUE TO FIELD CONDITIONS AND SITE REQUIREMENTS.
3. MONITORING WELLS HAVE BEEN INSTALLED IN ACCORDANCE WITH GROUNDWATER MONITORING PROGRAM.
4. BACKGROUND IMAGE DERIVED FROM BING.

LEGEND

- POND/LANDFILL BOUNDARY
- ACCESS ROADS
- IMPOUNDMENT BOUNDARY
- MONITORING WELLS

N

0 250 500 1000

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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

APPROVED BY: BJH | DESIGNED BY: BJH | DRAWN BY: BCK

SITE MAP

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

DATE: FEBRUARY 2022

PROJECT ID: 200387/0002

SHEET NUMBER: 2

Tab: Layout1 Last Saved: January 28, 2022, by Mike Nguyen Plotted: Friday, January 28, 2022 10:00:03 AM
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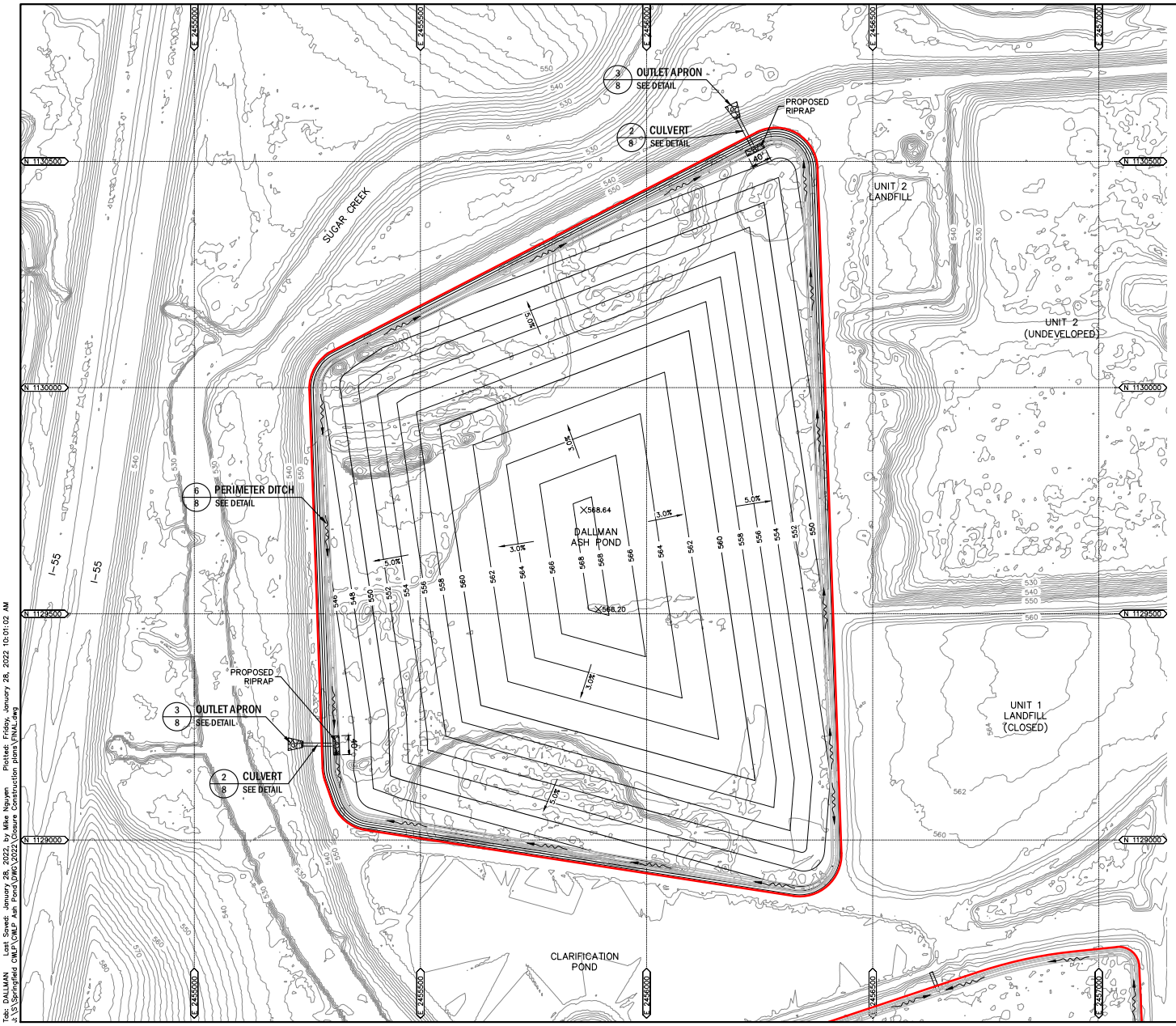

LEGEND

- IMPOUNDMENT BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED DITCH FLOW
- PROPOSED RIPRAP

NOTES

1. EXISTING AERIAL TOPOGRAPHY WAS GENERATED FROM LIDAR DATA TAKEN ON OCTOBER 15, 2018 FROM NATIONALMAP.GOV WEBSITE. CONTOUR INTERVAL SHOWN IS 2 FEET.
2. CURRENT TOPOGRAPHY MAY DIFFER FROM THAT SHOWN DUE TO MAINTENANCE ACTIVIES ON-GOING AT THE FACILITY.
3. FOR CLARITY, NOT ALL SITE FEATURES ARE SHOWN.
4. IMPOUNDMENT BOUNDARY SHOWN IS APPROXIMATE. ACTUAL LOCATIONS WILL BE DETERMINED IN THE FIELD.
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6. TEMPORARY DRAINAGE DIVERSION BERMS, DITCHES, CULVERTS, ETC., WILL BE USED AS NECESSARY TO DIVERT STORMWATER. EXCAVATED AREAS WILL BE PUMPED TO TEMPORARY OR PERIMETER DITCHES.
7. FINAL CONTOURS SHOWN ARE APPROXIMATE AND WILL BE AMENDED BASED UPON THE FINAL VOLUME OF MATERIAL PLACED IN THE IMPOUNDMENTS. A MINIMUM SLOPE OF TWO PERCENT SHALL BE MAINTAINED TO PROMOTE DRAINAGE AND PREVENT PONDING DUE TO SETTLEMENT ON THE TOP SLOPES.

N

0 100 200 400

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
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PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: DWM | DESIGNED BY: DWM | DRAWN BY: MPN

DALLMAN ASH POND
TOP OF FINAL COVER

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

DATE: FEBRUARY 2022

PROJECT ID: 200387/0032

SHEET NUMBER: 3

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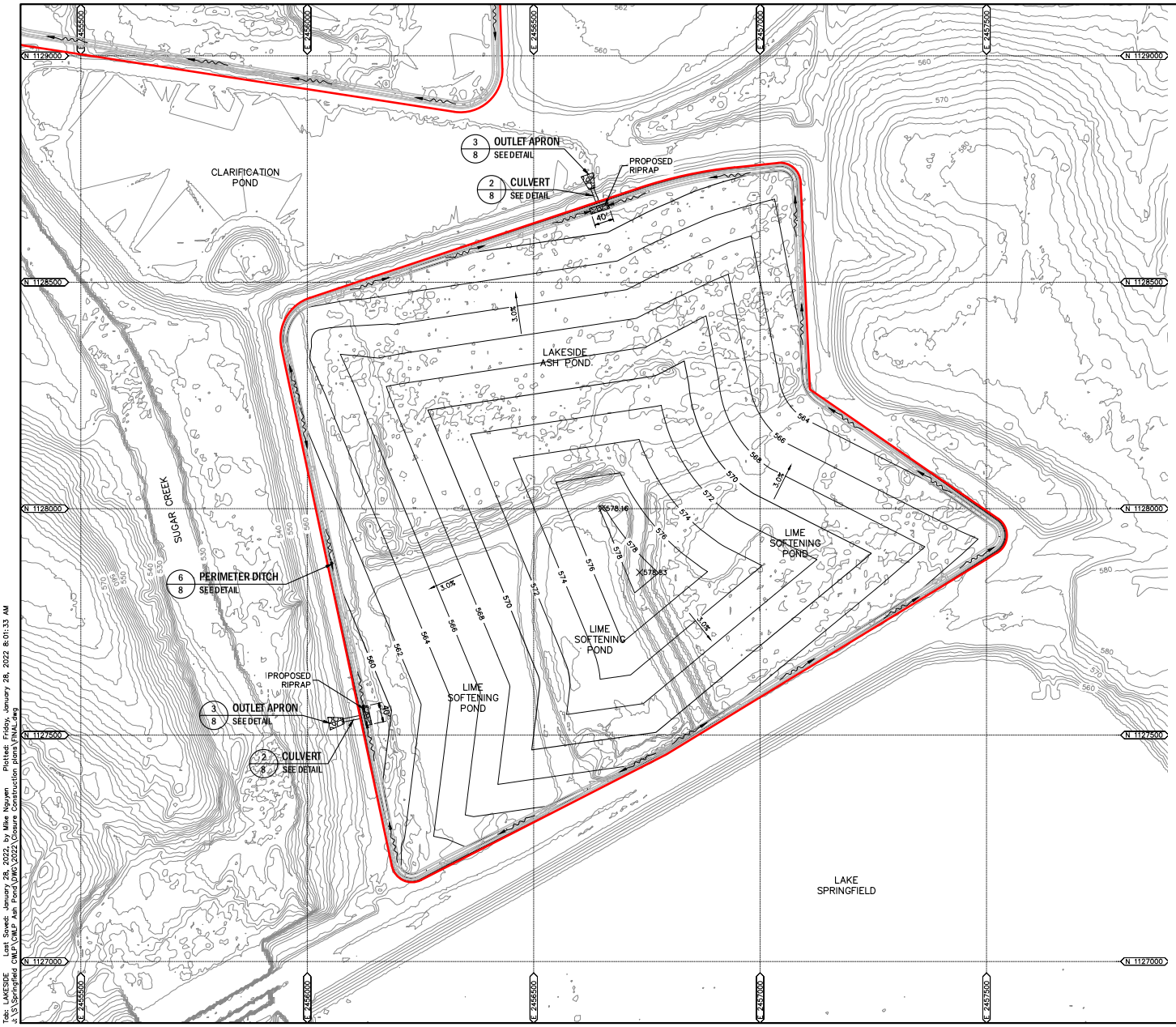

LEGEND

- IMPOUNDMENT BOUNDARY
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED DITCH FLOW
- PROPOSED RIPRAP

NOTES

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N

0 100 200 400

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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3300 GINGER CREEK DRIVE
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APPROVED BY: DWM | DESIGNED BY: DWM | DRAWN BY: MPN

LAKESIDE ASH POND
TOP OF FINAL COVER

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

DATE: FEBRUARY 2022

PROJECT ID: 200387/0032

SHEET NUMBER: 4

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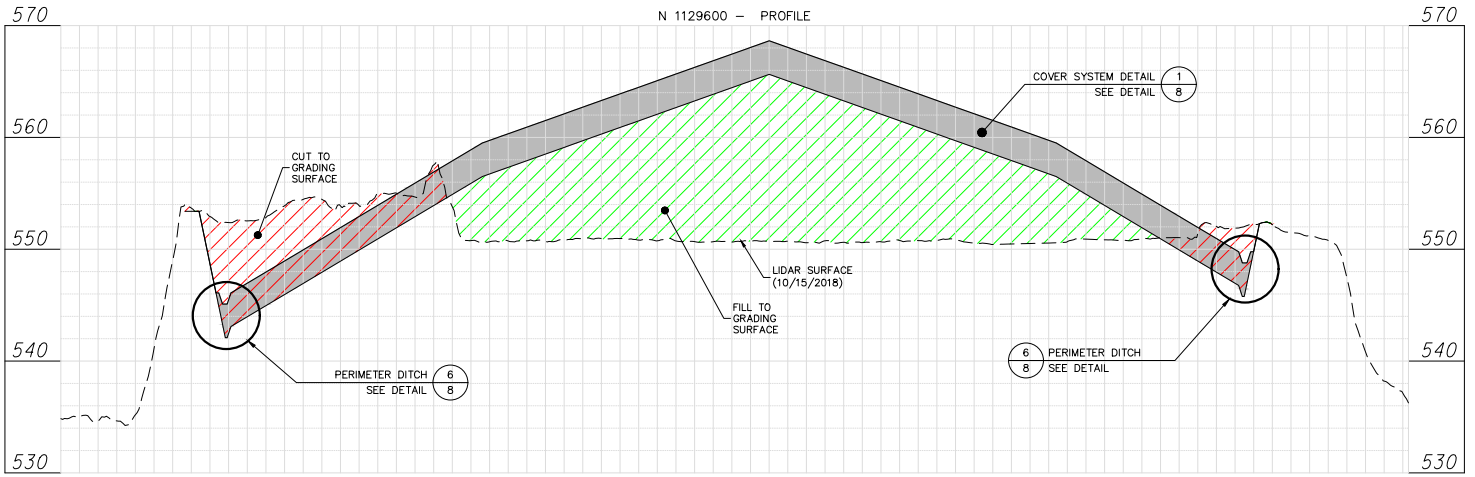
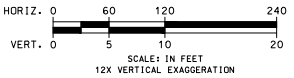
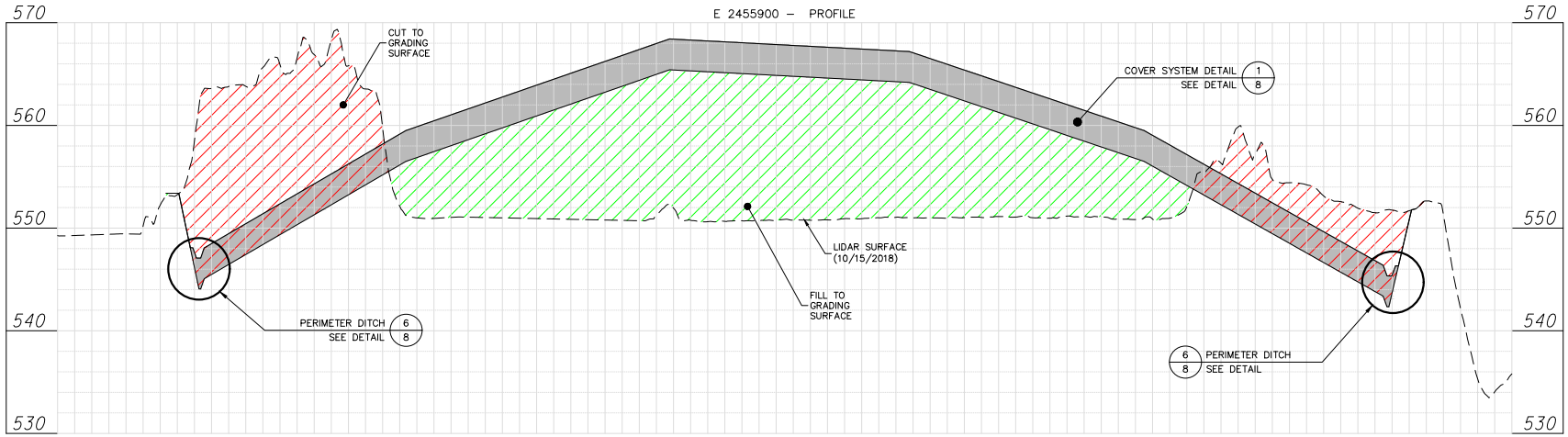


NOTES

1. TOP OF FINAL COVER GRADES WERE DERIVED FROM THE CONTOURS ON SHEET NUMBER 3.
2. FOR CLARITY NOT ALL EXISTING SITE FEATURES ARE SHOWN.
3. FOR CLARITY IN DEPICTING THE FEATURES SHOWN ON THIS SHEET, THE PROFILES HAVE BEEN DISTORTED BY A FACTOR OF 12 IN THE VERTICAL SCALE.
4. FINAL CONTOURS SHOWN ARE APPROXIMATE AND WILL BE AMENDED BASED UPON THE FINAL VOLUME OF MATERIAL PLACED IN THE IMPOUNDMENTS. A MINIMUM SLOPE OF TWO PERCENT SHALL BE MAINTAINED TO PROMOTE DRAINAGE AND PREVENT PONDING DUE TO SETTLEMENT ON THE TOP SLOPES.





NO.	DATE	REVISION DESCRIPTION	BY

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APPROVED BY: DWM | DESIGNED BY: DWM | DRAWN BY: MPN

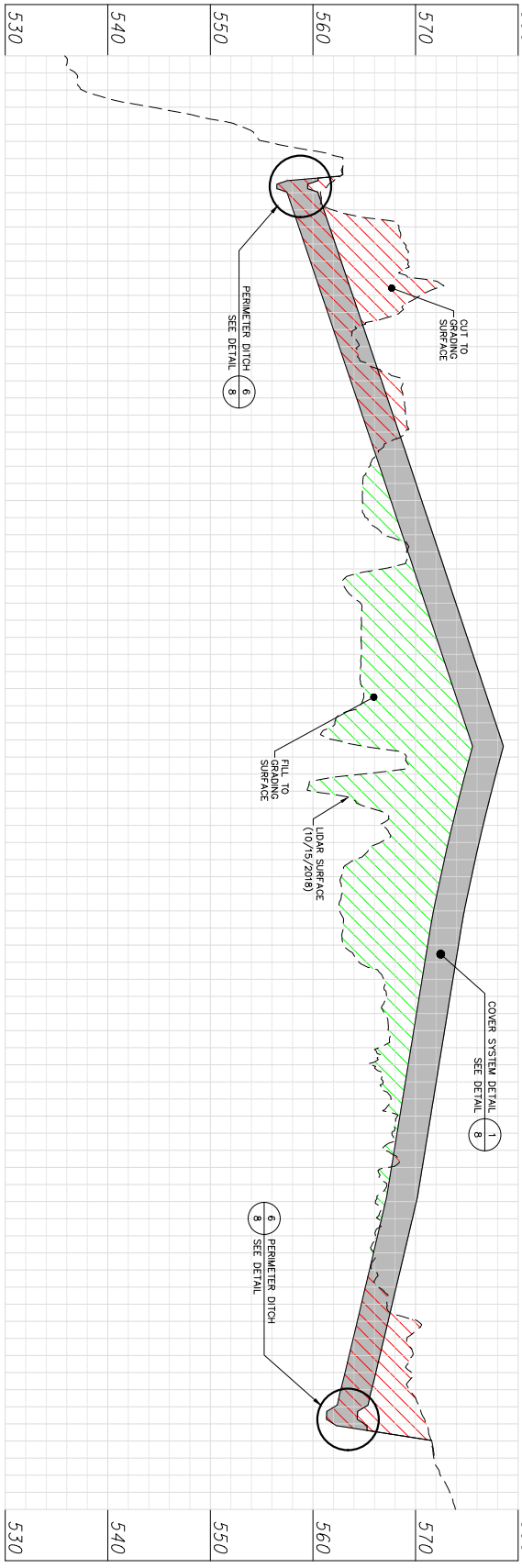
DALLMAN ASH POND
N 1129600 AND E 2455900 PROFILES

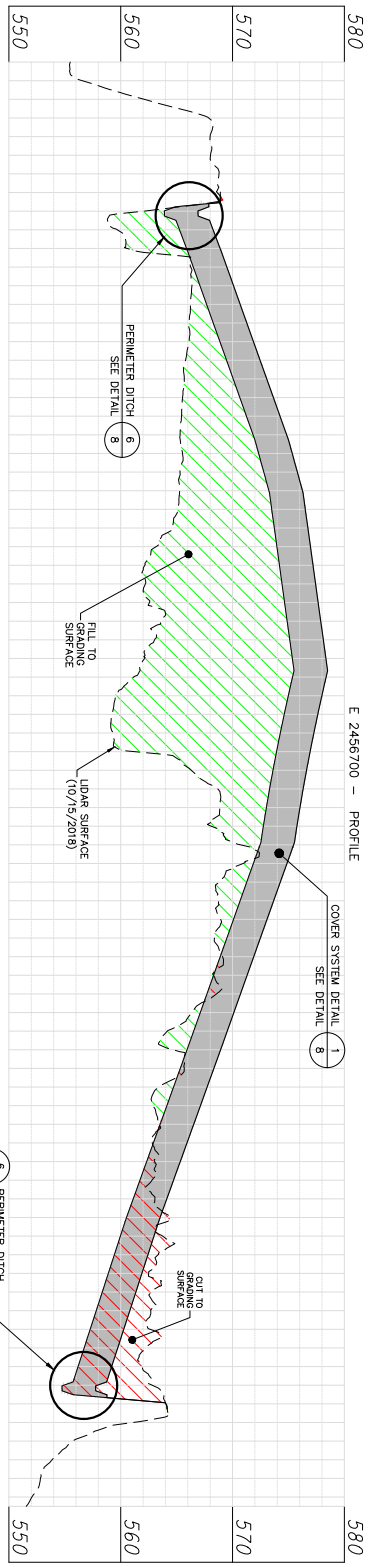
PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: FEBRUARY 2022

PROJECT ID: 200387/0032

SHEET NUMBER: 5





NOTES

1. TOP OF FINAL COVER GRADES WERE DERIVED FROM THE CONTOURS ON SHEET NUMBER 4.
2. FOR CLARITY NOT ALL EXISTING SITE FEATURES ARE SHOWN.
3. FOR CLARITY IN DEPICTING THE FEATURES SHOWN ON THIS SHEET, THE PROFILES HAVE BEEN DISTORTED BY A FACTOR OF 12 IN THE VERTICAL SCALE.
4. FINAL CONTOURS SHOWN ARE APPROXIMATE AND WILL BE AMENDED BASED UPON THE FINAL VOLUME OF MATERIALS PLACED IN THE IMPOUNDMENTS. A MINIMUM SLOPE OF TWO PERCENT SHALL BE MAINTAINED TO PROMOTE DRAINAGE AND PREVENT PONDING DUE TO SETTLEMENT ON THE TOP SLOPES.

HORIZ. 0 60 120 240
VERT. 0 5 10 20
SCALE: IN FEET
12X VERTICAL EXAGGERATION

LAKESIDE ASH POND
N 1127900 AND E 2456700 PROFILES

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

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NO.	DATE	REVISION DESCRIPTION	BY

DATE: FEBRUARY 2022
PROJECT ID: 20387/0032
SHEET NUMBER: 9

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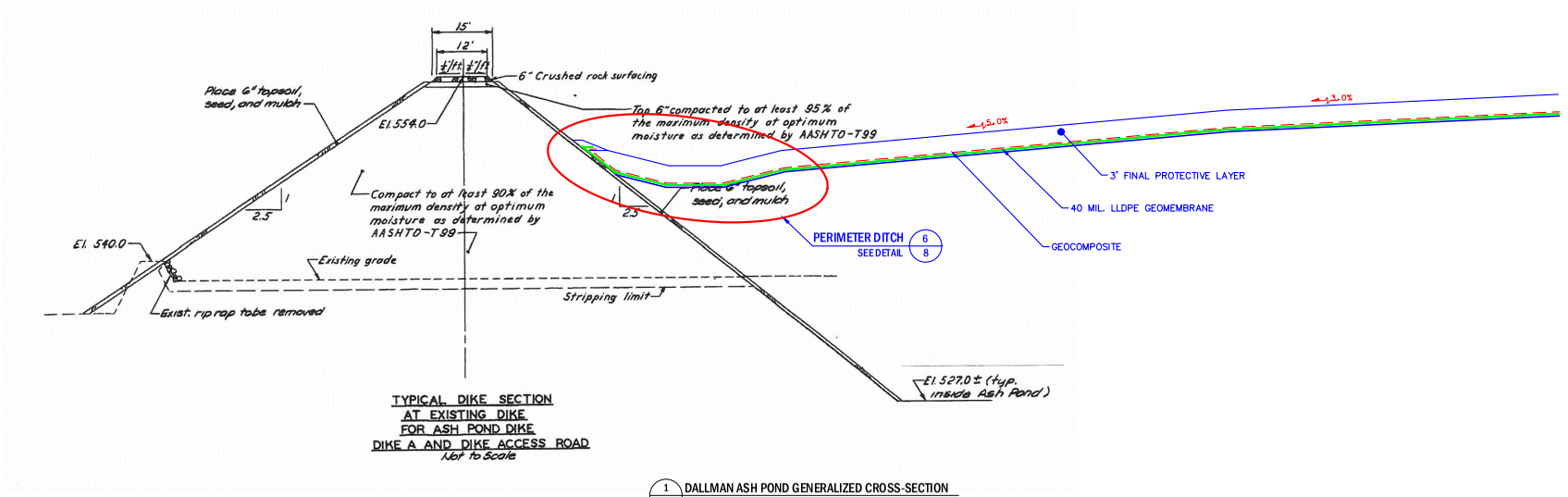
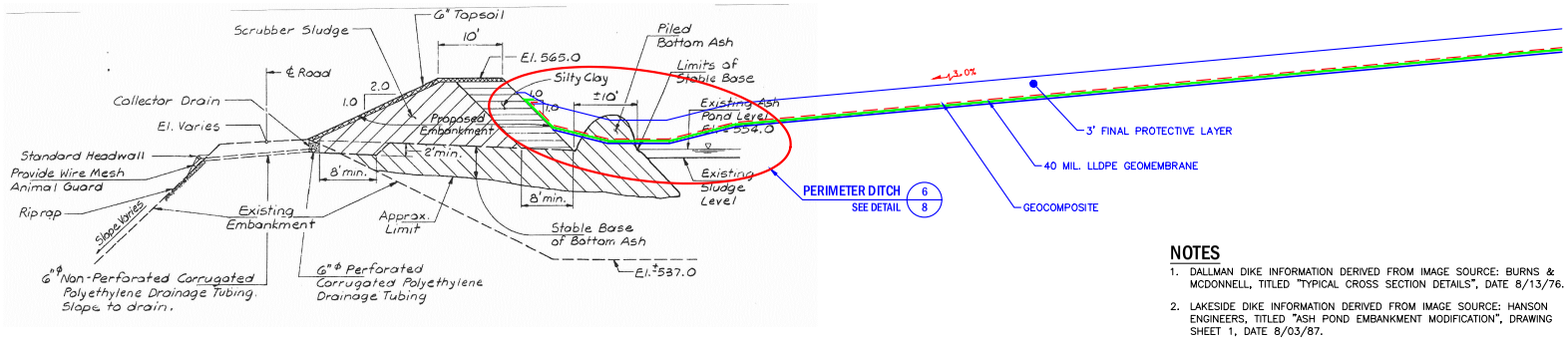


1/7 DALLMAN ASH POND GENERALIZED CROSS-SECTION
SCALE: NONE



2/7 LAKESIDE ASH POND GENERALIZED CROSS-SECTION
SCALE: NONE

NOTES

1. DALLMAN DIKE INFORMATION DERIVED FROM IMAGE SOURCE: BURNS & MCDONNELL, TITLED "TYPICAL CROSS SECTION DETAILS", DATE 8/13/76.
2. LAKESIDE DIKE INFORMATION DERIVED FROM IMAGE SOURCE: HANSON ENGINEERS, TITLED "ASH POND EMBANKMENT MODIFICATION", DRAWING SHEET 1, DATE 8/03/87.
3. FINAL COVER GRADES WERE DERIVED FROM THE CONTOURS SHOWN ON SHEET NUMBER 3 AND 4, RESPECTIVELY.
4. FINAL CONTOURS SHOWN ARE APPROXIMATE AND WILL BE AMENDED BASED UPON THE FINAL VOLUME OF MATERIAL PLACED IN THE IMPOUNDMENTS. A MINIMUM SLOPE OF TWO PERCENT SHALL BE MAINTAINED TO PROMOTE DRAINAGE AND PREVENT PONDING DUE TO SETTLEMENT ON THE TOP SLOPES.

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
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PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: DWM | DESIGNED BY: DWM | DRAWN BY: MPN

GENERALIZED CROSS-SECTIONS

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

DATE: FEBRUARY 2022
PROJECT ID: 200387/0032
SHEET NUMBER: 7

Tab: SHEET 7 Last Saved: January 27, 2022, by Mike Nguyen Plotted: Thursday, January 27, 2022 2:32:47 PM
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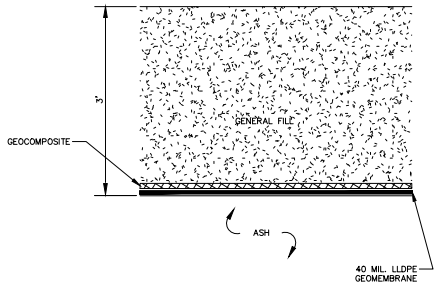
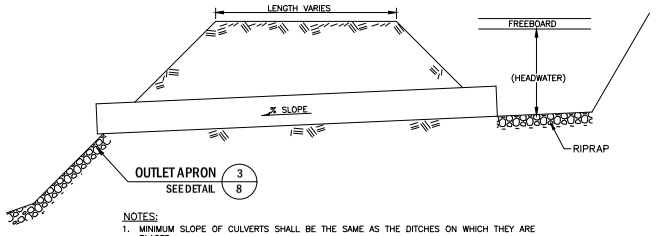
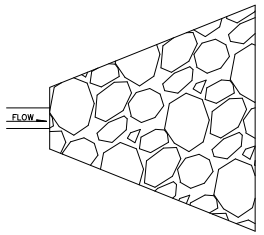


1/8 FINAL COVER SYSTEM
SCALE: NONE



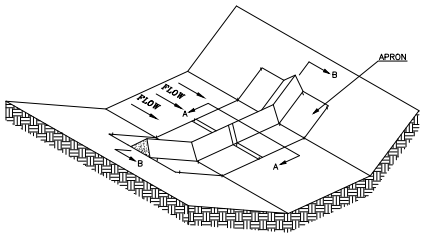
NOTES:
1. MINIMUM SLOPE OF CULVERTS SHALL BE THE SAME AS THE DITCHES ON WHICH THEY ARE PLACED.
2. THE DESIGN CAPACITIES OF THE CULVERTS ARE BASED UPON THE SAME CRITERIA AS THE DITCHES THE SERVE.
3. RIPAP OR OTHER SUITABLE EROSION CONTROL MEASURES SHALL BE UTILIZED AROUND THE CULVERTS INLET AND OUTLET AS NECESSARY TO PREVENT SCOURING.
4. FINAL CULVERT DESIGN WILL BE DETERMINED AFTER DESIGN OF THE FINAL COVER HAS BEEN COMPLETED.

2/8 CULVERT DETAIL
SCALE: NONE

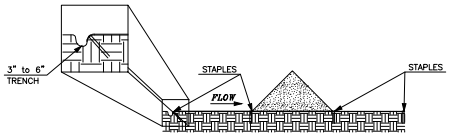


NOTES:
1. RIPRAP SIZING WILL BE DETERMINED AFTER DESIGN OF THE FINAL COVER AND CULVERT(S) HAVE BEEN COMPLETED.
2. RIPRAP PLACEMENT SHALL BE IN ACCORDANCE WITH IDOT SPECIFICATIONS.
3. RIPRAP OR AN EQUIVALENT EROSION CONTROL PRODUCT MAY BE UTILIZED WITH APPROVAL OF AN ILLINOIS REGISTERED PROFESSIONAL ENGINEER.

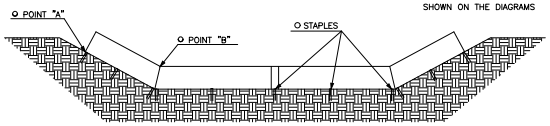
3/8 OUTLET APRON DETAIL
SCALE: NONE



SILT DIKE UNIT
CUT SECTION



DETAIL A–A



DIKE SECTION
DETAIL B–B

○ STAPLES SHALL BE PLACED WHERE THE UNITS OVERLAP AND IN THE CENTER OF THE UNIT AS SHOWN ON THE DIAGRAMS

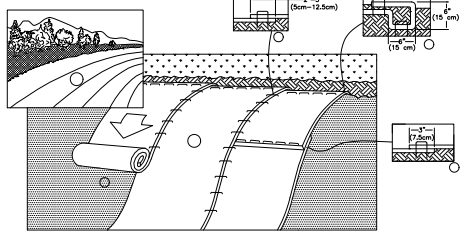
○ POINT "A" MUST BE HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUNT THE ENDS.

NOTES:
1. AS DETERMINED BY AN ILLINOIS REGISTERED PROFESSIONAL ENGINEER, THE DITCH DIMENSIONS AND GRADES MAY BE VARIED FROM THAT SHOWN IF THE DESIGN CAPACITY IS MAINTAINED AND EROSION WILL NOT RESULT.
2. TRIANGULAR SILT FENCE OR EQUIVALENT DITCH CHECK MAY BE USED AS NECESSARY FOR EROSION CONTROL IN THE PERIMETER DITCHES WITH APPROVAL OF AN ILLINOIS REGISTERED PROFESSIONAL ENGINEER.

4/8 TRIANGULAR SILT DIKE INSTALLATION FOR DRAINAGE DITCH
SCALE: NONE

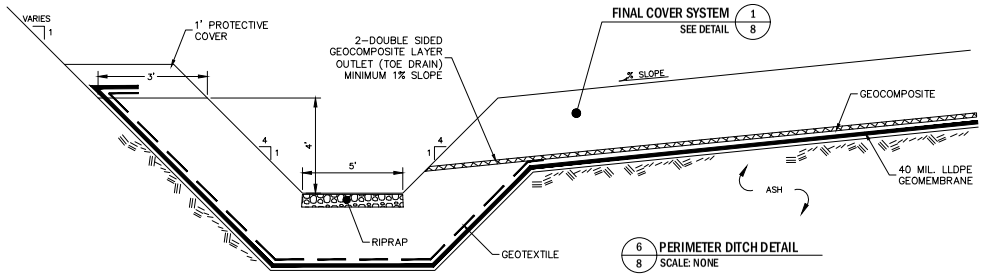
SLOPE INSTALLATION

NORTH AMERICAN GREEN
EROSION CONTROL *Products Guaranteed* SOLUTIONS
14649 HIGHWAY 41 NORTH
EVANSVILLE, IN 47725
800-772-2040
www.nagreen.com



NOTES:
1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™ STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" – 5" (5 CM – 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.
NOTE:
*IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

5/8 EROSION CONTROL BLANKET
SCALE: NONE



6/8 PERIMETER DITCH DETAIL
SCALE: NONE

NO.	DATE	REVISION DESCRIPTION	BY

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APPROVED BY: DWM | DESIGNED BY: DWM | DRAWN BY: MPN

DETAILS

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

DATE: FEBRUARY 2022
PROJECT ID: 200387/0032
SHEET NUMBER: 8

CONSTRUCTION QUALITY ASSURANCE PLAN

City Water, Light & Power

CCR Impoundments – Lakeside and Dallman Ash Ponds

Springfield, Sangamon County, Illinois

Construction Quality Assurance Plan

February 2022

Submitted to:
Illinois Environmental Protection Agency
Bureau of Land
Springfield, Illinois

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

TABLE OF CONTENTS

1. INTRODUCTION

Characteristics of the Lakeside and Dallman Ash Ponds have been evaluated pursuant to 35 Illinois Administrative Code (IAC) 845.300 (Subpart C – Location Restrictions). Based on extensive hydrogeologic investigations at and in the near proximity to the impoundments, it has been determined the impoundments do not meet the requirements of Section 845.300 (Placement above the Uppermost Aquifer). Therefore, pursuant to Section 845.350, the closure process defined in Section 845.700 must be implemented.

The closure construction permit application contains information specific to both closure of the impoundments and corrective action pursuant to 35 IAC 845.220(f). A closure alternatives analysis (CAA) was completed pursuant to Section 845.710. In addition, the facility anticipates conducting closure activities simultaneously with corrective action based on location restrictions and results from groundwater sampling and analyses. Therefore, the Corrective Measures Assessment was conducted pursuant to 35 IAC 845.660. Pursuant to the Closure Alternatives Assessment and Assessment of Corrective Measures provided in Attachment 11 of the Closure Construction Permit Application, the Construction Quality Assurance (CQA) Plan is specific to closure by final cover system defined in Section 845.750. Any specific reference to the closure process or components will also infer reference to corrective measures.

This CQA Plan reflects the requirements of 35 IAC Part 845, Subpart B. All structures necessary to comply with the requirements of Section 845.750 shall be constructed pursuant to the monitoring and certification activities summarized in this CQA Plan.

This program provides an outline of inspection activities and responsibilities to ensure proper performance of the closure components. The Owner or Operator will designate a qualified professional engineer as the CQA Officer. The CQA Officer will supervise, approve, and be responsible for all inspections, testing, and other activities required in this plan. The CQA Officer will be an Illinois Registered Professional Engineer with experience in geosynthetics. In addition, the CQA Officer will be responsible for providing documentation and as-built record drawings of completed construction and maintaining records of the construction sequences throughout the development, operation, and closure of the impoundments. The CQA Officer will comply with the regulations of Section 845.290(b) and will accept full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-Absentia during the absence of the CQA Officer. The CQA Officer may utilize one or more inspectors to assist the CQA Officer with the various inspections and testing to be conducted in the field. Any such inspector will work under the direct supervision of the CQA Officer and will be properly trained and/or experienced, as appropriate.

2. INSPECTION ACTIVITIES

The CQA Officer will be present to provide supervision and assume responsibility for performing all inspections of the following activities:

1. Excavation in Borrow Areas, including topsoil and vegetation stripping.
2. CCR grading of the final cover area and compaction of subgrade.
3. Erosion control, storm water pollution prevention and all required pumping.

4. Construction of Final Cover including geomembrane installation.
5. Seed, fertilize, and mulch Final Cover and borrow pits.
6. Construction of ditches, culverts, and letdowns.

If the CQA Officer is unable to be present, the CQA Officer will designate a person who will exercise professional judgment in carrying out the duties of a CQA Officer as the designated CQA Officer-in-absentia. The CQA Officer should be present at least one day of every week.

3. SAMPLING PLAN

A sampling plan will be implemented as part of the CQA Plan for all construction activities.

The CQA Officer will review all specifications and requirements for the manufactured items used in the construction of those components requiring inspection. (See Inspection Activities section previously presented herein.) The CQA Officer will approve all materials based on satisfaction of their individual specification. Furthermore, the CQA Officer will ensure that proper installation methods are used. Structural fill may not be necessary. However, if needed, the specifications are provided in Table 1.

Facility Component	**Sample Program Location**
Structural Fill (if needed)/Compacted Subgrade	Table 1
Protective/Vegetative Cover Layer	Table 2
Textured Geomembrane Cover Liner (40-mil)	Table 3
Final Cover Drainage Layer	Table 4
Ditches, Drainage Structures	Table 5

Additional testing and sampling may be required at the discretion of the CQA Officer, if in the CQA Officer's judgment they are necessary to ensure proper materials usage and construction procedures set forth by Federal and State Regulations. Furthermore, the CQA Officer will authorize additional sampling or sampling frequencies as necessary to ensure statistical sampling techniques are employed.

TABLE 1

STRUCTURAL FILL/COMPACTED SUBGRADE CQA SAMPLING PROGRAM

STRUCTURAL FILL CONFORMANCE TESTING		
Test/Procedure	**Minimum Frequency**	**Acceptable Values**
Grain Size Distribution (ASTM D422)	1 per 10,000 cy	P_{200} > 50%
Atterberg Limits (ASTM D4318)	1 per 10,000 cy (fine-grained soils only)	CL, ML, CH CL-ML
Standard Proctor (ASTM D698)	1 per 10,000 cy or soil change	> 95% Max. Dry Density by ASTM D698
CONSTRUCTION TESTING		
Test/Procedure	**Minimum Frequency**	**Acceptable Values**
Nuclear Density (ASTM D6938)	5 per Acre-Lift	> 95% Max. Dry Density by ASTM D698
In-Place Moisture Content (ASTM D6938)	5 per Acre-Lift	-3 to +3 % of by ASTM D698
Base Elevation	100-ft grid	≤ As necessary
Top Elevation	100-ft grid	≤ As necessary

Table 2

Protective/Vegetative Cover Layer CQA Sampling Program

Test/Procedure	**Minimum Frequency**	**Acceptable Values**
Base Elevation	100-ft grid	≤ Final Permitted Elevation – 36 inches
Top Elevation	100-ft grid	≤ Final Permitted Elevation
Thickness	100-ft grid	≥ 36 inches normal to surface

TABLE 3

TEXTURED GEOMEMBRANE BASE LINER CQA SAMPLING PROGRAM
(40-mil LLDPE Geomembrane)

MANUFACTURER QUALITY CONTROL (MQC) TESTING

Test/Procedure	Minimum Frequency	Acceptable Values
Geosynthetic Research Institute (GRI) GM-17 Testing Standard	Per GRI GM17	Per GRI GM17

CONFORMANCE TESTING

Test/Procedure	Minimum Frequency	Acceptable Values
Thickness (ASTM D5994)	1 per 100,000 ft^2 per lot	38 mil
Asperity Heights (ASTM D7466)	1 per 100,000 ft^2 per lot	$\geq$ 16 mil
Density (ASTM D1505 or ASTM D792)	1 per lot	$\geq$ 0.939
Tensile Strength at Break (ASTM D6693)	1 per 100,000 ft^2 per lot	$\geq$ 60 ppi
Elongation at Break (ASTM D6693)	1 per 100,000 ft^2 per lot	$\geq$ 250%
Tear Resistance (ASTM D1004)	1 per 100,000 ft^2 per lot	$\geq$ 22 lbs
Puncture Resistance (ASTM D4833)	1 per 100,000 ft^2 per lot	$\geq$ 44 lbs
Carbon Black Content (ASTM D4218)	1 per lot	2.0 to 3.0%
Carbon Black Dispersion (ASTM D5596)	1 per lot	9 in 10 Views Cat. 1 Or 2 1 in 10 Views Cat. 3

TABLE 4

FINAL COVER DRAINAGE LAYER CQA SAMPLING PROGRAM

Geocomposite Drainage Layer Configuration (200-mil. Double Sided Geotextile)

MANUFACTURER QUALITY CONTROL (MQC) TESTING

Double-Sided Geocomposite

Test/Procedure	Minimum Frequency	Acceptable Values
Tests and Procedures in accordance with the manufacturer's product specification sheet	Testing Frequency in accordance with manufacturer's product specification sheet	Acceptable Values in accordance with the manufacturer's product specification sheet

MANUFACTURER QUALITY ASSURANCE (MQA) TESTING

Double-Sided Geocomposite

Test/Procedure	Minimum Frequency	Acceptable Values
100-Hour Transmissivity* (ASTM D4716)	1 test per Manufacturer of Double Sided Geocomposite	> 1.0×10^{-4} m^2/sec (min)

*Test to be completed using 200-mil. GSE FabriNet Double Sided Geocomposite (or equivalent) layered between samples of a 40-mil. HPDE geomembrane and the project specific general protective layer material. The sample shall be presoaked for 24 hours, loaded with a 1,000 psf normal load, and run at a flow gradient of 0.1.

Ply Adhesion (ASTM D7005)	1 per 100,000 ft^2 per lot	> 1 ppi

Geonet Core

Test/Procedure	Minimum Frequency	Acceptable Values
Thickness (ASTM D5199)	1 per 100,000 ft^2 per lot	200 mil. avg.
Density (ASTM D1505)	1 per 100,000 ft^2 per lot	> 0.940
Carbon Black Content (ASTM D1603)	1 per 100,000 ft^2 per lot	> 2.0%

TABLE 4 (cont.)
CONFORMANCE TESTING

Geotextile (Prior to Lamination)

Test/Procedure	Minimum Frequency	Acceptable Values
Mass per unit Area (ASTM D5261)	1 per 100,000 ft^2 per lot	6 $oz./yd^2$
Grab Tensile (ASTM D4632)	1 per 100,000 ft^2 per lot	160 lbs.
Puncture Strength (ASTM D4833)	1 per 100,000 ft^2 per lot	90 lbs.
AOS, US Sieve (ASTM D4751)	1 per 540,000 ft^2 per lot	70
Permittivity (ASTM D4491)	1 per 540,000 ft^2 per lot	1.5 sec^{-1}

Table 5

Ponds, Ditches, Drainage Structures CQA Sampling Program

MANUFACTURER DATA SHEETS AND QUALITY CONTROL (MQC) TESTING

Drainage Structures (Inlet/Outlet Structures, Culverts, Drainage Tile)

Test/Procedure	Minimum Frequency	Acceptable Values
Obtain Manufacturer's product specification sheets and MQC testing (if available)	Per Material Order and Product Type	At discretion of CQA Officer per design applicability

Channel Lining Material (Armored Channel Lining, Erosion Control Material, Rip Rap)

Test/Procedure	Minimum Frequency	Acceptable Values
Obtain Manufacturer's product specification sheets and MQC testing (if available)	Per Material Order and Product Type	At discretion of CQA Officer per design applicability
Rip Rap Supplier Gradation Certification	Per Material Order and Product Type	At discretion of CQA Officer per design applicability

CONFORMANCE TESTING

Pond Berm Construction

Test/Procedure	Minimum Frequency	Acceptable Values
Grain Size Distribution (ASTM D422)	1 per 10,000 cy	P_{200} > 50%
Atterberg Limits (ASTM D4318)	1 per 10,000 cy (fine-grained soils only)	CL, ML, CH CL-ML
Standard Proctor (ASTM D698)	1 per 10,000 cy or soil change	> 95% Max. Dry Density by ASTM D698

CONSTRUCTION TESTING

Drainage Structures (Inlet/Outlet Structures, Culverts, Drainage Tile)

Test/Procedure	Minimum Frequency	Acceptable Values
Survey of Drainage Structure Location (Northing, Easting, and Elevation)	Inlets, Outlets, Joints Other pertinent features	In accordance with the design

Table 5 (cont.)
CONSTRUCTION TESTING (cont.)

Detention Pond Berms

Test/Procedure	Minimum Frequency	Acceptable Values
Nuclear Density (ASTM D2922)	5 per Acre-Lift	> 95% Max. Dry Density by ASTM D698
In-Place Moisture Content (ASTM D3017 or ASTM D2216)	5 per Acre-Lift	0 to +6 % of optimum moisture content by ASTM D698
Base Elevation	100-ft grid	≤ As necessary
Top Elevation	100-ft grid	≤ As necessary
Survey Discharge and Effluent Elevations	At discretion of CQA Officer	At discretion of CQA Officer

Ditches

Test/Procedure	Minimum Frequency	Acceptable Values
Survey Centerline Profiles	100-foot intervals or at major breaks in grade	At discretion of CQA Officer
Cross-Sections	200-foot intervals or at major breaks in grade	At discretion of CQA Officer

4. CONSTRUCTION MEETINGS

The CQA Officer may hold meetings prior to, and during, construction to ensure proper construction techniques, understanding of the specifications and plans, the proper handling of deviations from the plans necessitated by site-specific field conditions and to review the appropriate chain-of-command used if unsuitable work is discovered. Meetings shall be held with Owner, all Contractors, and Operator representatives involved with the project to discuss their individual responsibilities.

5. DOCUMENTATION

5.1 Daily Summary Report

A daily summary report will be prepared by the CQA Officer, or under the direct supervision of the CQA Officer, during each day of activity. The report will contain, at a minimum:

1. The date
2. A summary of the weather conditions
3. A summary of locations where construction is occurring
4. Equipment and personnel on the project
5. A summary of any meetings held and attendees
6. A description of all materials used and references or results of testing and documentation
7. The calibration and recalibration (if needed) of test equipment
8. The daily inspection report from each inspector

5.2 Daily Inspection Reports

Each inspector will complete a daily inspection report containing the following information:

1. The location
2. The type of inspection
3. The procedure used
4. Test data
5. Acceptable limits for construction testing analysis
6. In the event of unsuitable materials or construction techniques, documentation regarding corrective action taken and causes for the incongruity
7. Results of the activity
8. Personnel involved in the inspection and sampling activities
9. The signature of the inspector

5.3 Weekly Summary Report

A weekly summary report will be prepared by the CQA Officer, or under the direct supervision of the CQA Officer at the end of each week of construction until the end of construction. The CQA Officer must review and approve the report. The owner/operator of the facility must place the weekly reports in the facility's operating record, which is specified under Section 845.800(d)(3). The report will contain, at a minimum:

1. The dates of the week
2. Descriptions of the weather
3. Locations where construction occurred during the week
4. Materials used
5. Testing results
6. Inspection reports
7. Procedures used to perform the inspections

5.4 Photographic Records

Photographs may be used as tools to document the progress and acceptability of the work and may be incorporated into a daily summary report, a daily inspection report, and an acceptance report.

5.5 Acceptance Report

Upon completion of the construction of each major phase, the CQA Officer will submit an acceptance report to the Illinois Environmental Protection Agency (Illinois EPA) and the Owner and Operator. The acceptance report will be submitted before the structure is placed into service and will contain the following:

1. A certification by the CQA Officer that the construction has been prepared and constructed in accordance with the engineering design
2. As-built record drawings
3. All daily summary, inspection, and work location reports

6. FINAL COVER SYSTEM

6.1 Geomembrane

The CQA Officer will thoroughly inspect the subgrade surface layer on which the geomembrane cover is to be laid prior to proof rolling. The inspector will concentrate on the following and completion of the corrective action required:

1. The subgrade surface layer will be inspected and surveyed ensuring the grades and lines are consistent with those on the design plans.
2. The surface will be examined ensuring that all rocks, litter, construction debris, and/or undesirable objects are not present that could weaken the support of the geomembrane cover or puncture it.

3. All depressions will be filled and raised areas leveled.
4. Any desiccation cracks will be corrected as necessary to ensure proper performance of the subgrade layer.
5. No vegetative growth will be present.
6. All surfaces are firm and have not been wetted excessively in local areas in the preceding period before the geomembrane installation.

It is expected that fine finishing of the final surface will be required, starting from the top and working down. Uniform application of additional moisture to the surface may provide a smoother surface if grading is required. The geomembrane installer will conduct an additional inspection near the time of geomembrane placement, and any necessary repairs to its supporting layer will be made.

Prior to any geomembrane installation, the installer will provide the CQA Officer with a panel layout plan for the specific area included in his construction bid. The installer or manufacturer will also provide assurance that the geomembrane material is compatible with the soils to be contacted, and furthermore, that the liner is believed to have sufficient strength and durability to function at the site for the design period under the maximum expected loadings imposed by heavy equipment and stresses imposed by settlement, temperature, construction, and operation. These assurances will be approved by the CQA Officer. Alternatively, the CQA Officer may perform and/or subcontract performance of tests and/or calculations, as necessary to realize such assurances independent of the installer/manufacturer. The CQA Officer will also ensure that the geomembrane utilized has an adequate angle of friction based upon the actual materials/products that it will have contact with. As necessary, alternative products, materials, and/or thicknesses may be used to meet or exceed the geomembrane specifications, presented in Table 3.

A 40-mil LLDPE geomembrane cover will be installed on top of the subgrade layer in accordance with the drawings, specifications, and manufacturer's instructions by persons experienced in similar cover installation. Furthermore, the geomembrane cover will be installed in accordance with the installer's panel layout plan, and it may be revised with the approval of the CQA Officer to suit field conditions at the time of installation. All field seaming will be in accordance with the manufacturer's specifications. Any necessary revisions during installation will be reflected on the record as-built drawings.

Geomembrane bonding will use fusion welding when possible and extrusion welding as a secondary means. Fusion welding will typically consist of applying dynamic energy and heat between two overlapped panels. This will allow panel-to-panel bonding, providing a homogenous mass along the area of the seam. Extrusion welding will be completed via an extrudate gun equipped with an extrusion head and pre-heat blower to ensure proper pre-heating of the geomembrane seams.

Equipment used to bond the LLDPE geomembrane cover will be equipped with monitors capable of providing instantaneous temperature readings regarding the zone of contact. This will allow the operator to manually or automatically alter the bonding process to ensure integrity based on changes in environment.

The quality control aspects of LLDPE geomembrane cover installation will include, but not necessarily be limited to:

1. Inspection of the procedures and adequacy used for cleaning and/or drying the surfaces of the geomembrane to be seamed.
2. Monitoring of the temperature and speed of welding.
3. Only smooth soled shoes will be allowed on the geomembrane cover.

   No vehicles will be allowed directly on the geomembrane cover. Subsequent placement of the final protective layer will be with a LGP dozer or other suitable equipment and the materials advanced in front of the equipment so that operation directly on the cover does not occur.

The quality assurance aspects of LLDPE geomembrane cover installation will include, but not necessarily be limited to:

1. Conformance testing of the geomembrane material meets the minimum requirements of Table 3.
2. Test welds on scrap geomembrane cover materials will be produced by each seamer at least twice daily, in the early morning and afternoon, under the same conditions as production seaming to verify conditions are adequate.
3. All field seams will be pressure or vacuum tested over their full length.
4. Samples of actual field seams will be tested on an average basis of at least once every 500 feet of seam length by sample removal and laboratory testing for bonded seam strength and peel adhesion as recommended in the Geosynthetic Research Institutes' (GRI) GM-19 Technical Guidance. The test results will be considered acceptable if they meet the minimum requirements of the GRI GM-19 standards (Patches will be welded over holes created by sampling.)
5. Inadequate seams will be cut out and rewelded or an additional layer of geomembrane will be welded over the suspect seam.
6. Documentation of the location of each panel, sample point, repaired areas, and the test results.

Using the above-mentioned procedures and others that may be required or deemed appropriate by the CQA Officer, upon completion of the cover installation, the CQA Officer will exercise professional judgment to certify:

1. The bedding material contained no undesirable objects.
2. The placement plan has been followed.
3. The final protective layer was applied to prevent damage to the geomembrane cover.
4. All tears, rips, punctures, and other damages were repaired.
5. The anchor trench and backfill are constructed to prevent damage to the geosynthetic membrane.
6. All geomembrane seams were properly constructed and tested in accordance with the manufacturer's specifications.

6.2 Geocomposite Drainage Layer and Geocomposite Toe Drain

Installation of the geocomposite drainage layer and toe drain shall be made in accordance with the manufacturer's specifications. The geocomposite shall be installed in the direction of the slope and flow unless specified by the design engineer. The toe drain will be installed as shown on the drawings and care will be used when spreading the protective cover layer over the entire length of the geocomposite. Seams and edges of the geocomposite shall be butted against each other and joined with ties placed no greater than every five feet along the seam. End-to-end seams shall be overlapped by a minimum of 12 inches, shingled in the direction of flow with ties no greater than five feet along the seam. Testing requirements for the geocomposite will be conducted in accordance with Table 4.

6.3 Final Protective Layer

The final protective layer will consist of a minimum 36 inch thickness of soil. A layer of double-sided geocomposite will be placed directly over the geomembrane layer to provide a free-draining element to remove moisture from the final cover system. The soils overlaying the double-sided geocomposite will not be compacted, with the top 6 inches being the best onsite, readily available soil for supporting vegetation. The thickness of the final protective layer will be documented by comparing the finished elevation of the low permeability layer with the final surface. The minimum thickness of the final protective layer will be placed as soon as possible after placement of the geomembrane low permeability layer.

Loams of the United States Department of Agriculture (USDA) soils classification system or USCS classes GM, GC, SM, SC, ML, and CL are all considered suitable protective soils. The final protective layer may include soils from on- and/or offsite sources and compost. Other products that may be considered waste besides compost (such as sewage treatment sludge) may be used as a soil amendment if all necessary permits/authorizations are secured.

The finished surface of the final cover system will be surveyed on a spacing, which will not exceed 100 feet in any ordinate direction. This survey and acceptance criteria will apply to final protective layers of the final cover system, with allowance for the minimum three-foot difference between their surfaces.

In conjunction with the monitoring activities described above, the CQA Officer will implement the sampling program summarized in Table 2.

6.4 Vegetative Cover

Finalized areas will be prepared and seeded as soon as reasonably possible to prevent potential erosion impacts. Composite soil sample testing should be done to determine the amount of lime and/or fertilizer needed. Seed will typically be incorporated into the upper surface of the final protective layer using a disk or harrow, or by using hydroseeding techniques. The seed mixture selected must be amenable to the soil quality/thickness, slopes, and moisture/climatological conditions that exist without the need for continued maintenance and with minimal potential for root penetration into the low permeability layer. Such vegetation will be established by seeding with a dry prairie mix or dry-mesic prairie mix as recommended by the local Soil and Water Conservation Office. Fertilizer, lime, and straw mulch should be used at rates necessary to establish proper growth of the seed.

Landscaping or seeding professionals knowledgeable of Springfield area climatological conditions will be consulted in determining necessary soil amendments and application rates based upon specific seasonal conditions at the time of closure. As a guide, the design procedures and specifications presented in the handbook *Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois* may be utilized. Mulch consisting of straw, jute, and/or wood excelsior will be used as necessary to hold the seed in place and conserve moisture. The CQA Officer should record the amount of amendments and seed, and the boundaries of the completed areas on the as-built record drawings.

6.5 Drainage Control Structures

The CQA Officer shall inspect the final cover ditches, berms, and related drainage features to ensure proper construction of these structures as indicated by the drawings. Deviations from the plans shall be noted on the as-built record drawings with the appropriate erosion control covering as soon as reasonably possible. Repairs as warranted should be done prior to applying the coverings.

7. ROADWAYS

The CQA Officer will inspect the location of the roadways in relation to the transportation plan. The CQA Officer's primary responsibility will be to ensure proper grading of the roadway surfaces enabling runoff water to enter the stormwater runoff collection ditching as appropriate.

8. SURFACE WATER CONTROL

The CQA Officer will inspect the ditches, culverts, and sediment control devices to ensure proper construction of these structures as indicated by the drawings. Deviations from the plans will be noted on the as-built record drawings with the appropriate calculations showing that the hydraulic carrying capacity remains sufficient. All ditches will be completed with the appropriate erosion control coverings as soon as practicable. Repairs, as warranted, should be done prior to applying the coverings.

In conjunction with the monitoring activities described above, the CQA Officer will implement the sampling program summarized in Table 5.

9. EXCEPTIONS

The CQA Officer shall have the authority to modify the design shown on the plans based upon unexpected conditions encountered in the field. Small changes or modifications are historically required on any construction job of this size. Accordingly, the changes or modifications should be incorporated into the Acceptance Report and/or record drawings. Calculations, supporting discussion, etc. shall also be included to authenticate the adequacy of the changes in relation to the original design.