MWG

Midwest Generation, LLC

Powerton Generating Station

2022 Inflow Design Flood Control System Plan for Metal Cleaning Basin

Revision 0

March 29, 2022

Issue Purpose: Use

Project No.: 12661-130

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Sargent & Lundy

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1.0 PURPOSE

The Metal Cleaning Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is a basin that is regulated as an existing coal combustion residual (CCR) surface impoundment under the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundment." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." Pursuant to 35 Ill. Adm. Code 845.510(c)(1), MWG must prepare an inflow design flood control system plan that documents how the inflow design flood control systems for the Metal Cleaning Basin have been designed and constructed to meet the hydrologic and hydraulic capacity requirements for CCR surface impoundment promulgated by 35 Ill. Adm. Code 845.510.

This report documents the 2022 inflow design flood control system plan prepared in accordance with the Illinois CCR Rule by Sargent & Lundy (S&L) on behalf of MWG for the Metal Cleaning Basin at Powerton. This report:

- Lists the inputs and assumptions used to determine whether the Metal Cleaning Basin can manage the inflow design flood,
- Discusses the methodology used to determine whether the Metal Cleaning Basin can manage the inflow design flood, and
- Summarizes the results of the hydrologic and hydraulic calculations performed to support the conclusion of whether the Metal Cleaning Basin meet the hydrologic and hydraulic requirements for CCR surface impoundments promulgated by the Illinois CCR Rule.

2.0 INPUTS

Inflow Design Flood Control System

Powerton primarily uses the Metal Cleaning Basin for temporarily storing gas-side boiler cleaning wash water prior to treatment in the Station's Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. As shown on the as-built construction plans of the Metal Cleaning Basin in Appendix A, which depict how the basin was lined with its existing high-density polyethylene geomembrane liner circa 2011, wash water from the Station enters the basin via three concrete aprons along the basin's southern embankment. Effluent from the basin overflows a concrete weir wall at the northern end of the basin and flows into a 30-in.-diameter reinforced concrete pipe that discharges into a sump north of and adjacent to the basin. The Metal Cleaning Basin does not have an emergency spillway.

Inflow Design Flood Event

Per the basin's 2021 hazard potential classification assessment (Ref. 2), The Metal Cleaning Basin is classified as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1). Therefore,

the inflow design flood event used in this hydrologic and hydraulic assessment of the Metal Cleaning Basin is based on the 1,000-year storm (Ref. 1, § 845.510(a)(3)). Per the National Oceanic and Atmospheric Administration's Atlas 14 (Ref. 3), the precipitation depth for the 1,000-year, 24-hour storm event at the Powerton site is 9.00 inches.

Site Topography

Topographic data for the Metal Cleaning Basin and the surrounding areas was obtained from Sheet No. C-020 in Appendix A.

Metal Cleaning Basin Conditions

The physical conditions for the Metal Cleaning Basin was based on discussions with MWG personnel and the as-built construction plans in Appendix A.

3.0 ASSUMPTIONS

There are no assumptions in this document that require verification.

4.0 HYDROLOGIC & HYDRAULIC ASSESSMENT

4.1 METHODOLOGY

PondPack (Ref. 6) was used to analyze the abilities of the Metal Cleaning Basin to manage direct precipitation and stormwater runoff from the 1000-year, 24-hour storm event. The analysis conservatively assumed that the outlet pipe was full at the time of the storm event and, therefore, the Metal Cleaning Basin would need to contain the inflow design flood without water overtopping the basin's dikes (EL. 467.00 feet). The surface water depth in the basin at the time of the design storm event was assumed to be 4.5 feet (EL. 462.00 feet), which is 2.5 feet higher than the basin's normal operating level (Ref. 2, p. 2) . This operating level is conservative and accounts for unanticipated transient discharges. Finally, the time of concentration for this hydrologic and hydraulic assessment was assumed to be 5 minutes in accordance with the minimum time of concentration recommended in the U.S. Department of Agriculture's Technical Release No. 55, *Urban Hydrology for Small Watersheds* (Ref. 7).

4.2 RESULTS

Table 4-1 summarizes the results from the hydrologic and hydraulic calculations performed for the Metal Cleaning Basin (Ref. 8). Based on these results, water entering the Metal Cleaning Basin during the inflow design flood event will not overtop the basin. The water level in the Metal Cleaning Basin during the design event was estimated to be 3.85 feet below the basin's dikes.

Table 4-1 – Summary of Hydrologic & Hydraulic Assessment Results for the Metal Cleaning Basin

CCR Surface Impoundment	Illinois Hazard Potential Classification	Inflow Design Flood	Maximum Surface Water Elevation	Basin Crest Elevation
Metal Cleaning Basin	Class 2	1,000 Year	463.15 feet	467.00 feet

5.0 CONCLUSIONS

Based on the hydrologic and hydraulic calculations performed for the Metal Cleaning Basin (Ref. 8), the basin has adequate hydraulic capacity to retain the 1000-year flood event without water overtopping the surrounding dikes. Therefore, the Metal Cleaning Basin is able to collect and control the inflow design flood event specified in 35 Ill. Adm. Code 845.510(a)(3).

6.0 CERTIFICATION

I certify that:

- This inflow design flood control system plan was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.510.
- I am a registered professional engineer under the laws of the State of Illinois.

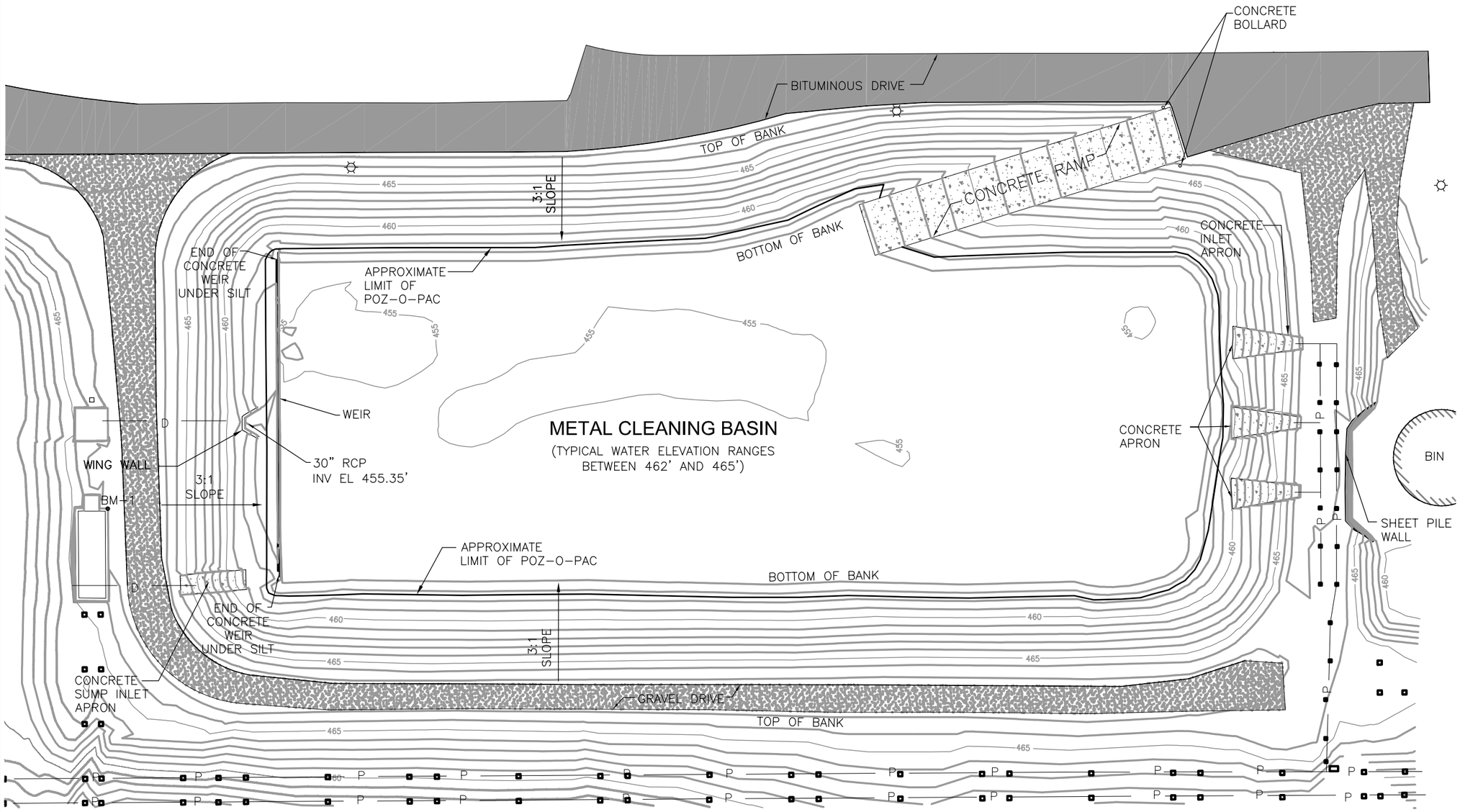
Certified By: Thomas Dehlin, P.E. Date: 03-29-2022

Seal:

7.0 REFERENCES

1. Illinois Pollution Control Board. “Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments.” 35 Ill. Adm. Code 845. Accessed March 29, 2022.
2. Civil & Environmental Consultants, Inc. “Hazard Potential Classification Assessment Report, Metal Cleaning Basin, Powerton Station.” CEC Project No. 312-192.0120. September 2021.
3. National Oceanic and Atmospheric Administration. “Point Precipitation Frequency Estimates.” NOAA Atlas 14, Volume 11, Version 3.
4. Bentley PondPack V8i Version 10.02.00.01.
5. U.S. Department of Agriculture. *Urban Hydrology for Small Watersheds*. Technical Release No. 55. 1986.
6. Sargent & Lundy. “Metal Cleaning Basin Hydraulic Capacity Calculation.” S&L Calc. No. MG-PS-C002, Rev. A. S&L Project No. 12661-130. March 2022.

APPENDIX A – 2011 AS-BUILT CONSTRUCTION PLANS



LEGEND

- D — UNDERGROUND DISCHARGE PIPE
- P — ABOVEGROUND PIPE RACK
- LIGHT POLE
- 460 — GROUND SURFACE CONTOUR

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO. 23209009.

LOCATION OF EXISTING LINER TAKEN FROM MIDWEST GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978.

N

0 10 20 40
SCALE IN FEET

	REVISION:	DATE:	APP'D BY:
6.			
5.			
4.	RECORD DOCUMENTATION	06/16/11	HMS
3.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
2.	ADDENDUM 1	10/22/09	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS

NATURAL RESOURCE TECHNOLOGY

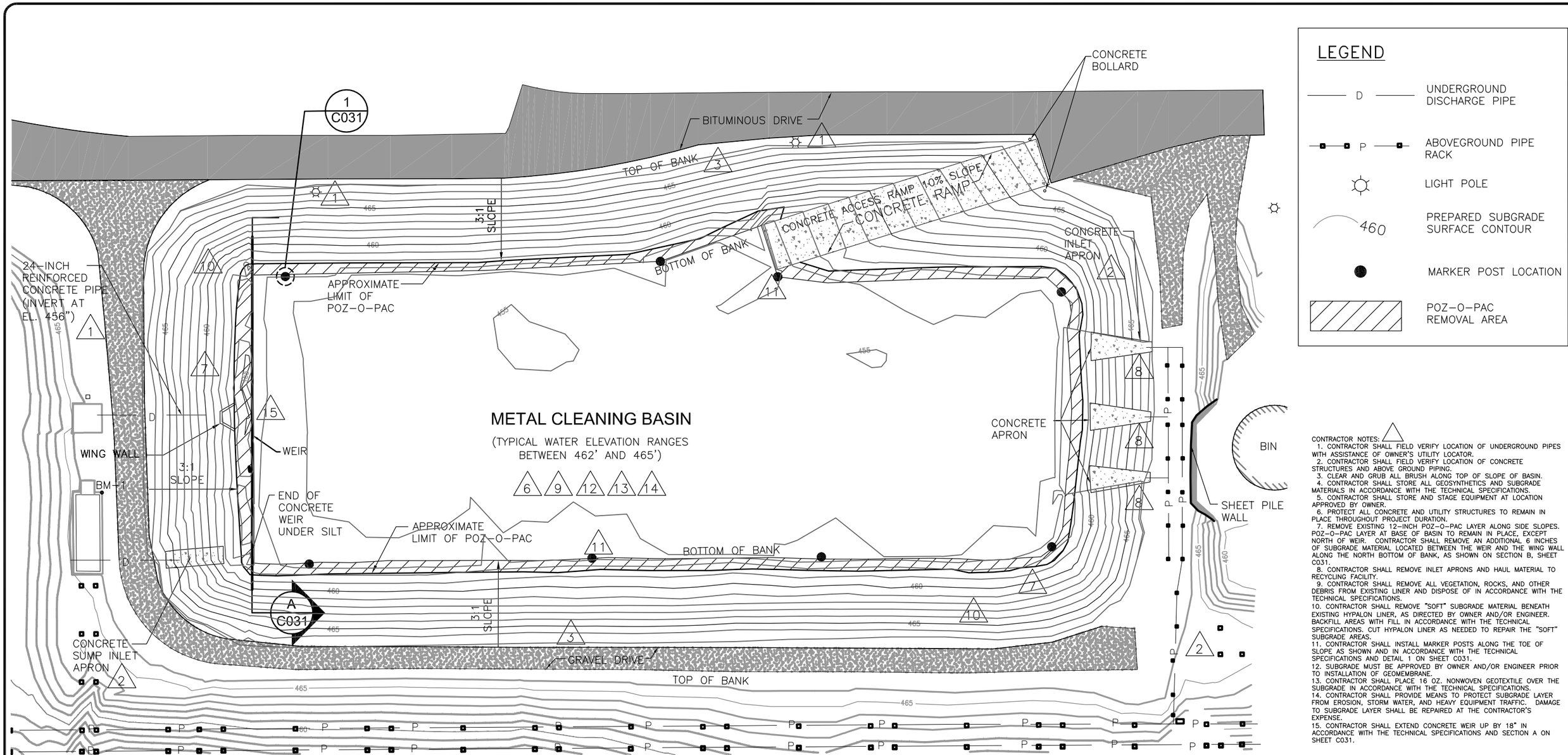
PROJECT NO. 1965/4.0
DRAWN BY: RLH/KNW 07/17/09
CHECKED BY: RJG 07/17/09
APPROVED BY: HMS 07/27/09

PRE-CONSTRUCTION CONDITIONS

METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C010-04
REFERENCE: .

SHEET NO. C010



CONTRACTOR NOTES:
1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE STRUCTURES AND ABOVE GROUND PIPING.
3. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
4. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES TO REMAIN IN PLACE THROUGHOUT PROJECT DURATION.
7. REMOVE EXISTING 12-INCH POZ-O-PAC LAYER ALONG SIDE SLOPES. POZ-O-PAC LAYER AT BASE OF BASIN TO REMAIN IN PLACE, EXCEPT NORTH OF WEIR. CONTRACTOR SHALL REMOVE AN ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL ALONG THE NORTH BOTTOM OF BANK, AS SHOWN ON SECTION B, SHEET C031.
8. CONTRACTOR SHALL REMOVE INLET APRONS AND HAUL MATERIAL TO RECYCLING FACILITY.
9. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
10. CONTRACTOR SHALL REMOVE "SOFT" SUBGRADE MATERIAL BENEATH EXISTING HYPALON LINER, AS DIRECTED BY OWNER AND/OR ENGINEER. BACKFILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. CUT HYPALON LINER AS NEEDED TO REPAIR THE "SOFT" SUBGRADE AREAS.
11. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE TOE OF SLOPE AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND DETAIL 1 ON SHEET C031.
12. SUBGRADE MUST BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
13. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE OVER THE SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
14. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE LAYER FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE LAYER SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
15. CONTRACTOR SHALL EXTEND CONCRETE WEIR UP BY 18" IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND SECTION A ON SHEET C031.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO. 23209009.

LOCATION OF EXISTING LINER TAKEN FROM MIDWEST GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICES, MARCH 2011.

6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:

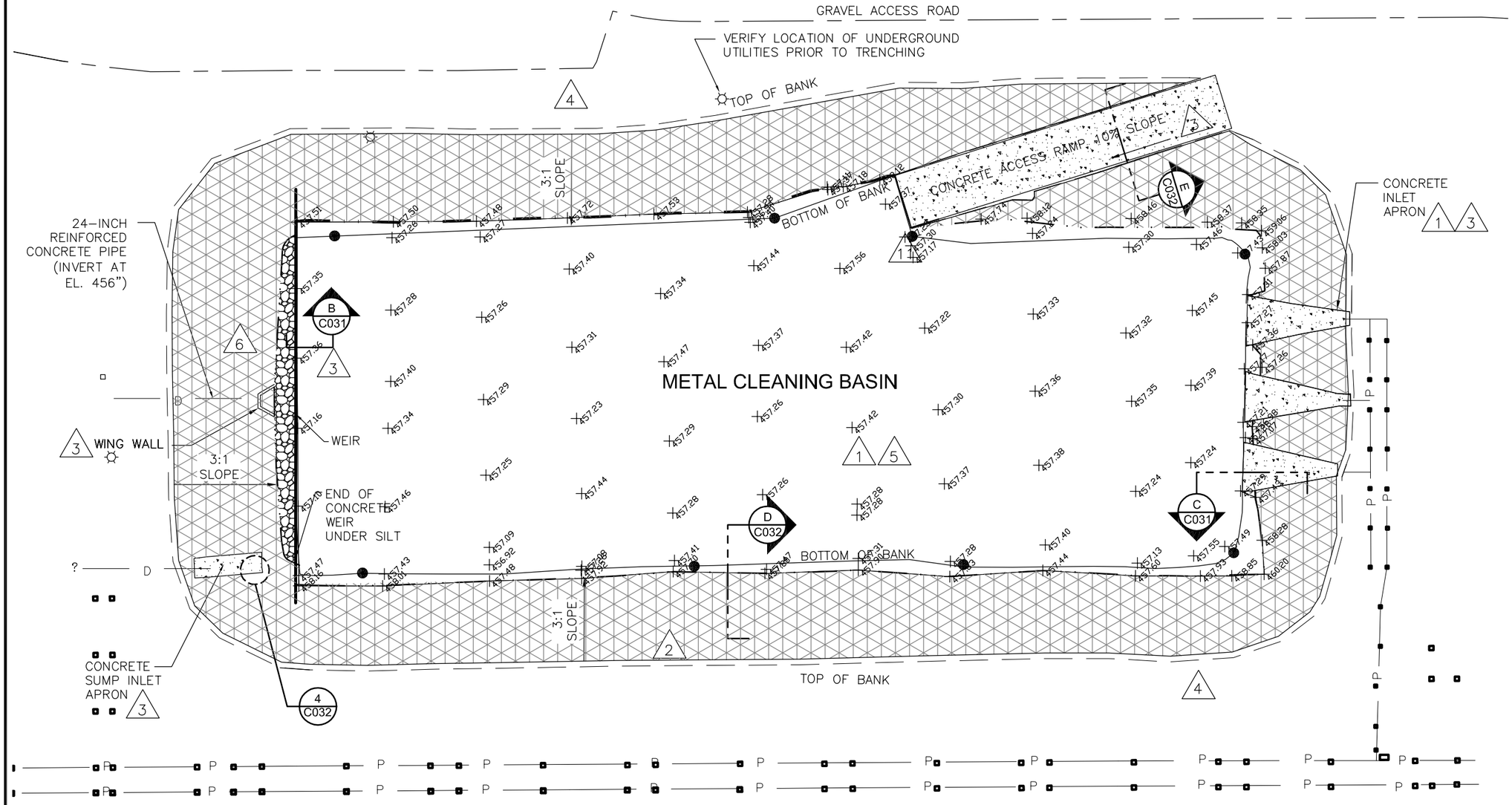
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/25/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

LINER SUBGRADE PREPARATION

METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C020-03
REFERENCE: .
SHEET NO. C020



LEGEND

- UNDERGROUND DISCHARGE PIPE (D)
- ABOVEGROUND PIPE RACK (P)
- ANCHOR TRENCH
- 12 OZ. NON-WOVEN GEOTEXTILE
- LIGHT POLE
- MARKER POST LOCATION
- TOP OF WARNING LAYER (ELEVATION, FT.) (×457.32)
- HDPE GEOMEMBRANE
- CONCRETE
- RIPRAP

CONTRACTOR NOTES:

1. PRIOR TO GEOMEMBRANE INSTALLATION CONTRACTOR SHALL CONSTRUCT INLET APRONS WITH HDPE WELD STRIPS AROUND PERIMETER AND 12-INCH DEEP FOOTING AT TOP AND BOTTOM OF APRON TO MATCH PREEXISTING APRON CONSTRUCTION. APRON TO EXTEND AT MINIMUM 3 FEET BEYOND TOE OF BANK. SEE DETAIL.
2. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION PRIOR TO PLACEMENT OF THE WARNING LAYER. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
3. CONTRACTOR SHALL ATTACH GEOMEMBRANE TO STRUCTURES IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION AND DETAILS ON SHEET C031 AND C032.
4. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE OWNER AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT FEASIBLE.
5. CONTRACTOR SHALL PLACE 12-OZ. NON-WOVEN GEOTEXTILE, CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
6. CONTRACTOR SHALL PLACE RIPRAP 18 INCHES THICK, BETWEEN WEIR AND WING WALL ALONG THE BOTTOM OF BANK.
7. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
9. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

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LOCATION OF EXISTING LINER TAKEN FROM MIDWEST GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978. BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICES, MARCH 2011.

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SCALE IN FEET

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3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:

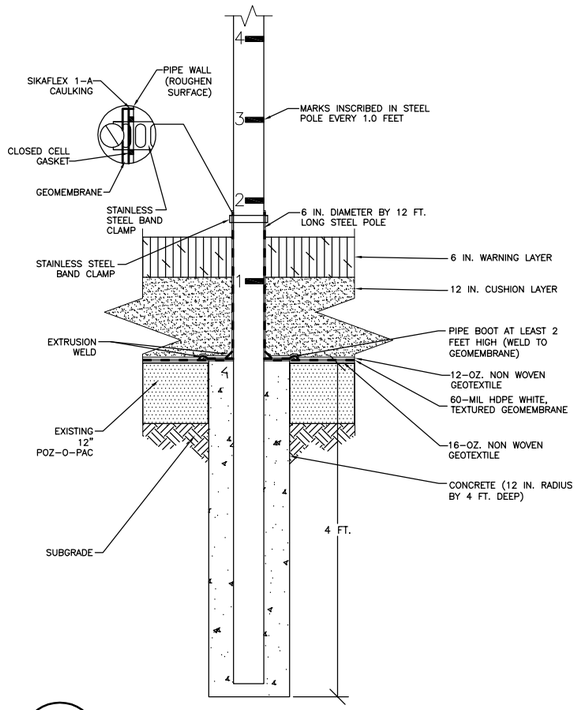
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/25/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

WARNING LAYER

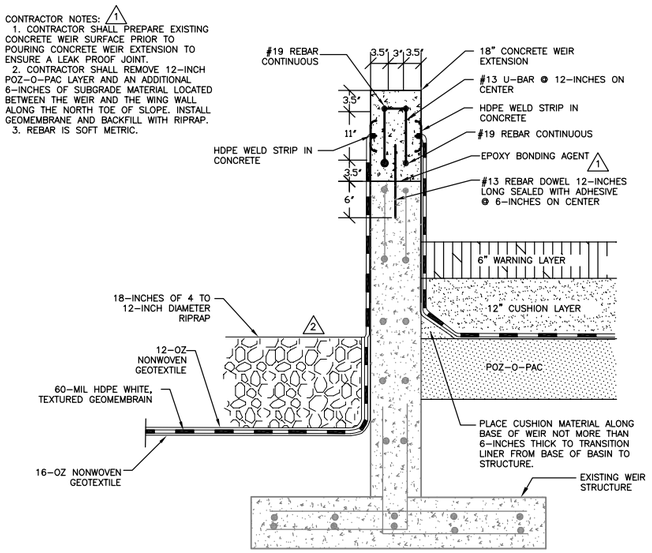
METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C030-03
REFERENCE: -
SHEET NO. C030



1 / C020 MARKER POST DETAIL
NOT TO SCALE

CONTRACTOR NOTES: △1
1. CONTRACTOR SHALL PREPARE EXISTING CONCRETE WEIR SURFACE PRIOR TO POURING CONCRETE WEIR EXTENSION TO ENSURE A LEAK PROOF JOINT.
2. CONTRACTOR SHALL REMOVE 12-INCH POZ-O-PAC LAYER AND AN ADDITIONAL 6-INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL ALONG THE NORTH TOE OF SLOPE. INSTALL GEOMEMBRANE AND BACKFILL WITH RIPRAP.
3. REBAR IS SOFT METRIC.



B / -- CONCRETE WEIR EXTENSION DETAIL
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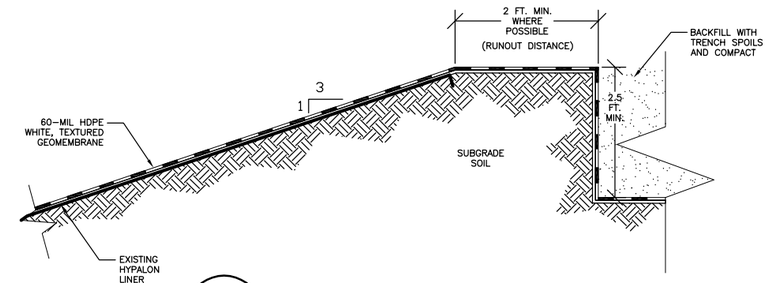

2 / C030 ANCHOR TRENCH SECTION
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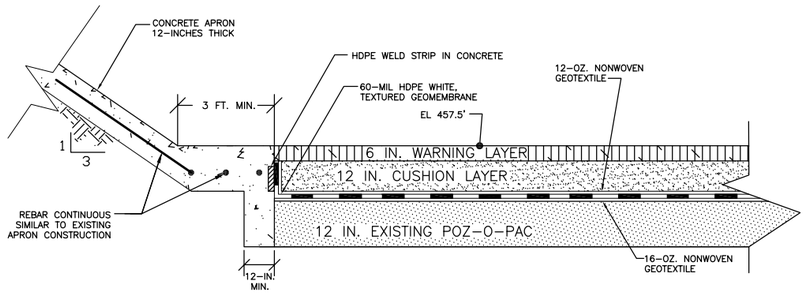

C / C030 CONCRETE INLET APRON SECTION
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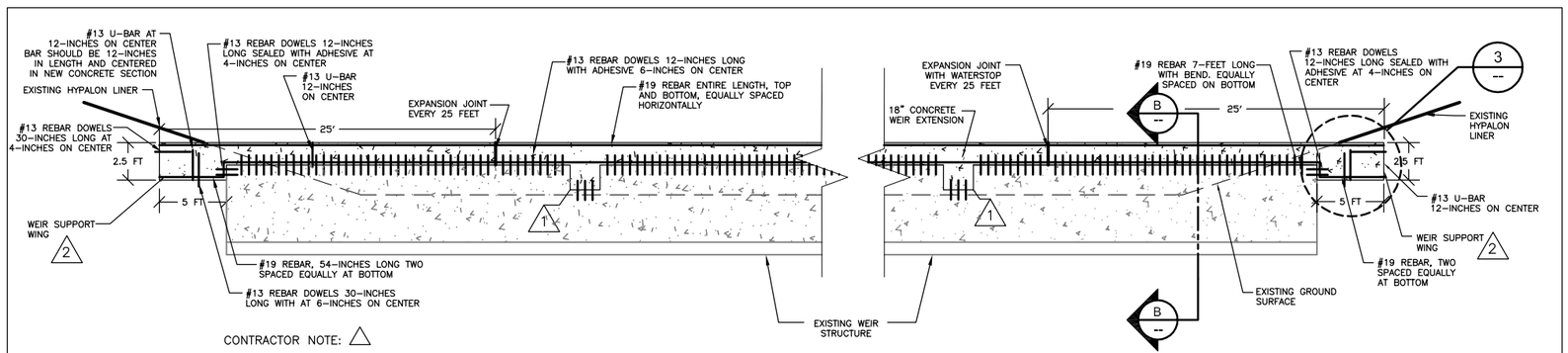
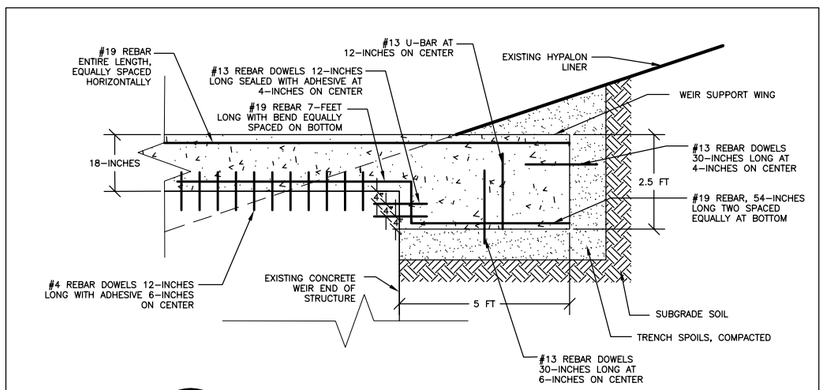


CONTRACTOR NOTE: △

1. CONTRACTOR SHALL REMOVE METAL SLIDING GATES AND REPLACE WITH CONCRETE REBAR DOWELS AND ADHESIVE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
2. CONTRACTOR SHALL INSTALL WEIR SUPPORT WINGS AND BACKFILL WITH TRENCH SPOILS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
3. REBAR IS SOFT METRIC.

A / C020 CONCRETE WEIR EXTENSION SECTION
NOT TO SCALE



3 / - WEIR SUPPORT WING DETAIL
NOT TO SCALE

6.			
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3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:

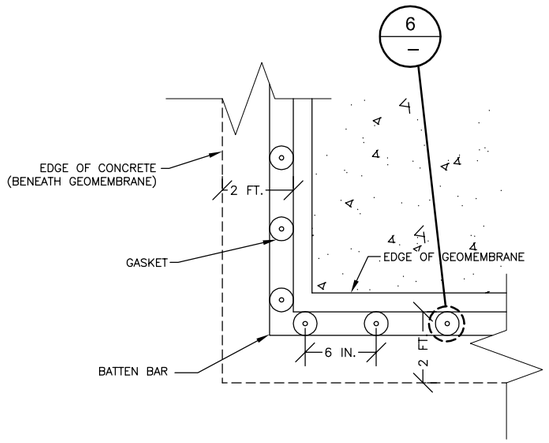
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/12/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

DETAILS AND SECTIONS

METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C031-03
REFERENCE:.
SHEET NO. C031



4 / C030 SUMP INLET APRON DETAIL
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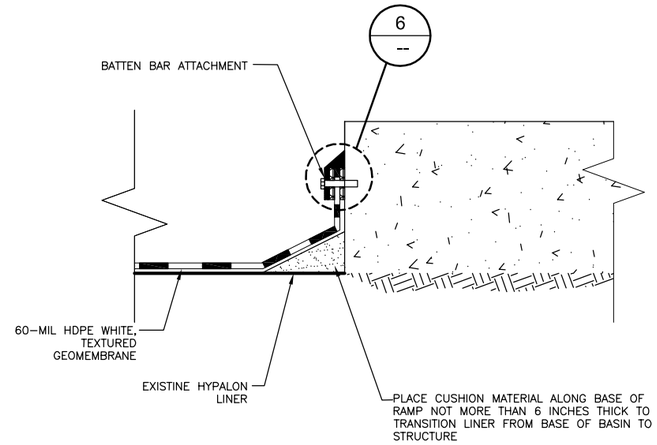
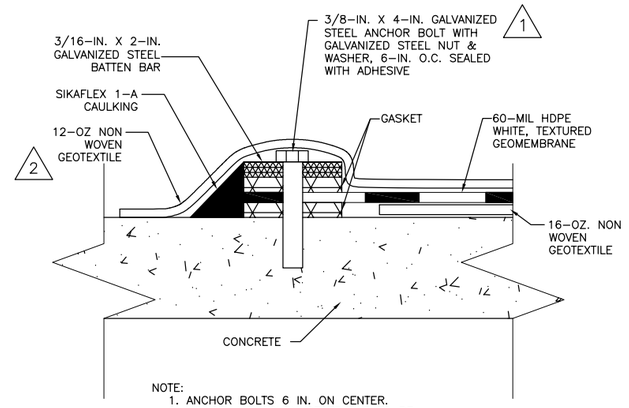
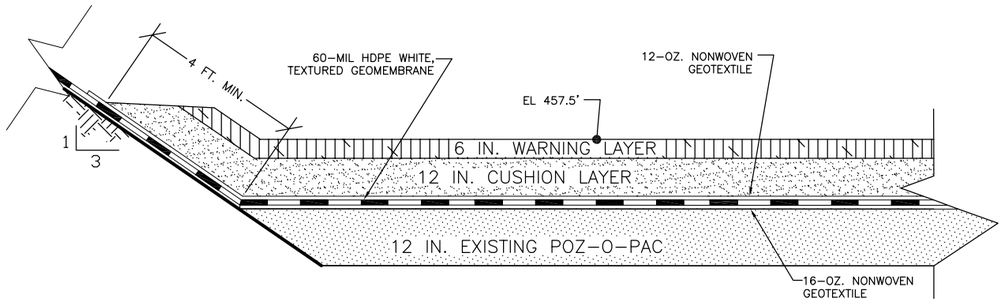


5 / -.-. CONCRETE RAMP CONNECTION DETAIL
NOT TO SCALE



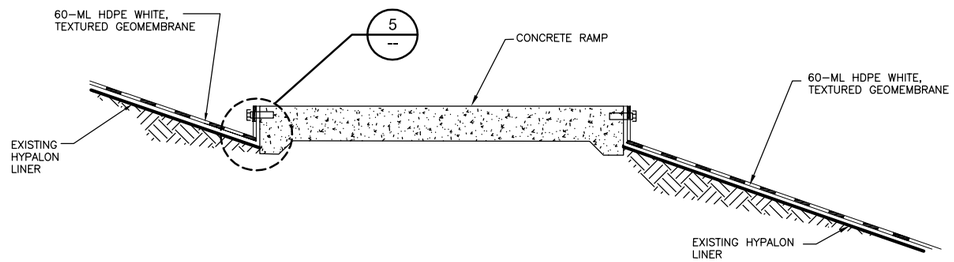
NOTE:
1. ANCHOR BOLTS 6 IN. ON CENTER.
2. 12-OZ. NONWOVEN GEOTEXTILE TO BE USED TO PROTECT GEOMEMBRANE BELOW CUSHION LAYER OR RIPRAP LAYER.

6 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE



NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED 2 TO 5 FT. FROM TOE OF SLOPE AT A MINIMUM.

D / C030 SLOPE TRANSITION SECTION
NOT TO SCALE



E / C030 CONCRETE RAMP SECTION
NOT TO SCALE

6.			
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2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/25/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

DETAILS AND SECTIONS

METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C032-03
REFERENCE:1965/4/

SHEET NO. C032