Geosyntec consultants

16644 West Bernardo Drive, Suite 301
San Diego, CA 92127
Phone: 858.674.6559
Fax: 858.674.6586
www.geosyntec.com

HISTORY OF CONSTRUCTION
ASH SURGE BASIN AND BYPASS BASIN
POWERTON STATION
OCTOBER 2016

Geosyntec Consultants (Geosyntec) prepared this history of construction report for the Ash Surge Basin and Bypass Basin located at the Powerton Station (Site) in Pekin, Illinois, which is owned and operated by Midwest Generation LLC (Midwest Generation). This history of construction report addresses the requirements of the Coal Combustion Residuals (CCR) Rule codified in the Code of Federal Regulations Title 40, Part 257, Subpart D. These regulations were published in the Federal Register on 17 April 2015 and became effective on 19 October 2015. This report identifies and addresses the specific requirements of §257.73(c) of the CCR Rule regarding preparing a history of construction report for CCR surface impoundments. Specifically, this report provides the history of construction through 17 October 2016 for the Ash Surge Basin and Bypass Basin.

This report was prepared under the direction of Ms. Jane Soule, P.E., and was reviewed in accordance with Geosyntec's internal review policy by Mr. Robert White of Geosyntec.

1. CCR Rule Requirements for History of Construction

History of construction requirements for existing CCR surface impoundments are included in the structural integrity criteria presented in §257.73 of the CCR Rule. The preamble of the CCR Rule (Page 21380) states that the history of construction for an existing CCR impoundment (in this case, the Ash Surge Basin and Bypass Basin) is required to include information only to the extent available and that only factual documentation, not anecdotal or speculative information, is to be included. Additionally, the preamble states that no new information should be generated to satisfy the requirements of §257.73(c).

2. History of Construction

2.1 Owner and Unit Identification - §257.73 (c)(1)(i)

Owner and unit identification for the Ash Surge Basin and Bypass Basin are presented in Table 1 below.

Table 1: Owner and Unit Identification

UNIT NAME	OWNER/OPERATOR	IDENTIFICATION NUMBER
Ash Surge Basin	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	IL0002232-001
Bypass Basin	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	IL0002232-001

2.2 Unit Location on USGS Map – §257.73 (c)(1)(ii)

The Site is located south of the Illinois River in the Pekin, Illinois. Figure 1 presents the location of the Ash Surge Basin and Bypass Basin on a 7.5-minute United States Geological Survey (USGS) topographic quadrangle map.

2.3 Purpose of the CCR Units – §257.73 (c)(1)(iii)

2.3.1 Ash Surge Basin

The Ash Surge Basin serves as a settling pond for sluiced CCR and other process waters related to electrical power generation at the Site.

2.3.2 Bypass Basin

The Bypass Basin serves as a settling pond for sluiced CCR and other process waters related to electrical power generation at the Site when the Ash Surge Basin is temporarily out of service for maintenance.

2.4 Name and Size of the Watershed – §257.73 (c)(1)(iv)

The Ash Surge Basin and the Bypass Basin are located in the Pekin Lake – Illinois River subwatershed (HUC12 071300030304), which is approximately 28,847 acres in size (USGS, 2015). However, surface water run-on to the basins is limited to the area within the embankment crests because the basins are constructed with elevated embankments surrounding them.

2.5 Description of Foundation– §257.73 (c)(1)(v)

The Ash Surge Basin and the Bypass Basin were constructed with fill embankments on all sides. Because no formational materials provide lateral structural support for the embankments, the

basins do not contain abutments. The remainder of this section addresses the foundation materials for the basins' embankments.

Information regarding the foundation materials at the Site is derived from geotechnical and hydrogeological investigations and engineering analyses (KPRG, 2005, Patrick Engineering, 2011, Geosyntec, 2016).

2.5.1 Properties of Foundation Materials

Foundation materials in the vicinity of the Ash Surge Basin and Bypass Basin generally consist of an interlayering of sandy and clayey units (KPRG, 2005). Publically available geologic information shows that the Site is underlain by approximately 100 to 125 feet of alluvial sands and gravels with some minor clay (Patrick Engineering, 2011). Logs from wells installed in the embankments of the Ash Surge Basin, as well as borings and cone penetration test (CPT) soundings in the vicinity of the basins, indicate silt and clay layers under the embankment fill (Patrick Engineering, 2011; Geosyntec, 2016). Well logs, boring logs, and CPT soundings show the thickness of the silt and clay layers ranging from 16 to 20 feet with approximately 34 to 43 feet of medium dense poorly graded sand and gravel below (Patrick Engineering 2011, Geosyntec, 2016). One boring and one CPT located east of the Ash Surge Basin indicated the presence of a layer of very hard lean clay below the poorly graded sand and gravel (Geosyntec, 2016).

2.5.2 Engineering Properties of Foundation

For engineering analyses, the foundation materials for the Ash Surge Basin and Bypass Basin were considered to either be clay or sand. Table 2 presents engineering properties for the clay and sand materials at the Site developed for the periodic structural stability and safety factor assessments (Geosyntec, 2016). These engineering properties are based on investigations performed at the Site, published correlations, and laboratory testing of samples collected from foundation soils during the Site investigations. Engineering properties were not developed for the very hard lean clay layer due to its relative depth below the ground surface and negligible contribution to the slope stability analyses.

Table 2: Foundation Material Engineering Properties

MATERIAL	UNIT WEIGHT (PCF)	DRAINED FRICTION ANGLE (DEGREES)	EFFECTIVE COHESION (PSF)	UNDRAINED SHEAR STRENGTH (PSF)
Clay	115	32	25	600
Sand	125	32	0	--

2.6 Description of the Materials, Methods, and Dates of Construction - §257.73 (c)(1)(vi)

The following sections describe the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the Ash Surge Basin and Bypass Basin, the method of site preparation and construction of each zone of the unit, and the approximate dates of construction of each successive stage of construction of the unit to the extent the information is available.

Information presented in the following sections is based on available construction drawings (NUS, 1978 and NUS, 1980) and subsequent investigations at the site. No as-built construction drawings or construction completion reports detailing the actual materials and methods used for the original construction of the basins were available for this report.

2.6.1 Ash Surge Basin

Based on the available construction drawings (NUS, 1978), embankments for the Ash Surge Basin were designed to be constructed using compacted fill. Additional detail of the compacted fill is included in prior investigations at the site (Patrick, 2011 and Geosyntec, 2016). The top of the embankment was designed to be 20 feet wide and have a gravel surfaced access road (NUS, 1978). The maximum height of the embankment is approximately 26 feet (measured from crest to downstream toe) in the northeast corner of the basin.

Interior embankments were designed at an inclination of 3H:1V (horizontal:vertical) and were originally lined with a geomembrane (Hypalon) liner (NUS, 1978). However, as-built subgrade topography from liner replacement construction in 2013 show interior slopes are inclined at approximately 4H:1V (NRT, 2014). The impoundment floor and portions of the slopes, including the southern slope below the inlet distribution trough, were lined with a Poz-O-Pac™ liner system to be installed in two 6-inch lifts (NUS, 1978). A description of the Poz-O-Pac™ liner system is not included in the Construction Drawings for the Ash Surge Basin, but is included in information provided from the available construction drawings for the Bypass Basin (NUS, 1980). In 2013, the membrane liner (and limited portions of the Poz-O-Pac liner near the outlet weir) were removed and replaced with a high-density polyethylene (HDPE) geomembrane liner (NRT, 2014). Exterior slopes were designed at 3H:1V or flatter.

2.6.2 Bypass Basin

A description of the embankment fill that was specified for the Bypass Basin is included in the available construction drawings for the Bypass Basin (NUS, 1980). Fill was specified to be placed and compacted in loose lifts not to exceed 9 inches and compacted to 95 percent relative compaction when compared to a maximum dry density obtained from a Modified Proctor test (NUS, 1980). Embankment construction for the Bypass Basin involved building the southern and

eastern embankments because the northern and western embankments are shared with previously constructed surface impoundments (CCR and non-CCR). The design width for the top of the embankment ranged from 12 to 18 feet and the maximum slope height is approximately 24 feet on the west side of the basin where the embankment is shared by the East Roof and Runoff Basin.

Interior embankments for the Bypass Basin were designed at an inclination of 3H:1V and were originally lined with a membrane (Hypalon) liner. The impoundment floor was lined with a Poz-O-Pac™ liner system (as described previously). In 2010, the original liner was removed and replaced with an HDPE geomembrane liner (NRT, 2011). Exterior slopes were designed at 2.5H:1V or flatter (NUS, 1980).

2.6.3 Engineering Properties

Engineering properties for the Embankment Fill used for the design and construction of the Ash Surge Basin and Bypass Basin embankment materials were not available at the time of this report. However, engineering properties were estimated for the Embankment Fill for use in the factor of safety assessment performed for the basins in accordance with the CCR Rule. The estimated engineering properties were based on investigations performed at the Site, published correlations, and laboratory testing of embankment materials and are presented in Geosyntec (2016) and reproduced in Table 3.

Table 3: Embankment Fill Engineering Properties

MATERIAL	UNIT WEIGHT (PCF)	DRAINED FRICTION ANGLE (DEGREES)	EFFECTIVE COHESION (PSF)
Embankment Fill	125	35	25

2.6.4 Construction Dates

Exact dates for construction of the Ash Surge Basin embankments, original liner system, and appurtenant structures are unknown; however, construction drawings were approved for construction in December 1978 (NUS, 1978). Replacement of the original liner system for the Ash Surge Basin was completed in 2013 (NRT, 2014).

Exact dates for construction of the Bypass Basin embankments, original liner system, and appurtenant structures are also unknown; however, construction drawings were approved for construction in June 1980 (NUS, 1980) and indicate that construction of the Ash Surge Basin was complete prior to design of the Bypass Basin. Replacement of the original liner system for the Bypass Basin was completed in 2010 (NRT, 2011).

2.7 Drawings - §257.73 (c)(1)(vii)

Available construction drawings relevant to the design, construction, operation, and maintenance of the Ash Surge Basin and the Bypass Basin are included in Appendix A and Appendix B, respectively. Appendix A-1 includes the available construction drawings for the Ash Surge Basin (NUS, 1978) and Appendix A-2 includes the construction record drawings for the liner replacement activities conducted in 2013 (NRT, 2014). Appendix B-1 includes the available construction drawings for the Bypass Basin (NUS, 1978) and Appendix B-2 includes the construction record drawings for the liner replacement activities conducted in 2010 (NRT, 2011).

2.8 Instrumentation - §257.73 (c)(1)(viii)

Instrumentation monitored for operation of the Ash Surge Basin and Bypass Basin includes a water level monitoring system. The water level monitoring system includes an ultrasonic level detector located in the pump house sump north of the Ash Surge Basin which is connected to contactors that control the pumps to maintain operational water levels in the basins.

2.9 Area-Capacity Curve - §257.73 (c)(1)(ix)

Area-capacity curves for the Ash Surge Basin and the Bypass Basin are included as Figure 2.

2.10 Spillway Description and Calculations - §257.73 (c)(1)(x)

A concrete spillway is located along the eastern perimeter of the Ash Surge Basin. The spillway is constructed of two 4.5-foot wide concrete box culverts beneath the perimeter access road (NUS, 1978). A concrete apron is located east of the box culvert and rip rap is located downstream of the apron. Calculations for the original design of the Ash Surge Basin spillway were not available at the time of this report.

The Bypass Basin includes a corrugated metal overflow pipe located along the northern interior slope of the basin that extends approximately 40 feet northward beneath the access road into the Ash Surge Basin. This overflow pipe includes a 5-foot diameter corrugated metal pipe vertical riser which connects to a 30-inch diameter concrete pipe that extends northward within the embankment between the Bypass and Ash Surge Basins and discharges onto the concrete apron on the southern slope of the Ash Surge Basin. Calculations for the original design of the Bypass Basin overflow pipe were not available at the time of this report.

2.11 Construction Specifications and Provisions for Surveillance, Maintenance and Repair - §257.73 (c)(1)(xi)

The only construction specifications available for this report are the HDPE geomembrane specifications for the liner replacement projects performed in 2010 and 2013 for the Bypass Basin and Ash Surge Basin, respectively. Generally, the HDPE geomembrane specifications identify that an HDPE, white, 60-mil, textured geomembrane be used for the projects. They also identify deployment and seaming requirements, quality control procedures, and requirements for materials placed above the geomembrane. The geomembrane specifications are included in Appendices C and D for the Ash Surge Basin and Bypass Basin, respectively.

As part of the 2010 and 2013 liner replacement projects, warning posts were installed at the toe of interior basin slopes above the geomembrane liner system. These posts are utilized as a visual guide to identify the toe of slope during CCR removal operations to limit potential damage to the liner system.

2.12 Record of Any Structural Instability - §257.73 (c)(1)(xii)

Based on our discussions with Site staff and review of the construction documentation provided herein, there are no records or knowledge of structural instability for the Ash Surge Basin and the Bypass Basin.

3. References

Geosyntec, 2016. Soil Properties Calculation, Ash Surge Basin and Bypass Basin, Powerton Station. October.

KPRG and Associates, Inc., 2005. Geotechnical Analysis of Soil Surrounding Settling Basins/Ponds, KPRG Project No. 15805, October.

Natural Resource Technology (NRT), 2011. Construction Documentation Transmittal – Metal Cleaning Basin and Bypass Basin Liner Replacement, dated 27 June 2011.

NRT, 2014. Construction Documentation Transmittal – Ash Surge Basin Liner Replacement, Midwest Generation Powerton Generation Station, dated 18 July 2014.

NUS Corporation (NUS), 1978. Waste Water Treatment Facility Drawings:

Detail Plan, Ash Surge Basin, Sheet No. 3B-0-2071, redrawn from NUS Dwg. #5080 C 5007 1 of 1, 1978.

Ash Surge Basin, Sections & Details, Sheet No. 3B-0-2075, redrawn from NUS Dwg. # 5080 C 5012 1 of 1, 1978.

Miscellaneous Sections & Details, NUS Dwg. # 5080 C 5015 1 of 2, Rev 2, 1978.

Sludge Weirs, Sections & Details, Sheet No. 3B-0-2089, redrawn from NUW Dwg. #C 5080 C 5506, 1 of 1, 1978.

Ramps & Ash Surge Basin, Overflow Structure, Sheet No. 3B-0-2090, redrawn from NUW Dwg. #5080 C 5507 1 of 1, 1978.

Ash Surge Basin and Limestone Basin Dist. Troughs – Sections, Sheet No. 3B-0-2092, redrawn from NUS Dwg. #5080 C 5509 1 of 1, 1978.

Ash Surge Basin, Wing Wall – Sheet No. 3B-0-2093, redrawn from NUS Dwg dated 1978.

Dewatering Bin Overflow Channel, Sections & Details, Sheet No. 3B-0-2094, redrawn from NUS Dwg # 5080 C 5511 1 of 1, 1978.

Ash Surge Basin, Sump – Soil Profile, Sheet No. 3B-0-2106, redrawn from NUS Dwg # 5080 C 5586 1 of 1, 1978.

Site Plan, East Roof & Yard Runoff Basin, Sheet No. 3B-0-2067, redrawn from NUS Dwg. #5080 C 5002 1 of 1, 1978.

NUS, 1980. Waste Water Treatment Facilities Powerton:

Ash Surge Basin By Pass Plan and Profile, Sheet No. 5295 C 5001.

Ash Surge Basin By Pass Sections and Ramp Profiles, Sheet No. 5295 C 5002.

Ash Surge Basin By Pass Miscellaneous Details, Sheet No. 5295 C 5003.

Ash Surge Basin By Pass Basin Inlet Structure, Sheet No. 5295 C 5501.

Ash Surge Basin By Pass Basin Outlet Structure, Sheet No. 5295 C 5502.

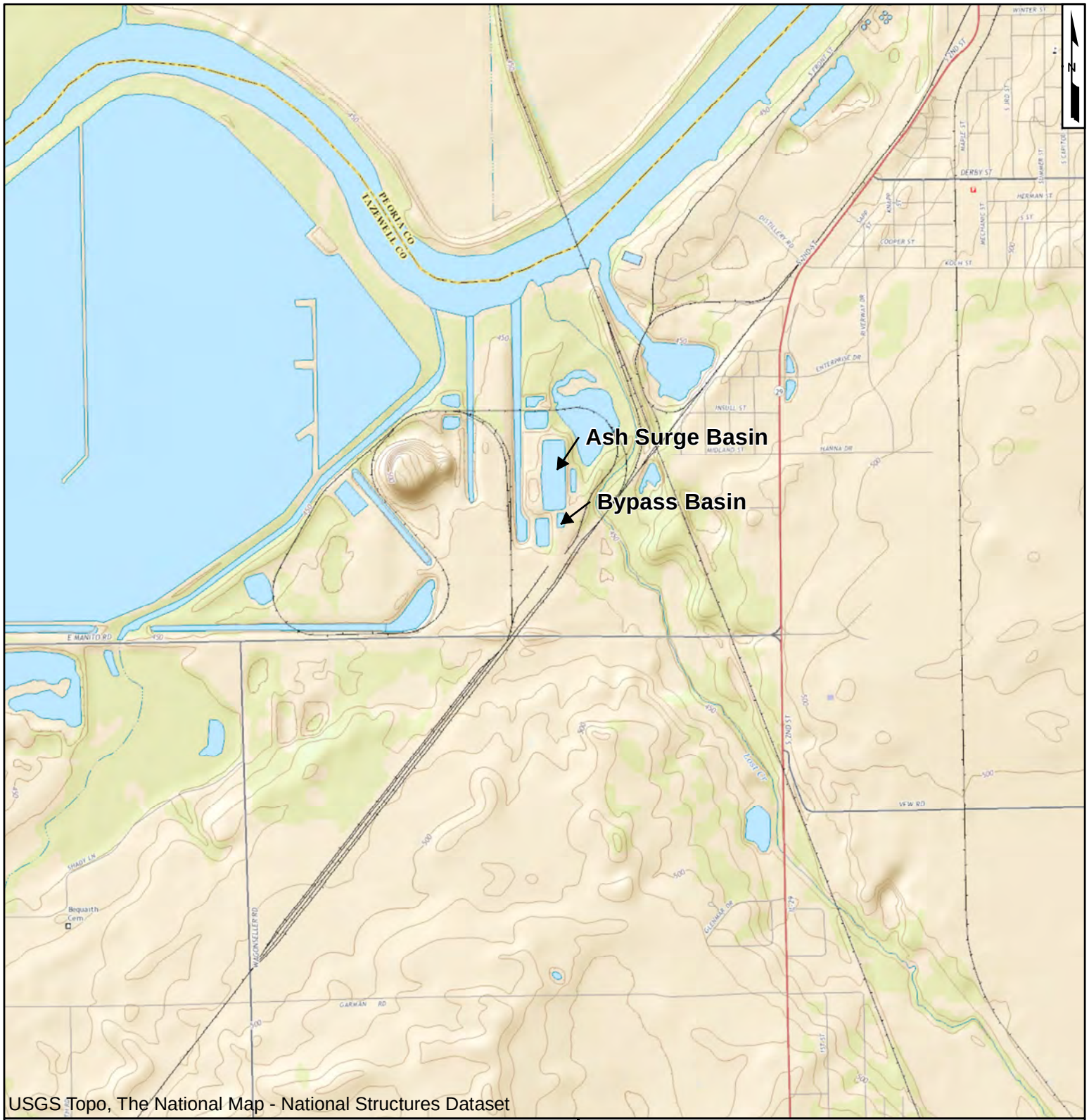
Ash Surge Basin By Pass Basin Miscellaneous Slide Gates, Sheet No. 5295 C 5503.

Patrick Engineering, 2011. Hydrogeological Assessment Report, Powerton Generating Station, Pekin, Illinois, Patrick Project No. 21053.070, February.

USGS (2015). "Watershed Boundary Dataset," accessed via The National Map, http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd, accessed 1 February 2016.

Attachments

Figure 1 – Site Location
Figure 2 – Area-Capacity Curves
Appendix A – Ash Surge Basin Construction Drawings
Appendix A-1 NUS Construction Drawings
Appendix A-2 Liner Replacement Drawings
Appendix B – Ash Surge Basin Construction Drawings



2,000 1,000 0 2,000 Feet

Site Location

Ash Surge and Bypass Basins
Powerton Station
Pekin, Illinois

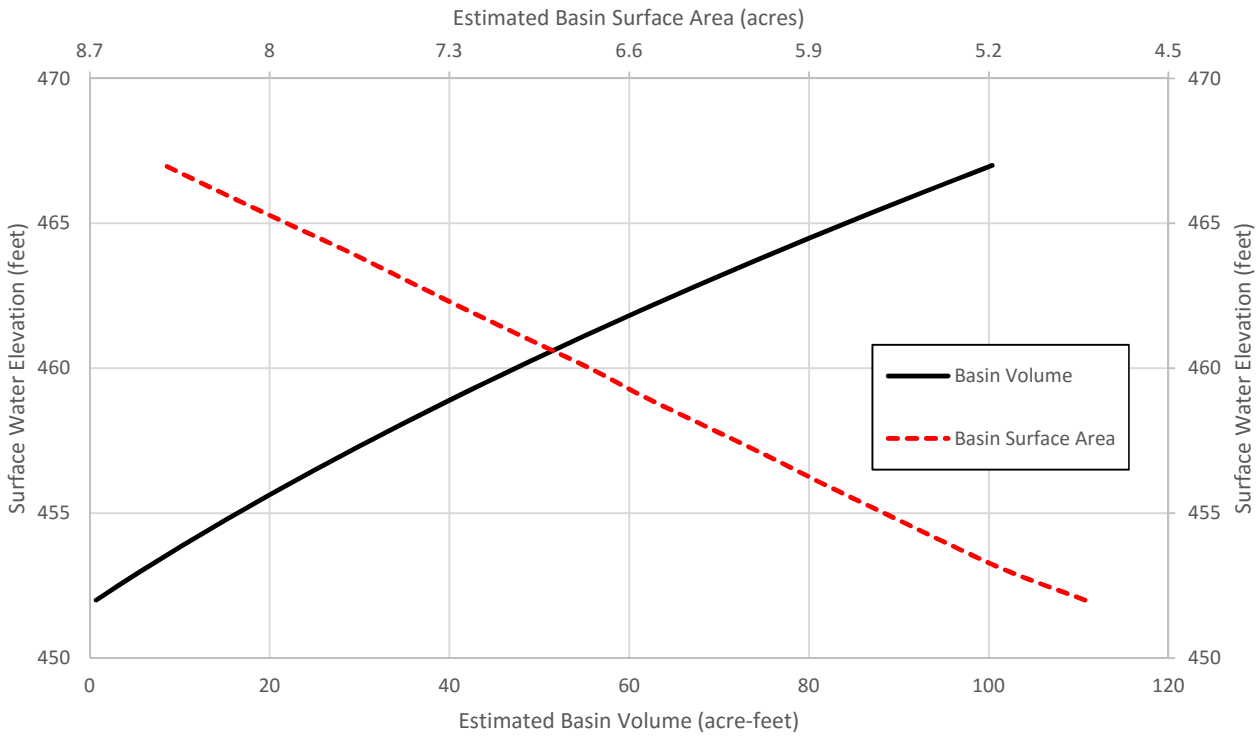
Geosyntec consultants

San Diego | October 2016

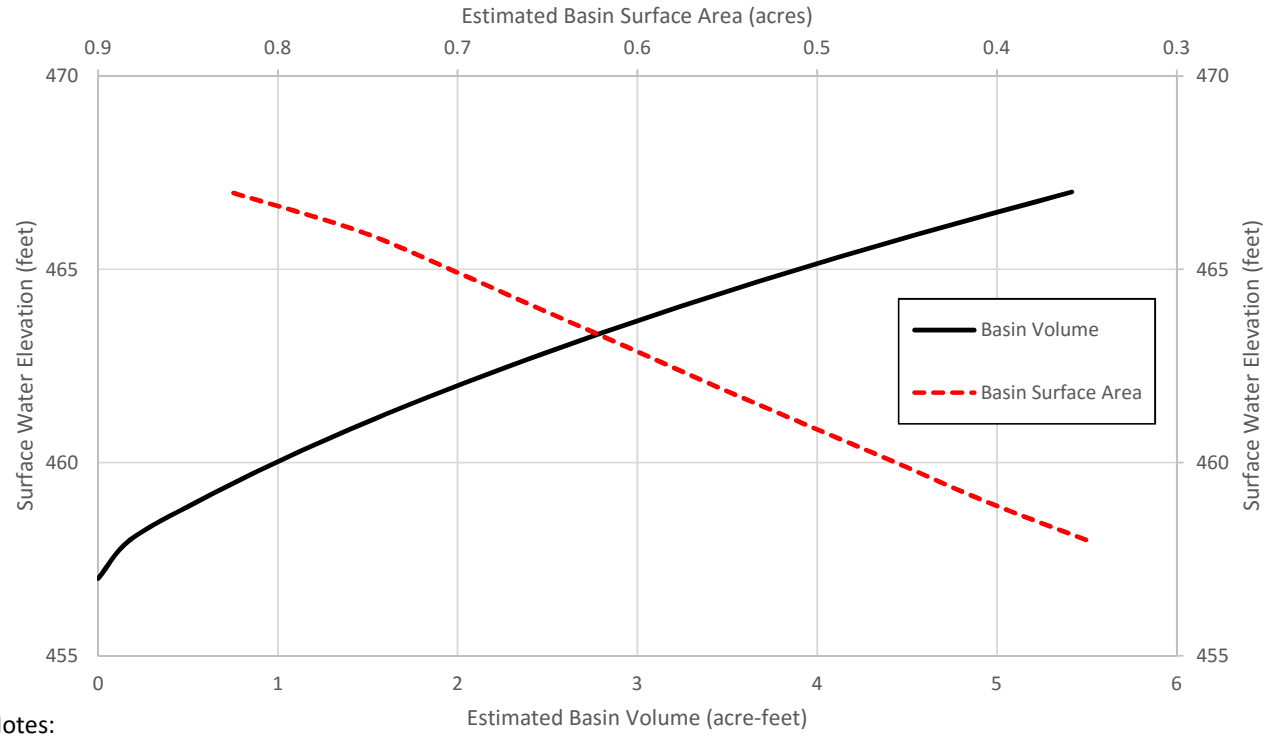
Figure 1

K:\GIS\PowertonSiteLocation.mxd Name

Ash Surge Basin



Bypass Basin



Notes:
(1) Surface water elevations are NAD83.
(2) Basin volumes are estimated based on as-built information and 2008 site topography.

Geosyntec consultants OCTOBER 2016 SW0251-07	AREA-CAPACITY CURVES ASH SURGE & BYPASS BASINS POWERTON STATION PEKIN, ILLINOIS	**FIGURE 2**

APPENDIX A

Ash Surge Basin Construction Drawing

APPENDIX A-1

NUS Construction Drawings

3B-0-2071

LIMESTONE PILE

GRADE SLOPE TO MEET SHEET OF STRUCTURE

OVERFLOW

PLACE RIP-RAP ON 1" TO EL 468.0 1.0' MIN

EL 468.0

EDGE OF MEMBRANE LINER

INV 466.0

LIMITS OF POZZOLANIC PAVING

457.0

3:1 SLOPE

SLOPE EXISTING TO GRADE

LINER ANCHOR SEE DWG. "C-5015-2

LIMITS OF MEMBRANE LINER

SLOPE VARIES TO MEET FUTURE LIMESTONE PILE RUNOFF DITCH

STATION 0+00
INV EL. 466.0
1+13.17

FOR CONTINUATION OF CHANNEL SEE DWG. "C 5005

468.6

463.0

STA. 1+00
INV. EL. 466.5

SLOPE 0.5%

DEWATERING BIN OVERFLOW DITCH
SEE DWG "C-5508

469.0

FUTURE BUMP BY OTHERS

GRADE TO EL 460.0

TEMPORARY END CAP

PROVIDE 80'-48" Ø RCP CL II DISCHARGE PIPE

WINGWALL STRUCTURE SEE DWG "C-5810

EL 452.0

N15°-7E
E 6-50

WEIR
SEE DWG "C 5508

LINED ASH SURGE BASIN

BOTTOM EL. 452.0

380'

DUE NORTH

N 6115
E 6150

FOR TYPICAL DETAIL FOR 0.060 HYPALON LINER SEE DWG "C5015

LIMITS OF MEMBRANE LINER

FOR RAMP SEE DWG "C 5008
FOR DETAIL SEE DWG "C 5507

DISTRIBUTION TROUGH
SEE DWG "C-5509

X4584

LIMITS OF POZZOLANIC PAVING

X 458.9

X456.3

EDGE OF MEMBRANE LINER

EL 465

EL 468.0

CONCRETE RAMP 10% SLOPE

GRAVEL ROAD SEE DETAIL DWG "C 5015.1

EXISTING GRAVEL ROAD

E 5+00

N 5+00

460.0

METAL CLEANING
WASTE EQUALIZATION BASIN
SEE DWG "C5008

NOTES

1. FOR GENERAL NOTES SEE DWG. C5001
2. FOR LEGEND SEE DWG. C5000-1.
3. FOR SPECIAL NOTES ON ASH SURGE BASIN SEE DWG. C5012.
4. FOR EXISTING SITE TOPOGRAPHY SEE DWG. C5002.
5. FOR SITE GRADING SEE DWG. C5002.
6. EXISTING CONTOURS AT TWO FOOT INTERVALS.

APPROVED FOR CONSTRUCTION 5-12-78

REDRAWN FROM NUS DWG. #5080 C 5007 1 OF 1, REV. 2, DTD. 5-12-78

BY:							
BY:							
BY:							
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDM	---	---	---
BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG	APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
DETAIL PLAN
ASH SURGE BASIN

STA. 3 POWERTON

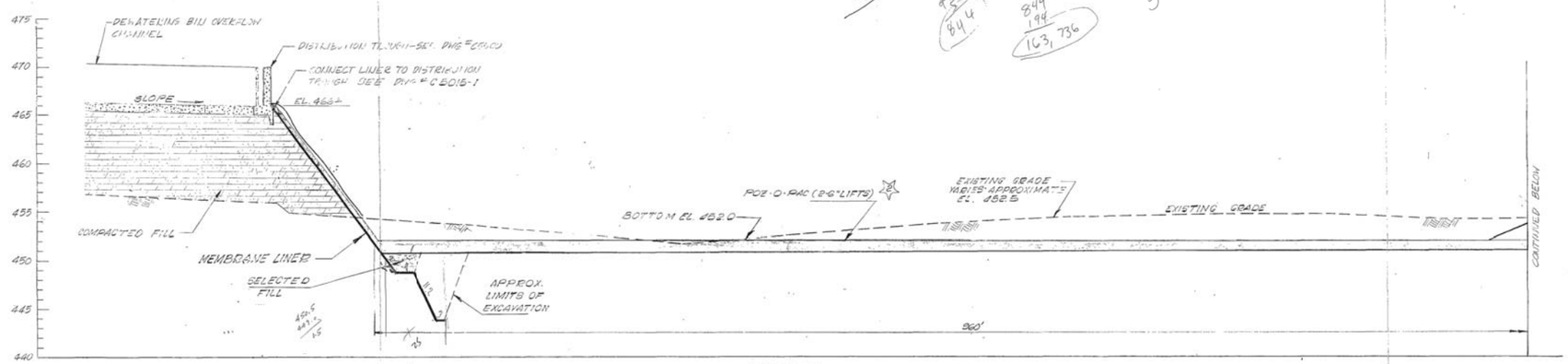
MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE 1"=20' DC –
DATE 03-06-03 SC –

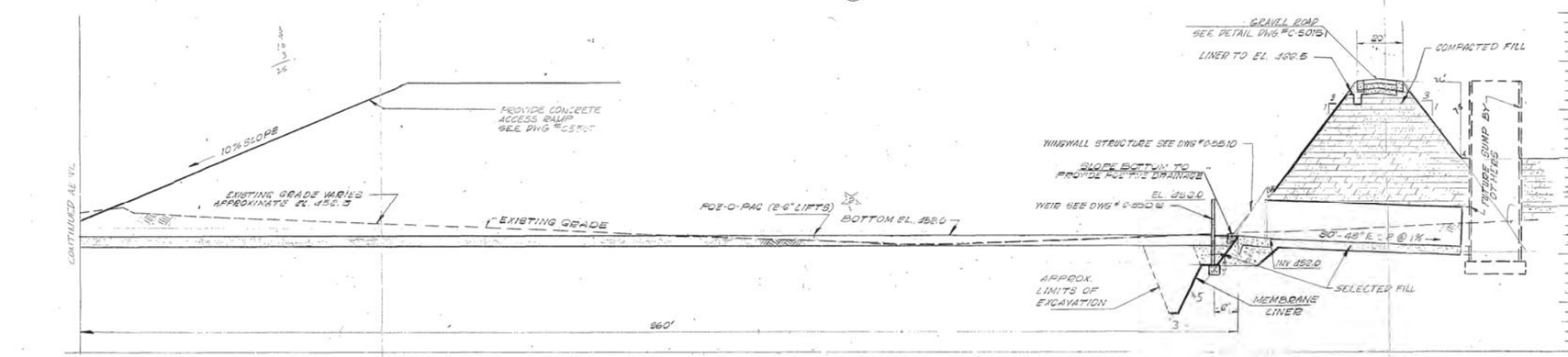
3B-0-2071

RCAD 3B-0-2071_A.TIF J. L. MEECE ENG. 03-06-03

3B-0-2075



SECTION F



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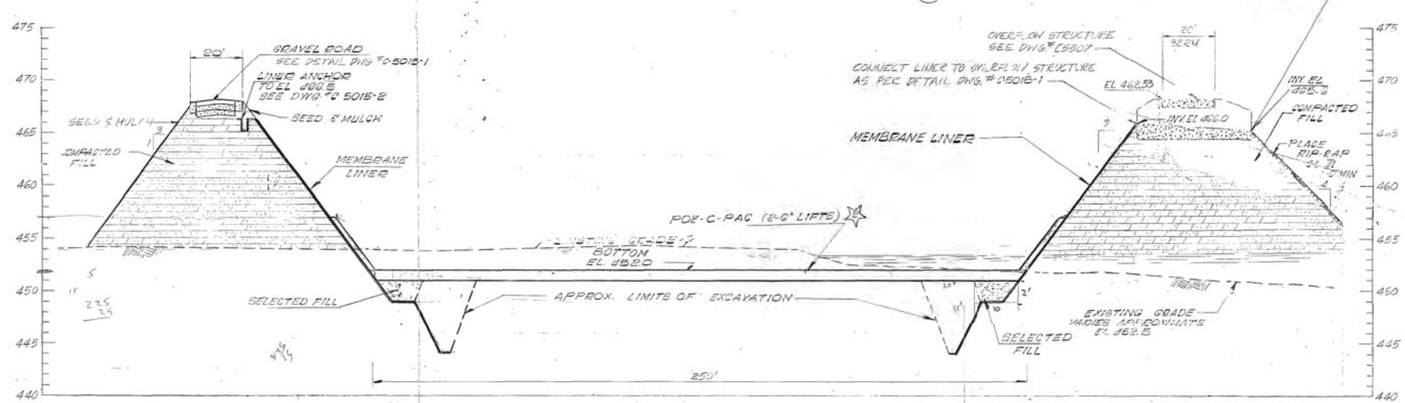


SECTION G

NOTES

1. FOR GENERAL NOTES SEE DWG. C5001.
2. FOR LEGEND SEE DWG. C5001-1.
3. CONTRACTOR TO DEWATER CONSTRUCTION AREA TO EL. 443.0 BY APPROVED METHOD(S) PRIOR TO BASIN CONSTRUCTION.
4. FOR ROAD SECTIONS SEE DWG.# C 5015-1
5. FOR SITE GRADING SEE DWG.# C5002.

FOR TYPICAL DETAIL POZ-O-PAC W/ HALON LINER SEE DWG #C5018

SCALE: HOR. 1"=20' VERT. 1"=5'

APPROVED FOR CONSTRUCTION 5-12-78

REDRAWN FROM NUS DWG. #5080 C 5012.1 OF 1, REV. 2, DTD. 5-12-78

BY:						
BY:						
BY:						
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	--	--
BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG/APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN
SECTIONS & DETAILS

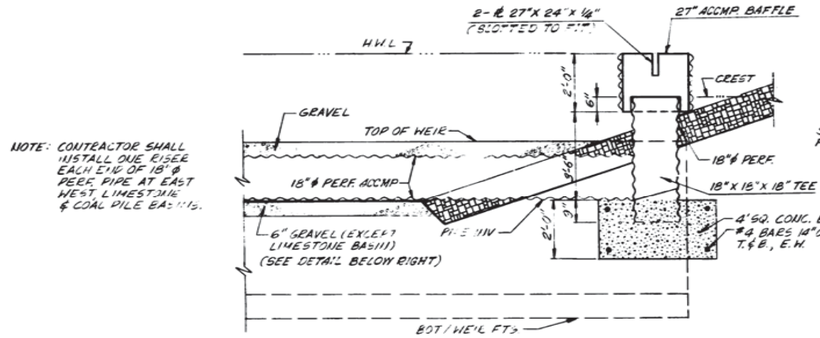
STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE	AS SHOWN	DC	–
DATE	03-06-03	SC	–

3B-0-2075

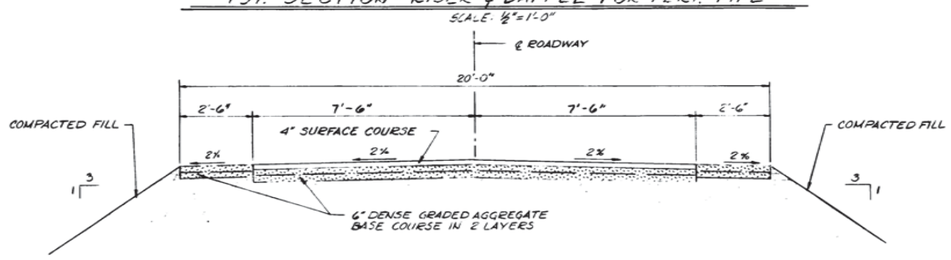
RCAD 3B-0-2075_A.TIF J. L. MEECE ENG. 03-06-03



NOTE: CONTRACTOR SHALL INSTALL ONE RISER EACH END OF 18"ø PERF. PIPE AT EAST WEST LIMESTONE & COAL PILE BASINS.

☆ TYP. SECTION - RISER & BAFFLE FOR PERF. PIPE

SCALE: 1/2"=1'-0"



TYPICAL ROAD SECTION

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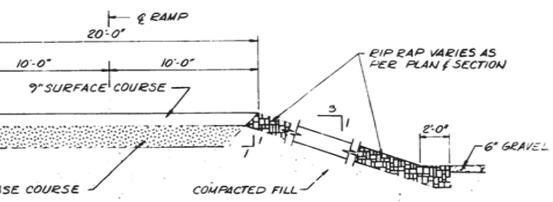
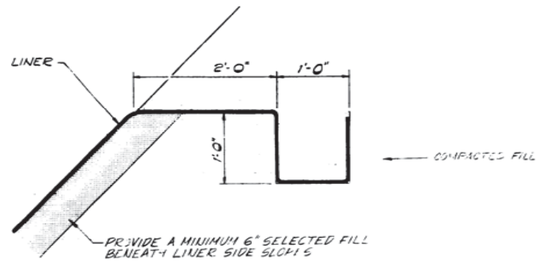
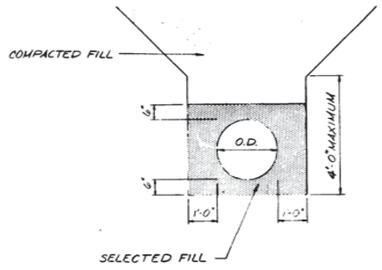


TYPICAL SECTION GRAVEL RAMP

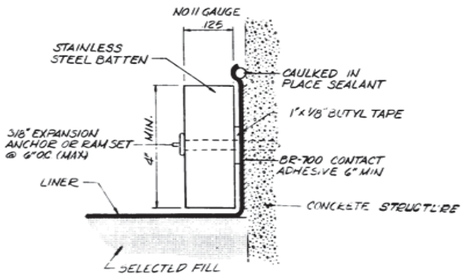
SCALE: 1"=4'





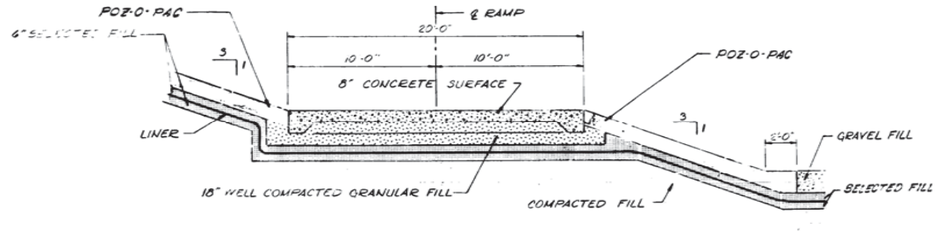
PIPE BEDDING DETAIL

SCALE 1"=2'

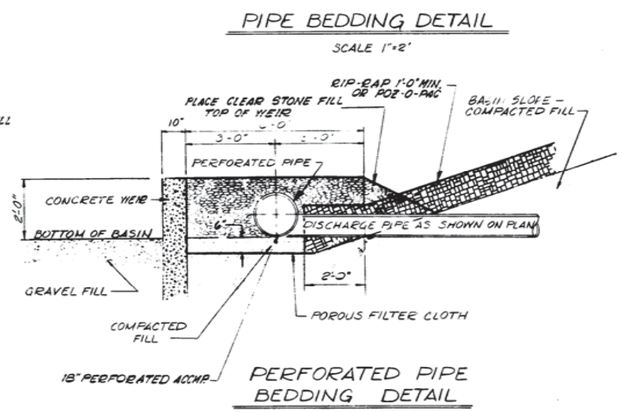


LINER ANCHOR DETAILS

NO SCALE

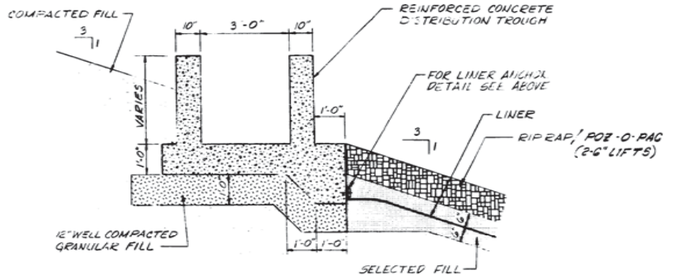


TYPICAL CONCRETE RAMP SECTION LINER BELOW RAMP



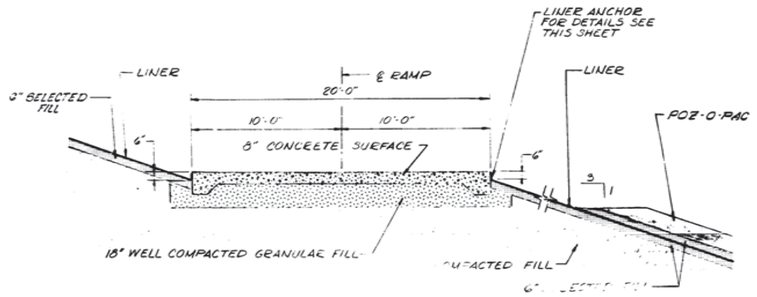
PERFORATED PIPE BEDDING DETAIL

SCALE: 1"=2'



LINER ANCHORAGE FOR DISTRIBUTION TROUGH

SCALE: 1"=2'



TYPICAL CONCRETE RAMP SECTION LINER ON GRADE

SCALE: 1"=4'
FOR TYPICAL SECTION SEE DWG. C055

NOTES:

1. FOR GENERAL NOTES SEE DWG. C-5001
2. FOR LEGEND SEE DWG. C-5000-1

GRAPHIC SCALE

2 1 0 2 4
4 3 2 1 0 4 8

Sudhaner P. Verma 5/11/78

DRAWING STATUS

APPROVED FOR CONSTRUCTION

Date 12/19/78

DRAWN	J. Teoc	7/1/77
CHECKED		7/19/78
CONS. ENGINEER		7/19/78
DISCIP. MGR. APPVL.		7/19/78
APPROVAL		9/29/78
APPROVAL		
APPROVAL PROJ. ENGR.		9/18/78
APPROVAL CLIENT		

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

MISCELLANEOUS SECTIONS & DETAILS

CECO CONTRACT: 802467 | CECO DWG. NO. | REV.

NUS CORPORATION ROCKVILLE, MD. | DRAWING NO. 5080 C 5015 | REV. 2

SCALE: AS SHOWN | SHEET 1 OF 2

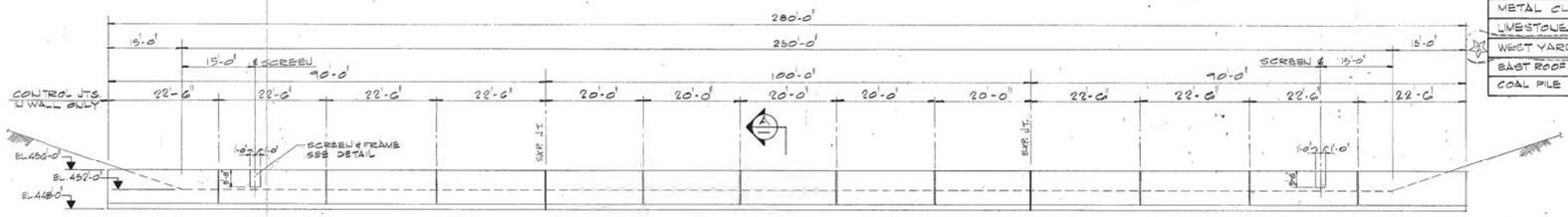
2/14/78	CONSTRUCTION.
8/29/78	ADDED RISER, BAFFLE DETAIL

SPECIFICATIONS CHK. BY 62-3335-3

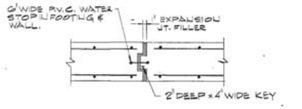
PLOTTED BY 12/20/78 9:19 AM

3B-0-2089

REFERENCE DRAWINGS	
WEIR LOCATION	CIVIL DWG. NO.
ASH SURGE BASIN	5080 C 5007
METAL CLEANING	5080 C 5008
LIMESTONE BASIN	5080 C 5008
WEST YARD BASIN	5080 C 5018
EAST ROOF & YARD BASIN	5080 C 5005
COAL PILE	5080 C 5006

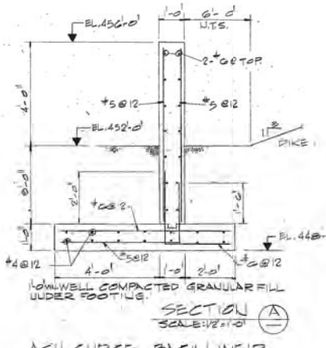


ASH SURGE BASIN WEIR
SCALE: 3/32" = 1'-0"



EXPANSION JOINT
(IN WALL & FOOTING)

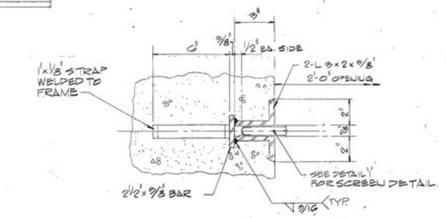
CONTROL JOINT



10" WELL COMPACTED GRANULAR FILL UNDER FOOTING.

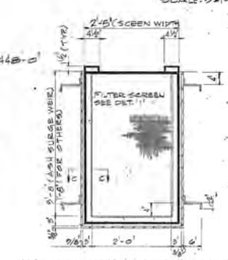
SECTION (A)
SCALE: 1/2" = 1'-0"

ASH SURGE BASIN WEIR
BASIN CONSTRUCTION AS PER DWG. 5080 C 5012 & SPECS.

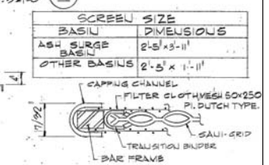


NOTE: ALL EXPOSED STEEL TO BE GALVANIZED

SECTION (C)
SCALE: 3/4" = 1'-0"



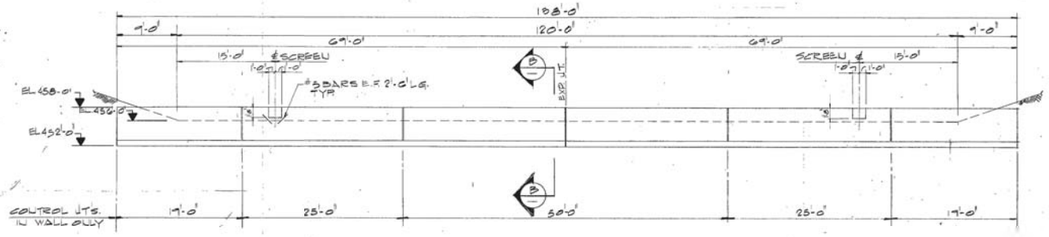
SCREEN SIZE	
BASIN	DIMENSIONS
ASH SURGE BASIN	2'-5" x 3'-11"
OTHER BASINS	2'-5" x 1'-11"



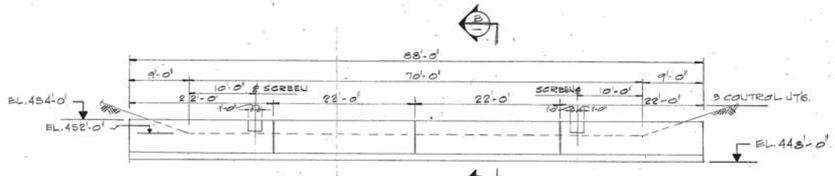
DETAIL 1
U.T.S.

FILTER SCREEN
MANUFACTURED BY SAUI-FILTRATION PRODUCTS DIVISION LEWARK WIRE CLOTH CO. OR APPROVED EQUAL.

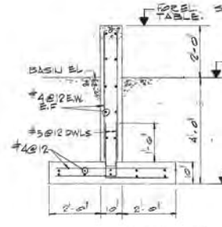
WEIR SCREEN FRAME DETAIL
SCALE: 3/4" = 1'-0"



METAL CLEANING EQUALIZATION BASIN WEIR
SCALE: 1/8" = 1'-0"

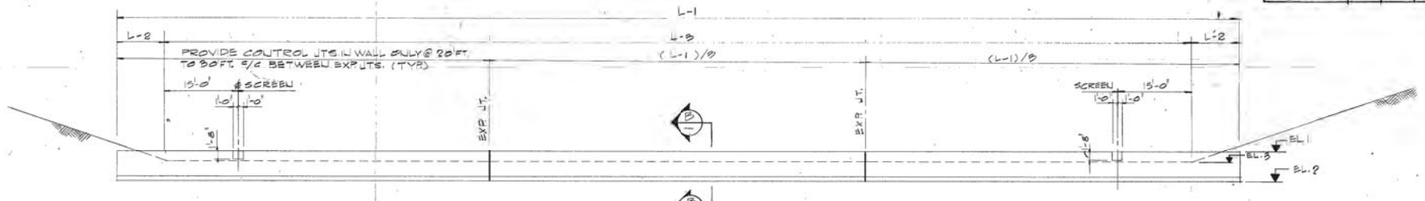


LIMESTONE RUNOFF BASIN WEIR
SCALE: 1/8" = 1'-0"



SECTION (B)
SCALE: 1/2" = 1'-0"

WEIR TABLE							
NAME OF BASIN	L-1	L-2	L-3	EL. 1	EL. 2	EL. 3
WEST YARD BASIN	268'	9'-0"	250'	456'	445'	447'
EAST YARD BASIN	198'	7'-0"	180'	447'	441'	445'
COAL PILE SKEG	252'	13'-0"	806'	445'	439'	443'



TYPICAL WEIR FOR
WEST ROOF & YARD BASIN
EAST ROOF & YARD BASIN
COAL PILE BASIN
SCALE: 3/32" = 1'-0"

NOTES:

1. FOR GENERAL NOTES SEE DWG. C 5501

DRAWING STATUS
APPROVED FOR CONSTRUCTION
4/7/78 Date

REDRAWN FROM NUS DWG. #5080 C 5506 1 OF 1, REV. 2, DTD. 6-7-78

BY:	REV	DATE	REVISION	BY	CKD	ENG/APPD
BY:						
BY:						
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	---	---
BY: (FIRM MAKING REVISIONS)						

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
SLUDGE WEIRS
SECTIONS & DETAILS

STA. 3 POWERTON

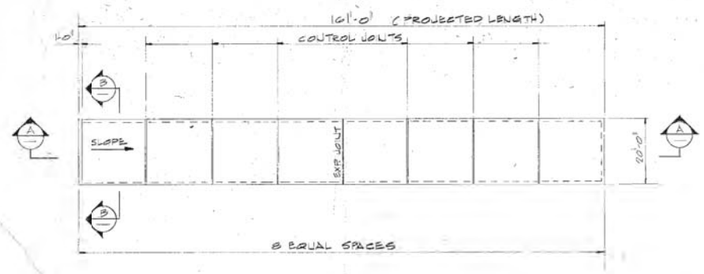
MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE	AS SHOWN	DC	–
DATE	03-06-03	SC	–

3B-0-2089

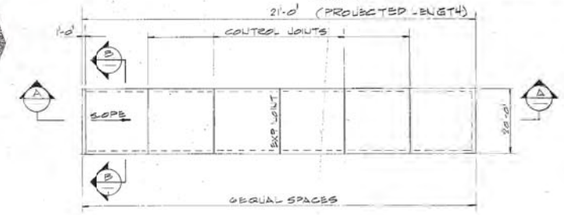
RCAD 3B-0-2089_A.TIF J. L. MEECE ENG. 03-06-03

3B-0-2090



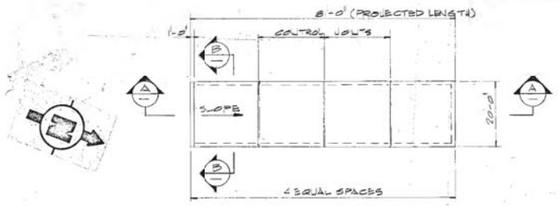
PLAN

RAMP FOR ASH SURGE BASIN (REF DWG 5080 C 5002)
SCALE: 1/12" = 1'-0"



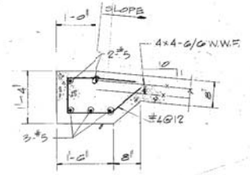
PLAN

RAMP FOR METAL CLEANING BASIN (REF DWG 5080 C 5003)
SCALE: 1/12" = 1'-0"

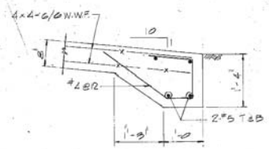


PLAN

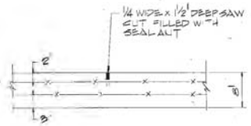
RAMP FOR LIMESTONE BASIN (REF. DWG. 5080 C 5008)
SCALE: 1/12" = 1'-0"



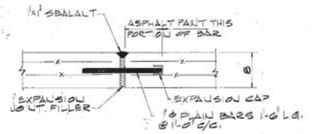
DETAIL '1'
SCALE: 3/4" = 1'-0"



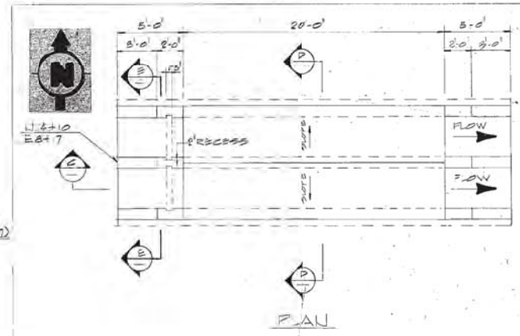
DETAIL '2'
SCALE: 3/4" = 1'-0"



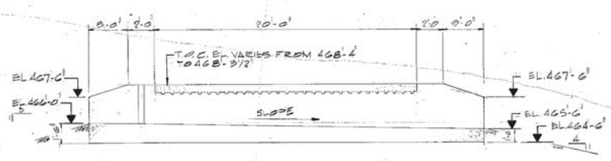
CONTROL JOINT
SCALE: 1"=1'-0"



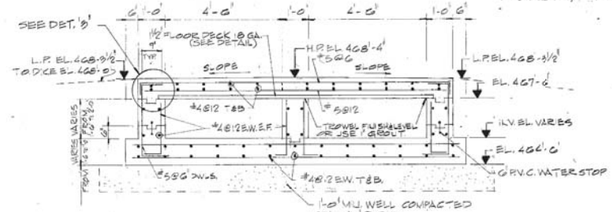
EXPANSION JOINT
SCALE: 1"=1'-0"



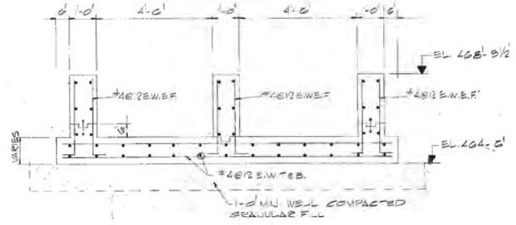
PLAN



SECTION C
SCALE: 1/4"=1'-0"

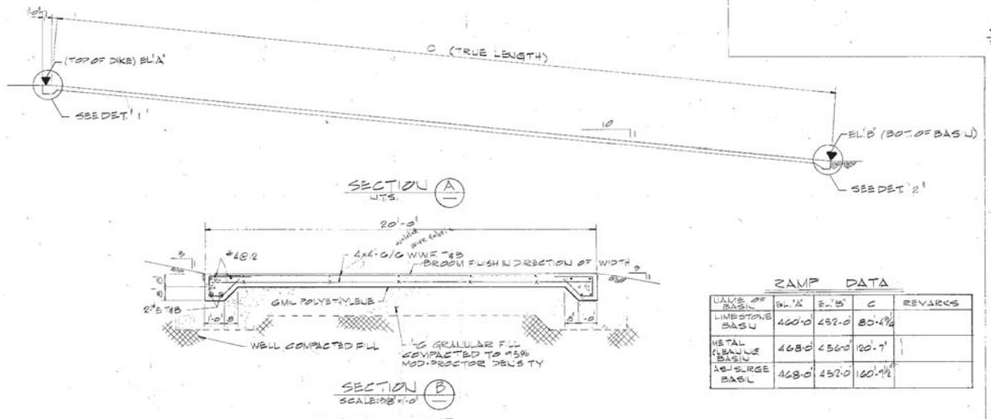


SECTION D
SCALE: 1/2"=1'-0"



SECTION E
SCALE: 1/2"=1'-0"

ASH SURGE BASIN OVERFLOW STRUCTURE (REF DWG 5080 C 5007)
SCALE: 1/2" = 1'-0"



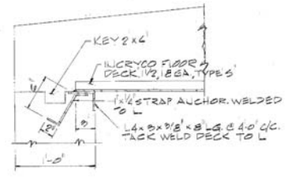
SECTION A
JTS.

SECTION B

TYPICAL RAMP
(FOR LIVER DETAILS SEE DWG. C 5015 SHT. 1)

RAMP DATA

LOCATION OF BASIN	EL. 'A'	EL. 'B'	C	REMARKS
LIMESTONE BASIN	460'-0	452'-0	80'-4"	
METAL CLEANING BASIN	468'-0	456'-0	120'-7"	
ASH SURGE BASIN	468'-0	452'-0	160'-4"	



DETAIL '3'
SCALE: 1 1/2" = 1'-0"

NOTES:
1. FOR GENERAL NOTES SEE DWG. C 5501

DRAWING STATUS
APPROVED FOR CONSTRUCTION
4/19/78 Date

REDRAWN FROM NUS DWG. #5080 C 5507 1 OF 1, REV. 1, DTD. 4-19-78

BY:						
BY:						
BY:						
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	--	--
BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG/APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE

STA. 3 POWERTON

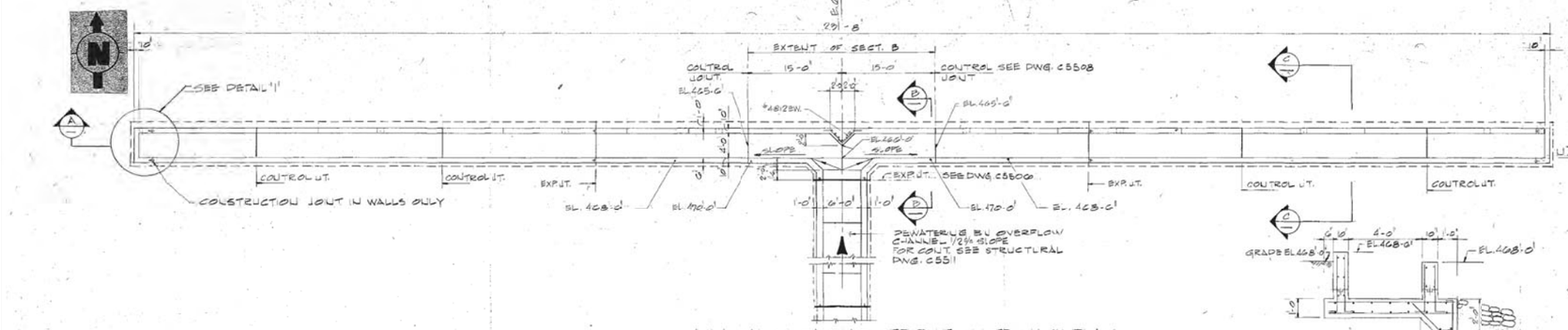
MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE	AS SHOWN	QC	--
DATE	03-06-03	SC	--

3B-0-2090

RCAD 3B-0-2090_A.TIF J. L. MEECE ENG. 03-06-03

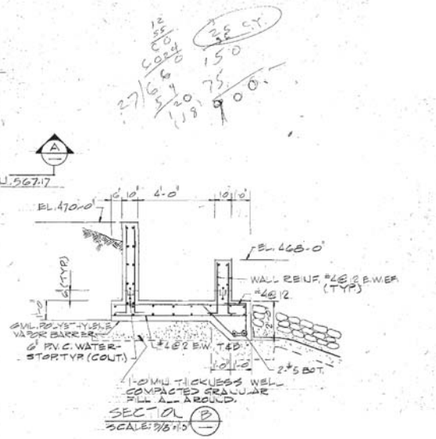
3B-0-2092



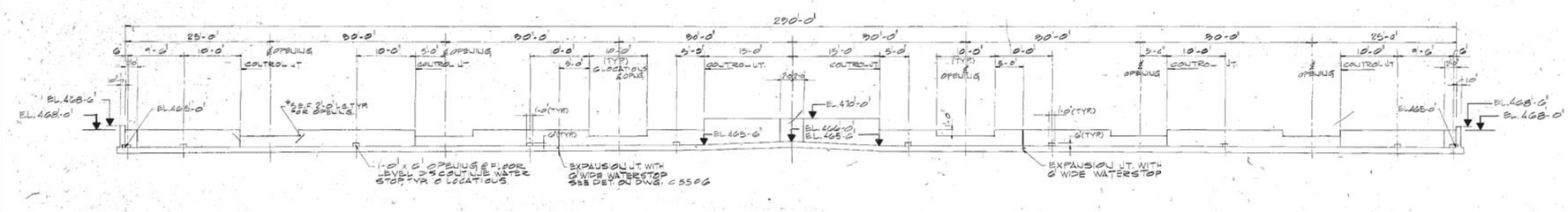
ASH SURGE BASIN DISTRIBUTION TROUGH PLAN

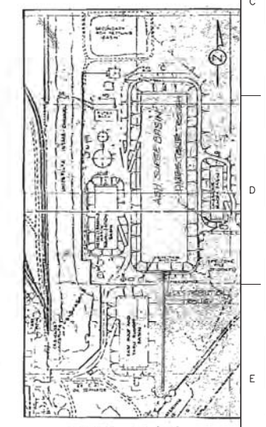
SCALE: 1/8"=1'-0" (REF. DWG. 5080 C 5007)

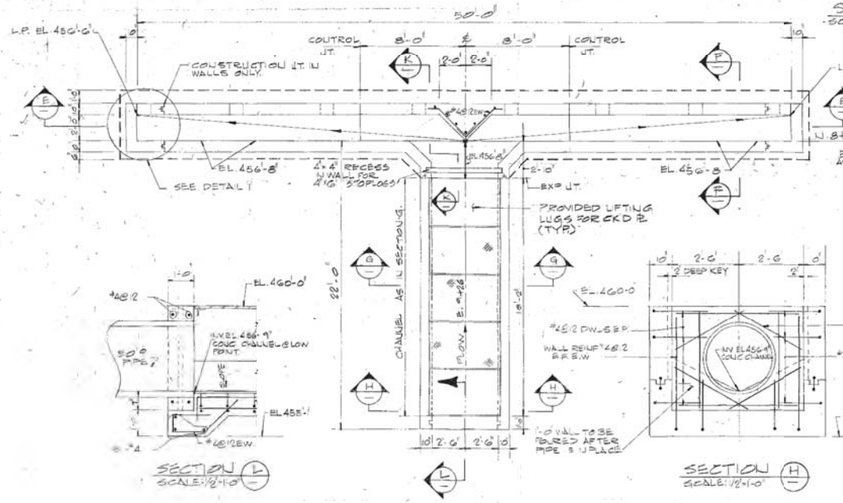
SECTION (C)
SCALE: 3/8"=1'-0"



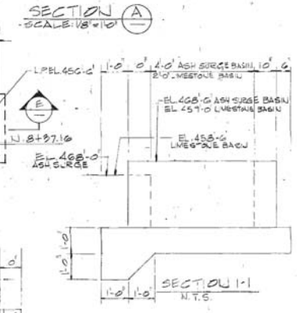
SECTION (B)
SCALE: 3/8"=1'-0"



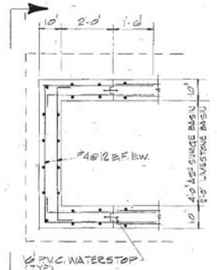




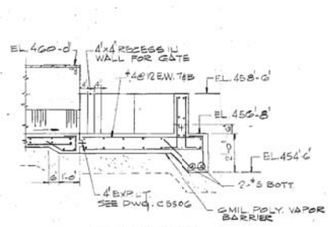
SECTION (A)
SCALE: 1/8"=1'-0"



SECTION 1-1
N.T.S.



PLAN
N.T.S.



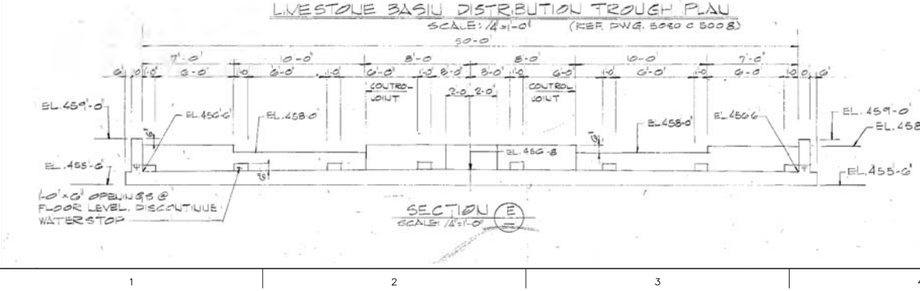
SECTION (K)
SCALE: 3/8"=1'-0"

SECTION (L)
SCALE: 1/2"=1'-0"

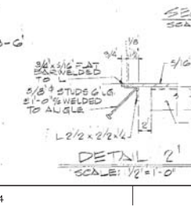
SECTION (H)
SCALE: 1/2"=1'-0"

LIMESTONE BASIN DISTRIBUTION TROUGH PLAN

SCALE: 1/8"=1'-0" (REF. PWG. 5080 C 5008)

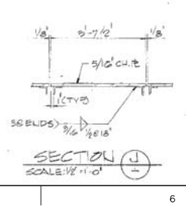


SECTION (E)
SCALE: 1/8"=1'-0"

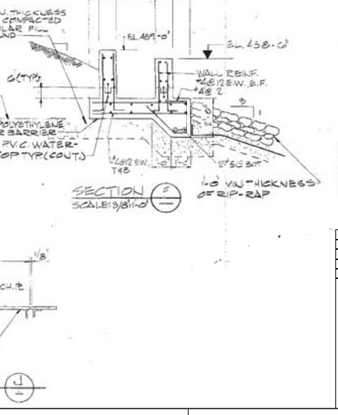


DETAIL '2'
SCALE: 1½"=1'-0"

PLAN
N.T.S.



SECTION (J)
SCALE: 1/8"=1'-0"



SECTION (F)
SCALE: 3/8"=1'-0"

NOTES

1 FOR GENERAL NOTES SEE DWG. C5501

DRAWING STATUS: APPROVED FOR CONSTRUCTION
4/14/78 Date

REDRAWN FROM NUS DWG. #5080 C 5509 1 OF 1, REV. 1, DTD. 4-19-78

BY:							
BY:							
BY:							
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	---	---	---
BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG	APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN & LIMESTONE BASIN
DIST. TROUGHS – SECTIONS & DET.

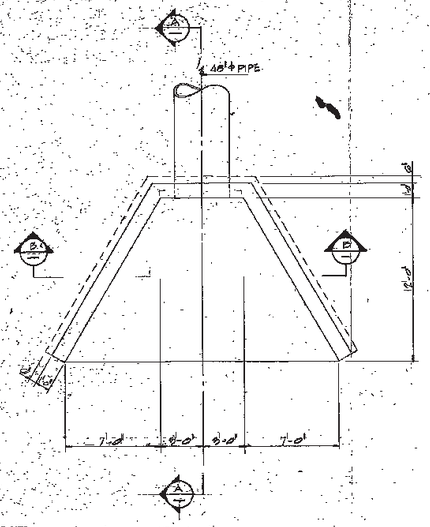
STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL Company

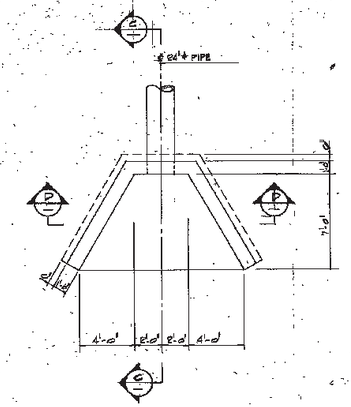
SCALE	AS SHOWN	DC	–
DATE	03-06-03	SC	–

3B-0-2092

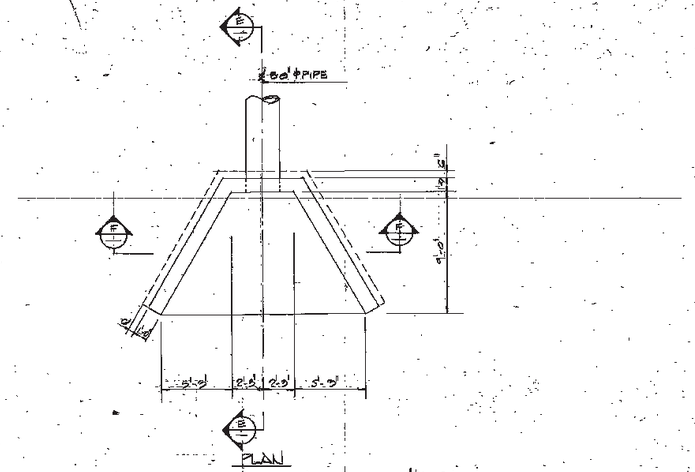
RCAD 3B-0-2092_A.TIF J. L. MEECE ENG. 03-06-03



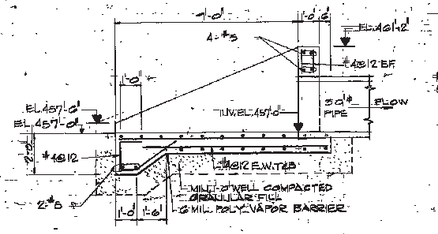
ASH SURGE BASIN WING WALL FOR 48"ϕ PIPE
SCALE: 1/4"=1'-0" (REF. DWG. 5080 C 5007)



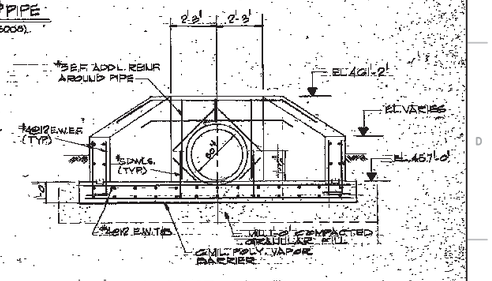
METAL CLEANING BASIN WING WALL FOR 24"ϕ PIPE
SCALE: 1/4"=1'-0" (REF DWG. 5080 C 5008)



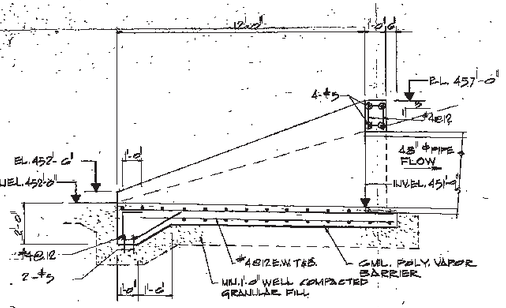
LIMESTONE BASIN WING WALL FOR 60"ϕ PIPE
SCALE: 1/4"=1'-0" (REF. DWG. 5080 C 5009)



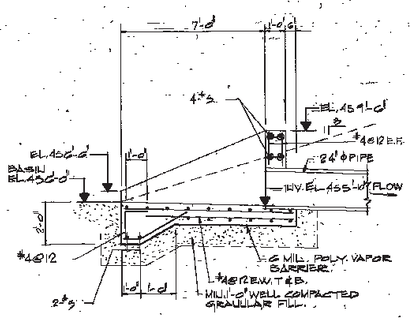
SECTION (E)
SCALE: 3/8"=1'-0"



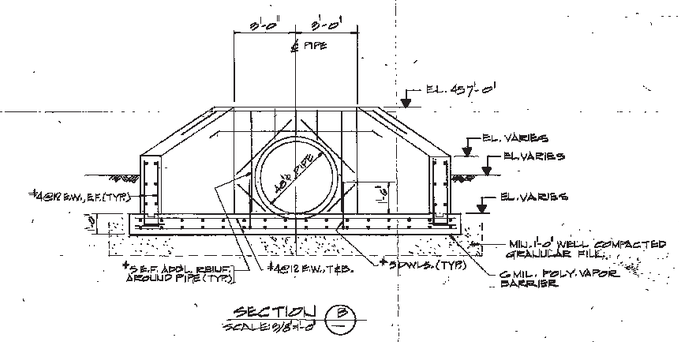
SECTION (F)
SCALE: 3/8"=1'-0"



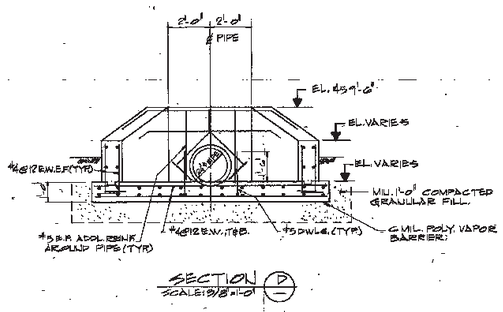
SECTION (A)
SCALE: 3/8"=1'-0"



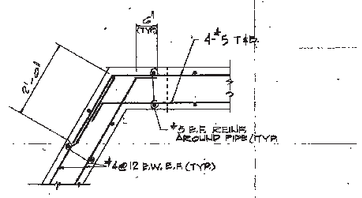
SECTION (C)
SCALE: 3/8"=1'-0"



SECTION (B)
SCALE: 3/8"=1'-0"



SECTION (D)
SCALE: 3/8"=1'-0"



TYPICAL CORNER REINFORCEMENT
SCALE: 3/4"=1'-0"

NOTES:

1. FOR GENERAL NOTES SEE DWG. C5501.

DRAWING STATUS
APPROVED FOR CONSTRUCTION
4/19/04
Date

REDRAWN FROM AS BUILT DWG. #5080 C 5510 1 OF 1, REV. 1, DTD. 4-19-78

BY:					
BY:					
BY:					
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #5008886	SCH	–
BY: (PRIOR SIGNED REVISIONS)	REV	DATE	REVISION	BY	CKD ENG APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
WING WALL PLANS, SECTIONS & DETAILS

STA. 3 POWERTON

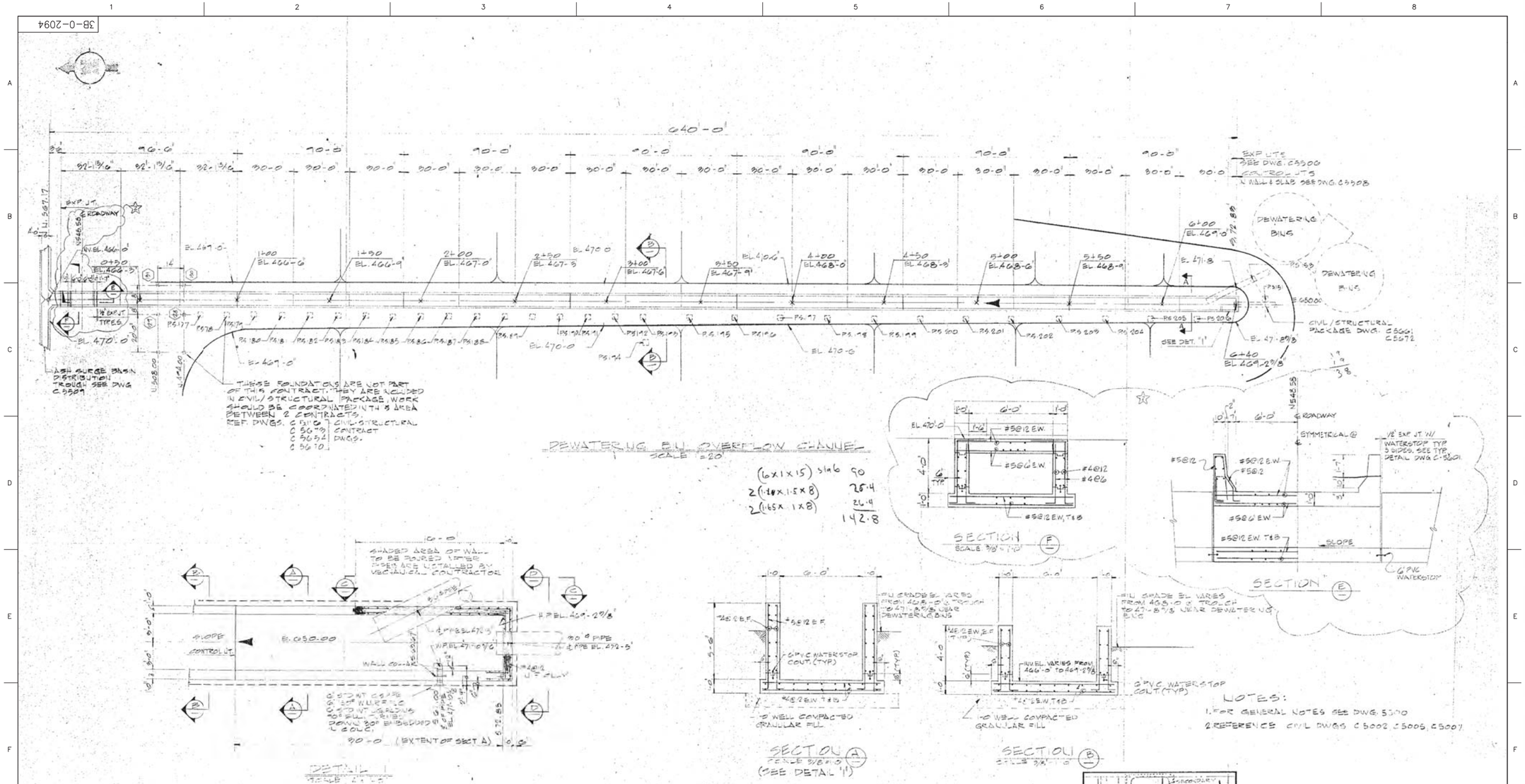
MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE	AS SHOWN	DC	–
DATE	03-06-03	SC	–

3B-0-2093

RCAD 3B-0-2093_A.TIF J. L. MEECE ENG. 03-06-03

3B-0-2094


640'-0"
EXP JTS SEE DWG. C5300
CONTROL JTS IN WALL & SLAB SEE DWG. C5308
EXP. JT.
ROADWAY
DEWATERING BINS
DEWATERING BIN
CIVIL/STRUCTURAL PACKAGE DWG. C5601, C5672
ASH SURGE BASIN DISTRIBUTION TROUGH SEE DWG C5589
THESE FOUNDATIONS ARE NOT PART OF THIS CONTRACT. THEY ARE INCLUDED IN CIVIL/STRUCTURAL PACKAGE. WORK SHOULD BE COORDINATED IN THIS AREA BETWEEN 2 CONTRACTS. REF. DWGS. C 5601 C 5672 C 5673 C 5674 C 5610 CIVIL-STRUCTURAL CONTRACT DWGS.
DEWATERING BIN OVERFLOW CHANNEL
SCALE 1"=20'
(6x1x15) slab 90
2(1.0x1.5x8) 26.4
2(1.65x1x8) 26.4
142.8
SECTION (F)
SCALE 3/8"=1'0
SECTION (E)
SHADED AREA OF WALL TO BE POURED AFTER PIPES ARE INSTALLED BY VECTAIR CONTRACTOR
SLOPE CONTROL JT.
WALL CONST. JT.
6"PVC WATERSTOP
SECTION (C)
SECTION (D)
SECTION (A)
(SEE DETAIL '1')
SECTION (B)
NOTES:
1. FOR GENERAL NOTES SEE DWG. S300
2. REFERENCE CIVIL DWGS. C5002, C5005, C5007
KEY PLAN
STICK
FB 27
APPROVED FOR CONSTRUCTION
7/11/79
REDRAWN FROM NUS DWG. #5080 C 5511 1 OF 1, REV. 2, DTD. 7-17-78
A 03-06-03 CREATED DRAWING FROM SCAN WO #508866
DRAFTING SERVICES ONLY
PROVIDED BY J. L. MEECE ENGINEERING
(SEAL)
WASTE WATER TREATMENT FACILITY
DEWATERING BIN OVERFLOW CHANNEL SECTIONS & DETAILS
STA. 3
POWERTON
MIDWEST GENERATION
An EDISON INTERNATIONAL Company
SCALE AS SHOWN
DATE 03-06-03
3B-0-2094
RCAD
3B-0-2094_A.TIF
J. L. MEECE ENG. 03-06-03

3B-0-2106

SOIL BORING

B-10

ELEV	DESCRIPTION	DEPTH	SAMPLE	N	Qu	W	REMARKS
469.6	SURFACE						
468.6	Brown, fine to coarse, silty SAND, some cinders, FILL		1 AU		-	9	
	Very stiff brown silty CLAY some fine to coarse sand and gravel, FILL		2-SS	19	2.7	13	
465.6		5	3-ST			12	γd=126 pcf
	Black fine to coarse SAND some gravel and cinders, FILL		4-SS	34		8	
461.1	Very stiff gray silty CLAY, some cinders FILL	10	5-SS	17	2.0	14	
458.6			6-SS	16		16	
	Black cinders (fine to coarse sand size), FILL	15	7-SS	7		26	
440.1	Soft gray silty CLAY to CLAY	20	8-SS	5	0.7*	37	
432.1	Stiff to very stiff gray silty CLAY to CLAY trace fine to coarse sand and gravel	25	9 SS	6	1.0*	40	
		30	10-SS	12	3.2	16	LL=35 PI=21
426.6	Medium light brown, fine to coarse silty SAND and GRAVEL	35	11-SS	18	-	11	
424.6	End of Boring	40					

SAMPLE DESCRIPTION
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER SAMPLE
- RC - ROCK CORE RUN
- WOR - WEIGHT OF ROD OR HAMMER
- WOH - WEIGHT OF HAMMER
- CS - CONTINUOUS SAMPLING
- CORES
- MC - MONITORING WELL

Penetration Value, PSF

N.15+00

4:1 SLOPE

3:1 SLOPE

TOP OF BERM EL 468.0

+EL 460.0

ASH SURGE BASIN SUMP DWG. 5080C5638

N.16+83

E.6+70

EL 467.0

WING WALL

N.15+75 E.6+50

SLUDGE WEIR DWG NO. 5080C5506

LINED ASH SURGE BASIN DWG NO. 5080C5007

BOTTOM BASIN EL. 452.0

N.20+25 E.5+70

B-10

CIVIL - STRUCTURAL CONTRACT MEPE 722

3:1 SLOPE

FOR SOIL BORING LOG SEE DWG. NO 5080C5602

E.5+00

B-20

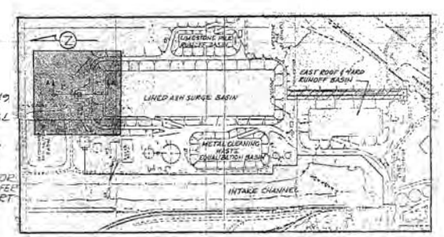
N.4+20 E.2+05

TOP OF BERM EL.468.0

PLAN

NOTES:

1. SEE NOTES ON DWG 5080C5602 FOR EXCAVATION BACKFILL & COMPACTION PROCEDURES.
2. ASH SURGE BASIN & SLUDGE WEIR IS INCLUDED IN EARTHWORK CONTRACT MEPE649 WORK TO BE COORDINATED BETWEEN EARTHWORK CONTRACT & CIVIL-STRUCTURAL CONTRACT.
3. SOIL BORING DATA B-10 IS FURNISHED BY A&H ENGINEERING COMPANY, DOWNERS GROVE, CHICAGO, ILL AS A PART OF THEIR SOIL INVESTIGATION WORK. THIS DATA IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. REFER SOIL INVESTIGATION REPORT FOR DETAIL REPORT



KEY PLAN

EARTHWORK CONTRACT MEPE 649 | CIVIL STRUCTUREAL CONTRACT MEPE 722 | EARTHWORK CONTRACT MEPE 649

ASH SURGE BASIN SUMP N.16+03

WING WALL

SLUDGE WEIR

PROPOSED GRADE

EL. 467.0

EL. 460.0

TOP OF BERM EL. 468.0

LINED ASH SURGE BASIN

BOTTOM BASIN EL. 452.0

EXISTING WATER SURFACE

EL 446.5

WELL COMPACTED 1'-0" GRAVEL OR CRUSHED STONE

PROOF ROLL AS PER NOTES ON DWG. 5080 C 5602.

N.15+00

500 490 480 470 460 450 440 430 420 410 400

SECTION (A)

DRAWING STATUS

APPROVED FOR CONSTRUCTION

Date 6/13/78

REDRAWN FROM NUS DWG. #5080 C 5586 1 OF 1, REV. 1, DTD. 6-13-78

BY:			
BY:			
BY:			
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #5088866
BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN
SUMP – SOIL PROFILE

STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL® Company

SCALE 1"=20' | DC –
DATE 03-06-03 | SC –

3B-0-2106

RCAD 3B-0-2106_A.TIF J. L. MEECE ENG. 03-06-03

3B-0-2067

TRAVERSE STATION "A-11"

TRAVERSE STATION "A-10"

TRAVERSE STATION "A-9"

BENCH MARK #1

EXISTING ASH SETTLING BASIN APPROX W/S EL 462.5

TS A-11, 2521' NE FROM CL OVERPASS, 30" COPPERWELD 0.10' BELOW SURFACE ELEVATION 157.885

TS A-10, 2010' NE FROM CL OVERPASS, 30" COPPERWELD 0.10' BELOW SURFACE ELEVATION 153.982

TS A-9, 1500' NE FROM RR OVERPASS, 30" COPPERWELD 0.10' BELOW SURFACE ELEVATION 160.336

BM #1, 18A 30" COPPERWELD SET FLUSH WITH GROUND, ELEVATION = 159.324

N 7,345 E 18,670
S 37°41'41"W - 518.3'

A-10 N 5,990.1 E 19,478

S 38°-5' 28"W 2109'

NORTH SOUTH BASE LINE N 0 S

A-9 N 9,187.0 E 19,551.0

OVERFLOW SEE DWG. C5008

DISCHARGE PIPE

PERF PIPE

OVERFLOW - SEE DWG. C5007

PERF PIPE W/ RISER & BAFFLE EACH END SEE DWG # 5016 1 OF 2

LINED LIMESTONE PILE RUNOFF BASIN

BOTTOM EL 0 SEE DWG. C5008

POLYMER BLDG. (BY OTHERS)

EL. 462.0

30" CMP INLET STR.

LIMESTONE PILE EL. 500±

VARY SLOPE IN THIS AREA TO PROVIDE POSITIVE DRAINAGE TO LIMESTONE PILE RUNOFF DITCH.

STA. 1400 EL 460.0

SEE DWG. C5005

DEWATERING BINS UNIT #5

DEWATERING BIN OVERFLOW CHANNEL (DUE SOUTH)

SLOPE @ 0.5%

LINED ASH SLUICE BASIN EL 460.0 SEE DWG C5007

DISCHARGE PIPE

WEIR

DISTRIBUTION TROUGH

INTAKE PIPE

ELECT. BLDG.

ALL EQUIPMENT SHOWN DASHED IS NOT PART OF THIS CONTRACT

GRANULAR MEDIA FILTER

LIME SILO

BACKWASH HOLDING SUMP & PUMPS

D.F. SILOS

MAIN WASTE TREATMENT BUILDING

ELECTRICAL TRANS. PADS

CLARIFIER UNDERFLOW PUMP & CHAMBER

THICKENER

CLARIFIER

SUMP & PUMPS

SULPHURIC ACID TANK & PUMP

FLASH MIX TANK & AGITATOR

LINED METAL CLAD WASTE EQUALIZATION BASIN

SEE DWG. C5009

TOP OF DIKE EL 466.0

DEMIN. TANKS (BY OTHERS)

DEMIN. PUMP (BY OTHERS)

EAST ROOF & YARD RUNOFF BASIN

PERF PIPE W/ RISER & BAFFLE BOT. EL 455 RAIN ENG. SEE DWG. C5005 SEE DWG # 5015 1 OF 2

GRAVEL RAMP 10% SLOPE

SEE DWG. C5005

PROVIDE OIL ABSORBENT BOOM AT PORT INTAKE CHANNEL

THICKENER UNDERFLOW SUMP & PUMPS

THICKENER OVERFLOW SUMP & PUMPS

CLARIFIER OVERFLOW SUMP, PUMPS & AGITATOR

EXISTING UNITS #1-#4 INTAKE CHANNEL W/S EL 451.8

AIR HEATER LINE, UNIT # 6
DEMINERALIZATION LINE
PRECIPITATOR LINE
AIR HEATER LINE, UNIT #5

NOTES:

1. FOR GENERAL NOTES SEE DWG. C5001
2. PROVIDE 3:1 SLOPE TO MEET EXISTING GRADE, UNLESS OTHERWISE NOTED ON DWGS.
3. FOR ROAD & RAMP SECTIONS SEE DWG. C5015, SHT. 1 OF 2.

LAYOUT CONTROL FOR ROADS

NO.	N. S	E. W	BEARINGS	LENGTHS
1	S 0+20	E8+20		
2	S 0+20	E9+60	90°	80'
3	S0+20	E9+60	EQD	80'
4	N0+00	E9+80		
5	N 5+18	E5+25	150°	65.81
6	N 8+07	E4+27	150°	65.81
7	N 8+88	E4+27		
8	N 8+00	E4+62		
9	N11+00	E4+62	100°	15'
10	N11+27	E4+79	100°	15'
11	N18+35	E4+67	68'	68'
12	N18+35	E8+35	68'	68'
13	N18+3	E8+38		
14	N13+07	E8+38	68'	67.7'
15	N7+25	E8+	68'	18.5'
16	N7+25	E7+		
17	N5+	E7+	100°	15'
18				
19	N11+82	E8+05	68'	67'

APPROVED FOR CONSTRUCTION 12-19-78

REDRAWN FROM NUS DWG. #5080 C 5002 1 OF 1, REV. 2, DTD. 12-19-78

BY:							
BY:							
BY:							
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	---	---	---
BY: FIRM MAKING REVISIONS	REV.	DATE	REVISION	BY	CKD	ENG	APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
SITE PLAN
EAST ROOF & YARD RUNOFF BASIN

STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL Company

SCALE	1"=50'	DC	–
DATE	03-06-03	SC	–

3B-0-2067

RCAD 3B-0-2067_A.TIF J. L. MEECE ENG. 03-06-

APPENDIX A-2

Liner Replacement Drawings

ASH SURGE BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON GENERATING STATION
PEKIN, ILLINOIS

LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21132TS-03
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21132C010-03
C020	LINER SUBGRADE PREPARATION	D21132C020-03
C021	GEOMEMBRANE PANEL LAYOUT	D21132C021-00
C030	WARNING LAYER PLAN	D21132C030-03
C031	DETAILS AND SECTIONS	D21132C031-03
C032	DETAILS AND SECTIONS	D21132C032-03

RECORD DRAWING LEGEND

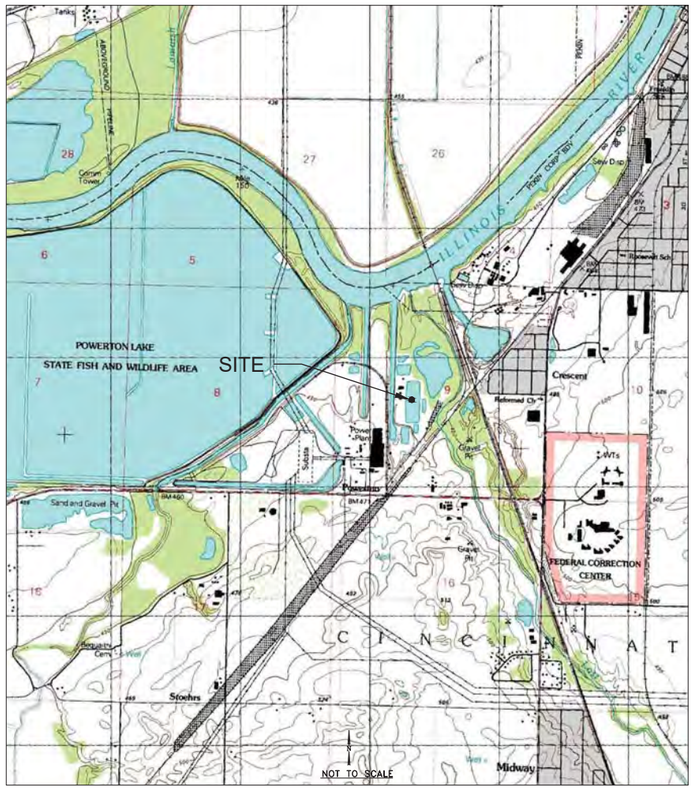
~~PROPOSED~~ — CROSSED OUT TEXT INDICATES CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION

PRE-CONSTRUCTION — UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION

"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION

"CROSS OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION

ILLINOIS



SITE LOCATION

PREPARED FOR:
MIDWEST GENERATION, LLC
13082 EAST MANITO RAOD
PEKIN, IL 61554

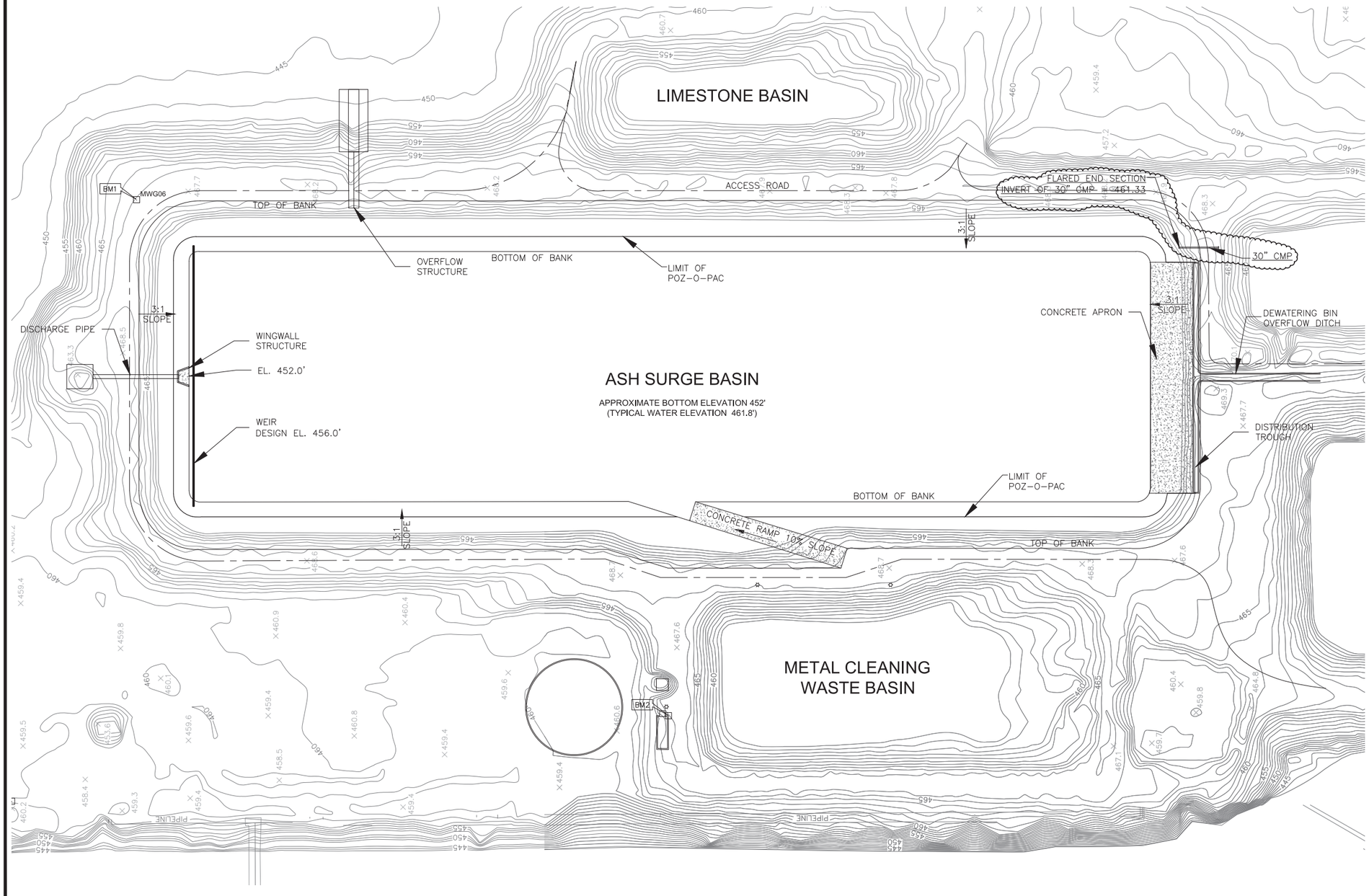
TITLE SHEET
ASH SURGE BASIN LINER REPLACEMENT DOCUMENTATION
MIDWEST GENERATION
POWERTON GENERATING STATION
PEKIN, ILLINOIS

PROJECT NO. 2113.2/POWER/BID
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13
DRAWING NO.: D21132TS-03
REFERENCE:
SHEET NO. TS

NATURAL RESOURCE TECHNOLOGY

	REVISION:	DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS

JULY 2014



NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).

CONTRACTOR NOTES: COMPLETED DURING CONSTRUCTION
1. ACCUMULATED ASH, SLUDGE/SEDIMENT, AND DEBRIS TO BE REMOVED BY CONTRACTOR, AS DIRECTED BY OWNER.

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

VERTICAL DATUM:
PLANT DATUM

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 38-0-2071, DATED 5-12-78.
3. LOCATION OF 30" CMP PIPE FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/18/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS

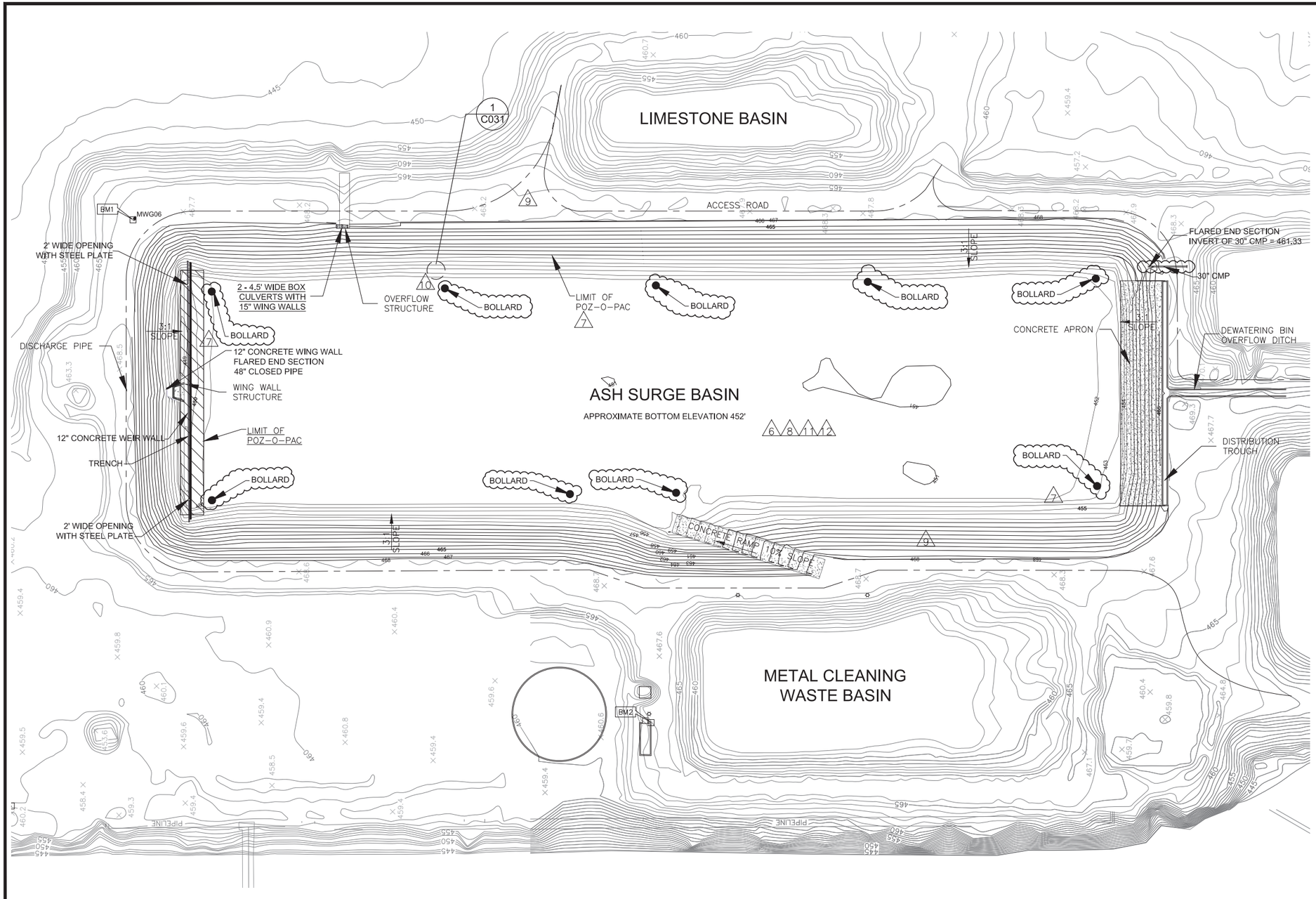
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

PRE-CONSTRUCTION SITE CONDITIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C010-03
REFERENCE: .
SHEET NO. C010



EXISTING PREVIOUS GROUND SURFACE CONTOURS

SUBGRADE SURFACE CONTOUR

LIMIT OF POZ-O-PAC

LIGHT POLE

ACCESS ROAD

MARKER POST LOCATION

POZ-O-PAC REMOVAL AREA

CONCRETE

BENCHMARK LOCATION

NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE APRON, 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 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 AND 20 FOOT SECTION SOUTH OF WEIR, AS SHOWN. CONTRACTOR SHALL REMOVE AN ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL STRUCTURE ALONG THE NORTH TOE OF SLOPE, AS SHOWN ON SHEET C032. REMOVE AT LEAST 18 INCHES OF POZ-O-PAC LAYER AND SUBGRADE MATERIAL AT BASE OF WEIR TO THE SOUTH AND GRADE AT A ~~1%~~ 7.5% SLOPE. REFER TO SHEET C032.
8. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. CONTRACTOR SHALL RESHAPE SIDE SLOPES AS NECESSARY TO MAINTAIN 3:1 SIDE SLOPES, AND REMOVE "SOFT" SUBGRADE MATERIAL AS DIRECTED BY OWNER AND/OR ENGINEER. BACKFILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. EXISTING HYPALON GEOMEMBRANE MAY REMAIN IN PLACE ALONG THE SIDE SLOPES, EXCEPT IN SOFT OR LOW/HIGH (RELATIVE TO GEOMEMBRANE SUBGRADE) AREAS, AS DIRECTED BY ENGINEER AND/OR OWNER.
10. 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.
11. SUBGRADE MUST BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
12. 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.

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

VERTICAL DATUM:
PLANT DATUM

N

0 25 50 100
SCALE IN FEET

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 38-0-2071, DATED 5-12-78.
3. SUBGRADE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/18/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/18/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

LINER SUBGRADE PREPARATION

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C020-03
REFERENCE: .

SHEET NO. C020

Jul 18, 2014 12:21pm PLOTTED BY: ddada SAVED BY: ddada
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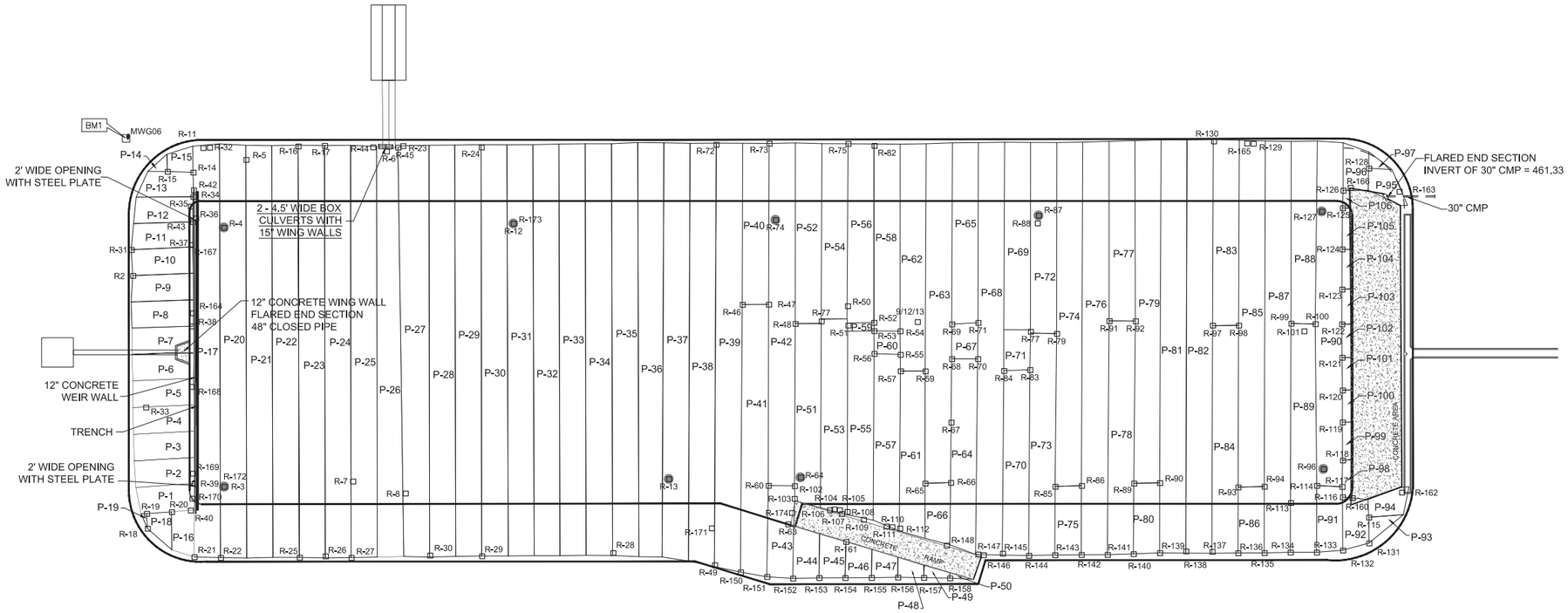
XREFS:



GEOMEMBRANE PANEL SEAM

P23 — GEOMEMBRANE PANEL AND PANEL NUMBER

R87 — GEOMEMBRANE REPAIR LOCATION (NOT TO SCALE)

BM2 — BENCHMARK LOCATION

MARKER POST LOCATION

NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).

N

0 25 50 100

SCALE IN FEET

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

VERTICAL DATUM:
PLANT DATUM

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM SURVEY DATA BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:	DATE:	APP'D BY:
6.		
5.		
4.		
3.		
2.		
1.		
0. ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2

DRAWN BY: RLH 03/06/14

CHECKED BY: JRR 03/06/14

APPROVED BY: EJT 07/17/14

GEOMEMBRANE PANEL LAYOUT

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C021-00

REFERENCE: .

SHEET NO. C021

Jul 18, 2014 12:16pm PLOTTED BY: dduda SAVED BY: dduda
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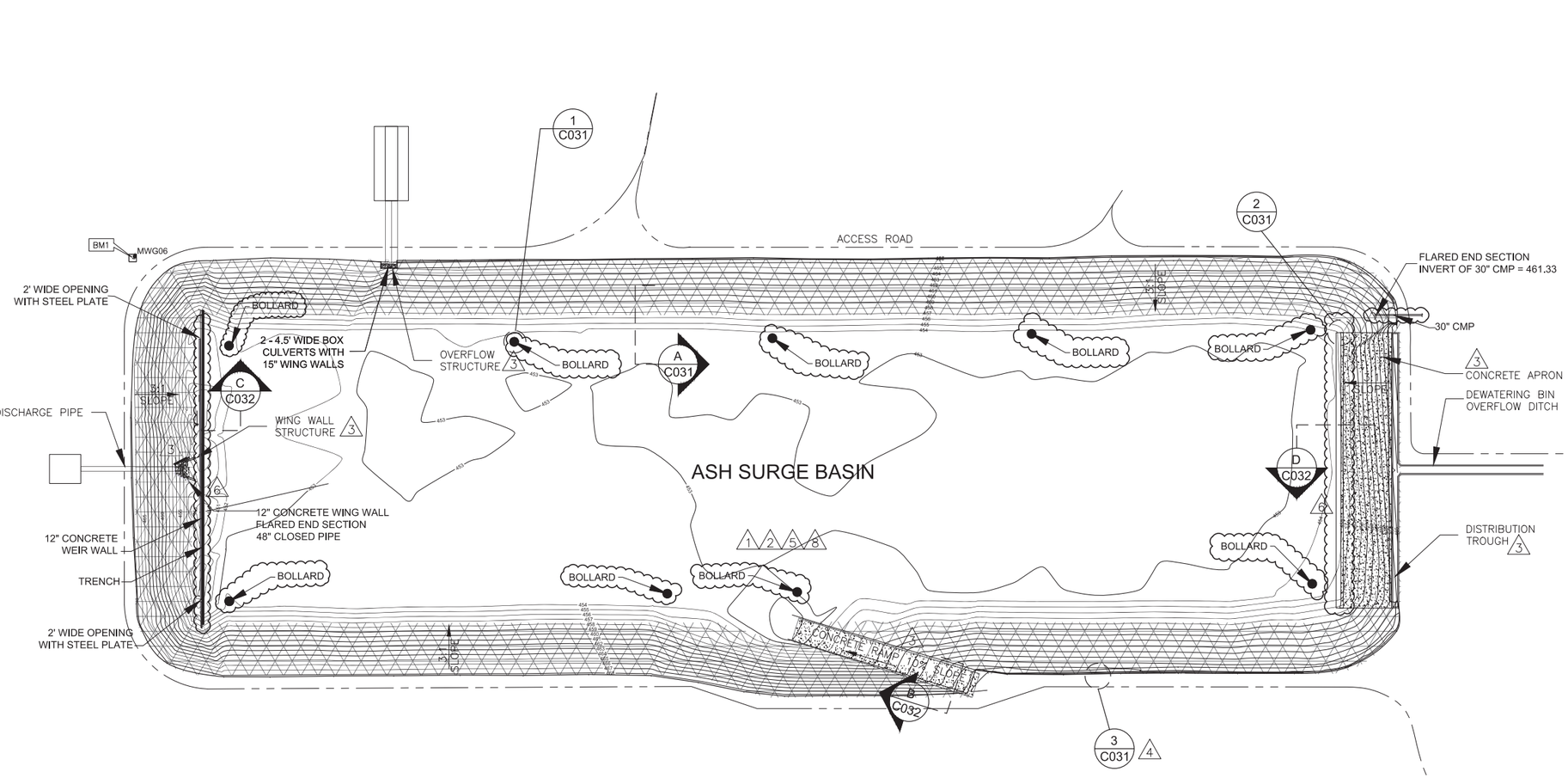
XREFS:



465 FINAL SURFACE CONTOUR

LIGHT POLE

ACCESS ROAD

MARKER POST LOCATION

HDPE GEOMEMBRANE

CONCRETE

~~RIPRAP~~

BM1 BENCHMARK

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL PLACE ~~16-OZ. NON-WOVEN~~ GEOTEXTILE OVER THE SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS
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, CONCRETE RAMP, AND APRON, 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 IN DETAIL 3 ON SHEET C031. CONTRACTOR SHALL ADVISE OWNER AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT FEASIBLE.
5. CONTRACTOR SHALL PLACE 16-OZ. NON-WOVEN GEOTEXTILE, CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES (SEE SECTION A, SHEET C031), FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
6. CONTRACTOR SHALL PLACE AN 18-INCH LAYER OF ~~4 TO 12 INCH DIAMETER RIPRAP~~ WARNING LAYER MATERIAL BETWEEN WEIR AND WING WALL STRUCTURE ALONG THE NORTH TOE OF SLOPE AND AT TOE OF CONCRETE APRON AS DIRECTED BY ENGINEER. REFER TO DETAILS ON SHEET C032.
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 FEET.

VERTICAL DATUM:
PLANT DATUM

N

0 25 50 100

SCALE IN FEET

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 3B-0-2071, DATED 5-12-78.
3. FINAL SURFACE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED OCTOBER 8, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

6.			
5.			
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3.	ISSUED FOR RECORD DOCUMENTATION	07/18/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/18/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2/POWER/CON

DRAWN BY: RLH 01/15/13

CHECKED BY: HMS 01/15/13

APPROVED BY: HMS 01/16/13

WARNING LAYER PLAN

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C030-03

REFERENCE: .

SHEET NO. C030

Jul 18, 2014 12:25pm PLOTTED BY: dduda SAVED BY: dduda
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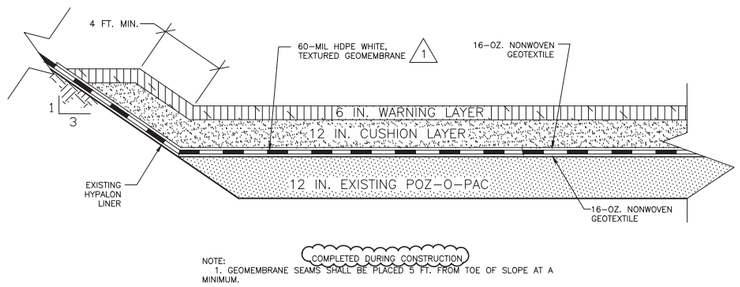
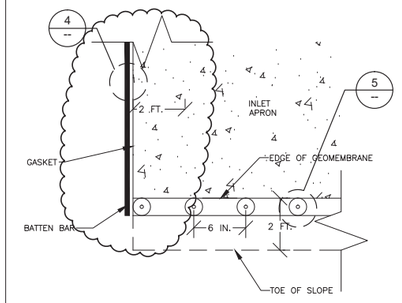
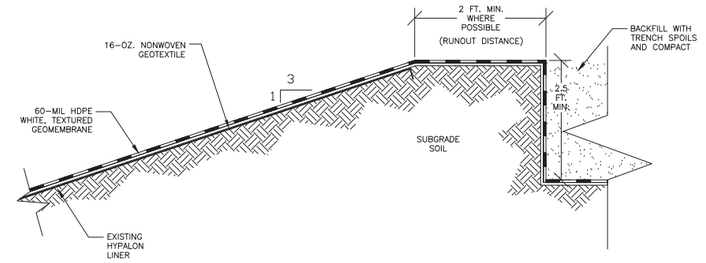


NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED 5 FT. FROM TOE OF SLOPE AT A MINIMUM.

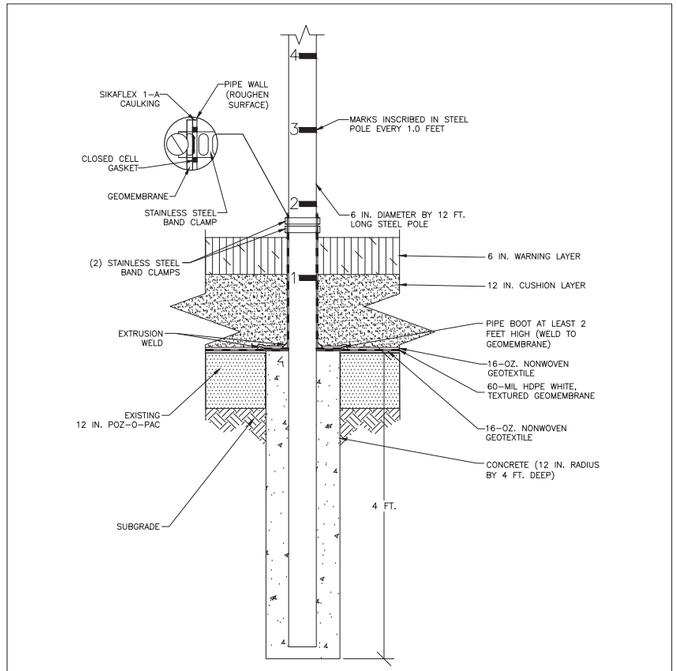
A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE



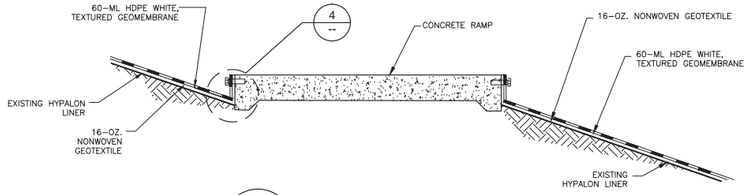
2 / C030 INLET APRON DETAIL PLAN
NOT TO SCALE



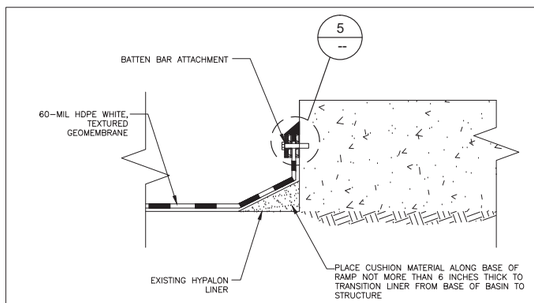
3 / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



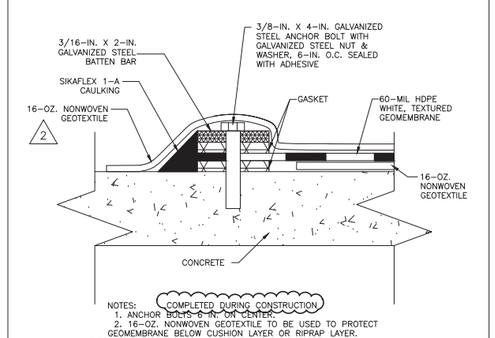
1 / C020 C030 MARKER POST DETAIL
NOT TO SCALE



B / C030 CONCRETE RAMP SECTION
NOT TO SCALE



4 / -- VERTICAL CONNECTION DETAIL
NOT TO SCALE



NOTES:
1. ANCHOR BOLTS 6 IN. ON CENTER.
2. 16-OZ. NONWOVEN GEOTEXTILE TO BE USED TO PROTECT GEOMEMBRANE BELOW CUSHION LAYER OR RIPRAP LAYER.

5 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE

REVISION:		DATE:	APP'D BY:
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3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2/POWER/CON
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C031-03
REFERENCE: .
SHEET NO. C031

Jul 17, 2014 1:13pm PLOTTED BY: dduda SAVED BY: dduda
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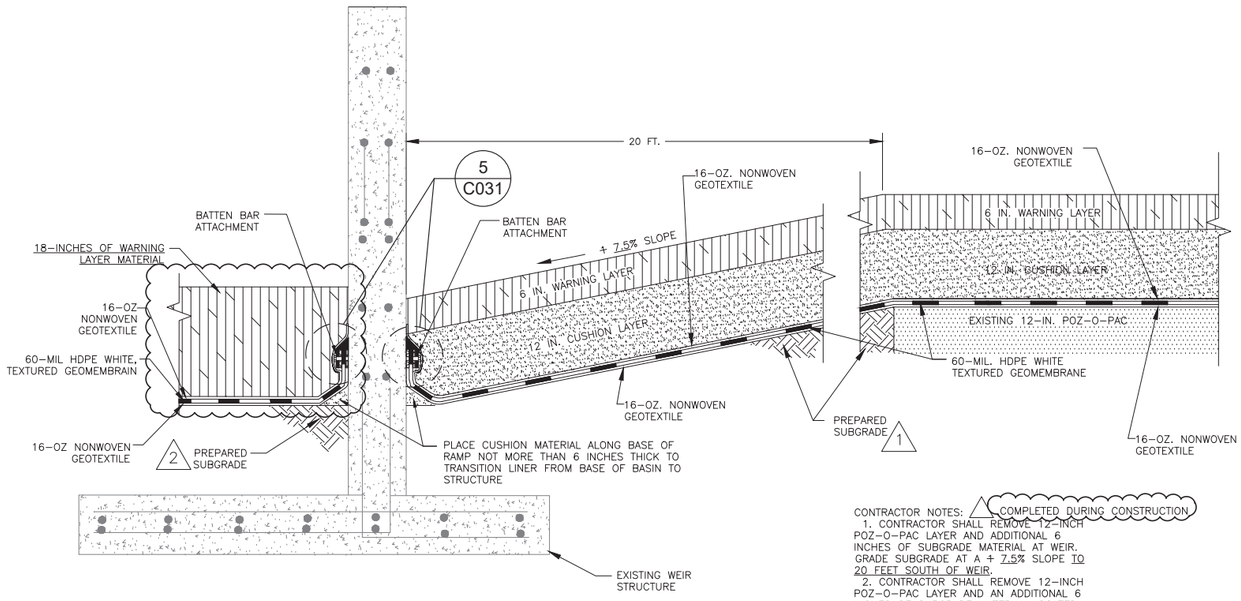
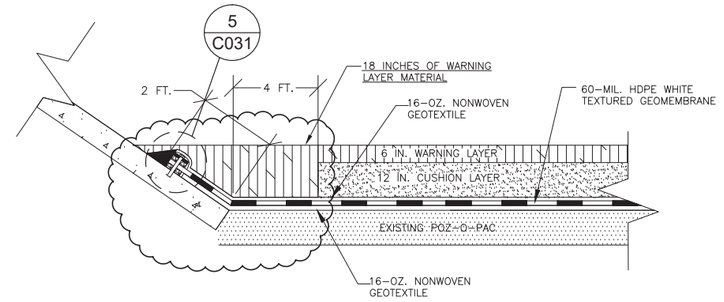
XREFS:



CONTRACTOR NOTES: 1 COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL REMOVE 12-INCH POZ-O-PAC LAYER AND ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL AT WEIR. GRADE SUBGRADE AT A + 7.5% SLOPE TO 20 FEET SOUTH OF WEIR.
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 STRUCTURE ALONG THE NORTH TOE OF SLOPE. INSTALL GEOMEMBRANE AND BACKFILL WITH ~~RIPRAP~~ WARNING LAYER MATERIAL.

C / C030 CONCRETE WEIR SECTION
NOT TO SCALE



D / C030 INLET APRON SECTION
NOT TO SCALE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2/POWER/CON
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

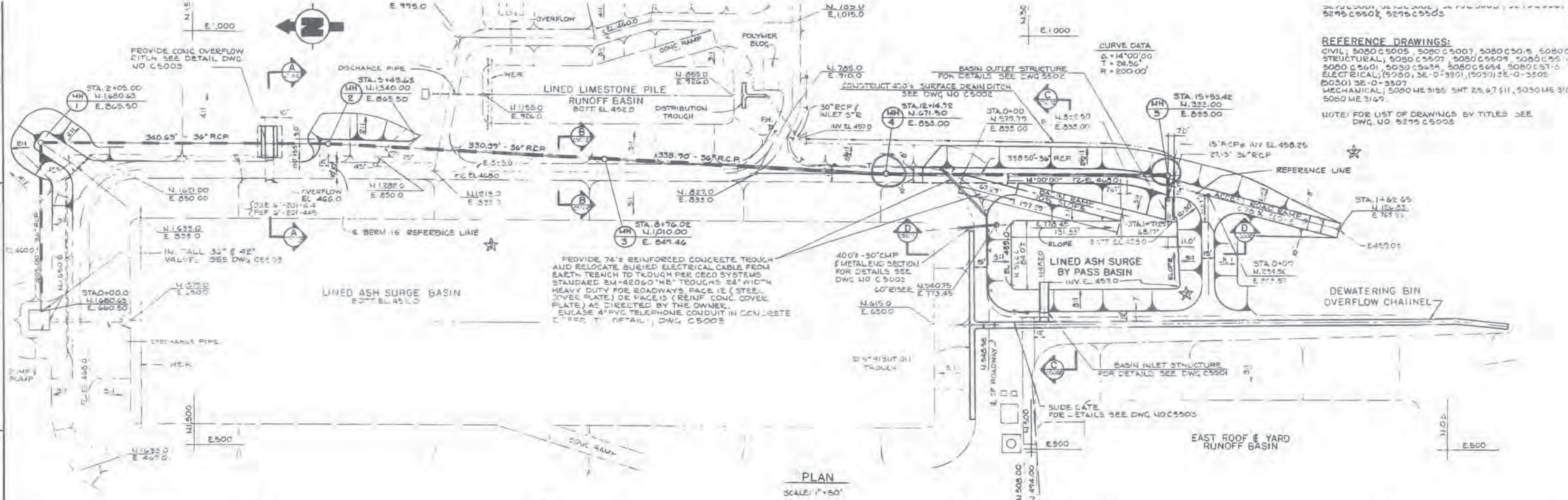
DRAWING NO: D21132C032-04
REFERENCE: .
SHEET NO. C032

APPENDIX B

Ash Surge Basin Construction Drawings

APPENDIX B-1

NUS Construction Drawings


LINED ASH SURGE BASIN
LINED LIMESTONE PILE RUNOFF BASIN
BOTT. EL 452.0
LINED ASH SURGE BY PASS BASIN
INV. EL. 457.0
DEWATERING BIN OVERFLOW CHANNEL
EAST ROOF & YARD RUNOFF BASIN
CURVE DATA
Δ = 14°00'00
T = 24.56'
R = 200.00'
BASIN OUTLET STRUCTURE FOR DETAILS SEE DWG 5502
CONSTRUCT 400'± SURFACE DRAIN DITCH SEE DWG NO C5002
BASIN INLET STRUCTURE FOR DETAILS SEE DWG C5501
SLIDE GATE FOR DETAILS SEE DWG NO C5503
PROVIDE CONC OVERFLOW DITCH SEE DETAIL DWG. NO C5003
PROVIDE 74'± REINFORCED CONCRETE TROUGH AND RELOCATE BURIED ELECTRICAL CABLE FROM EARTH TRENCH TO TROUGH PER CECO SYSTEMS STANDARD EM-42060 "HB" TROUGHS 24" WIDTH HEAVY DUTY FOR ROADWAYS PAGE 12 (STEEL COVER PLATE) OR PAGE 13 (REINF. CONC. COVER PLATE) AS DIRECTED BY THE OWNER.
ENCASE 4" PVC TELEPHONE CONDUIT IN CONCRETE
400'± -30" CMP & METAL END SECTION FOR DETAILS SEE DWG NO C5002
340.65' - 36" RCP
330.39' - 36" RCP
338.90' - 36" R.C.P.
338.50' - 36" RCP
REFERENCE LINE
℄ BERM IS REFERENCE LINE
PLAN
SCALE: 1"=50'

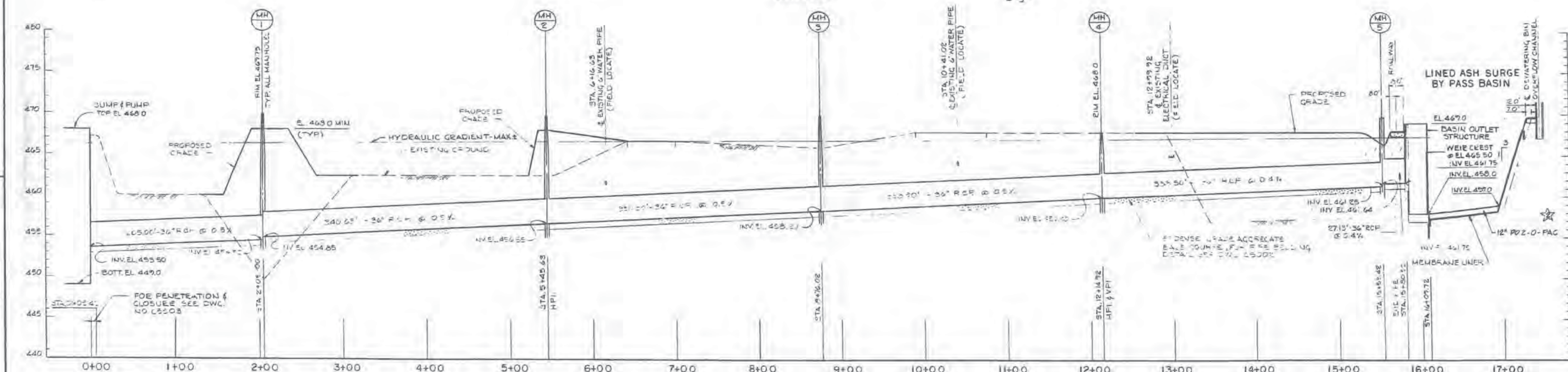
REFERENCE DRAWINGS:

CIVIL; 5080 C5005, 5080 C5007, 5080 C5015, 5080 C5121
STRUCTURAL; 5080 C5507, 5080 C5509, 5080 C5511, 5080 C5601, 5080 C5639, 5080 C5654, 5080 C5713
ELECTRICAL; (5080) 3E-0-3301, (5080) 3E-0-3305, (5080) 3E-0-3307
MECHANICAL; 5080 ME 3155 SHT 2,5,6,7 & 11, 5080 ME 3163, 5080 ME 3169

NOTE: FOR LIST OF DRAWINGS BY TITLES SEE DWG. NO. 5295 C5008

5295 C5502, 5295 C5503

REV	DESCRIPTION
2	(a) REMOVED 9" SELECT FILL AND 9" GRAVEL BLANKET (TOTAL 1'-6" FROM BOTTOM BY-PASS BASIN, REPLACED WITH 12" POZ-O-PAC (b) ADDED ELEV., SLOPE AND REFERENCE LINE NOTATIONS TO PLAN.


SUMP & PUMP TOP EL 468.0
PROPOSED GRADE
HYDRAULIC GRADIENT-MAX.±
EXISTING GROUND
EL 468.0 MIN (TYP)
RIM EL 469.75 TYP. ALL MANHOLES
205.00' - 36" RCP @ 0.5%
340.65' - 36" RCP @ 0.5%
330.39' - 36" RCP @ 0.5%
338.90' - 36" RCP @ 0.5%
333.50' - 36" RCP @ 0.4%
INV. EL. 453.50
BOTT. EL. 449.0
FOR PENETRATION & CLOSURE SEE DWG. NO C5503
LINED ASH SURGE BY PASS BASIN
EL. 467.0
BASIN OUTLET STRUCTURE
WEIR CREST @ EL 465.50
INV EL 461.75
INV. EL. 458.0
INV. EL. 457.0
12" POZ-O-PAC
MEMBRANE LINER
0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00

PROFILE
SCALE: HOR. 1"=30'
VERT. 1"=5'

SPECIFICATION:

3. MANHOLES
MANHOLES SHALL BE THE SIZE AND AT THE LOCATIONS AND GRADES SHOWN ON THE CONTRACT DRAWINGS. MATERIAL FOR THE WALL SHALL BE EITHER CAST IN-PLACE REINFORCED CONCRETE OR PRECAST REINFORCED CONCRETE SECTIONS. PRECAST MANHOLES SHALL BE MANUFACTURED TO THE REQUIREMENTS OF ANSI/ASTM C478-78 A STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS. JOINTS ARE TO BE SEALED WITH O-RING GASKETS. MANHOLES SHALL BE CONSTRUCTED FOR 15 FOOT HYDROSTATIC HEAD. THE COMPLETED CHANNEL THROUGH THE MANHOLE SHALL BE U-SHAPED TO A HEIGHT THREE-FOURTHS THE DIAMETER. CAST FRAME (290 LBS) AND COVER (115 LBS) SHALL BE GRAY IRON ILLINOIS DOT STANDARD 1213-4 TYPE 1 (NEENAH CAT NO. R-1015, REF R-1712) OR EQUAL. CONTRACTOR TO SUBMIT VENDOR DRAWINGS FOR APPROVAL.

4. MANHOLE LINE ... SEE DWG NO C5008

MANHOLE SCHEDULE

MH NO.	BY PASS STATION	EL TOP CONE	EL. 36" PIPE INV. IN	EL. 36" PIPE INV. OUT	MH DEPTH (MIN.)	NOTES
–	0+00	–	453.50	–	–	EXIST PUMP SUMP
1	2+05	469.0	454.85	454.55	14.45'	HPI & +90°
2	5+45.63	469.0	456.57	456.53	12.47'	HPI & +02°27'
3	8+76.02	469.0	458.22	458.18	10.82'	STRAIGHT RUN
4	12+14.92	467.25	459.92	457.88	7.37'	HPI & -2°27' USE SCALE BINGSEED
5	15+53.42	469.0	461.64	461.25	7.75'	HPI & +90°
–	15+80.55	–	–	461.75	–	OUTLET STRUCTURE

NOTE: MAX. HYDRAULIC GRADIENT EL 467.25±

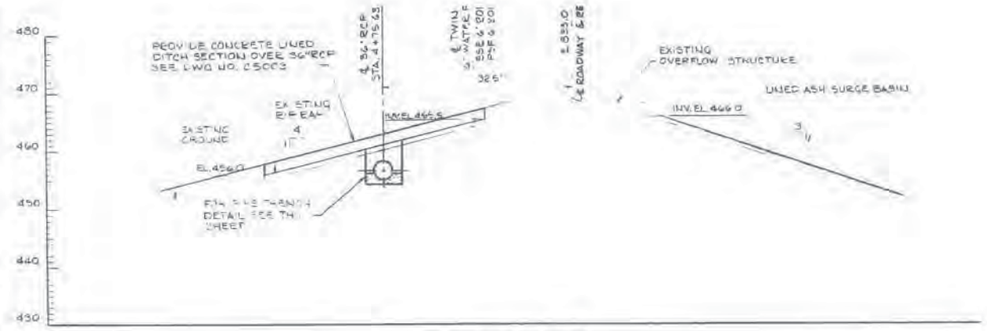
Peter D. Armsworth 6/6/80

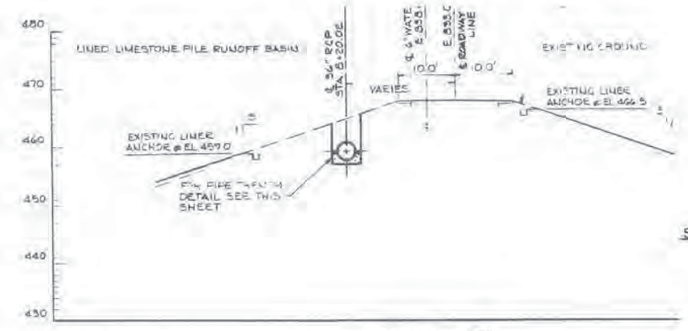
DRAWING STATUS
APPROVED FOR CONSTRUCTION
Date 6/26/80

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

ASH SURGE BASIN BY PASS
PLAN AND PROFILE

CECO CONTRACT: 802668
NUS CORPORATION ROCKVILLE, MD.
DRAWING NO. 5295 C 5001
REV. 2
SCALE: AS SHOWN SHEET 1 OF 1





CONTRACT DRAWINGS:
5295 C 5001, 5295 C 5002, 5295 C 5003, 5295 C 5501, 5295 C 5502, 5295 C 5503

REFERENCE DRAWINGS:
CIVIL, 5080 C 5075, 5080 C 5307, 5080 C 5308, 5080 C 5121
STRUCTURAL, 5080 C 5807, 5080 C 5808, 5080 C 5811, 5080 C 5601, 5080 C 5653, 5080 C 5654, 5080 C 5713
ELECTRICAL, 7500 C, 3E-0-3301, (5053), 3E-0-3302, (5053), 3E-0-3307
MECHAN. CAL, 5080 ME 3156 SHT 2 & 3, 5080 ME 3157, 5080 ME 3167

NOTE: FOR LIST OF DRAWINGS BY OTHERS SEE DWG NO. 5295 C 5002

SPECIFICATION (CONTINUED FROM C 5001)

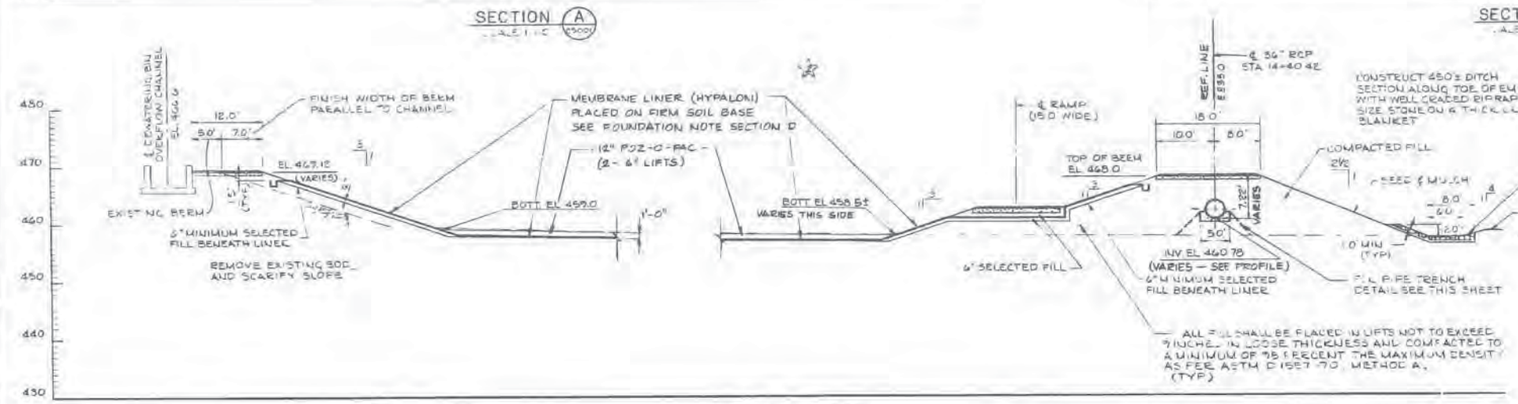
4. MEMBRANE LINER
THE LINER MATERIAL SHALL BE SYNTHETIC RUBBER SHEETING MANUFACTURED FROM A SYNTHETIC RUBBER COMPOUND CONTAINING NOT LESS THAN 65% (BY WEIGHT) OF DU PONT HYPALON 45 SYNTHETIC RUBBER AS THE SOLE ELASTOMER AND FORMULATED IN ACCORDANCE WITH THE RECOMMENDATIONS OF E.I. DU PONT, ELASTOMER CHEMICALS DEPARTMENT, WILMINGTON, DELAWARE.
THE LINING MATERIAL SHALL BE TWO PLY CONSISTING OF TWO 15 MIL THICKNESS OF HYPALON SYNTHETIC RUBBER SHEETING LAMINATED TO ONE LAYER OF NYLON OR POLYESTER REINFORCING FABRIC FOR A SINGLE 30 MIL THICKNESS. THE MATERIAL SHALL FURTHER COMPLY WITH THE REQUIREMENTS OF TABLE I.
THE CONTRACTOR SHALL FURNISH ONE COPY OF THE MANUFACTURER'S INSTRUCTIONS FOR STORAGE, HANDLING, INSTALLATION AND SEAMING OF LINING MATERIAL. INSTALLATION SHALL BE COMPLETED IN ACCORDANCE WITH THESE INSTRUCTIONS.
SMOOTH SURFACES FREE OF SHARP ROCKS, VEGETATION AND STUBBLE.

5. POZ-O-PAC
POZZOLANIC BASE IS TO BE PLACED AT THE BASIN BOTTOM ON TOP OF THE MEMBRANE LINER. THIS PRODUCT MIXTURE SHALL BE FIELD DETERMINED BUT SHALL BE COMPOSED OF HYDRATED LIME (4% ±), FLY ASH (80% ±) AND BOILER SLAG AGGREGATE (66% ±), WITH ABOUT 10% MOISTURE ADDED. COMPACTION TO THE REQUIRED DENSITY SHALL BE IN 6-INCH LAYERS UNTIL THE REQUIRED 12-INCH THICKNESS IS OBTAINED. POZ-O-PAC BASE SHALL BE CONSTRUCTED WHEN THE TEMPERATURE IS ABOVE 40°F DURING MAY 15TH TO SEPT 15TH.

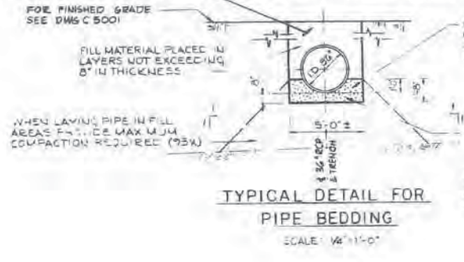
2	6/6/80	JT	Removed 9" Selected Fill & 9" Gravel (Total 1'-6") Blanket From Bottom of Bypass Basin & Replaced With 12" Poz-O-Pac
1	6/6/80	JT	Added Spec 5 (Poz-O-Pac)

DRFTSMN JT 6/6/80
CHKR
CDS ENGR
DISCIP MGR
PROJ MGR

SECTION (A)
SCALE: 1"=10' (2500)

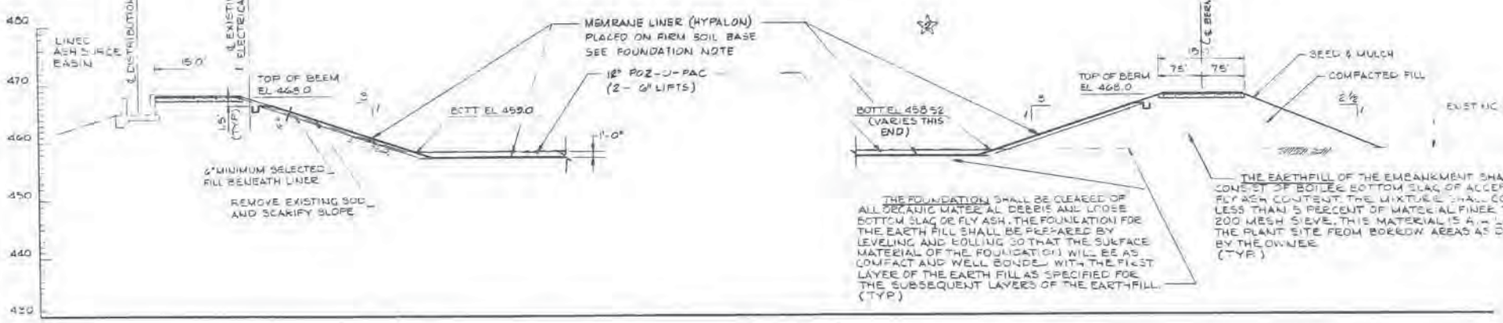


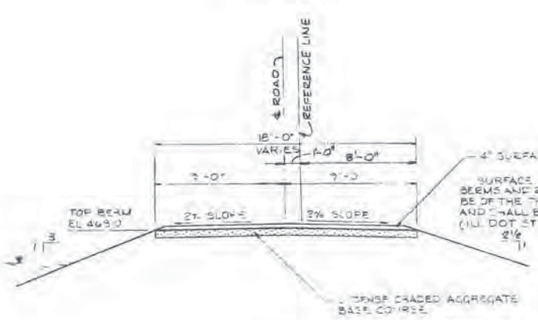
SECTION (B)
SCALE: 1"=10' (2500)



TYPICAL DETAIL FOR PIPE BEDDING
SCALE: 1/8"=1'-0"

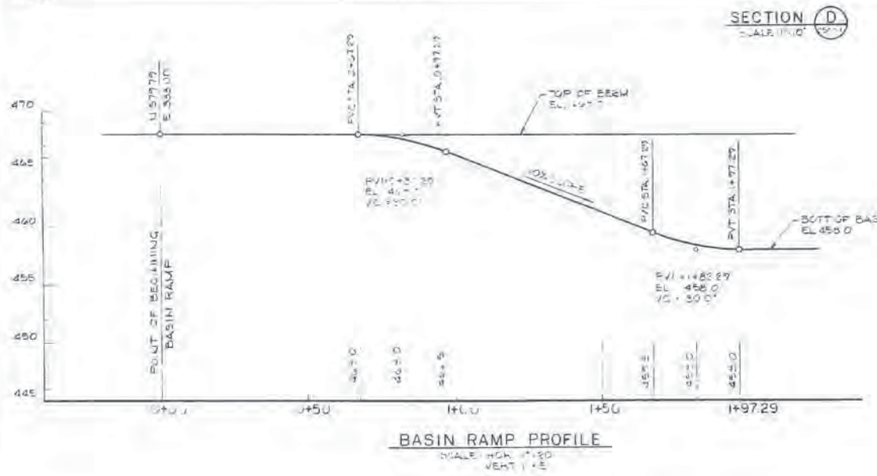
SECTION (C)
SCALE: 1"=10' (2500)



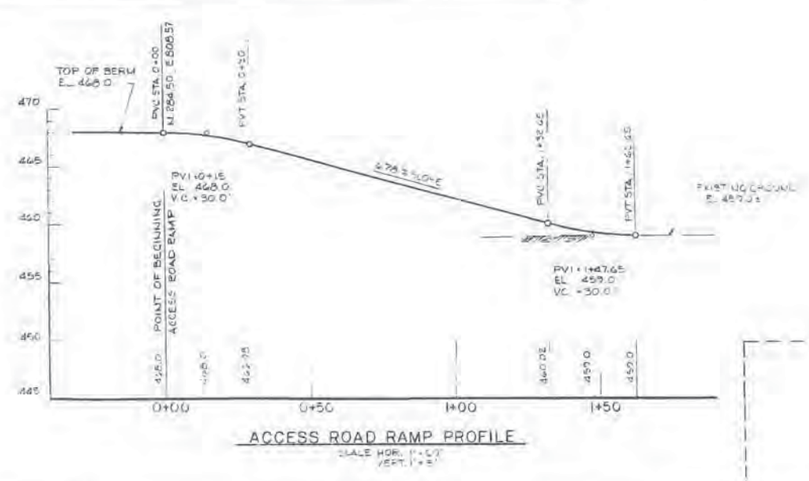


TYPICAL ROAD SECTION
SCALE: 1/8"=1'-0"

SECTION (D)
SCALE: 1"=10' (2500)



BASIN RAMP PROFILE
SCALE: HOR. 1"=50' VERT. 1"=5'



ACCESS ROAD RAMP PROFILE
SCALE: HOR. 1"=50' VERT. 1"=5'

Peter D. Arnaiswich 9/9/80
DRAWING STATUS

APPROVED FOR CONSTRUCTION

Date 6/24/80

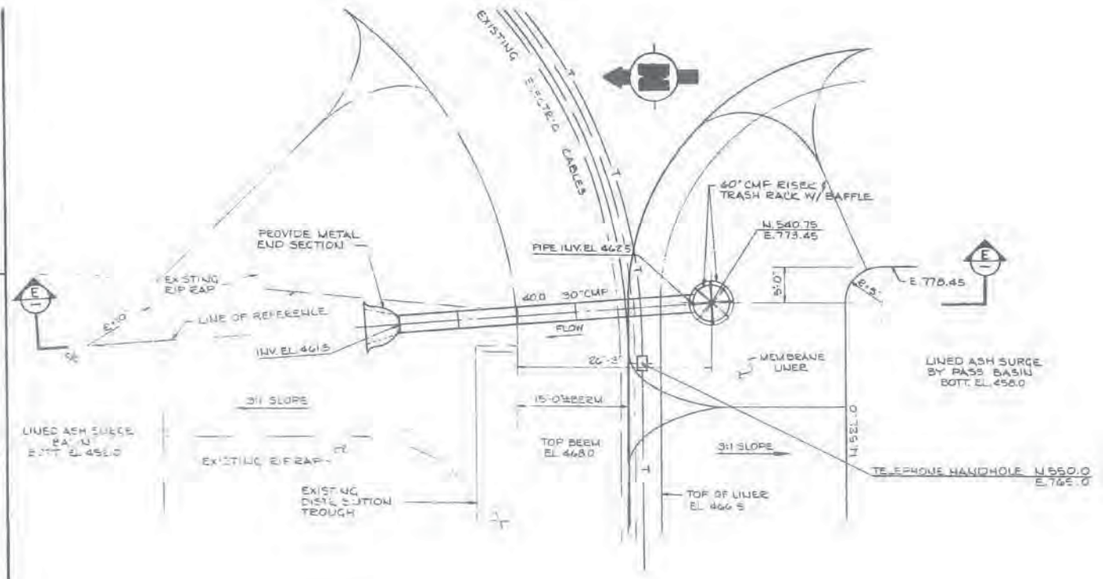
DRAWN	J Tedo	9/9/80
CHECKED		9/9/80
CDC ENGINEER		9/9/80
APPROVAL		9/9/80
APPROVAL		
APPROVAL		
APPROVAL		
APPROVED BY		9/9/80

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

ASH SURGE BASIN BY PASS
SECTIONS AND RAMP PROFILES

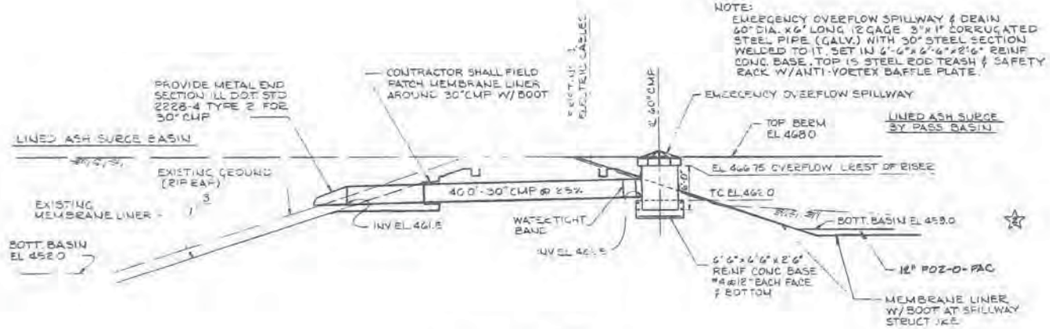
CECO CONTRACT 802658 | CECO DWG NO.
NUS CORPORATION ROCKVILLE, MD. | DRAWING NO. 5295 C 5002 | REV. 2
SCALE: AS SHOWN | SHEET 1 OF 1

FORM 5295-1 (9/79) A



PLAN

NOTE:
EMERGENCY OVERFLOW SPILLWAY & DRAIN 60" DIA. X 6' LONG. 12 GAGE 3"x1" CORRUGATED STEEL PIPE. (GALV.) WITH 30" STEEL SECTION WELDED TO IT. SET IN 6'-6"x6'-6"x2'6" REINF. CONC. BASE. TOP IS STEEL ROD TRASH & SAFETY RACK W/ANTI-VORTEX BAFFLE PLATE.

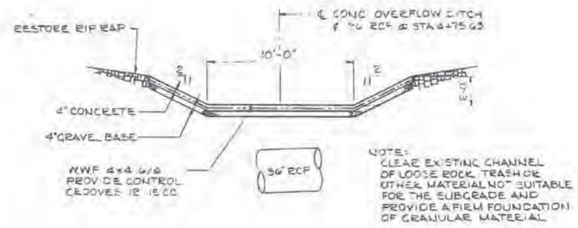


SECTION E

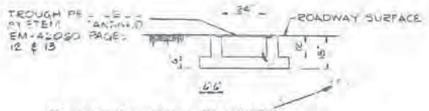
EMERGENCY OVERFLOW SPILLWAY
SCALE: 1/8"=1'-0"

CONTRACT DRAWINGS		
DRAWING NO.	REV.	DRAWING TITLES
5295 C 5001	1	PLAN & PROFILE
5295 C 5002	1	DETAILS & SECTIONS
5295 C 5003	1	MISCELLANEOUS DETAILS
5295 C 5501	1	INLET STRUCTURE
5295 C 5502	1	OUTLET STRUCTURE
5295 C 5503	1	MISCELLANEOUS GATES
REFERENCE DRAWINGS		
5080 C 5006	2	DETAIL PLAN - EAST ROOF & YARD RUNOFF BASIN
5080 C 5007	2	DETAIL PLAN ASH SURGE BASIN
5080 C 5015	2	MISCELLANEOUS SECTIONS AND DETAILS, SHTS 1 & 2
5080 C 5181	1	BASIN END SECTION
5080 C 5507	1	RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE
5080 C 5509	1	ASH SURGE BASIN & LIMESTONE BASIN DISTRIBUTION TROUGH SECTION & DETAILS
5080 C 5511	2	DEWATERING BIN OVERFLOW CHANNEL SECTIONS & DETAILS
5080 C 5601	2	STANDARD DETAILS
5080 C 5638	2	ASH SURGE BASIN SUMP - CLARIFIER OVERFLOW SUMP
5080 C 5654	1	PIPE SUPPORTS FRAMING PLAN & SECTIONS GDL NO 74-3151
5080 C 5718	1	ASH SURGE BASIN SUMP PLAT FORM SECTIONS & DETAILS
(5080) 3E-0-3501	2	ELECTRICAL AREA LAYOUT EAST RUNOFF BASIN - NORTH
(5080) 3E-0-3505	3	ELECTRICAL AREA LAYOUT LIMESTONE PILE RUNOFF BASIN
(5080) 3E-0-3507	2	ELECTRICAL AREA LAYOUT ASH SURGE BASIN AREA
5080 ME 3155 SHT 2	4	PIPING ARRANGEMENT YARD AREA
SHT 5	3	
SHT 6	3	
SHT 7	3	
SHT 11	3	
5080 ME 3162 SHT 1	3	PIPING ARRANGEMENT YARD DETAIL EAST ROOF & YARD RUNOFF BASIN
5080 ME 3169 SHT 1	1	PIPING ARRANGEMENT YARD DETAIL LIMESTONE PILE RUNOFF BASIN AND ASH SURGE BASIN SUMPS

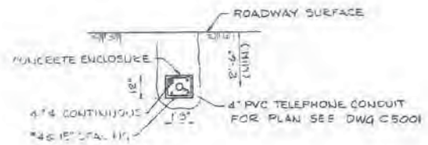
NOTE:
FOR ELECTRICAL CABLE TROUGH SEE CECO SYSTEMS STANDARD EM-42060 "HB" TROUGHS 24" WIDTH HEAVY DUTY FOR ROADWAYS PAGE 12 (STEEL COVER PLATE) OR PAGE 13 (REINFORCED CONCRETE COVER PLATE).



TYPICAL DETAIL
CONCRETE OVERFLOW DITCH
SCALE: 1/2"=1'-0"



DETAIL
ELECTRICAL CABLE TROUGH
SCALE: 3/8" = 1'-0"



DETAIL
CONCRETE ENCLOSURE FOR
TELEPHONE CONDUIT
SCALE: 3/8" = 1'-0"

VR/BO		
2	(4) REMOVED COMBINED SELECT AND GRAVEL BLANKET FROM BOTTOM OF BASIN AND ADDED 12" PDZ-O-PAC, SEE E (5) CHANGED BOTTOM EL. 458.0 TO 459.0.	

DFT'SMN [illegible] 6/-/83
CHK'R [illegible]
COG ENGR [illegible]
DISCIP MGR [illegible]
PROJ MGR [illegible]

Peter D. Arrendondo 9/18/85

GRADING STATUS

APPROVED FOR CONSTRUCTION

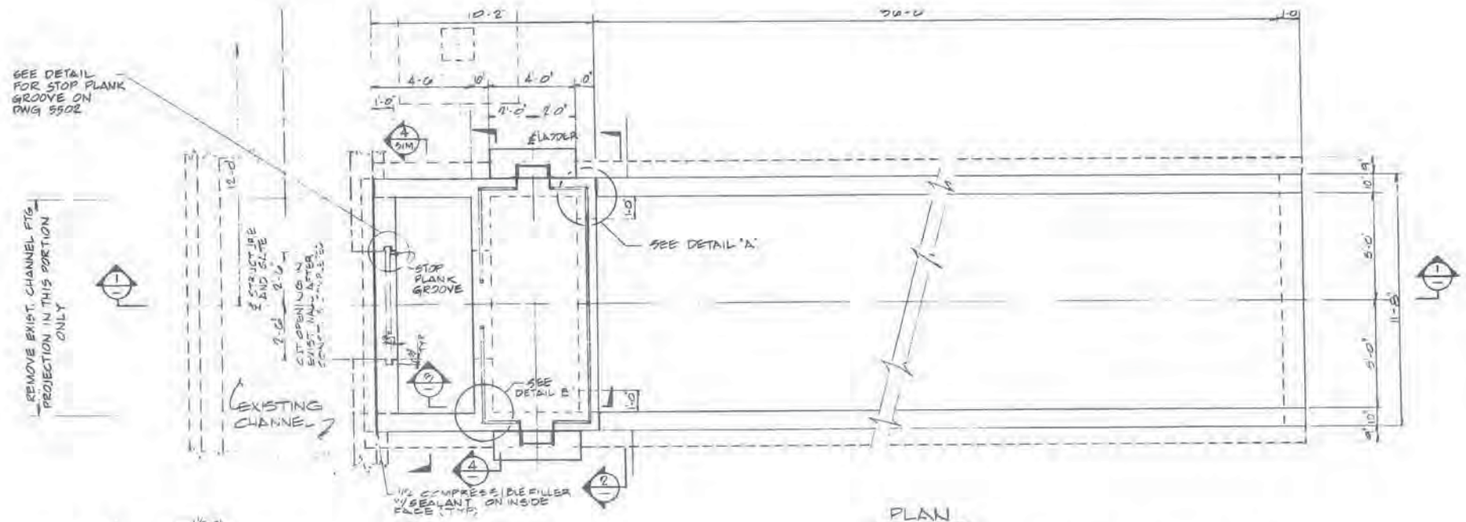
Date 6/22/83

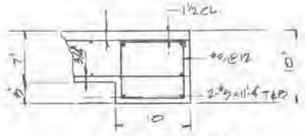
DESIGN	[illegible]	6/20
CHECKED	[illegible]	6/20
COG ENGINEER	[illegible]	6/22
CONSTRUCT. APPVL.	[illegible]	6/22
APPROVAL		
APPROVAL		
APPROVAL		
APPROVAL PROJ. MGR.	[illegible]	7/1/10

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

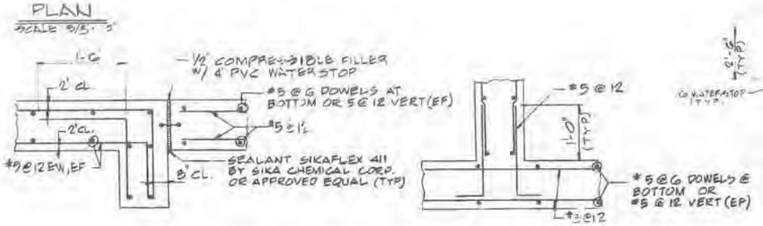
ASH SURGE BASIN BY PASS
MISCELLANEOUS DETAILS

CECO CONTRACT: 802668
CECO DWG. NO.
NUS CORPORATION ROCKVILLE, MD.
DRAWING NO. 5295 C 5003
REV. 2
SCALE: AS SHOWN
SHEET 1 OF



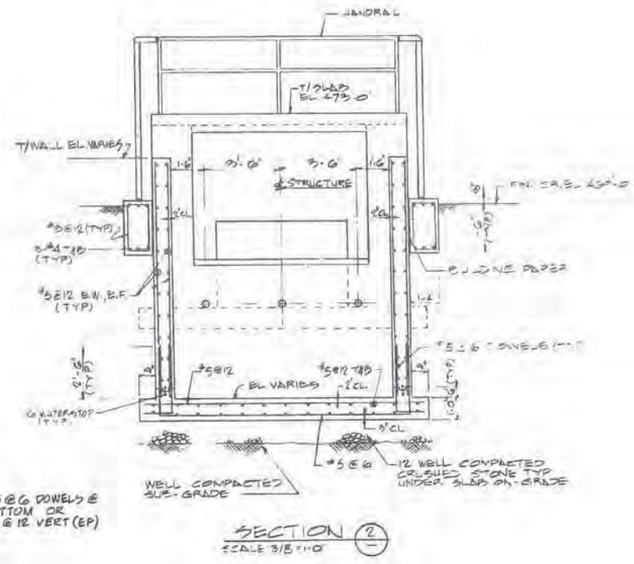


DETAIL 'C'
SCALE: 1½" = 1'-0"

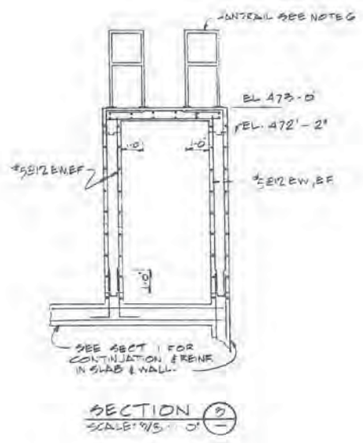


DETAIL "A"
SCALE 1" = 1'-0"

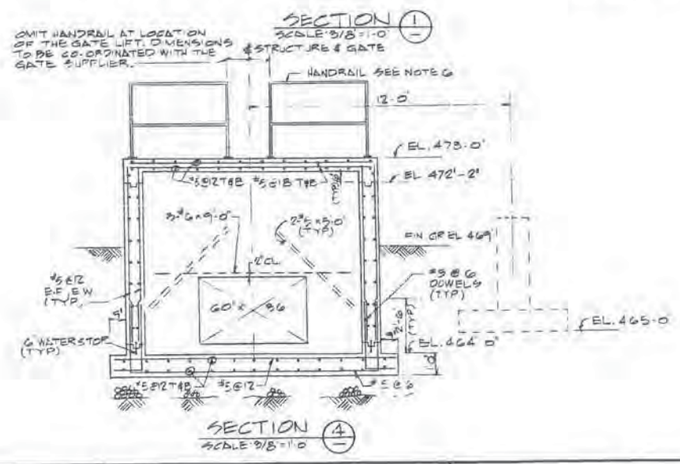
DETAIL 'B'
SCALE 1" = 1'-0"



SECTION (2)
SCALE 3/8"=1'-0"



SECTION (3)
SCALE 3/8"=1'-0"



SECTION (4)
SCALE 3/8"=1'-0"

CONTRACT DRAWINGS:

5295 C 5001, 5002, 5003, 5501, 5502, 5503.

REFERENCE DRAWINGS:

CIVIL: 5080 C 5005, 5007, 5015, 5121

STRUCTURAL: 5080 C 5507, 5501, 5511, 5601, 5638, 5654, 5713

ELECTRICAL: (5080) 3E-0-3301, 3305, 3307

MECHANICAL: 5080 ME 3155 SHT 2, 5, 6, 7 & 11, 3162, 3169

NOTE: FOR LIST OF DRAWINGS BY TITLES SEE DWG NO. 5295 C 5003

NOTES:

1. CONCRETE: f'c = 3000 PSI AT 28 DAYS
2. REINFORCING = ASTM A 615, GRADE 60
3. CONTRACTOR SHALL FURNISH AND INSTALL FAB STEEL GATE AND ACCESSORIES AS MANUFACTURED BY ARMCO STEEL CORP. CONFORMING TO THE FOLLOWING SPECS. OR APPROVED EQUAL.
   a. GATE MODEL 10-00
      QUANTITY REQUIRED = 1
      OPENING SIZE = 60" x 36"
      FRAME TYPE = FLAT BACK STD BOTTOM
      MATERIAL COMBINATION = #2
      STEM DIA. = 1 1/2" Φ
   b. ACCESSORIES
      TYPE OF LIFT = CPE 2
      LIFT SUPPORT = WALL BRACKET TO MATCH CPE 2
      STEM SUPPORT = ADJUSTABLE STEM GUIDES AT SPACING RECOMMENDED BY MANUFACTURER
4. CONTRACTOR SHALL COORDINATE WITH THE GATE SUPPLIER FOR THE NUMBER, SIZE AND LOCATION OF ANCHOR BOLTS REQUIRED TO ATTACH THE GATE, WALL BRACKET AND STEM GUIDES TO THE SUPPORTING WALL.
5. WORK THIS DWG. WITH CIVIL DWGS. 5295 C 5001 AND 5002.
6. FOR HANDRAIL & LADDER DETAILS SEE REF DWG. 5080 C 5601
7. FOR STOP PLANKS SEE DWG 5295 C 5502 NOTE 4

Peter D. Ferguson 4/4/80

DRAWING STATUS

APPROVED FOR CONSTRUCTION

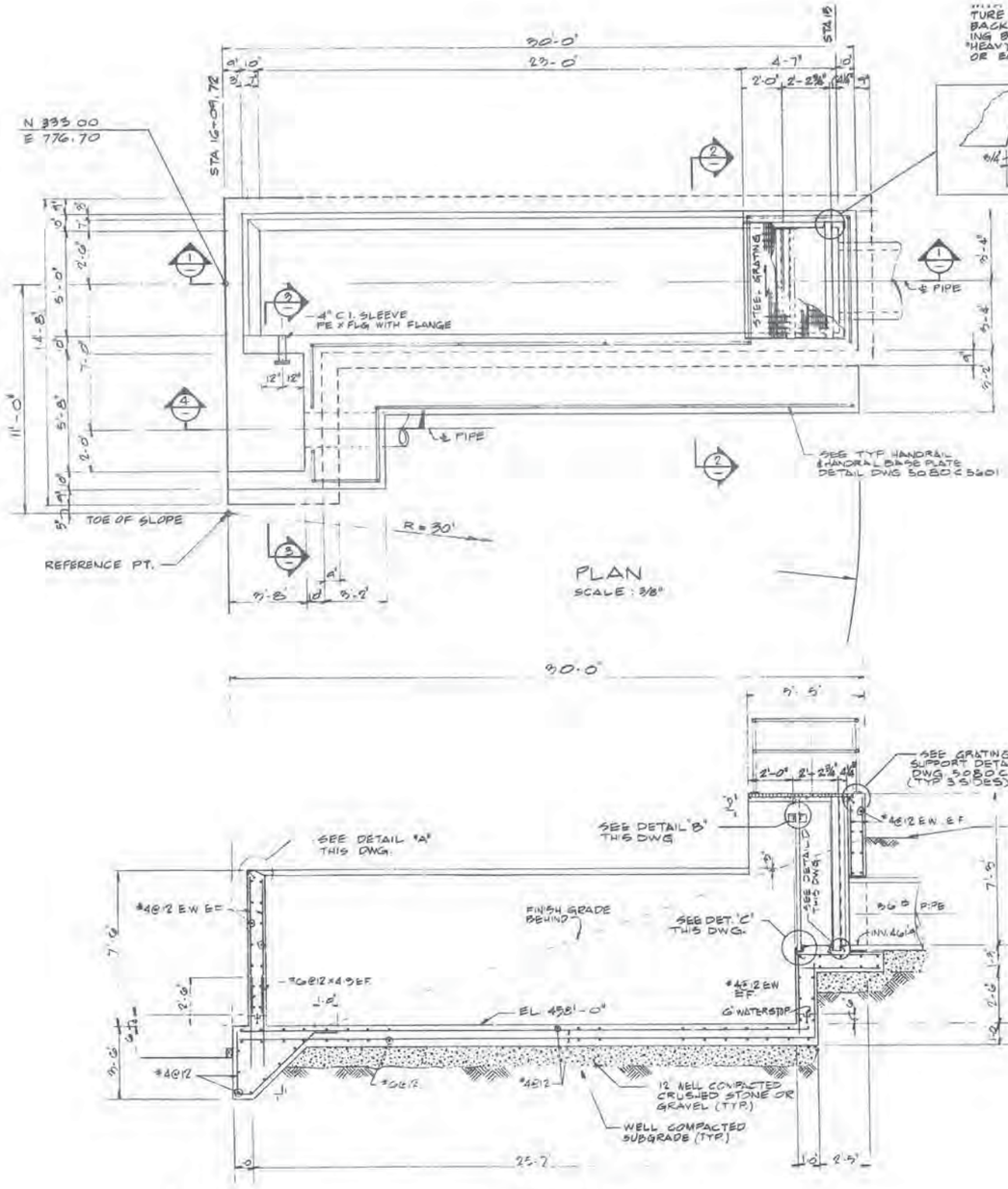
Date 2/26/80

DRAWN: KENNETH LONG		COMMONWEALTH EDISON COMPANY
CHECKED: D-N		WASTE WATER TREATMENT FACILITIES
COG. ENGINEER		POWERTON
PROJ. ENGR.		ASH SURGE BASIN BY PASS
APPROVAL		BASIN INLET STRUCTURE
APPROVAL		
APPROVAL FOR CONST.		
APPROVAL CLIENT		

REQ. NO. B02668 — DRAWING NO. 5295 C 5501 — REV. 1

NUS CORPORATION ROCKVILLE, MD. — SCALE: AS SHOWN — SHEET 1 OF 1

33 11



NOTES:

1. SEE NOTE NOS 1, 2, 4, 5 AND 6 ON DWG 5501.
2. CONTRACTOR SHALL FURNISH & INSTALL MEDIUM DUTY SLUICE GATE & ACCESSORIES AS MANUFACTURED BY ARMCO STEEL CORP. OR APPROVED EQUAL, CONFORMING TO FOLLOWING SPECS:
   a. GATE
      MODEL 20-10C
      QUANTITY REQD = 1
      OPENING SIZE = 15" DIA.
      FRAME TYPE = FLAT BACK
      MATERIAL COMBINATION = #2
      STEM DIA = ⅞"
   b. ACCESSORIES
      TYPE OF LIFT = H1-10
      FRAME HT = 12'-4½" MINIMUM.
3. STEEL GRATING TO BE IRVING WELDED RECTANGULAR DESIGN TYPE IHB-2 WITH 1¼" x ¼" MAIN BARS, AS MANUFACTURED BY IKG INDUSTRIES OR APPROVED EQUAL (GALVANIZED)
4. STOP PLANKS TO BE DOUGLAS FIR COMMERCIAL GRADE NO. 2 (WEST COAST)
   PROVIDE ONE SET OF 7 PLANKS 4" x 8" x 5'-5" LONG (DRESSED SIZE 3½ x 7¼ x 5'-5")
   STOP PLANKS ARE INTERCHANGEABLE AT THREE LOCATIONS — SEE ALSO DWGS C5501 & C5503 (ONLY ONE SET REQUIRED UNLESS DIRECTED OTHERWISE BY OWNER.)

CONTRACT DRAWINGS:
5295 C 5001, 5002, 5003, 5501, 5502, 5503.

REFERENCE DRAWINGS:
CIVIL: 5080 C 5005, 5007, 5015, 5121
STRUCTURAL: 5080 C 3507, 5509, 5511, 5601, 5635, 5654, 5713
ELECTRICAL: (ENGR) 3E-0-3301, 3305, 3307
MECHANICAL: E 380 ME 3155 SHT 2, 5, 6, 7, & 11, E 62, 3169

NOTE: FOR LIST OF DRAWINGS BY TITLES SEE DWG NO. 5295 C 5003.

R.H.D. Approved 2/8/80

DRAWING STATUS
APPROVED FOR CONSTRUCTION
Date 2/8/80

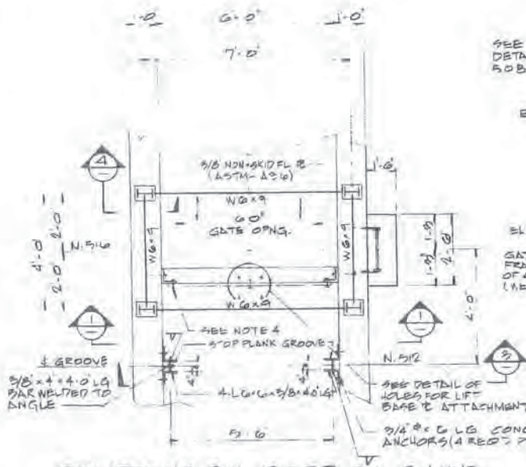
DESIGNED	LONG	1/80
CHECKED	[illegible]	2/8/80
CDC ENGINEER	[illegible]	2/8/80
APPROVAL		
APPROVAL		
APPROVAL		
APPROVED		2/8/80
APPROVAL CLIENT		

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON
ASH SURGE BASIN BY PASS
BASIN OUTLET STRUCTURE

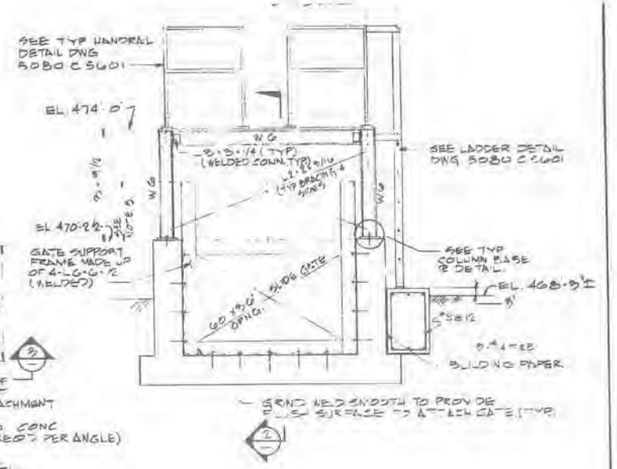
CECO CONTRACT 802668 | CECO DWG NO. | REV.

NUS CORPORATION, ROCKVILLE MD.
DRAWING NO. 5295 C 5502 | REV 1
SCALE AS SHOWN | SHEET 1 OF 1

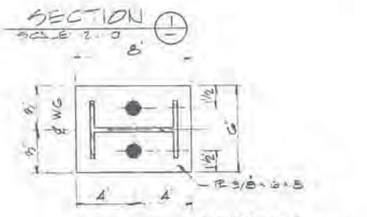
33 10



DEWATERING BIN OVERFLOW CHANNEL SLIDE GATE PLAN
SCALE: 1/2" = 1'-0"

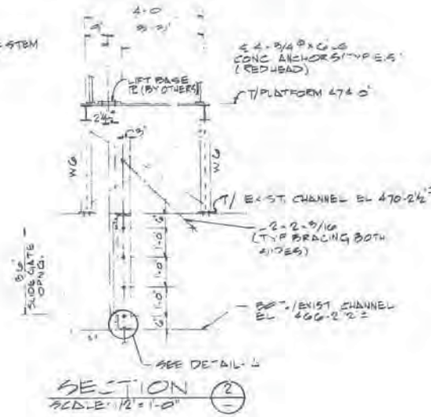


SECTION
SCALE: 1" = 1'-0"

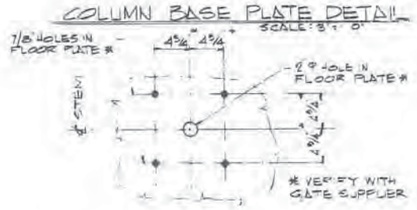


℄ 4-¾"ø x 6" LG CONC ANCHORS (TYP 6) (REDHEAD)

COLUMN BASE PLATE DETAIL
SCALE: 3" = 1'-0"

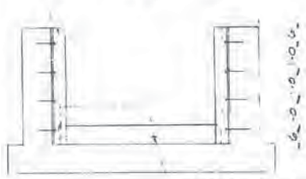


SECTION (2)
SCALE: 1½" = 1'-0"

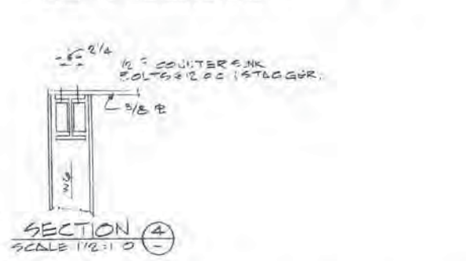


HOLE ARRANGEMENT FOR LIFT BASE PLATE ATTACHMENT
SCALE: 1½" = 0"

DETAIL-A
SCALE: 3" = 1'



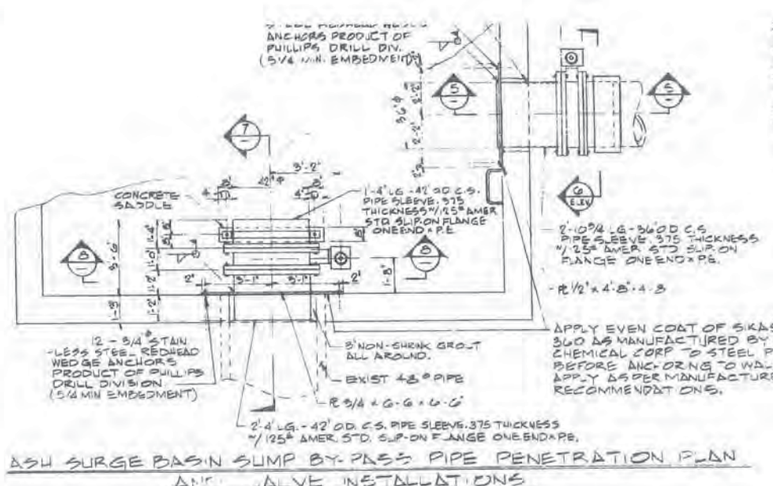
SECTION (3)
SCALE: 1½" = 1'-0"



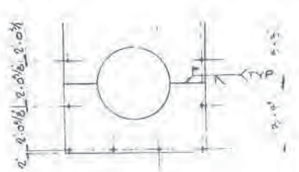
SECTION (4)
SCALE: 1½" = 1'-0"

NOTES:

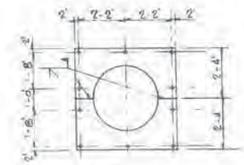
1. STRUCTURAL STEEL = ASTM A-36
2. WELDING ELECTRODE = E70-XX
3. GATE TO BE ARMCO FABRICATED STEEL SLIDE GATE MODEL 10-00, MATERIAL COMBINATION 2 WITH 12" SPE-2 LIFT, 1½ # STEM, OR APPROVED EQUAL.
4. GATE TO BE ATTACHED TO SUPPORTING ANGLE FRAME WITH BOLTS AS RECOMMENDED BY GATE SUPPLIER
5. VERTICAL ANGLES OF GATE SUPPORT FRAME TO BE EXTENDED FOR A SUFFICIENT LENGTH TO ATTACH SIDE GUIDES OF GATE. THIS DIMENSION SHALL BE CO-ORDINATED WITH THE GATE SUPPLIER
6. STRUCTURAL STEEL TO RECEIVE ONE SHOP COAT OF INORGANIC ZINC



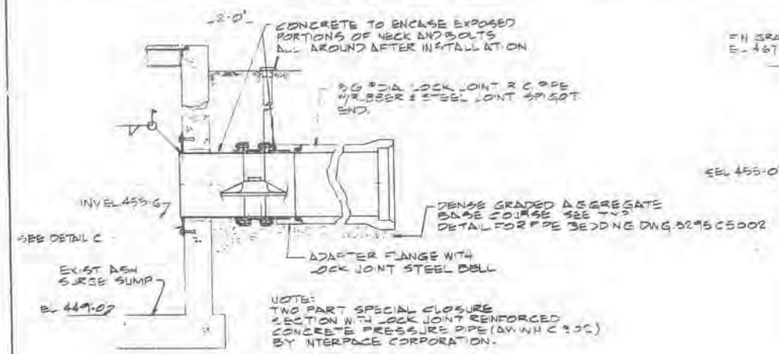
ASH SURGE BASIN SUMP BY-PASS PIPE PENETRATION PLAN AND VALVE INSTALLATIONS
SCALE: 3/8" = 1'-0"



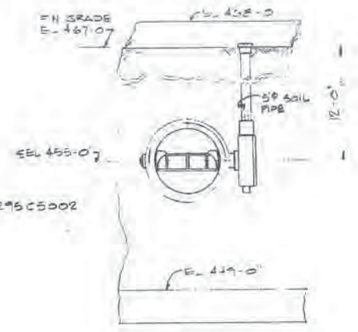
DETAIL-B
SCALE: 3/8" = 1'-0"



DETAIL-C
SCALE:



SECTION (5)
SCALE: 3/8" = 1'-0"



SECTION (6) ELEVATION
SCALE: 3/8" = 1'-0"

NOTES:

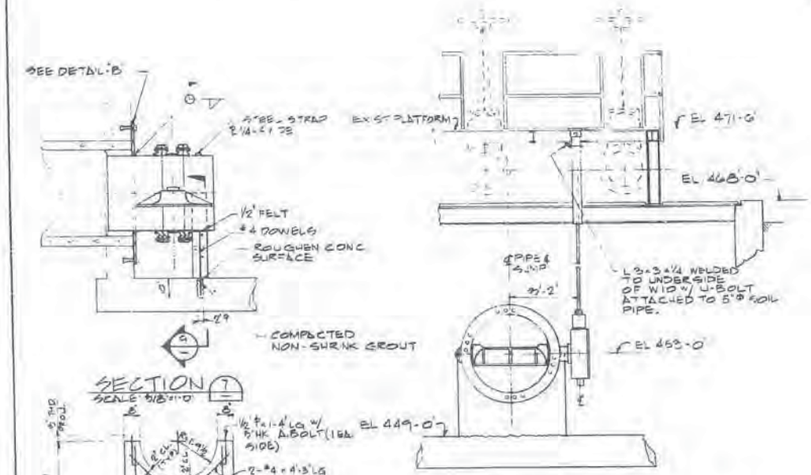
1. PROVIDE ONE(1) 36" DIA. AND ONE(1) 42" DIA. RUBBER SEATED BUTTERFLY VALVES WHICH COMPLY WITH AWWA STANDARD C504, (LATEST REVISION). BODY SHALL BE CAST IRON WITH END FOR FLANGES. SERVICE IS FOR AWWA PRESSURE CLASS 250, 250. OPERATORS SHALL BE BURIED SERVICE/SUBMERSION PRESSURE (10 PSI) WITH 2" STD AWWA NUT, AND EXTENSION STEMS AS SHOWN. VALVES SHALL BE TRITON XR-70, MANUFACTURED BY HENRY PRATT COMPANY, AURORA, ILL. OR APPROVED EQUAL.
2. MISCELLANEOUS STEEL EXPOSED SHALL BE GALVANIZED.

CONTRACT DRAWINGS:

5295 C 5001, 5002, 5003 (CIVIL) 5295 C 5501, 5502, 5503 (STRUCT.)

REFERENCE DRAWINGS:

CIVIL: 5080 C 5005, 5007, 5015, 5121
STRUCTURAL: 5080 C 5507, 5509, 5511, 5601, 5638, 5654, 5713
ELECTRICAL: 5080-ME-0-3301, 3305, 3307
MECHANICAL: 5080 ME 3155 SHT. 2, 5, 6, 7, 11, 3162, 3169.
NOTE: FOR LIST OF DRAWINGS BY TITLES SEE DWG. NO. 5295 C 5003



SECTION (7)
SCALE: 3/8" = 1'-0"

SECTION (8) ELEVATION
SCALE: 3/8" = 1'-0"

SECTION (9)
SCALE: 3/8" = 1'-0"

Rhd Approved 2/8/60

DRAWING STATUS:
APPROVED FOR CONSTRUCTION
Date 2/8/60

DRAWN K. LONG	4/30	COMMONWEALTH EDISON COMPANY	
CHECKED J.F.U.	2/26	WASTE WATER TREATMENT FACILITIES	
CIVIL ENGINEER	4/30	POWERTON	
STRUCTURAL APPVL.	2/26	MISCELLANEOUS SLIDE GATES	
APPROVAL			
APPROVAL		CECO CONT. NO. 2668	CECO DWG. NO.
APPROVAL M & E	2/26	NUS CORPORATION ROCKVILLE, MD.	DRAWING NO. 5295 C 5503 REV 1
APPROVAL CLIENT			SCALE: AS SHOWN SHEET 1 OF 1

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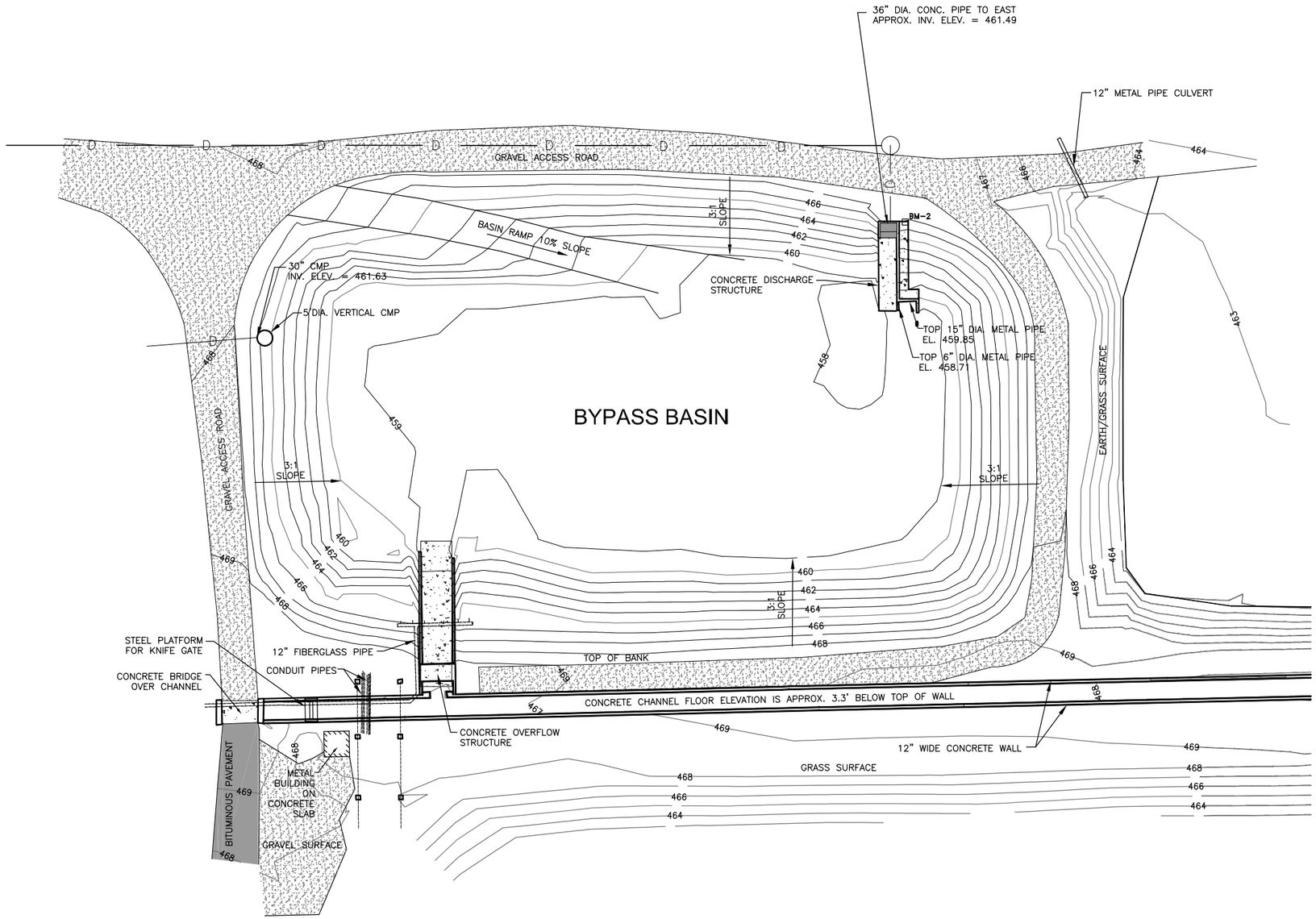
APPENDIX B-2

Liner Replacement Construction Drawings



LEGEND

- D — UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- 460 — GROUND SURFACE CONTOUR
- BM-2 — BENCHMARK 2

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

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION
DRAWING NO. 5295 C5001-2, DATED 6-26-1980.

N

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SCALE IN FEET

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2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS
REVISION:		DATE:	APP'D BY:

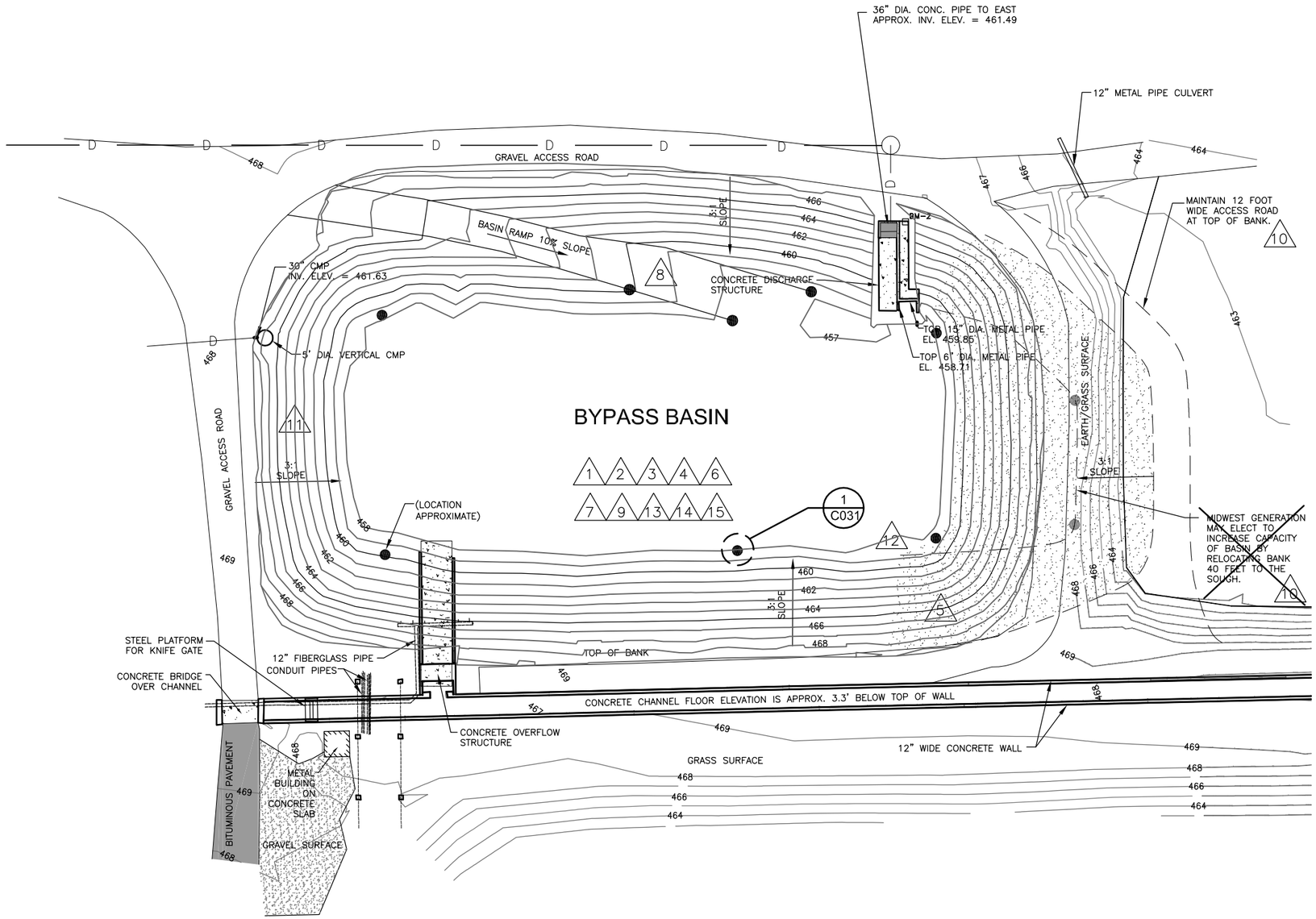
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965.5/5.4	
DRAWN BY: KNW 06/30/10	
CHECKED BY: RJG 06/30/10	
APPROVED BY: HMS 06/130/10	DRAWING NO: D1965C010-02
	REFERENCE: .

PRE-CONSTRUCTION CONDITIONS

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

SHEET NO. C010



LEGEND

- UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- PREPARED SUBGRADE SURFACE CONTOUR
- 12 OZ. NON-WOVEN GEOTEXTILE
- MARKER POST LOCATION
- ADDITIONAL MARKER POST LOCATION IF BANK IS RELOCATED.
- BANK/AREA FOR POSSIBLE RELOCATION
- BM-2 BENCHMARK 2

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. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
4. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
5. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
7. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL CLEAN OFF THE RAMP SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR OWNER.
9. CONTRACTOR SHALL REMOVE 12-INCH LAYER OF POZ-O-PAC AND 6-INCHES OF POZ-O-PAC SUBGRADE FROM THE BASE OF BASIN.
~~10. CONTRACTOR SHALL RELOCATE SOUTHERN BANK 40 FEET TO THE SOUTH, AS DIRECTED BY OWNER. SEGREGATE GRAVEL ACCESS ROAD MATERIAL TO BE REUSED AS BASE COURSE MATERIAL. MATERIAL REMOVED FROM THE EXISTING BANK MAY BE USED TO RECONSTRUCT NEW SOUTHERN BANK IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.~~
11. CONTRACTOR SHALL REMOVE "SOFT" SUBGRADE MATERIAL BENEATH EXISTING HYPALON LINER, AS DIRECTED BY OWNER AND/OR ENGINEER. BACK FILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. CUT HYPALON AS NEEDED TO REPAIR THE "SOFT" SUBGRADE AREAS.
12. 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.
13. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE AT BASE OF BASIN AND WHERE HYPALON LINER DOES NOT EXIST OR WAS REMOVED OF THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
14. SUBGRADE SHALL BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
15. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

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

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION DRAWING NO. 5295 C5001-2, DATED 6-26-1980.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICES, MARCH 2011.

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SCALE IN FEET

REVISION:		DATE:	APP'D BY:
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2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS

NATURAL RESOURCE TECHNOLOGY

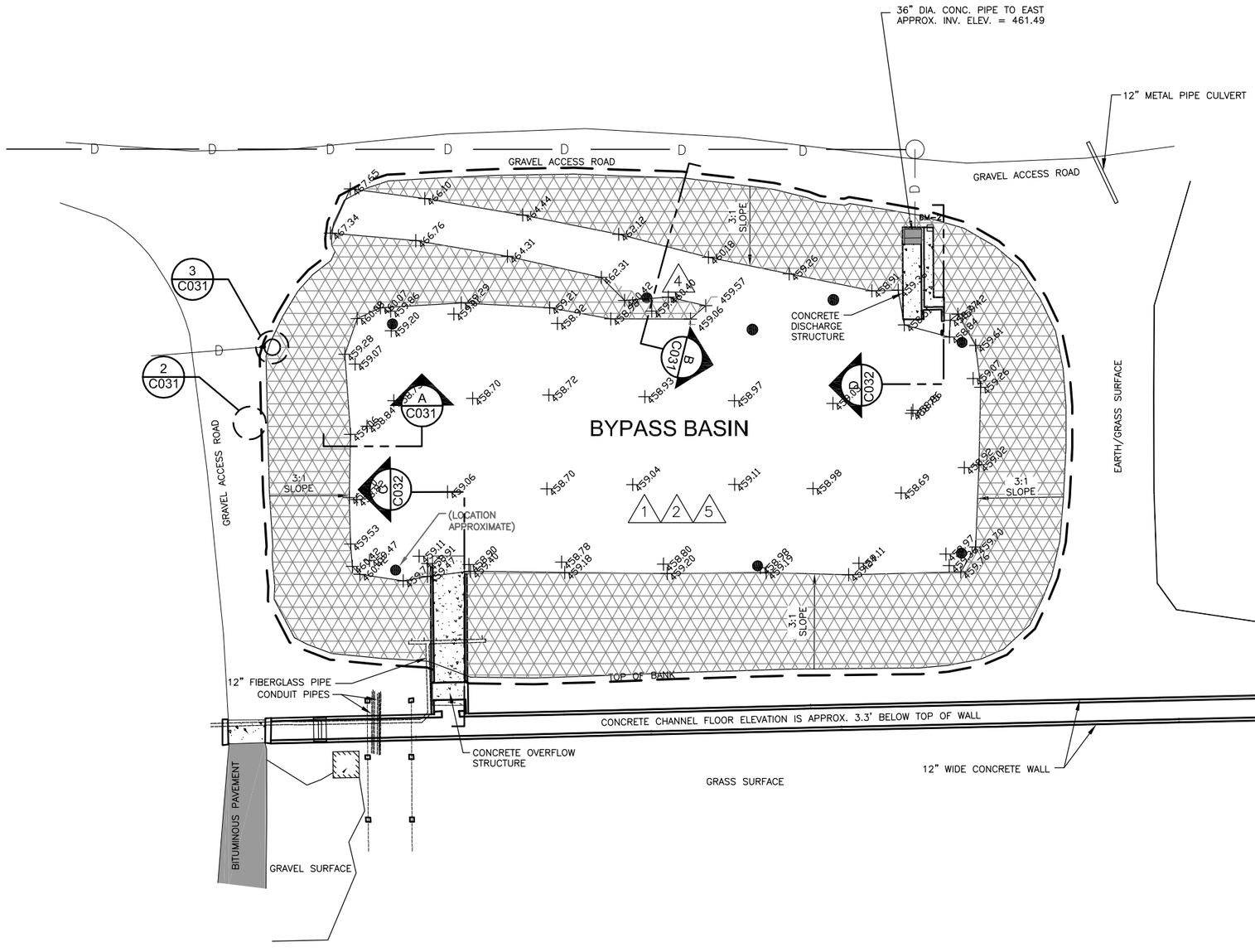
PROJECT NO. 1965/5.4
DRAWN BY: KNW 06/30/10
CHECKED BY: RJG 06/30/10
APPROVED BY: HMS 06/30/10

LINER SUBGRADE PREPARATION

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C020-02
REFERENCE: .

SHEET NO. C020



LEGEND

- D — UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- ANCHOR TRENCH
- × 459.11 — TOP OF WARNING LAYER (ELEVATION, FT.)
- MARKER POST LOCATION
- BM–2 — BENCHMARK 2
- HDPE GEOMEMBRANE

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

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

CONTRACTOR NOTES: △

1. 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.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF BASIN BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE OWNER AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. 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).
4. CONTRACTOR SHALL PLACE 2 LAYERS OF 12–OZ. NONWOVEN GEOTEXTILE, CUSHION AND WARNING LAYER MATERIALS OVER THE GEOMEMBRANE ON THE RAMP, AS SHOWN ON SHEET C031.
5. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
6. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
7. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION DRAWING NO. 5295 C5001–2, DATED 6–26–1980.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICE, MARCH 2011.

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REVISION:		DATE:	APP'D BY:
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2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS

NATURAL RESOURCE TECHNOLOGY

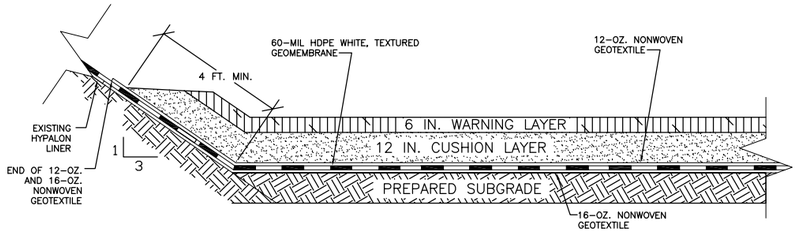
PROJECT NO. 1965.5/5.4
DRAWN BY: KNW 06/30/10
CHECKED BY: RJG 06/30/10
APPROVED BY: HMS 06/30/10

WARNING LAYER PLAN

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

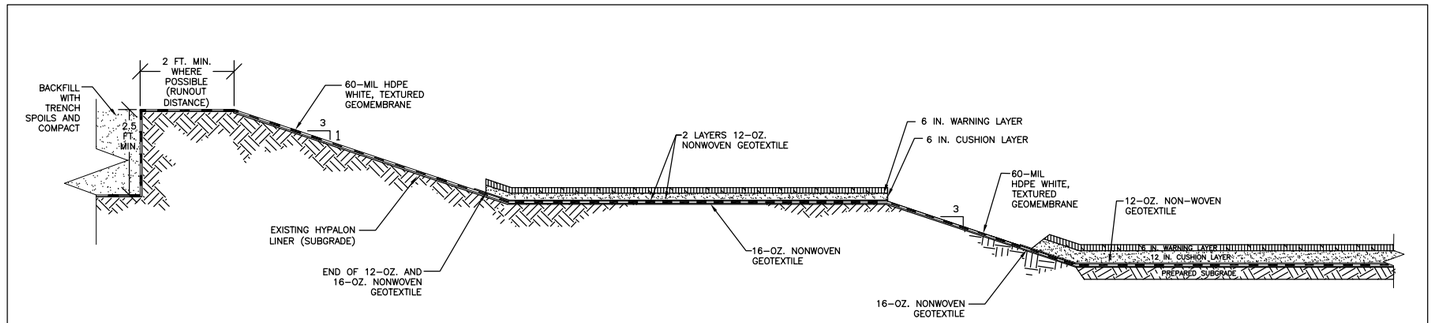
DRAWING NO: D1965C030–02
REFERENCE: .

SHEET NO. C030



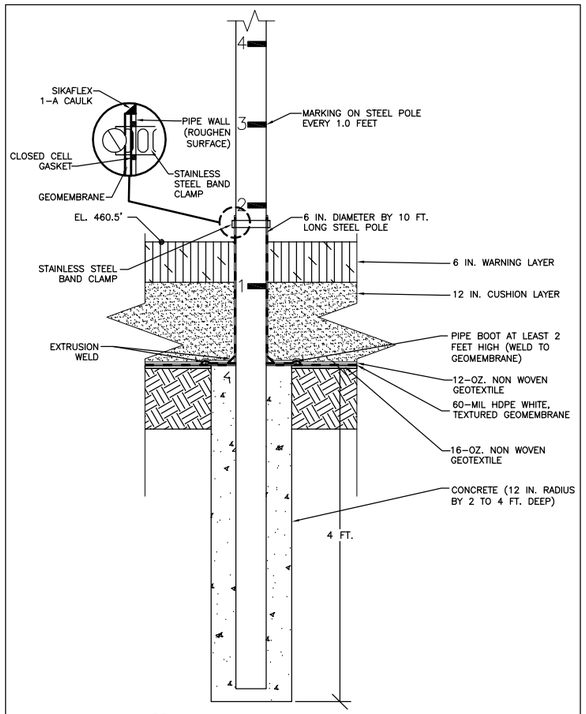
NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED 2 TO 5 FT. FROM TOE OF SLOPE AT A MINIMUM.

A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE

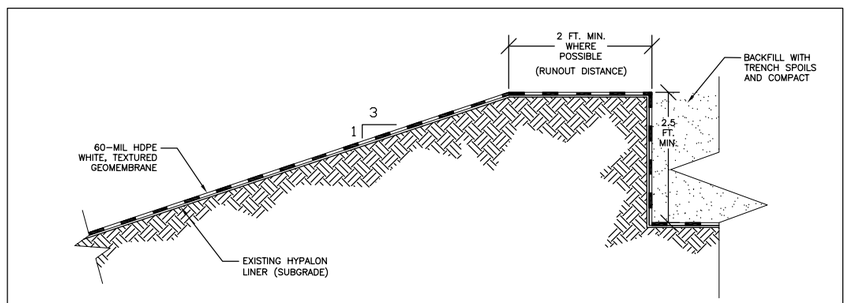


NOTE:
16-OZ. NONWOVEN GEOTEXTILE TO BE PLACED AT BASE OF BASIN AND WHERE HYPALON LINER DOES NOT EXIST OR WAS REMOVED OF PREPARED SUBGRADE

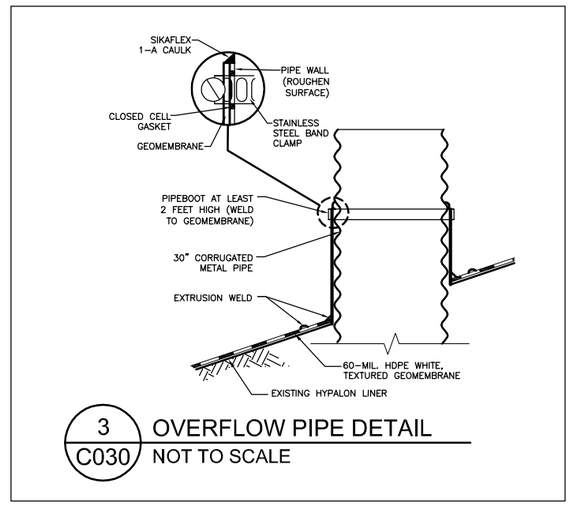
B / C030 RAMP SECTION
NOT TO SCALE



1 / C020 MARKER POST DETAIL
NOT TO SCALE



2 / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



3 / C030 OVERFLOW PIPE DETAIL
NOT TO SCALE

NOT FOR CONSTRUCTION

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2.	RECORD DOCUMENTATION	06/16/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
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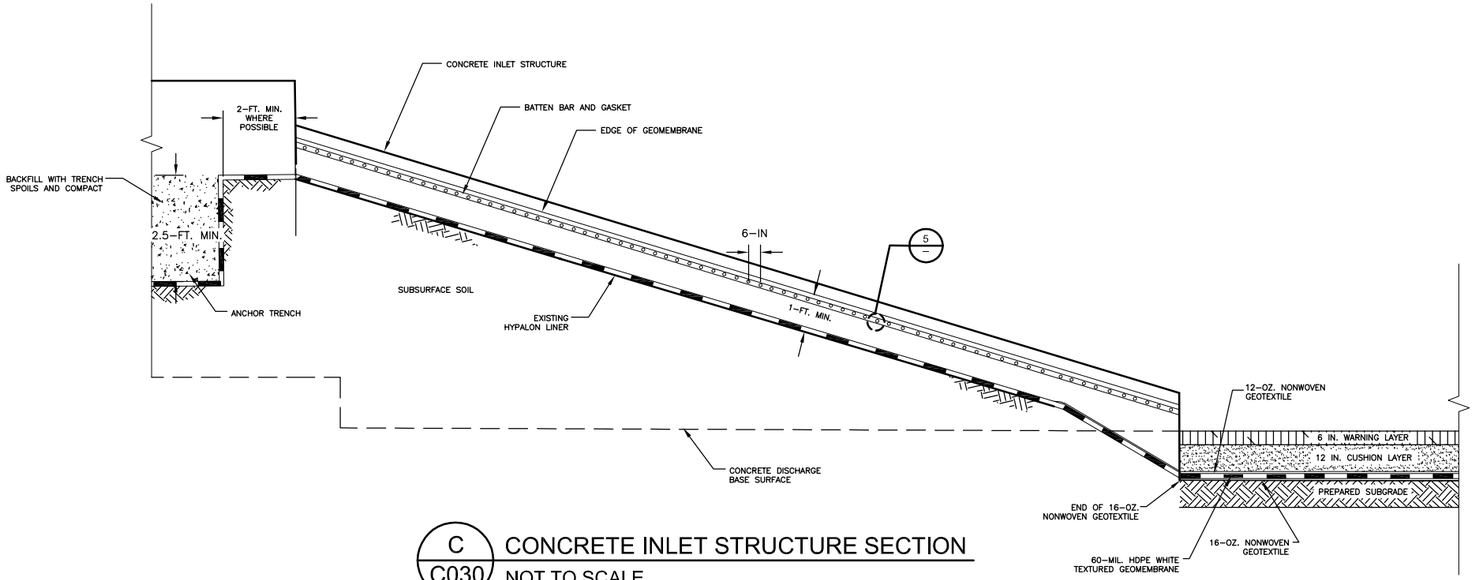
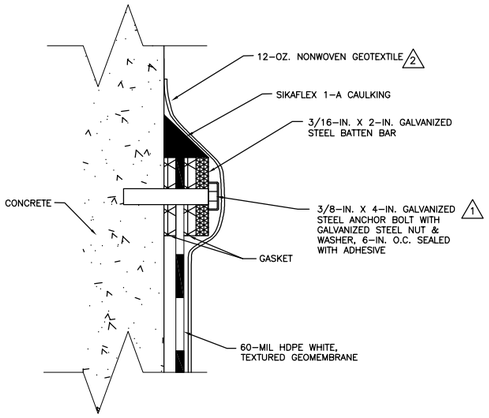
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/5.4	DETAILS AND SECTIONS
DRAWN BY: KNW 06/30/10	BYPASS BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS
CHECKED BY: RJG 06/30/10	
APPROVED BY: HMS 06/30/10	DRAWING NO: D1965C031-02
	REFERENCE:
	SHEET NO. C031

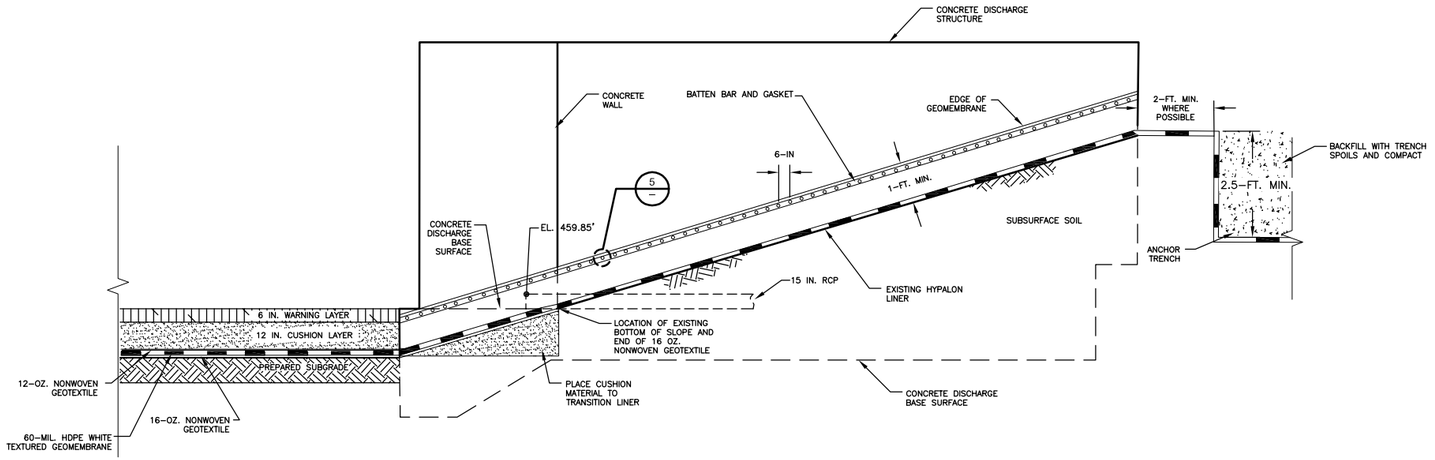


C / C030 CONCRETE INLET STRUCTURE SECTION
NOT TO SCALE



NOTE: △
1. ANCHOR BOLTS 6 IN. ON CENTER.
2. 12-OZ. NONWOVEN GEOTEXTILE TO BE USED TO PROTECT GEOMEMBRANE BELOW CUSHION/WARNING LAYERS.

5 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE



D / - CONCRETE DISCHARGE STRUCTURE SECTION
NOT TO SCALE

NOT FOR CONSTRUCTION

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2.	RECORD DOCUMENTATION	06/16/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/5.4
DRAWN BY: KNW 06/30/10
CHECKED BY: RJG 06/30/10
APPROVED BY: HMS 06/30/10

DETAILS AND SECTIONS

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C032-02
REFERENCE:
SHEET NO. C032

APPENDIX C

Ash Surge Basin Liner Replacement Specifications

SECTION 02600
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

A. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber

B. ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes

C. ASTM D6392 –Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

D. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.

E. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

F. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

G. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

A. Geomembrane Installer: hired by Contractor responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

B. Geomembrane Manufacturer: hired by Geomembrane Installer to provide HDPE geomembrane.

C. Leak Location Contractor: hired by Contractor and responsible for locating potential holes in the installed geomembrane using electrical methods.

D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the Owner, Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

E. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

F. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.

G. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than $100ft^2$.

H. Patch: Unit area of a geomembrane that will be seamed in the field that is less than $100ft^2$.

I. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.

2. Geomembrane Installer:

a. 5 years of continuous experience in installation of HDPE geomembrane.

b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.

c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.

d. Geomembrane Installers that are qualified and approved by Engineer are listed below:

i. Clean Air and Water Systems
Dousman, WI
Brain McKeown
262-965-4366

3. Leak Location Contractor:

a. 3 years of continuous experience in performing leak location surveys using electrical methods.

b. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

c. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

d. Leak Location Contractors that are qualified and approved by Engineer are listed below:

i. Leak Location Services, Inc.
San Antonio, TX
210-408-1241

ii. Or other approved by Owner and/or Engineer.

B. Quality Assurance Program:

1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.

2. The Owner and/or Engineer may document geomembrane installation including panel placement, seaming, pre-qualification seam testing, non-destructive seam and repair testing, repair size and locations, and weather conditions.

3. The Owner may engage and pay for the services of Engineer and QA Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals:

1. Raw Materials:

a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.

b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.

c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.

2. Geomembrane Manufacturer's Certification:

a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).

3. Geomembrane Manufacturer Production Information:

    a. Corporate background information indicating compliance with qualification requirements.

    b. Quality control plan for manufacturing.

    c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e., mill certificates).

4. Contractor shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, chemical composition of the filaments and other pertinent information to fully describe the geotextile.

5. Geomembrane Installer's Seaming Personnel

    a. Training completed by personnel.

    b. Seaming experience for each personnel.

6. Geomembrane Installer's Information:

    a. Corporate background information indicating compliance with qualification requirements.

    b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.

    c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.

    d. Installation quality control plan.

7. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.

B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals

1. Leak Location Contractor's Work Plan:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.

c. Resumes of personnel performing leak location survey, along with pertinent experience information.

d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.

f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.

C. During installation, submit the following to the Owner and/or Engineer:

1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.

2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.

D. Within 10 days of geomembrane installation completion, submit the following to Owner and/or Engineer:

1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.

2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.

3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.

E. The Owner and/or Engineer will review and inspect geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.

F. The Owner and/or Engineer will provide written final acceptance of the geomembrane installation after completion of the leak location survey. Written conditional

geomembrane installation acceptance can be provided to the Contractor prior to completion of the leak location survey when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.

2. All installation quality assurance/control documentation has been completed and submitted to the Owner and/or Engineer.

3. Verification of the adequacy of all field seams, repairs and associated testing is complete.

G. Within 14 days of completion of the leak location survey, submit final written report (per ASTM D 7007) of the leak location survey provided by Leak Location Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Owner and/or Engineer.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Engineer.

2. Store geomembrane rolls to ensure adequate protection against exposure to the following:

a. Equipment;

b. Strong oxidizing chemicals, acids, or bases;

c. Flames, including welding sparks;

d. Temperatures in excess of 160 deg. F;

e. Dust;

f. Ultraviolet radiation (i.e. sunlight); and

g. Inclement weather.

3. Whenever possible, provide a 6-inch minimum air space between rolls.

4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Geotextile to be used for cushioning between subgrade and geomembrane shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd^2	16	ASTM D5261	MARV
Puncture Strength	lb	170	ASTM D4833	MARV
Trapezoid Tear	lb	145	ASTM D4533	MARV
Grab Tensile Strength	lb	370	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

B. Geotextile to be used for separation between geomembrane and cushion material shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd^2	12	ASTM D5261	MARV
Apparent Opening Size	US Sieve	100	ASTM D4751	MARV
Puncture Strength	lb	210	ASTM D4833	MARV
Trapezoid Tear	lb	125	ASTM D4533	MARV
Grab Tensile Strength	lb	320	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

C. High Density Polyethylene (HDPE) White Textured Geomembrane

1. HDPE geomembrane shall be white, textured (both sides), 60-mil product approved by the Owner and/or Engineer.

2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:

a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program

and submitted to the Owner and/or Engineer with the written conformance certification.

b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.

c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.

d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Owner and/or Engineer.

e. Geomembrane Manufacturer that are qualified and approved by Engineer are listed below:

i. GSE
Houston, TX
800 435 2008

3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

D. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.

2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

E. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.

2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.

3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.

4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Owner and/or Engineer. Nonconforming material shall either be retested at the direction of the Owner and/or Engineer or removed from site and replaced at Contractor's expense.

B. Conformance Test Methods

1. Samples will be located and collected by the Owner and/or Engineer at a rate of one sample per 100,000 square feet of geomembrane delivered to site.

2. One sample will be obtained from each geomembrane production batch delivered to the site.

3 Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.

4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.

5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.

C. Role of Testing Laboratories

1. The Owner and/or Engineer will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Engineer will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.

2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Owner and/or Engineer.

3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in GRI GM 13. Results shall not be substituted for quality assurance testing described herein.

D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Owner and/or Engineer. Two additional tests (retests)

shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Owner and/or Engineer reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Owner and/or Engineer may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.

3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.

B. The following topics relating to geomembrane installation shall be addressed:

1. Responsibilities of each party.

2. Lines of authority and communication.

3. Methods for documenting, reporting and distributing documents and reports.

4. Procedures for packaging and storing archive samples.

5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.

6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.

7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.

10. Deployment techniques including allowable subgrade for geomembrane.

11. Procedures for covering of the geomembrane to prevent damage.

12. Plan for minimizing wrinkles in the geomembrane.

13. Measurement and payment schedules.

14. Site health and safety procedures/protocols.

3.02 SUBGRADE INSPECTION AND REPAIR

A. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Owner and/or Engineer and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Owner and/or Engineer with written acceptance of subgrade surface over which 16 oz non woven geotextile and geomembrane is deployed (Part 1.05C*)* for each day of deployment.

3.03 GEOMEMBRANE LINER DEPLOYMENT

A. Geomembrane Installer shall deploy 16-oz non woven geotextile following applicable certifications/quality control certificates listed in Subsection 1.05 of this section and approved by the Owner and/or Engineer. Any 16-oz non woven geotextile placed prior to approval by the Owner and/or Engineer shall be at the sole risk of the Contractor. If geotextile installed prior to approval by the Owner and/or Engineer does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

B. 60 mil HDPE geomembrane will be deployed following installation of 16-oz non woven geotextile and applicable certifications/quality control certificates listed in Subsection 1.05 of this section according to submitted panel layout drawing as approved by the Owner and/or Engineer. The Owner and/or Engineer is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.

C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.

D. Geomembrane shall not be deployed if:

1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Owner and/or Engineer.

2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.

3. Winds are excessive as determined by Geomembrane Installer in agreement with the Owner and/or Engineer.

4. The Owner and/or Engineer will have the authority to suspend work during such conditions.

E. The Geomembrane Installer shall be responsible for conformance with the following requirements:

1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 8 psi . Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.

2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).

3. Method of deployment does not damage geomembrane.

4. Method of deployment minimizes wrinkles.

5. Temporary loading or anchoring does not damage geomembrane.

6. Direct contact with geomembrane is minimized.

F. Geomembrane Installer shall place 16-oz non woven geotextile on the geomembrane at the base of the basin and at least 4 feet up side slopes, as indicated on Contract Drawings. Geomembrane Installer shall cover the batten bar attachments with the 16-oz non woven geotextile.

G. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

A. Seam Layout

1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

B. Seaming Processes/Equipment

1. Approved processes for field seaming (panel to panel) are extrusion or hot wedge fusion-type seam methods. No other processes can be used without prior written authorization from the Owner and/or Engineer. Only equipment which has been specifically approved by make and model shall be used, if applicable.

2. The Geomembrane Installer will meet the following requirements regarding use, availability, and cleaning of welding equipment at job site:

   a. Intersecting hot wedge seams shall be patched using extrusion welding process.

   b. Electric generator for equipment shall be placed on a smooth base such that no damage occurs to geomembrane. A smooth insulating plate or fabric shall be placed beneath hot equipment after usage.

3. The Geomembrane Installer shall keep records for performance and testing of all seams.

C. Seaming Requirements/Procedures

1. Weather Conditions - Range of weather conditions under which geomembrane seaming can be performed are as follows:

   a. Unless otherwise authorized in writing by Owner and/or Engineer, no seaming shall be attempted or performed at an ambient temperature below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C).

   b. Between ambient temperatures of 32 degrees F (0 degrees C) and 41 degrees F (5 degrees C), seaming shall follow GRI GM9 cold weather seaming guidelines. Pre-qualification seams shall be produced to determine appropriate seaming parameters and for Engineer's approval.

   c. Above 41 degrees F (5 degrees C), no special conditions will be required.

   d. Geomembrane shall be dry and protected from wind.

   e. Seaming shall not be performed during any precipitation event.

   f. Seaming shall not be performed in areas where ponded water has collected below surface of geomembrane.

2. If the Geomembrane Installer chooses to use methods which may allow seaming at ambient temperatures below 41 degrees F or above 104 degrees F, the Geomembrane Installer shall demonstrate and submit certification to Owner and/or Engineer that methods and techniques used to perform seaming produce seams that are equivalent to seams produced at temperatures above 41 degrees F and below 104 degrees F. The Owner and/or Engineer may deny approval for use of the proposed technique regardless of demonstration results.

3. Overlapping - Geomembrane panels shall have finished overlap as follows:

   a. Minimum of 6 inches for thermal fusion welding.

b. Insufficient overlap will be considered a failed seam.

4. Pre-qualification tests for geomembrane fusion welding shall be conducted by a minimum of 2 pre-qualification seams conducted per day per welding machine by each seaming technician performing welding with that machine. At least one test shall be performed at the start of each work day, with tests at intervals of no greater than 5 hours and additional pre-qualification tests following work interruptions, weather changes, changes to machine settings, or as directed by the Owner and/or Engineer. Pre-qualification seams shall be made under the same conditions as the actual seams.

   a. Pre-qualification seam samples shall be 5 feet long by 1-foot wide (minimum) after seaming, with seam centered along its length. Each pre-qualification seam shall be labeled with the date, geomembrane temperature, seaming unit identifier, seam number or test location, technician performing the test seam and description of testing results.

   b. Seam overlap shall be in accordance with Subsection 3.04(C)(3).

   c. Pre-qualification seams shall be inspected for proper squeeze-out, footprint pressure, and general appearance.

   d. Four specimens, each 1-inch in length, shall be cut from opposite ends of the pre-qualification seam sample by the Geomembrane Installer. The remainder of pre-qualification seam shall be retained by the Owner and/or Engineer and may be submitted for laboratory testing.

   e. The Geomembrane Installer shall complete two shear tests and two peel tests in accordance with GRI GM 19.

   f. Pre-qualification seams failed by inspection or testing may be retested at request of the Geomembrane Installer. If the second pre-qualification seam fails, then the seaming apparatus or seaming technique shall be disqualified from use until two consecutive, satisfactory pre-qualification seams are obtained.

5. Seam Preparation

   a. Prior to seaming, seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.

   b. Seams shall be aligned so as to minimize number of wrinkles and fishmouths.

6. General Seaming Procedures

a. Fishmouths or wrinkles at seam overlaps shall be cut along ridge of the wrinkle to achieve a flat overlap. Cut fishmouths or wrinkles shall be repaired, and/or patched in accordance with Part 3.07.

b. Seaming shall extend to the outside edge of geomembrane panels including material placed in anchor trenches.

c. The intersecting thermal fusion seams shall be patched using the extrusion welding process.

3.05 NON-DESTRUCTIVE TESTING

A. Each field seam shall be non-destructively tested over its entire length by the Installer. Testing shall be conducted as field seaming progresses, not at completion of all seams, unless specifically agreed to by the Owner and/or Engineer in writing.

B. Vacuum Testing – shall be performed in accordance with ASTM D5641.

C. Air Pressure Testing – shall be performed in accordance with ASTM D5820, and GRI GM 6, Pressurized Air Channel Test for Dual Seamed Geomembranes.

D. Each seam tested non-destructively shall be marked with the date of the test, name of the testing technician, length of the seam, test method and results. The same shall also be recorded by the Owner and/or Engineer on the appropriate CQA documentation.

E. Non-Destructive Seam Test Failures

1. Seams failing non-destructive testing shall be repaired by the Geomembrane Installer according to Part 3.07. Seams shall be non-destructively retested. If the seam defect cannot be located, the entire section of seam affected shall be repaired and retested.

3.06 ELECTRONIC LEAK LOCATION SURVEY

A. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.

B. Contractor shall ensure that the cushion and warning layers, and 12 oz non woven geotextile above and 16 oz non woven geotextile below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of the cushion layer, warning layer and subgrade is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.

C. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.

D. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

E. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.

F. After the warning layer is placed, conduct a leak location survey on the warning layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.

G. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.

H. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.

I. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.07 of this Section.

3.07 DEFECTS AND REPAIRS

A. The geomembrane shall be examined by the Geomembrane Installer and the Owner and/or Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.

B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:

1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;

2. Capping - used to repair large lengths of failed seams; and

3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Owner and/or Engineer.

C. Patches or caps.

1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.

2. Round corners of patch and/or cap (suggest 3-inch radius).

3. Repair procedures, equipment, materials, and techniques will be approved by the Owner and/or Engineer prior to repair.

4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.

D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.

E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Owner and/or Engineer.

F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.

G. The Owner and/or Engineer will document repairs, repair testing, and retesting results.

H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.08 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:

1. Use minimum 2-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.

2. Use standard welding procedures to seam the geomembrane boot or weld strip to the geomembrane.

3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.09 SURVEY DOCUMENTATION

A. Prior to covering the geomembrane, the Geomembrane Installer shall provide the Contractor , Owner and/or Engineer with 24-hour notification to conduct a survey. The Contractor shall survey the location of all seams (panel corners acceptable), and repairs. The Contractor shall provide survey data to the Owner and/or Engineer within two

working day of survey completion and in accordance with Section 01050, Field Engineering and Survey.

3.10 DAILY FIELD INSTALLATION REPORTS

A. At the beginning of each day, the Geomembrane Installer shall provide the Owner and/or Engineer with a report for all work completed the previous day.

B. The Daily Field Installation Report shall include the following:

1. The total amount and location of geomembrane placed.

2. The total length and location of seams completed, technician name and welding unit numbers.

3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).

4. Results of pre-qualification test seams, if available.

5. Results of non-destructive testing.

C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

END OF SECTION

APPENDIX D

Bypass Liner Replacement Specifications

SECTION 02600
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

A. ASTM D6392 –Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

B. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.

C. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

D. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

E. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

A. Geomembrane Installer: hired by Contractor or Owner responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

B. Geomembrane Manufacturer: hired by Geomembrane Installer, Contractor, or Owner to provide HDPE geomembrane.

C. Leak Location Contractor: hired by Contractor or Owner and responsible for locating potential holes in the installed geomembrane using electrical methods.

D. Geosynthetic Quality Assurance Consultant: Consultant, independent from the Manufacturer, and Installer, responsible for field oversight of geosynthetics installation, and related testing, usually under the direction of the Owner.

D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

D. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

E. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.

F. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than $100ft^2$.

G. Patch: Unit area of a geomembrane that will be seamed in the field that is less than $100ft^2$.

H. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.

2. Geomembrane Installer:

a. 5 years of continuous experience in installation of HDPE geomembrane.

b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.

c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.

3. Leak Location Contractor:

d. 3 years of continuous experience in performing leak location surveys using electrical methods.

e. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

f. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

B. Quality Assurance Program:

1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.

2. The Owner or Contractor will engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Geosynthetic Quality Assurance Consultant in accordance with Section 01300, Submittals:

1. Raw Materials:

a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.

b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.

c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.

2. Geomembrane Manufacturer's Certification:

a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).

3. Geomembrane Installer's Seaming Personnel

a. Training completed by personnel.

b. Seaming experience for each personnel.

4. Geomembrane Manufacturer Production Information:

a. Corporate background information indicating compliance with qualification requirements.

b. Quality control plan for manufacturing.

c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e. mill certificates).

5. Geomembrane Installer's Information:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.

c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.

d. Installation quality control plan.

6. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.

7. Installation Sequence and Schedule shall be included as part of Construction Progress Schedule.

8. Description of seaming apparatus to be used.

B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals

1. Leak Location Contractor's Work Plan:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.

c. Resumes of personnel performing leak location survey, along with pertinent experience information.

d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.

f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.

C. During installation, submit the following to the Geosynthetic Quality Assurance Consultant:

1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.

2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.

D. Within 10 days of geomembrane installation completion, submit the following to Geosynthetic Quality Assurance Consultant:

1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.

2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.

3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.

E. The Geosynthetic Quality Assurance Consultant will review and inspect HDPE geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.

F. The Geosynthetic Quality Assurance Consultant will provide written final acceptance of the geomembrane installation after completion of material placement above geomembrane. Written conditional geomembrane installation acceptance can be provided to the Contractor prior to completion of material placement above geomembrane when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.

2. All installation quality assurance/control documentation has been completed and submitted to the Geosynthetic Quality Assurance Consultant or Owner.

3. Verification of the adequacy of all field seams, repairs and associated testing is complete.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Geosynthetic Quality Assurance Consultant.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Geosynthetic Quality Assurance Consultant.

2. Store geomembrane rolls to ensure adequate protection against exposure to the following:

a. Equipment;

b. Strong oxidizing chemicals, acids, or bases;

c. Flames, including welding sparks;

d. Temperatures in excess of 160 deg. F;

e. Dust;

f. Ultraviolet radiation (i.e. sunlight); and

g. Inclement weather.

3. Whenever possible, provide a 6-inch minimum air space between rolls.

4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. High Density Polyethylene (HDPE) White Textured Geomembrane.

1. HDPE geomembrane shall be white, textured, 60-mil product approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.

2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:

a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program and submitted to the Geosynthetic Quality Assurance Consultant with the written conformance certification.

b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.

c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.

d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.

3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

B. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.

2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

C. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.

2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.

3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.

4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Geosynthetic Assurance Consultant. Nonconforming material shall either be retested at the direction of the Geosynthetic Quality Assurance Consultant or removed from site and replaced at Contractor's expense.

B. Conformance Test Methods

1. Samples will be located and collected by the Geosynthetic Quality Assurance Consultant at a rate of one sample per 100,000 square feet of geomembrane delivered to site.

2. One sample will be obtained from each geomembrane production batch delivered to the site.

3 Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.

4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.

5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.

C. Role of Testing Laboratories

1. The Geosynthetic Quality Assurance Consultant will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Geosynthetic Quality Assurance Consultant will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.

2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Geosynthetic Quality Assurance Consultant. Non-conforming panels may be retested in accordance with Subsection 2.02(B) and 2.02(D) under authorization of the Geosynthetic Quality Assurance Consultant only.

3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in Subsection 2.02(B). Results shall not be substituted for quality assurance testing described herein.

D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Geosynthetic Quality Assurance Consultant. Two additional tests (retests) shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Geosynthetic Quality Assurance Consultant reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Geosynthetic Quality Assurance Consultant may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.

3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.

B. The following topics relating to geomembrane installation shall be addressed:

1. Responsibilities of each party.

2. Lines of authority and communication.

3. Methods for documenting, reporting and distributing documents and reports.

4. Procedures for packaging and storing archive samples.

5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.

6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.

7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.

10. Deployment techniques including allowable subgrade for geomembrane.

11. Procedures for covering of the geomembrane to prevent damage.

12. Plan for minimizing wrinkles in the geomembrane.

13. Measurement and payment schedules.

14. Site health and safety procedures/protocols.

3.02 SUBGRADE PREPARATION

A. Contractor shall prepare a subgrade surface in accordance with Section 02300, Earthwork.

B. The Contractor shall not excavate more than the amount of anchor trench required for one day of geosynthetics deployment, unless otherwise specified by the Geosynthetic Quality Assurance Consultant. Rounded corners shall be provided in the trenches where the geosynthetics enter the trench to allow them to be uniformly supported by the subgrade and to avoid sharp bends. The geosynthetics shall not be supported by loose soils in anchor trenches.

C. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Geosynthetic Quality Assurance Consultant and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with written acceptance of subgrade surface over which geomembrane is deployed (Part 1 .05C*)* for each day of deployment.

3.03 GEOMEMBRANE DEPLOYMENT

A. Geomembrane shall not be deployed until all applicable certifications/quality control certificates listed in Subsection 1.05 of this section and conformance testing listed in Subsection 2.02 of this section are submitted and approved by the Geosynthetic Quality Assurance Consultant. Any geomembrane deployed prior to approval by the Geosynthetic Quality Assurance Consultant shall be at the sole risk of the Geomembrane Installer and/or Contractor. If material installed prior to approval by the Geosynthetic Quality Assurance Consultant does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

B. Geomembrane will be deployed according to submitted panel layout drawing as approved by the Geosynthetic Quality Assurance Consultant. The Geosynthetic Quality Assurance Consultant is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.

C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.

D. Geomembrane shall not be deployed if:

1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Geosynthetic Quality Assurance Consultant.

2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.

3. Winds are excessive as determined by Geomembrane Installer in agreement with the Geosynthetic Quality Assurance Consultant.

4. The Geosynthetic Quality Assurance Consultant will have the authority to suspend work during such conditions.

E. The Geomembrane Installer shall be responsible for conformance with the following requirements:

1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 5 psi or total weight exceeding 750 lbs. Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.

2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).

3. Method of deployment does not damage geomembrane.

4. Method of deployment minimizes wrinkles.

5. Temporary loading or anchoring does not damage geomembrane.

6. Direct contact with geomembrane is minimized.

F. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

A. Seam Layout

1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

C. Field Test Methods

1. Ten 1-inch-wide samples described above under Part 3.06(B)(3) shall be field tested for peel (5 samples) and shear (5 samples) in accordance with GRI GM 19.

2. One seam sample shall be field tested for peel and shear at the end of each continuous field seam 100 feet or greater in length.

3. Testing shall be performed in accordance with ASTM D6392 using a field tensiometer or equivalent device to qualitatively and quantitatively determine mode of failure.

4. Seam shall be considered passing if failure in both peel and shear meet criteria listed in GRI GM 19.

5. The procedures specified in Subsection 3.06(D) shall be implemented when sample passes field tensiometer test.

D. Laboratory Test Methods

1. Laboratory testing of seam samples shall be conducted by the Geosynthetic Quality Assurance Laboratory under contract with the Geosynthetic Quality Assurance Consultant or Owner. Five specimens shall be tested in shear and five in peel.

2. Laboratory testing shall be conducted in accordance with GRI GM 19.

3. For both seam shear and peel tension tests, an indication will be given for each specimen tested which defines locus of failure.

4. For shear tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:

   a. Maximum tension in pounds per square inch.

   b. Elongation at break (up to a tested maximum of 100 percent).

   c. Locus of failure using ASTM D6392 designations.

5. For peel tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:

   a. Maximum tension in pounds per square inch.

   b. Seam separation (expressed as percent of original seam area).

c. Locus of failure.

6. Retesting of seams due to nonconformance with specifications may be performed at the discretion of the Geosynthetic Quality Assurance Consultant.

E. Destructive Seam Test Failure

1. Shear and peel test results derived from testing described in Parts 3.06(C) and 3.06(D) shall comply with GRI GM 19 for seam to be considered acceptable.

2. The Geomembrane Installer has two options in determining the repair boundary whenever a seam has failed destructive testing:

   a. The seam can be reconstructed between the two previously tested and passed destructive sample locations; or,

   b. The Geomembrane Installer can trace the welding path to an intermediate location at least ten feet from point of failed test in each direction and obtain destructive test samples collected from these locations. If destructive tests on these samples are acceptable, then the seam shall be reconstructed between the intermediate locations. If either sample fails, the process may be repeated until an acceptable seam test has been performed on both sides of the original failed sample. If a passing sample is not realized on one (or both) side of the original failed sample, then seam repair must extend to the end(s) of the seam. Retesting of seams according to this procedure shall utilize the sampling methodology described in Part 3.06(B). The Owner reserves the right to terminate this process, at the discretion of the Geosynthetic Quality Assurance Consultant, after the second retesting. An additional sample taken from the reconstructed zone must pass destructive seam testing if destructive sample failure(s) causes reconstruction.

3. The Geosynthetic Quality Assurance Consultant shall be responsible for documenting all actions taken in repairing seams. The Geomembrane Installer will be responsible for keeping the Geosynthetic Quality Assurance Consultant informed of seaming progress.

4. Additional fees for destructive seam test failures shall be assessed to the Contractor and deducted from payment. This fee shall be assessed only if the failing sample is a laboratory sample.

3.07 ELECTRONIC LEAK LOCATION SURVEY

A. The Owner shall have the option to conduct an electronic leak location survey. Leak location survey shall be performed by the Leak Location Contractor under the observation of the Geosynthetic Quality Assurance Consultant.

B. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.

C. Contractor shall ensure that the layers above and below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of layers above and/or below the geomembrane is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.

D. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.

E. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

F. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.

G. After the final layer is placed above the geomembrane, conduct a leak location survey on the final layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.

H. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.

I. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.

J. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.08 of this Section.

3.08 DEFECTS AND REPAIRS

A. The geomembrane shall be examined by the Geomembrane Installer and the Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The

Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.

B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:

1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;

2. Capping - used to repair large lengths of failed seams; and

3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Engineer.

C. Patches or caps.

1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.

2. Round corners of patch and/or cap (suggest 3-inch radius).

3. Repair procedures, equipment, materials, and techniques will be approved by the Geosynthetic Quality Assurance Consultant prior to repair.

4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.

D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.

E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Geosynthetic Quality Assurance Consultant.

F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.

G. The Geosynthetic Quality Assurance Consultant will document repairs, repair testing, and retesting results.

H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.09 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:

1. Use minimum 1-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.

2. Use standard welding procedures to seam the geomembrane boot to the geomembrane.

3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.10 SURVEY DOCUMENTATION

A. The Geomembrane Installer shall survey the completed geomembrane prior to covering and provide the Geosynthetic Quality Assurance Consultant with 24-hour notification of survey. The Contractor shall document the location of all seams (panel corners acceptable), destructive test samples (if conducted) and repairs. The Contractor shall provide survey data to the Geosynthetic Quality Assurance Consultant within two working day of survey completion.

3.11 DAILY FIELD INSTALLATION REPORTS

A. At the beginning of each day, the Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with a report for all work completed the previous day.

B. The Daily Field Installation Report shall include the following:

1. The total amount and location of geomembrane placed.

2. The total length and location of seams completed, technician name and welding unit numbers.

3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).

4. Results of pre-qualification test seams, if available.

5. Results of non-destructive testing.

C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

3.12 MATERIAL ABOVE GEOMEMBRANE

A. The Geosynthetic Quality Assurance Consultant and Geomembrane Installer shall verify the area of geomembrane completion prior to placement of material over the geomembrane.

B. Soils - Apply following general criteria for covering of the geomembrane:

1. Do not place soils on the geomembrane at an ambient temperature below 32 degrees F, (0 degrees C) nor above 104 degrees F (40 degrees C), unless otherwise specified.

2. Do not drive equipment used for placing soil directly on the geomembrane.

3. A minimum thickness of 1 foot of soil is specified between a low ground pressure dozer (maximum contact pressure of 5 lb/sq. inch) and the geomembrane.

4. A minimum thickness of 2 feet of soil is required between rubber-tired vehicles and the geomembrane.

5. Do not compact soils placed directly on geomembrane.

6. Damage to the geomembrane resulting from placement of cover soils shall be repaired in accordance with Part 3.08 by the Geomembrane Installer at the Contractor's expense.

7. Do not push soil downslope. Soil shall be placed over the geomembrane starting from base of the slope, up to top of the slope.

END OF SECTION