Geosyntec consultants

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

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
ASH SURGE AND BYPASS BASINS
POWERTON STATION
OCTOBER 2016

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), herein referred to as the coal combustion residual (CCR) Rule, Section 257.82(c), Geosyntec Consultants (Geosyntec) prepared this Inflow Design Flood Control System Plan for the Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois (Figure 1). The Basins are owned and operated by Midwest Generation, LLC (Midwest Generation).

Section 257.82(c) of the CCR Rule requires that operators of every existing or new CCR surface impoundment design, construct, operate, and maintain an inflow design flood control system that adequately manages flow into the CCR unit during and following the peak discharge of the inflow design flood. The Preamble to the CCR Rule provides guidance on the documentation that should be provided for the inflow design flood control plan.

This inflow design flood control system plan for the Basins meets the requirements of **§**257.82(c). The inflow design flood control systems consist of outflow structures that maintain minimum operating freeboards for the Basins. Justification and documentation of the adequacy of the inflow design flood control systems are presented in the sections below.

The work presented in this report was performed under the direction of Ms. Jane Soule, P.E., of Geosyntec in accordance with §257.82(c). Mr. Robert White reviewed this plan in accordance with Geosyntec's senior review policy.

1. Basin Design

The Basins are located east of the old inlet canal and northeast of the main powerblock building. The Basins are operated to receive sluiced CCR and other process water from plant operations one basin at a time. Inflow from plant operations is discharged into the Basins through concrete inflow channels located along the southern boundary of the Ash Surge Basin and the northeastern boundary of the Bypass Basin. Average inflow through the Ash Surge or Bypass Basin is on the order of 7.3 million gallons per day (mgd).

Routine outflow from the Ash Surge Basin drains northward through a 48-inch diameter reinforced concrete pipe located at the bottom of the basin along its northern perimeter. This pipe connects to the sump located within the pump station located approximately 35 feet north of the Ash Surge Basin (Figure 2). The Site maintains three pumps at the pump station, including one backup pump. As indicated by historical sump water level data, the pump controls are managed so that the water level within the Ash Surge Basin is maintained between 463.5 feet and 465 feet MSL. From the pump station, discharged process water is pumped to the Service Water Basin located northwest of the Ash Surge Basin. The Ash Surge Basin also includes an emergency spillway along the eastern boundary that would discharge toward the Former Ash Basin (FAB). The spillway is constructed with two box culverts, each approximately 4.5 feet in width and approximately 1.5 feet in height that extend beneath the embankment crest. A concrete apron is located east of the box culvert and rip rap is located downstream of the apron. Topographic survey point data from the basin crest indicates a minimum crest elevation of the Basins of approximately 467.6 feet MSL[1] (Aero-Metric, 2008). Appendix A-1 includes available design drawings documenting the Ash Surge Basin emergency spillway.

Routine outflow from the Bypass Basin flows over a weir wall (top elevation at 465.5 feet MSL) within the basin into a 36-inch diameter reinforced concrete pipe. This pipe extends northward within the east embankment of the Bypass and Ash Surge Basins until it reaches the northeast corner of the Ash Surge Basin, where the pipe extends west to the pump station north of the Ash Surge Basin. From the pump station, discharged process water is pumped to the Secondary Holding Basin located northwest of the Ash Surge Basin. When in service, the operating water level within the Bypass Basin is maintained at the elevation of the top of the weir wall (465.5 feet MSL). The Bypass Basin also includes an emergency overflow pipe located along the northeastern corner of the basin. This emergency overflow pipe includes a 5-foot diameter corrugated metal pipe vertical riser (invert elevation 466.75 feet MSL) 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. Appendix A-2 includes available drawings documenting the Bypass Basin emergency overflow pipe.

2. Inflow Design Flood Control Plan Documentation

Because of the relatively small size and design of the Basins, some of the references and drawings recommended for inclusion in the Inflow Design Flood Control Plan by the Preamble to the CCR Rule (page 21392) are not applicable. Table 1 below provides a summary of this documentation.

[1] Mean Sea Level based on local plant vertical datum.

Table 1: Recommended Documentation

Documentation	Assessment
Identification of the design storm event for the catchment area and CCR unit	Identification of the design storm event is provided in Section 4 and Appendix B. A drawing of the Basins and catchment areas is presented in Figure 2.
Characterization of the rainfall abstractions, including, but not limited to, depression storage and infiltration in the upstream catchment area	Full capture of the design precipitation event was assumed, so rainfall abstractions were assumed to be zero, i.e., 100% of the volume from the design storm was assumed to be held within the Basins. Typical abstractions include mechanisms such as evaporation and infiltration.
Selection and basis of the appropriate run-off model or run-off and run-on routing model	A run-on model was not required because full capture within the limited catchment areas was assumed. No discharge from the design event is anticipated so a run-off model was not necessary to demonstrate compliance. Outflow is controlled through the pump station.
Identification and characterization of any intake or decant structures	Design features are provided in Section 1.
Appropriate characterization and capacity of spillways	The spillway (Ash Surge Basin) and emergency overflow pipe (Bypass Basin) are described in Section 1 and drawings of these structures are provided in Appendix A. Because outflow from these structures is not anticipated during the design event, capacity of these structures was not evaluated.
Characterization of downstream hydraulic structures	No outflow from the spillway (Ash Surge Basin) or emergency overflow pipe (Bypass Basin) is predicted from the design storm event and therefore downstream hydraulic structures were not evaluated.

3. Catchment Areas

The Basins are formed by embankments on all sides. Based on site topography, shown in Figure 2, the Basins' inflow from precipitation is limited to run-on from the embankment crests and precipitation falling directly into the basin. The catchment areas for the Basins are presented in Table 2 and shown in Figure 2.

4. Design Event

Because the Basins are classified as significant hazard potential surface impoundments (Geosyntec, 2016), the inflow design flood is defined as the 1,000-year flood. Because direct precipitation is collected within Basins and run-on is limited to the embankment crest areas, the inflow design is based on the 24-hour, 1,000-year precipitation event of 9.0 inches (NOAA, 2016), see Appendix B. Total inflow from the design event is calculated as the depth of precipitation multiplied by the catchment area[2].

5. Freeboard

As discussed in Section 1, the Basins are operated to maintain a minimum freeboard of approximately 2 feet for the Ash Surge Basin and 1.5 feet for the Bypass Basin under normal operating conditions. The maximum potential increase in water levels due to the design storm event, assuming basin outflows are limited to process water inflows (net zero), are based on the area-capacity curves for the Basins (see Appendix C) and are presented in Table 2. These estimated maximum water levels in the Basins are estimated to be below the invert level of the emergency spillway (Ash Surge Basin) or overflow pipe (Bypass Basin).

Table 2: Inflow Design Volumes and Basin Water Level Estimates

Value	Ash Surge Basin	Bypass Basin
Catchment Area (acres)	9.3	1.0
Operating Water Elevation (feet, MSL)	465.0	465.5
Design Event Inflow (acre-feet)	6.98	0.75
Increased Basin Water Elevation (feet)	0.9	1.0
Estimated Post-Event Water Elevation (feet, MSL)	465.9	466.5
Spillway or Overflow Pipe Invert Elevation (feet, MSL)	466.0	466.75

With full containment of the design event, the Basins maintain water level elevations below the spillway or overflow pipe invert elevation and a freeboard of greater than 1 foot. The inflow design system, as designed and constructed, meets the requirements of §257.82.

6. Plan Amendments and Revisions

In accordance with §257.82(c)(2) and (4), this Inflow Design Flood Control System Plan will be amended or revised whenever there is a change in conditions that would substantially affect the plan or every five years.

[2] Depression storage or infiltration of stormwater into the embankment crest and other rainfall abstractions are negligible and are not included in inflow volume calculations. Similarly, this calculation does not require the use of a run-on model for the precipitation falling on the embankment crest.

7. Limitations and Certification

This inflow design flood control system plan meets the requirements of §257.82(c) of the Code of Federal Regulations Title 40, Part 257, Subpart D, and was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

JANE W. SOULE
062-067766
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Jane W. Soule, P.E.
Illinois Professional Engineer No. 062-067766
License Expires: 11/30/17

8. References

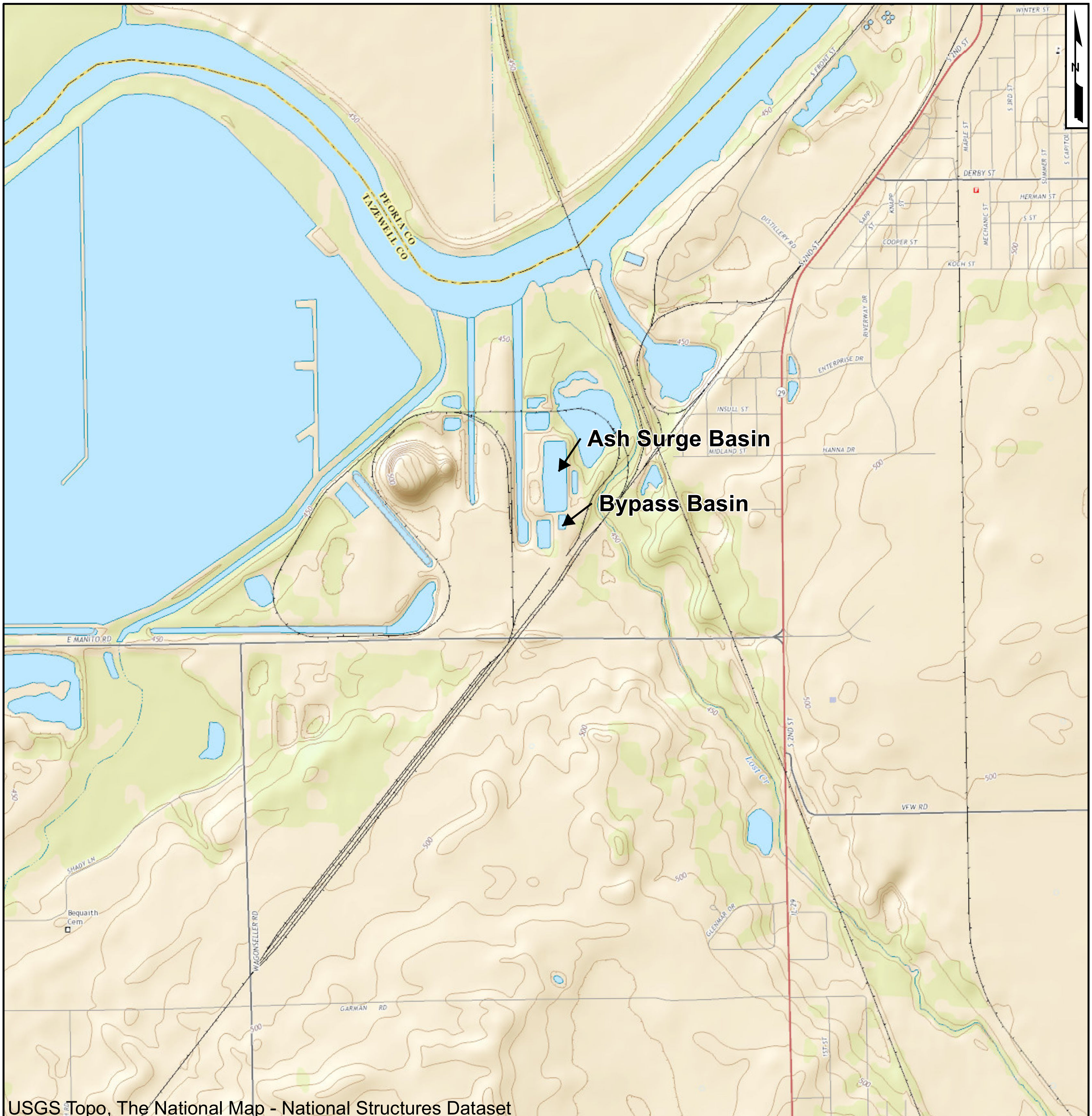
Aero-Metric (2008). Aerial topography dated 06-19-2008, Aero-Metric, Inc.

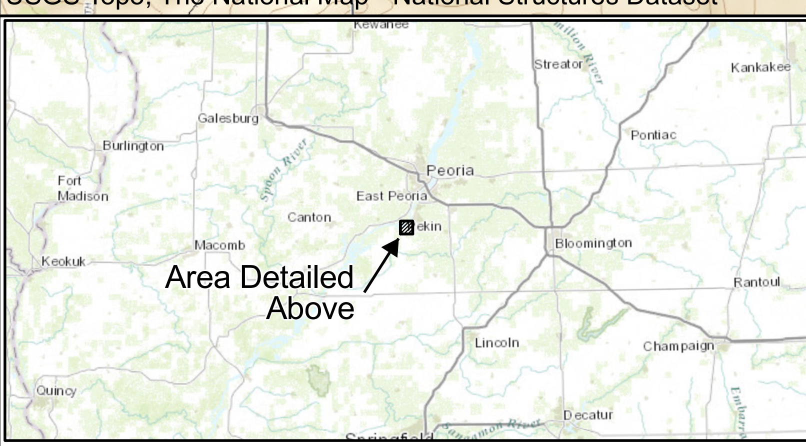
Geosyntec Consultants, 2016, Hazard Potential Classification Assessment, Ash Surge and Bypass Basins, Powerton Station, October 2016.

NOAA, 2016, NOAA Atlas 14 Point Precipitation Frequency Estimates: Illinois, available at: http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Attachments

Figure 1:	Site Location
Figure 2:	Basin Topography and Catchment Area
Appendix A:	Outlet Structure Design Drawings
Appendix A-1:	Ash Surge Basin Emergency Spillway
Appendix A-2:	Bypass Basin Overflow Pipe
Appendix B:	Design Storm Event Depth
Appendix C:	Basin Area Capacity Curves





2,000 1,000 0 2,000 Feet

Site Location

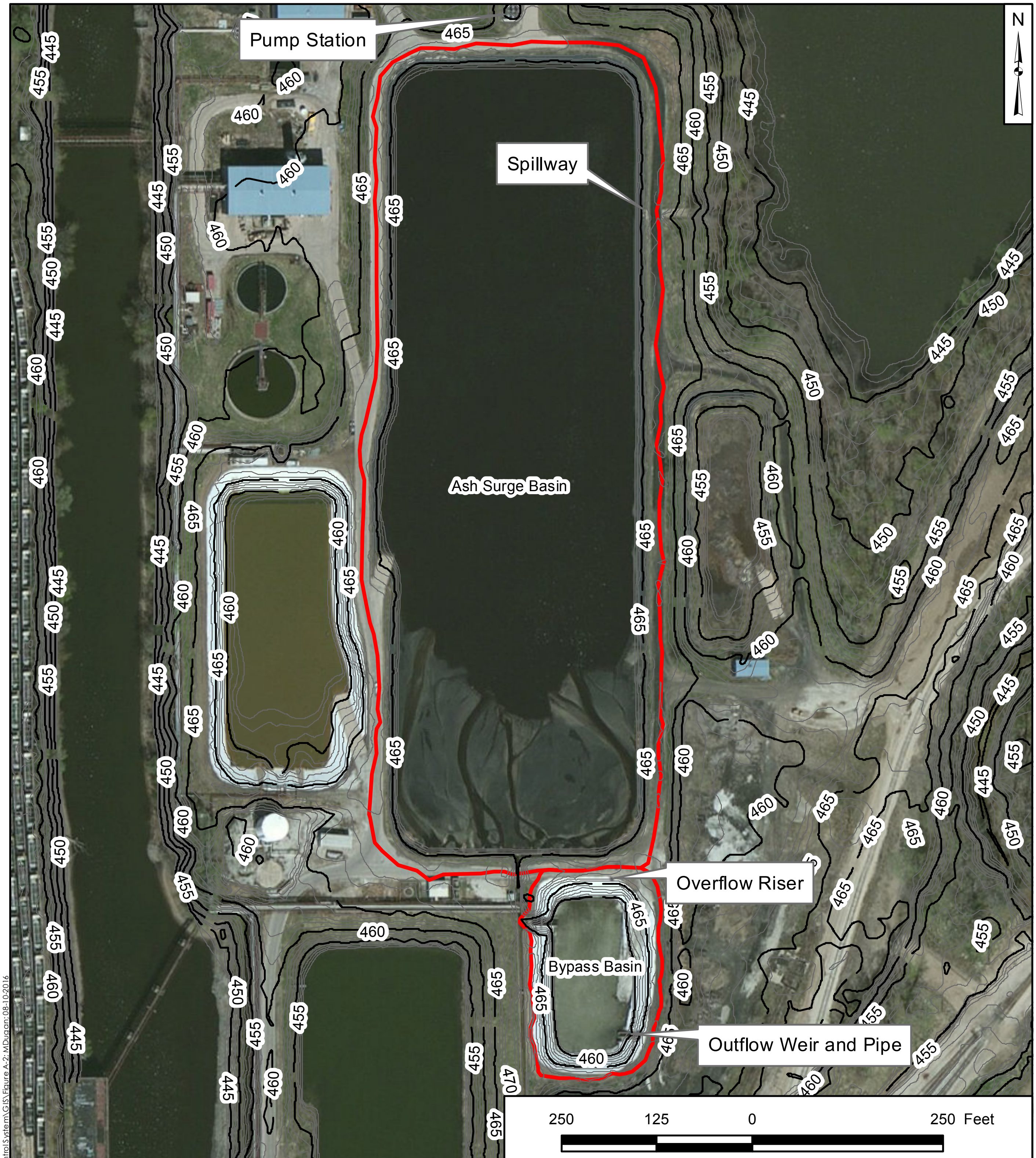
Ash Surge and Bypass Basins
Powerton Station
Pekin, Illinois

Geosyntec consultants

San Diego | October 2016

Figure 1

K:\GIS\PowertonSiteLocation.mxd.Name



Topography: Aerometric, Inc. Project Number 1080611, Dated 6-19-2008.
Aerial Image: Esri Basemaps

Legend

- 5 Foot Elevation Contours
- 1 Foot Elevation Contours
- Catchment Area

Basin Topography and Catchment Areas

Ash Surge and Bypass Basins
Powerton Station
Pekin, Ilinois

Geosyntec consultants

San Diego | October 2016

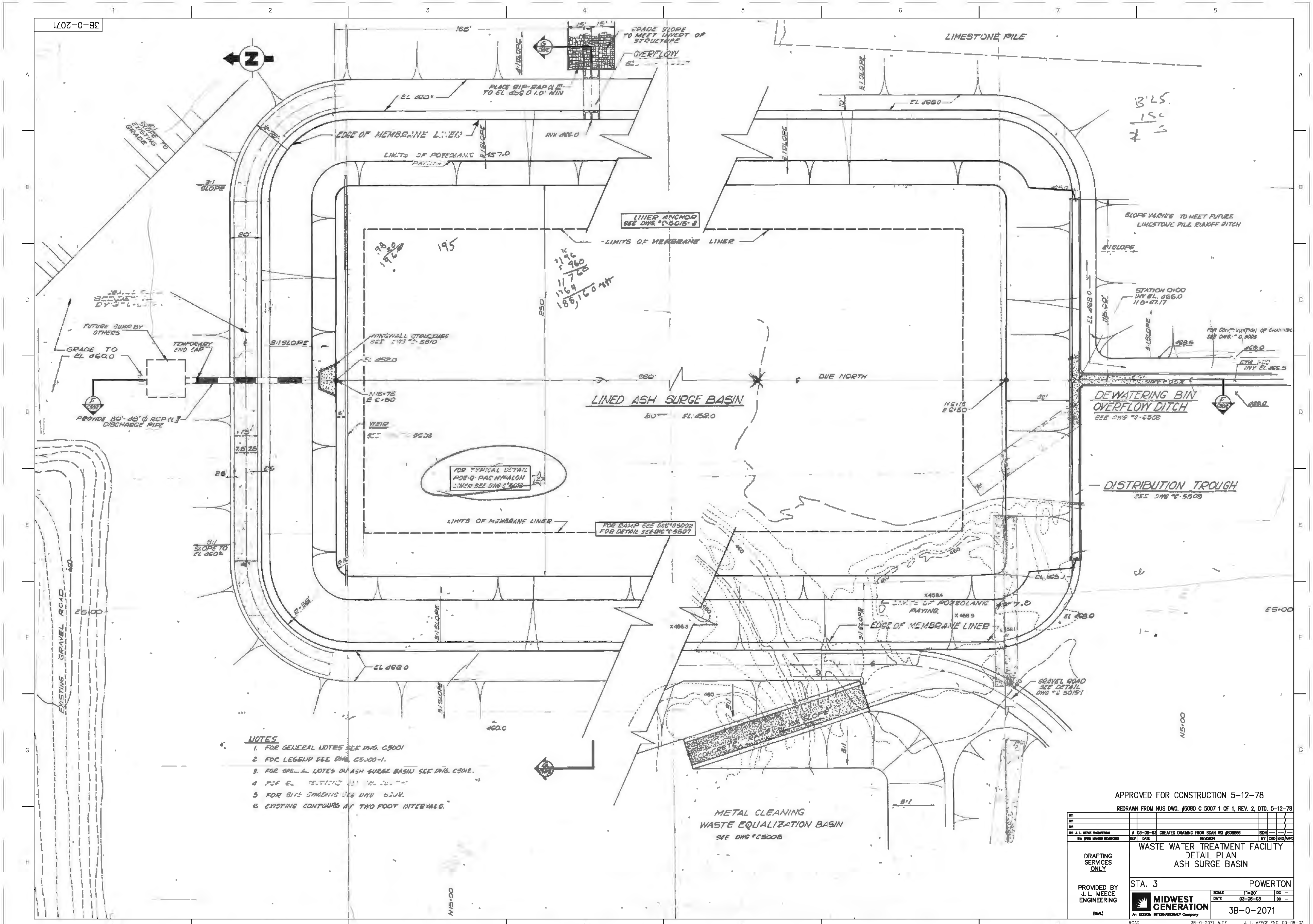
Figure **2**

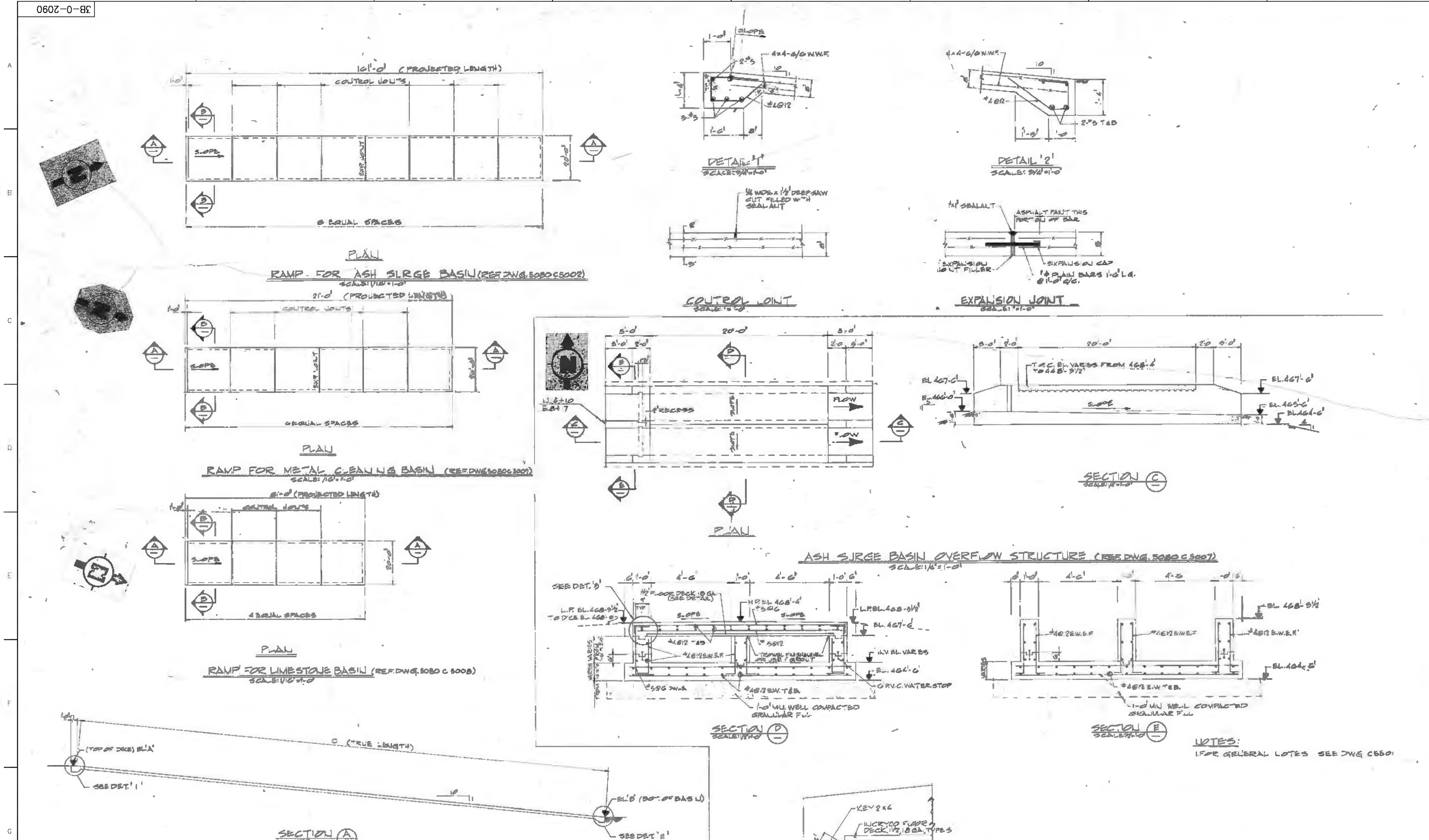
Appendix A

Outlet Structure Design Drawings

Appendix A-1

Ash Surge Basin Emergency Spillway


3B-0-2071
LIMESTONE PILE
GRADE SLOPE TO MEET INVERT OF STRUCTURE
OVERFLOW
PLACE RIP-RAP TO EL 460.0 1.0' MIN
EL 468.0
EDGE OF MEMBRANE LINER
LIMITS OF POZZOLANIC PAVING
3:1 SLOPE
20'
LINER ANCHOR SEE DWG. #C5015-2
LIMITS OF MEMBRANE LINER
SLOPE VARIES TO MEET FUTURE LIMESTONE PILE RUNOFF DITCH
STATION 0+00
INV EL. 466.0
FUTURE SUMP BY OTHERS
GRADE TO EL 460.0
TEMPORARY END CAP
WINGWALL STRUCTURE
EL 452.0
260'
DUE NORTH
LINED ASH SURGE BASIN
DEWATERING BIN OVERFLOW DITCH
PROVIDE 80'-48" Ø RCP CL III DISCHARGE PIPE
WEIR
FOR TYPICAL DETAIL POZ-O-PAC HYPALON LINER SEE DWG #C5015
DISTRIBUTION TROUGH
LIMITS OF MEMBRANE LINER
FOR RAMP SEE DWG #C5002
FOR DETAIL SEE DWG #C5507
E5+00
EXISTING GRAVEL ROAD
GRAVEL ROAD SEE DETAIL DWG #C 5015-1
N5+00
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.
5. FOR SITE GRADING SEE DWG C5001.
6. EXISTING CONTOURS AT TWO FOOT INTERVALS.
CONCRETE RAMP
METAL CLEANING WASTE EQUALIZATION BASIN
SEE DWG #C5008
APPROVED FOR CONSTRUCTION 5-12-78
REDRAWN FROM NUS DWG. #5080 C 5007 1 OF 1, REV. 2, DTD. 5-12-78
A 03-06-03 CREATED DRAWING FROM SCAN
WASTE WATER TREATMENT FACILITY
DETAIL PLAN
ASH SURGE BASIN
DRAFTING SERVICES ONLY
PROVIDED BY J. L. MEECE ENGINEERING
STA. 3
POWERTON
MIDWEST GENERATION
SCALE 1"=20'
DATE 03-06-03
3B-0-2071



RAMP DATA

NAME OF BASIN	EL. 'A'	EL. 'B'	C	REMARKS
LIMESTONE BASIN	460'-0'	452'-0'	80'-1¾	
METAL CLEANING BASIN	468-0'	456-0'	120'-7'	
ASH SURGE BASIN	468-0'	452-0'	160'-7½	

APPROVED FOR CONSTRUCTION 4/19/78

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

BY (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG/APPD
BY:						/
BY:						/
BY:						/
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #S08886	SDH	--	--/--

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 DC –
DATE 03-06-03 SC –

3B-0-2090

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

Appendix A-2

Bypass Basin Overflow Pipe

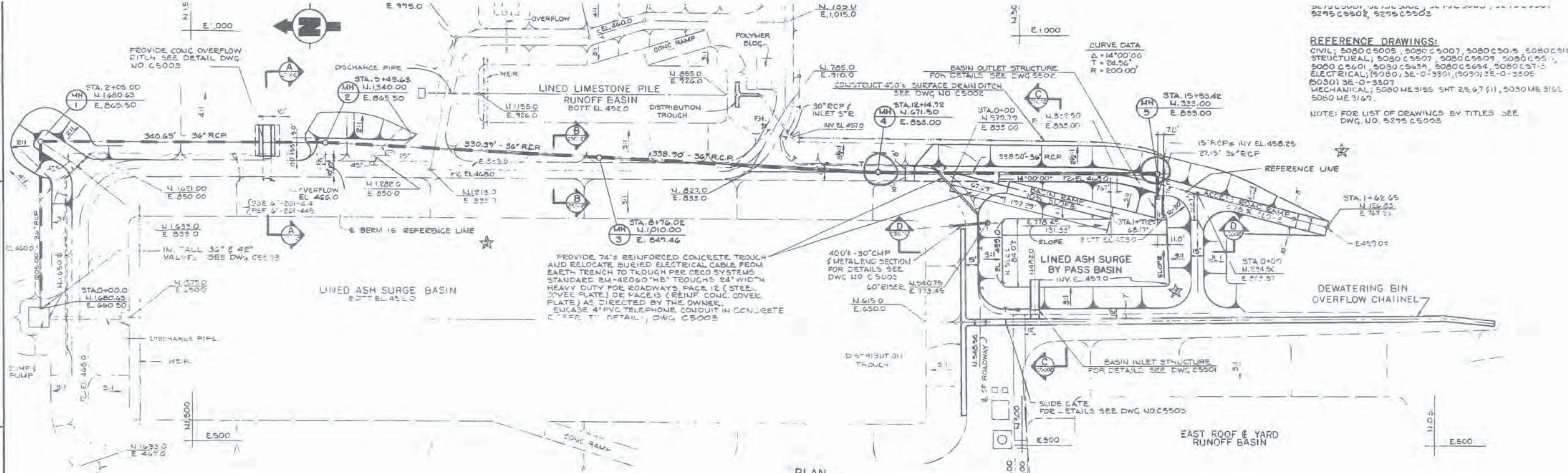
5295C5508, 5295C5503

REFERENCE DRAWINGS:

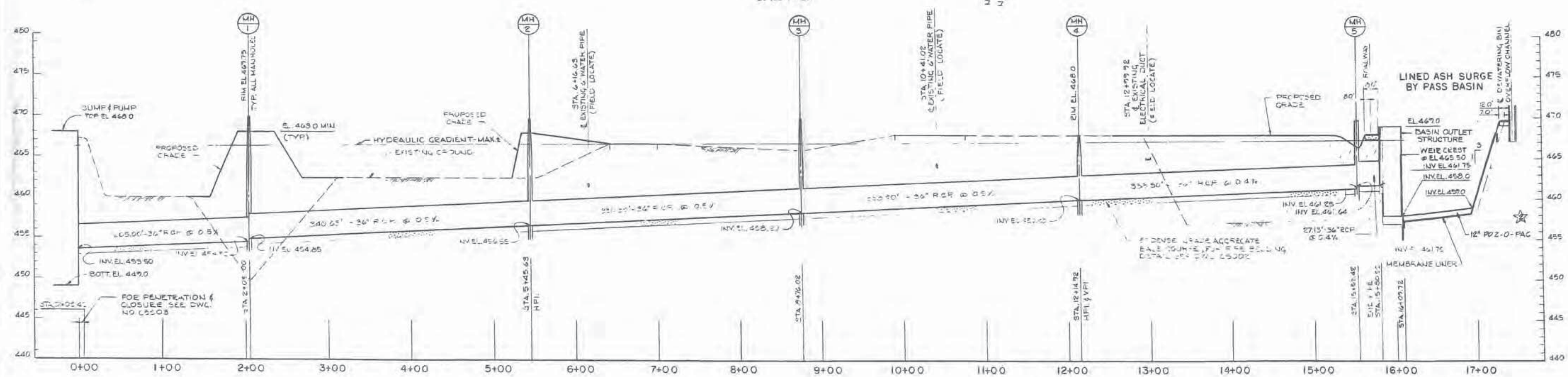
CIVIL; 5080C5005, 5080C5007, 5080C5015, 5080C5121
STRUCTURAL; 5080C5507, 5080C5509, 5080C55[illegible], 5080C5601, 5080C5635, 5080C5654, 5080C57[illegible]
ELECTRICAL; (5080) 3E-0-3301, (5080) 3E-0-3305 (5080) 3E-0-3307
MECHANICAL; 5080ME3155 SHT 2,5,6,7 & 11, 5080ME3165 5080ME3169.

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

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.



PLAN
SCALE: 1"=50'



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

SPECIFICATION:

[illegible]

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 (390 LB±) AND COVER (115 LB±) SHALL BE GRAY IRON ILLINOIS DOT STANDARD 4213-4 TYPE 1 (NEENAH CAT NO. R-1015, REF R-1712) OR EQUAL. CONTRACTOR TO SUBMIT VENDOR DRAWINGS FOR APPROVAL.

4. [illegible] SEE DWG NO C5005

MANHOLE SCHEDULE

MH NO	BY PASS STATION	EL TOP CONE	EL 36 IN PIPE INV. IN	EL 36 IN PIPE INV. OUT	MH DEPTH (MIN.)	NOTES
–	0+00	–	455.50	–	–	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	459.88	7.37'	HPI & ±2°27' USE SEALS RINGS @ RD
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. Ammeraal 2/6/80

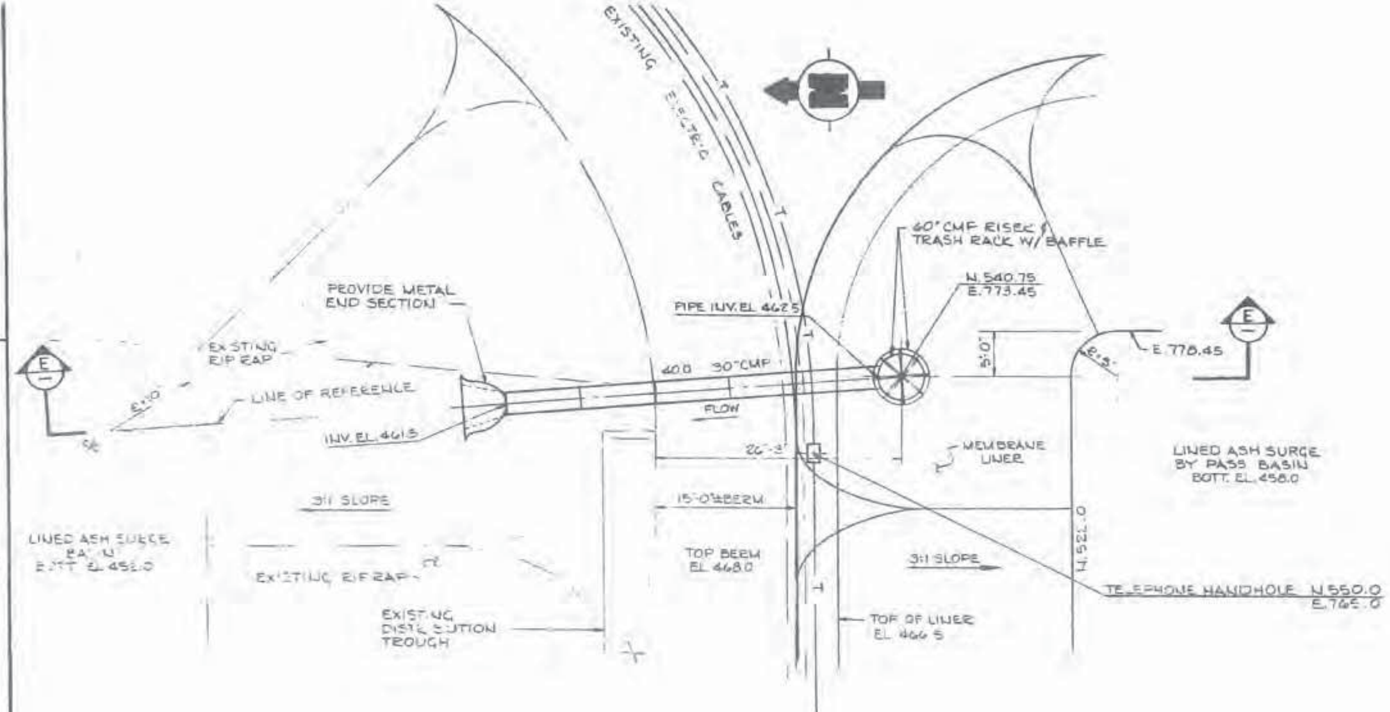
DRAWING STATUS
APPROVED FOR CONSTRUCTION
Date 6/26/80

DRAWN J. Tesic		COMMONWEALTH EDISON COMPANY WASTE WATER TREATMENT FACILITIES POWERTON
CHECKED J.S. Lawrence	2/7/80	ASH SURGE BASIN BY PASS PLAN AND PROFILE
COG. ENGINEER	3/7/80	
APPROVAL		CECO CONTRACT: 802668
APPROVAL		CECO DWG. NO.
APPROVAL PROJ.		NUS CORPORATION ROCKVILLE, MD. — DRAWING NO. 5295 C 5001 — REV. 2
		SCALE: AS SHOWN — SHEET 1 OF 1

DRAWING NO.	REV.	DRAWING TITLES
CONTRACT DRAWINGS		
5295 C5001	1	PLAN & PROFILE
5295 C5002	1	DETAILS & SECTIONS
5295 C5003	1	MISCELLANEOUS DETAILS
5295 C5501	1	INLET STRUCTURE
5295 C5502	1	OUTLET STRUCTURE
5295 C5503	1	MISCELLANEOUS GATES
REFERENCE DRAWINGS		
5080 C5005	2	DETAIL PLAN - EAST ROOF & YARD RUNOFF BASIN
5080 C5007	2	DETAIL PLAN ASH SURGE BASIN
5080C5015	2	MISCELLANEOUS SECTIONS AND DETAILS, SHTS 1 & 2
5080C5121	1	BASIN END SECTION
5080C5507	1	RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE
5080C5509	1	ASH SURGE BASIN & LIMESTONE BASIN DISTRIBUTION TROUGH SECTION & DETAILS
5080C5511	2	DEWATERING BIN OVERFLOW CHANNEL SECTIONS & DETAILS
5080C5601	2	STANDARD DETAILS
5080C5638	2	ASH SURGE BASIN SUMP - CLARIFIER OVERFLOW SUMP
5080C5654	1	PIPE SUPPORTS FRAMING PLAN & SECTIONS COL NO 74 TO 151
5080C5718	1	ASH SURGE BASIN SUMP PLAT FORM SECTIONS & DETAILS
(5080) 3E-0-3301	2	ELECTRICAL AREA LAYOUT EAST RUNOFF BASIN - NORTH
(5080) 3E-0-3305	3	ELECTRICAL AREA LAYOUT LIMESTONE PILE RUNOFF BASIN
(5080) 3E-0-3307	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 3163 SHT 1	1	PIPING ARRANGEMENT YARD DETAIL LIMESTONE PILE RUNOFF BASIN AND ASH SURGE BASIN SUMPS

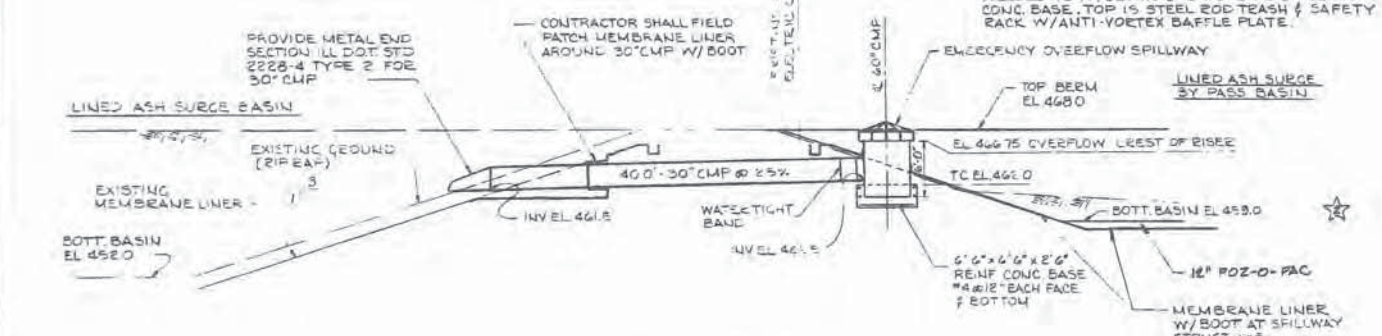
NOTE:
FOR ELECTRICAL CABLE TROUGH SEE CECO SYSTEMS STANDARD EM-42060 "HB" TROUGHS 24" WIDTH HEAVY DUTY FOR ROADWAYS PAGE 12 (STEEL COVER PLATE) OR PAGE 13 (REINFORCED CONCRETE COVER PLATE).

2		(a) REMOVED COMBINED SELECT AND GRAVEL BLANKET FROM BOTTOM OF BASIN AND ADDED 12" POZ-O-PAC, SECE (b) CHANGED BOTTOM EL. 458.0 TO 459.0



PLAN

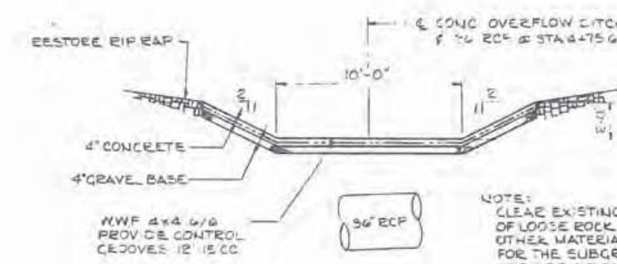
NOTE:
EMERGENCY OVERFLOW SPILLWAY & DRAIN 60" DIA. x 6' LONG 12 GAGE 3" x 1" CORRUGATED STEEL PIPE (GALV.) WITH 30" STEEL SECTION WELDED TO IT, SET IN 6'-6" x 6'-6" x 2'-6" REINF CONC. BASE. TOP IS STEEL ROD TRASH & SAFETY RACK W/ANTI-VORTEX BAFFLE PLATE.



SECTION (E)

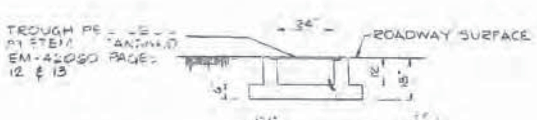
EMERGENCY OVERFLOW SPILLWAY

SCALE: 1/8" = 1'-0"



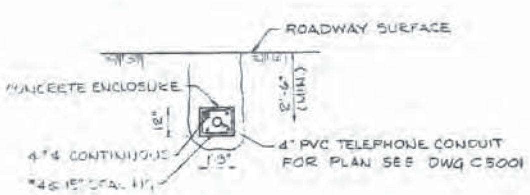
NOTE:
CLEAR EXISTING CHANNEL OF LOOSE ROCK, TRASH OR OTHER MATERIAL NOT SUITABLE FOR THE SUBGRADE AND PROVIDE A FIRM FOUNDATION OF GRANULAR MATERIAL.

TYPICAL DETAIL
CONCRETE OVERFLOW DITCH
SCALE: 1/4" = 1'-0"



AT ROADWAY FIELD TRANSFER BURIED CABLE FROM EARTH TRENCH TO CONCRETE TROUGH MAINTAIN DESIGNATED GROUPING OF POWER AND OPERATING CABLES. FOR PLAN SEE DWG C5001

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



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

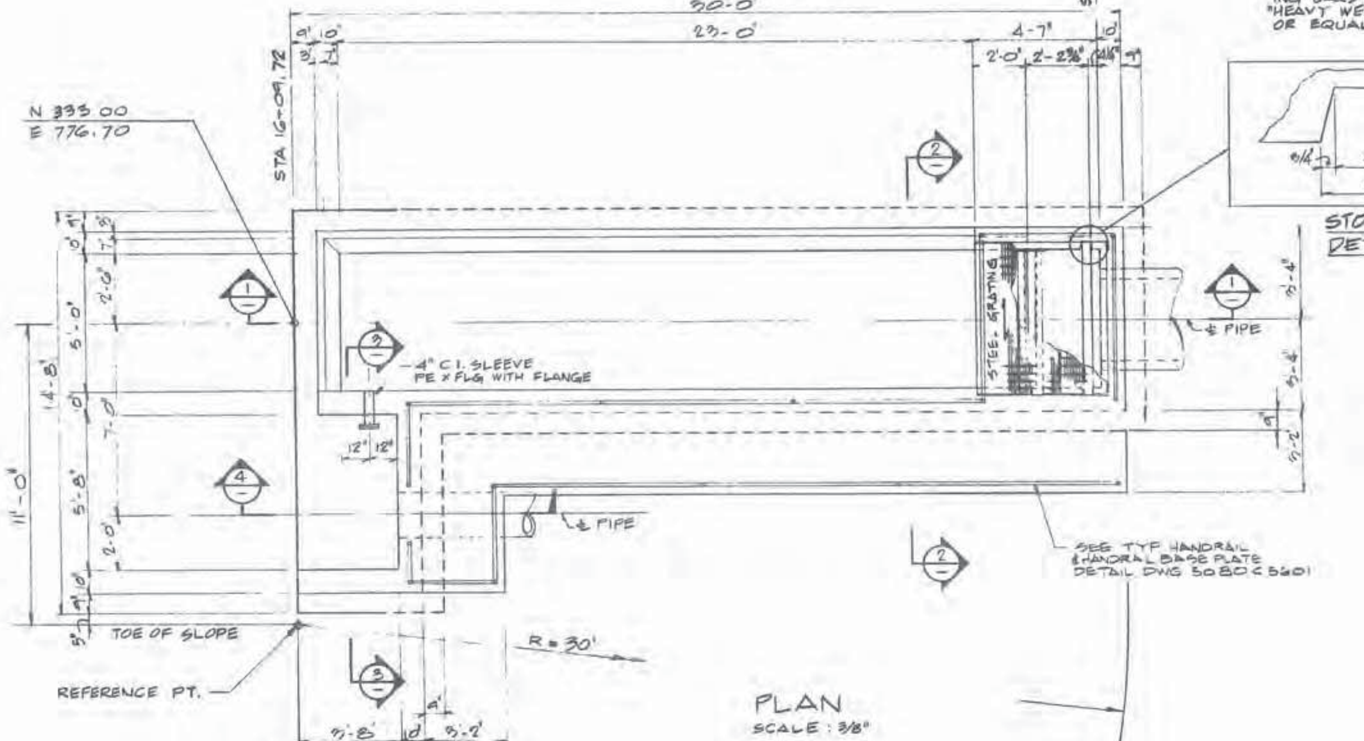
DRAWING STATUS
APPROVED FOR CONSTRUCTION
Date 6/26/83

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

ASH SURGE BASIN BY PASS
MISCELLANEOUS DETAILS

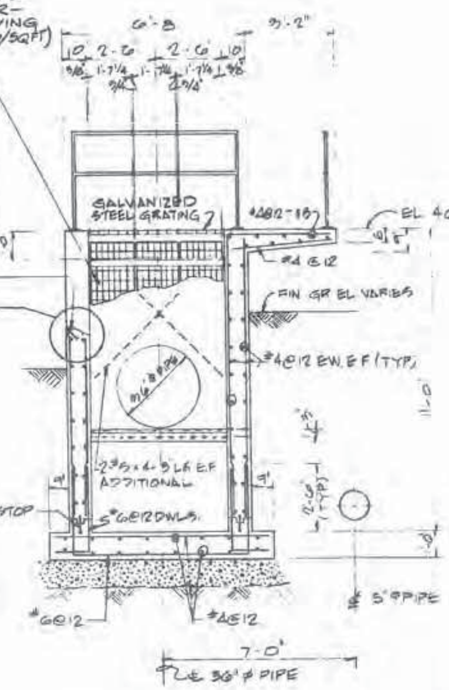
CECO CONTRACT: 802668 | CECO DWG. NO.
NUS CORPORATION, ROCKVILLE, MD.
DRAWING NO. 5295 C 5003 | REV. 2
SCALE: AS SHOWN | SHEET 1 OF 1

TURE AS SHOWN WITH CROSS BARS BACK FACE (DOWN STREAM). BEARING BARS 2½" × ¼" @ 2 3/16" SC. IRVING "HEAVY WELD" TYPE HE (WT. 12.9 LBS/SQFT) OR EQUAL.

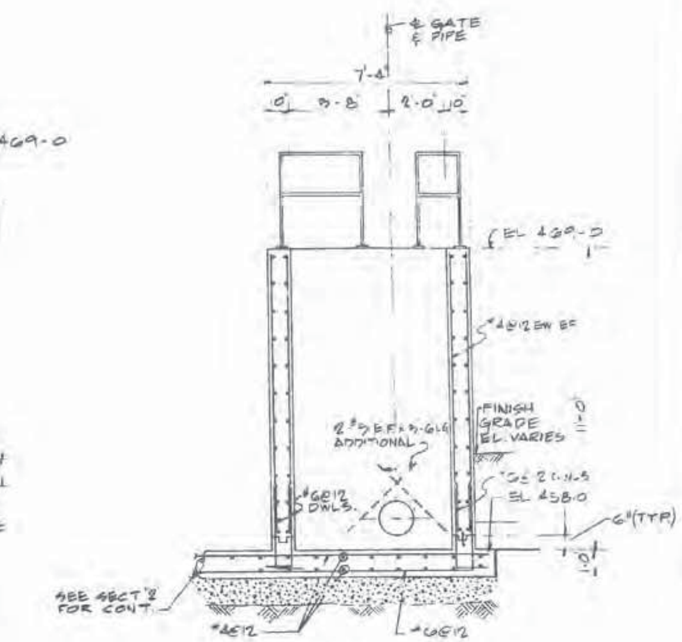


PLAN
SCALE: 3/8"

STOP PLANK GROOVE DETAIL



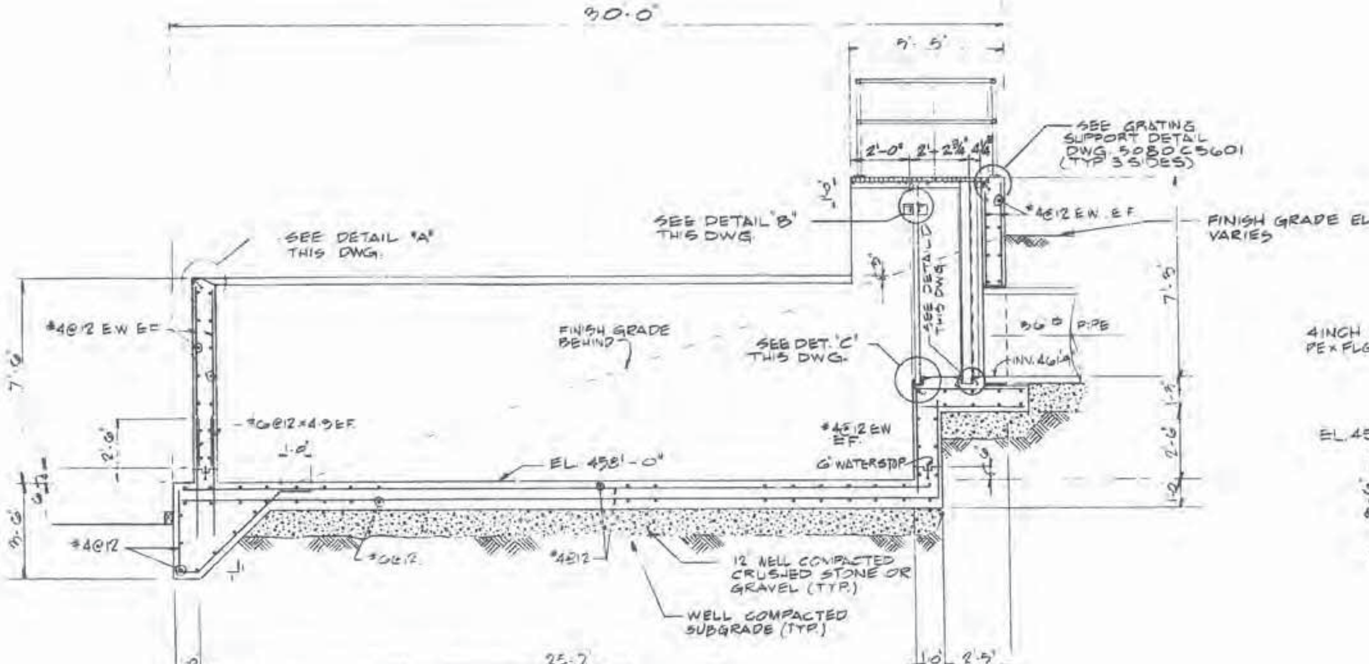
SECTION (2)
SCALE 3/8" = 1'-0



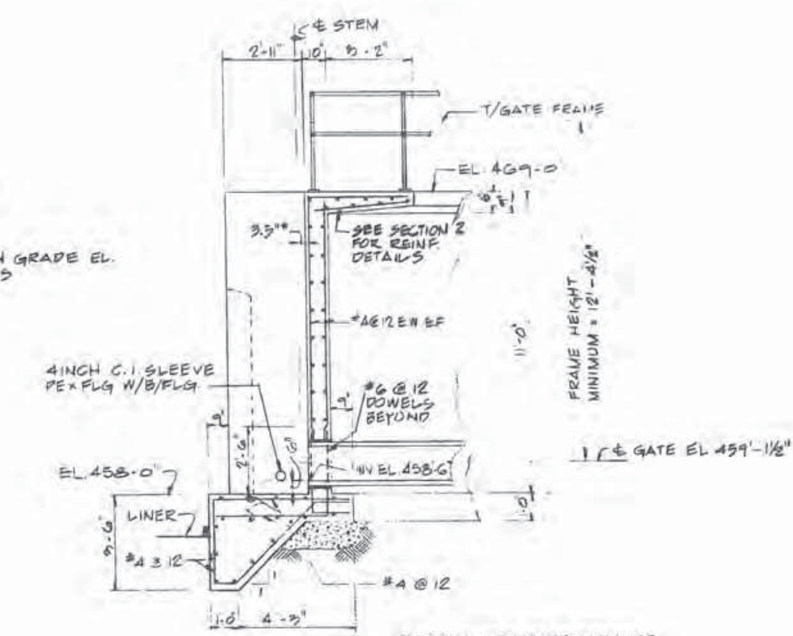
SECTION (3)
SCALE 3/8" = 1'-0

NOTES:

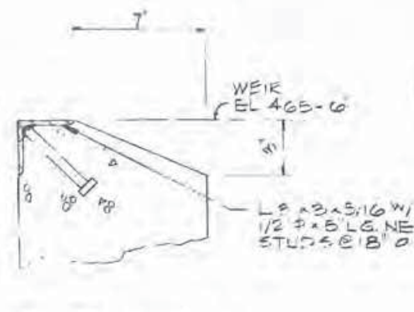
1. SEE NOTE NOS 1, 2, 4, 5 AND 6 ON DWG 5501.
2. CONTRACTOR SHALL FURNISH & INSTALL MEDIUM DUTY SLUICE GATE & ACCESSORIES AS MANUFACTURED BY ARMCO STEEL CORP. OR APPROVED EQUAL, CONFORMING TO FOLLOWING SPECS:
   a. GATE
      MODEL 20-10C
      QUANTITY REQD = 1
      OPENING SIZE = 15" DIA.
      FRAME TYPE = FLAT BACK
      MATERIAL COMBINATION = #2
      STEM DIA = 7/8"
   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" × 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" × 8" × 5'-5" LONG (DRESSED SIZE 3½ × 7¼ × 5'-5")
   STOP PLANKS ARE INTERCHANGEABLE AT THREE LOCATIONS — SEE ALSO DWGS C5501 & C5503 (ONLY ONE SET REQUIRED UNLESS DIRECTED OTHERWISE BY OWNER)



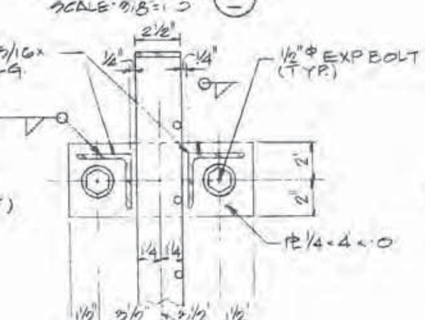
SECTION (1)
SCALE: 3/8" = 1'-0



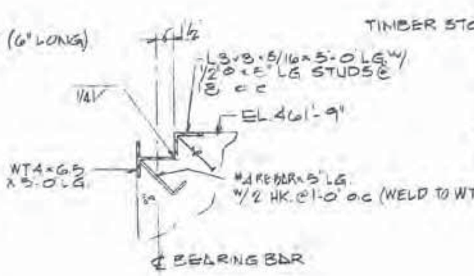
SECTION (4)
SCALE: 3/8" = 1'-0"



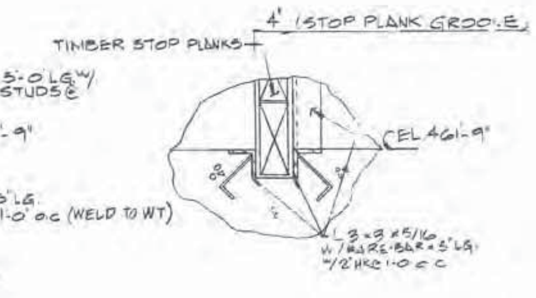
DETAIL-"A"
SCALE: 3" = 1'-0"



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



DETAIL-"C"
SCALE: 1½" = 1'-0"



DETAIL-"D"
SCALE: 1½" = 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, 5509, 5511, 5601, 5635, 5654, 5713.

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

MECHANICAL: F 780 ME 3155 SHT 2, 5, 6, 7, & 11, & 62, 3169

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

DRAWING STATUS

APPROVED FOR CONSTRUCTION

DATE 2/9/80

DRAWN S.J. LONG 1/80	COMMONWEALTH EDISON COMPANY WASTE WATER TREATMENT FACILITIES POWERTON
CHECKED 2/6/80	ASH SURGE BASIN BY PASS BASIN OUTLET STRUCTURE
COG. ENGINEER 2/6/80	CECO CONTRACT 802668 · CECO DWG NO. · REV.
APPROVAL	NUS CORPORATION ROCKVILLE, MD · DRAWING NO. 5295 C 5502 · REV. 1
APPROVAL, CLIENT	SCALE AS SHOWN · SHEET 1 OF 1

SYS. CODE: 04

DWG. CODE: 12

3310

Appendix B

Design Storm Event Depth

NOAA Atlas 14, Volume 2, Version 3
Location name: Pekin, Illinois, US*
Latitude: 40.5434°, Longitude: -89.6779°
Elevation: 466 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.409** (0.375-0.447)	**0.487** (0.447-0.534)	**0.581** (0.533-0.636)	**0.654** (0.598-0.715)	**0.746** (0.679-0.814)	**0.816** (0.740-0.891)	**0.884** (0.797-0.964)	**0.953** (0.854-1.04)	**1.04** (0.928-1.14)	**1.11** (0.981-1.22)
10-min	**0.635** (0.582-0.695)	**0.760** (0.697-0.834)	**0.903** (0.828-0.989)	**1.01** (0.923-1.10)	**1.14** (1.04-1.25)	**1.24** (1.12-1.35)	**1.33** (1.20-1.45)	**1.42** (1.27-1.55)	**1.53** (1.36-1.68)	**1.62** (1.43-1.77)
15-min	**0.778** (0.714-0.852)	**0.929** (0.853-1.02)	**1.11** (1.02-1.21)	**1.24** (1.14-1.36)	**1.41** (1.28-1.54)	**1.53** (1.39-1.67)	**1.65** (1.49-1.80)	**1.77** (1.59-1.93)	**1.92** (1.70-2.10)	**2.02** (1.78-2.22)
30-min	**1.03** (0.944-1.13)	**1.24** (1.14-1.36)	**1.52** (1.39-1.66)	**1.73** (1.58-1.89)	**1.99** (1.81-2.17)	**2.19** (1.98-2.39)	**2.39** (2.15-2.60)	**2.58** (2.31-2.82)	**2.84** (2.52-3.11)	**3.03** (2.68-3.33)
60-min	**1.26** (1.15-1.38)	**1.53** (1.40-1.67)	**1.91** (1.75-2.09)	**2.19** (2.01-2.40)	**2.58** (2.35-2.82)	**2.88** (2.61-3.15)	**3.19** (2.88-3.48)	**3.50** (3.14-3.83)	**3.92** (3.49-4.30)	**4.26** (3.76-4.67)
2-hr	**1.48** (1.35-1.61)	**1.79** (1.64-1.97)	**2.25** (2.06-2.46)	**2.61** (2.38-2.85)	**3.10** (2.82-3.38)	**3.48** (3.15-3.80)	**3.88** (3.49-4.23)	**4.29** (3.84-4.68)	**4.85** (4.30-5.31)	**5.31** (4.67-5.82)
3-hr	**1.57** (1.45-1.72)	**1.91** (1.75-2.09)	**2.41** (2.21-2.64)	**2.80** (2.56-3.07)	**3.34** (3.04-3.65)	**3.78** (3.42-4.12)	**4.23** (3.81-4.61)	**4.70** (4.20-5.12)	**5.36** (4.74-5.84)	**5.90** (5.17-6.44)
6-hr	**1.86** (1.72-2.04)	**2.26** (2.08-2.48)	**2.85** (2.62-3.12)	**3.31** (3.04-3.62)	**3.96** (3.61-4.31)	**4.48** (4.06-4.87)	**5.03** (4.53-5.46)	**5.60** (5.00-6.08)	**6.41** (5.66-6.98)	**7.06** (6.18-7.71)
12-hr	**2.15** (1.98-2.34)	**2.60** (2.40-2.83)	**3.25** (3.00-3.54)	**3.76** (3.46-4.09)	**4.47** (4.09-4.85)	**5.04** (4.59-5.46)	**5.63** (5.10-6.10)	**6.24** (5.61-6.77)	**7.10** (6.32-7.71)	**7.80** (6.87-8.49)
24-hr	**2.46** (2.29-2.66)	**2.97** (2.76-3.22)	**3.73** (3.46-4.04)	**4.33** (4.01-4.69)	**5.16** (4.76-5.57)	**5.82** (5.35-6.29)	**6.50** (5.96-7.02)	**7.21** (6.59-7.79)	**8.20** (7.45-8.86)	**9.00** (8.13-9.73)
2-day	**2.86** (2.66-3.07)	**3.45** (3.22-3.71)	**4.30** (4.00-4.62)	**4.97** (4.61-5.33)	**5.87** (5.44-6.30)	**6.58** (6.08-7.06)	**7.31** (6.73-7.85)	**8.07** (7.40-8.68)	**9.12** (8.31-9.81)	**9.94** (9.03-10.7)
3-day	**3.03** (2.83-3.25)	**3.65** (3.41-3.92)	**4.54** (4.23-4.87)	**5.23** (4.87-5.61)	**6.16** (5.72-6.60)	**6.90** (6.39-7.39)	**7.64** (7.06-8.19)	**8.41** (7.75-9.02)	**9.46** (8.67-10.2)	**10.3** (9.39-11.1)
4-day	**3.20** (2.99-3.42)	**3.85** (3.60-4.13)	**4.78** (4.47-5.13)	**5.49** (5.13-5.88)	**6.46** (6.01-6.91)	**7.21** (6.70-7.72)	**7.97** (7.39-8.53)	**8.75** (8.09-9.37)	**9.80** (9.02-10.5)	**10.6** (9.75-11.4)
7-day	**3.75** (3.52-3.98)	**4.49** (4.23-4.79)	**5.50** (5.18-5.86)	**6.27** (5.90-6.67)	**7.27** (6.83-7.74)	**8.05** (7.54-8.56)	**8.82** (8.24-9.39)	**9.61** (8.96-10.2)	**10.6** (9.88-11.4)	**11.4** (10.6-12.2)
10-day	**4.25** (4.00-4.51)	**5.09** (4.80-5.42)	**6.19** (5.83-6.59)	**7.01** (6.59-7.45)	**8.09** (7.59-8.60)	**8.91** (8.35-9.47)	**9.73** (9.10-10.4)	**10.5** (9.84-11.2)	**11.6** (10.8-12.4)	**12.5** (11.6-13.3)
20-day	**5.73** (5.38-6.11)	**6.86** (6.46-7.32)	**8.27** (7.77-8.81)	**9.29** (8.72-9.89)	**10.6** (9.94-11.3)	**11.6** (10.9-12.4)	**12.6** (11.8-13.4)	**13.6** (12.6-14.4)	**14.8** (13.8-15.8)	**15.8** (14.6-16.8)
30-day	**7.10** (6.70-7.54)	**8.48** (8.00-9.00)	**10.1** (9.54-10.7)	**11.3** (10.6-12.0)	**12.8** (12.0-13.5)	**13.9** (13.0-14.7)	**15.0** (14.0-15.9)	**16.0** (15.0-17.0)	**17.4** (16.2-18.5)	**18.4** (17.1-19.6)
45-day	**8.91** (8.43-9.41)	**10.6** (10.0-11.2)	**12.5** (11.9-13.2)	**13.9** (13.1-14.7)	**15.6** (14.7-16.5)	**16.9** (15.9-17.8)	**18.1** (17.0-19.1)	**19.3** (18.1-20.3)	**20.8** (19.5-22.0)	**21.9** (20.5-23.1)
60-day	**10.6** (10.1-11.2)	**12.6** (12.0-13.3)	**14.9** (14.1-15.7)	**16.4** (15.5-17.3)	**18.4** (17.3-19.4)	**19.8** (18.7-20.9)	**21.1** (19.9-22.3)	**22.4** (21.1-23.7)	**24.1** (22.6-25.5)	**25.3** (23.7-26.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

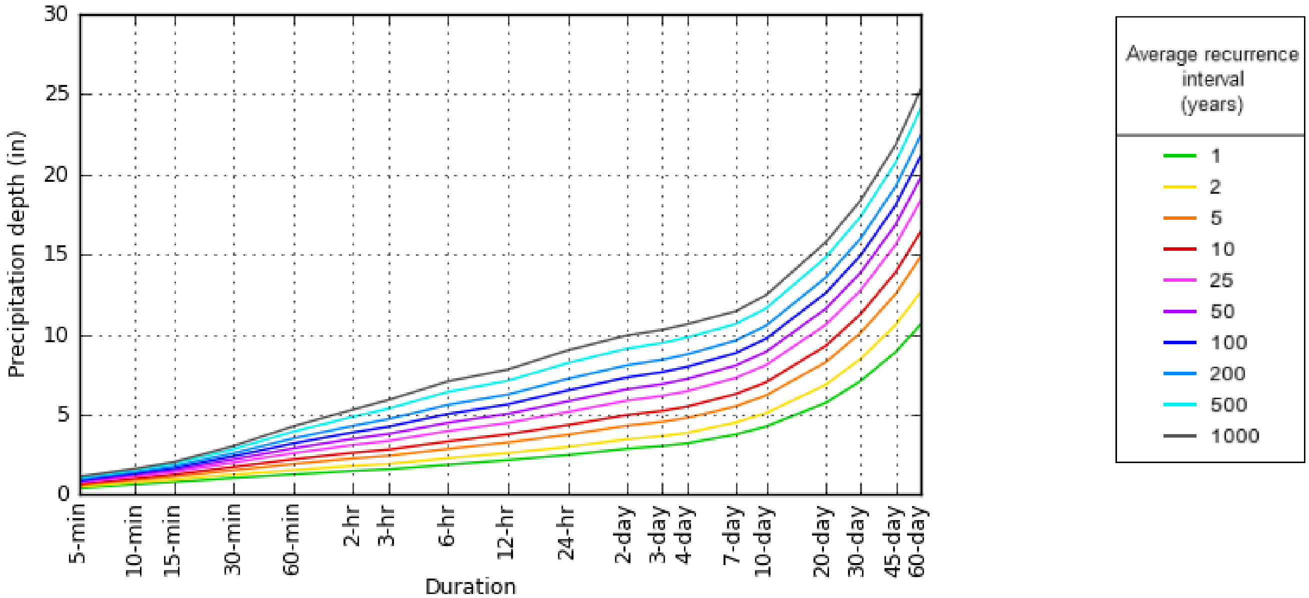
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

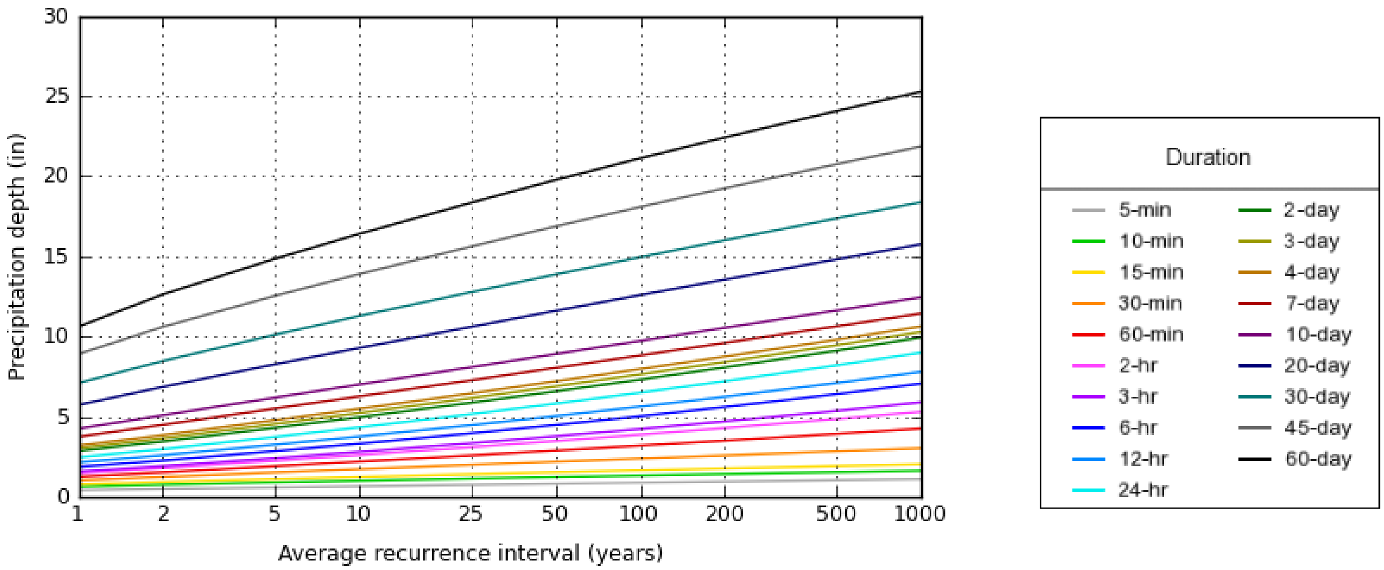
Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.5434°, Longitude: -89.6779°





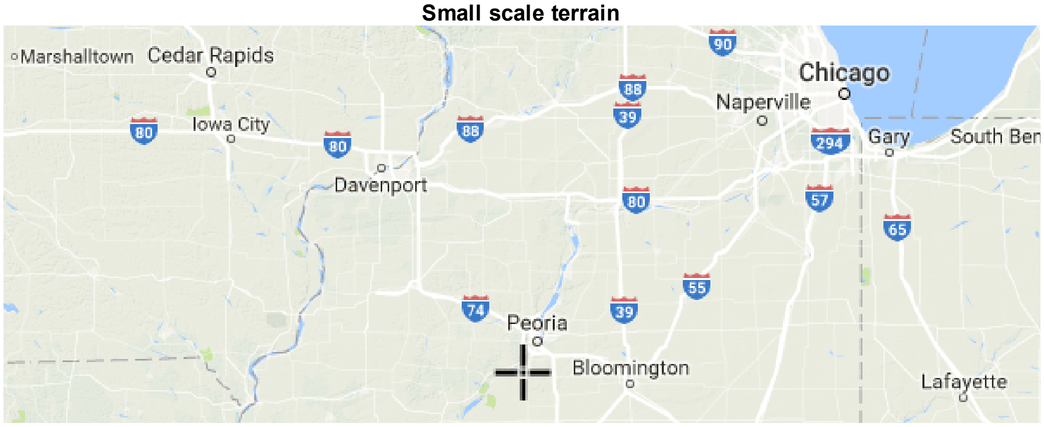
NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Wed Jul 27 17:39:47 2016

Back to Top

Maps & aerials

Small scale terrain



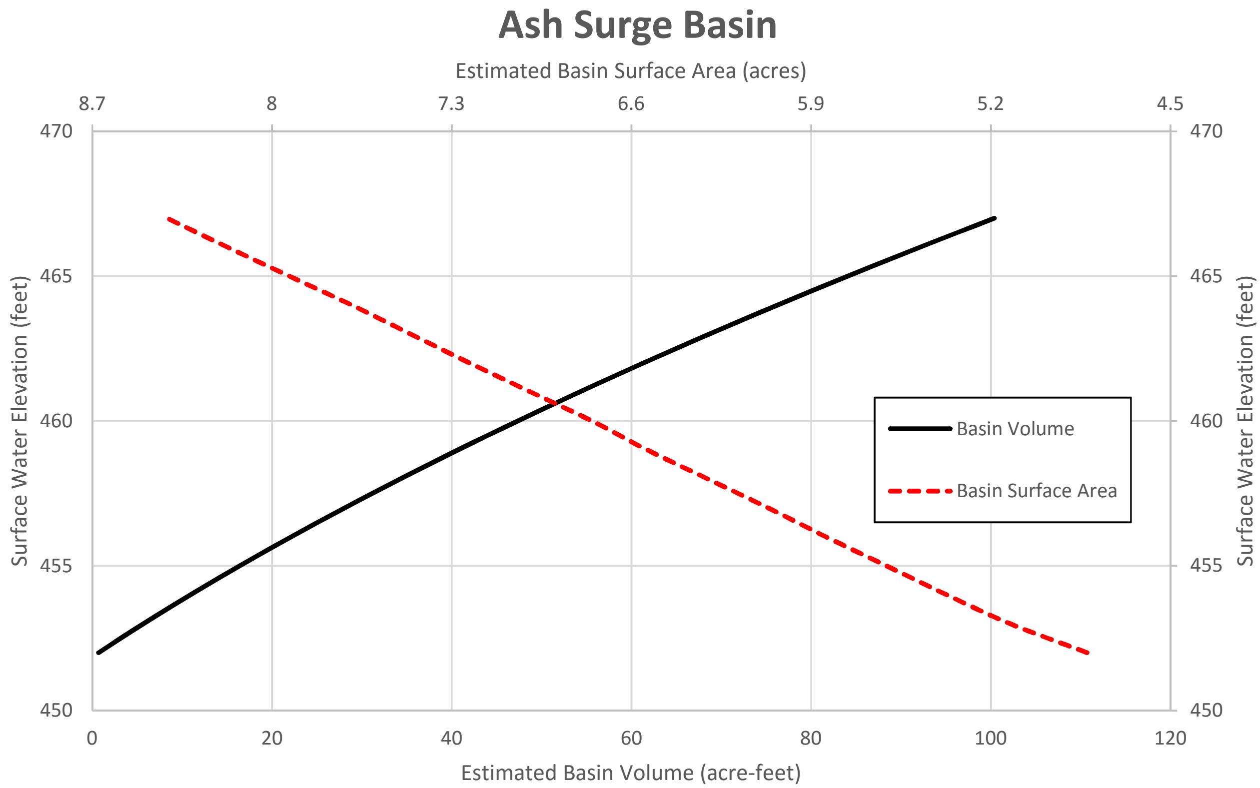
Large scale terrain

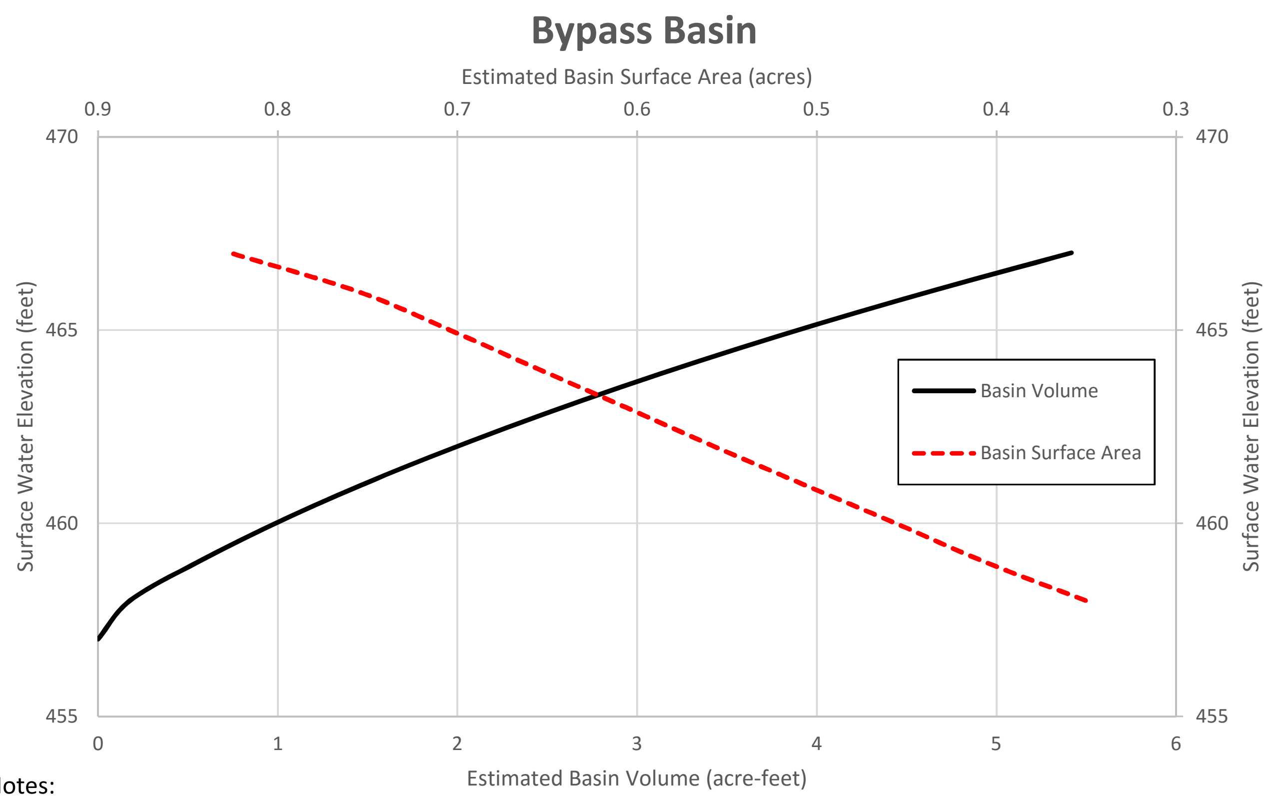
Large scale map

Large scale aerial

Appendix C

Basin Area Capacity Curves





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

Geosyntec consultants	AREA-CAPACITY CURVES ASH SURGE & BYPASS BASINS POWERTON STATION PEKIN, ILLINOIS	**FIGURE C-1**
OCTOBER 2016		
SW0251-07		