AECOM

October 2016

Dynegy Midwest Generation, LLC
#1 Chessen Lane
Alton, IL 62002

RE: History of Construction
USEPA Final CCR Rule, 40 CFR § 257.73(c)
Wood River Power Station
Alton, Illinois

On behalf of Dynegy Midwest Generation, LLC, AECOM has prepared the following history of construction for the West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E, and Primary East Ash Pond at the Wood River Power Station in accordance with 40 CFR § 257.73(c).

Wood River Power Station was permanently retired in June 2016. In accordance with 40 CFR § 257.102(g), notice of intent to close West Ash Pond 2W was provided in November 2015, notices of intent to close the Primary East Ash Pond and West Ash Pond 1 were provided in July 2016, and notice of intent to close West Ash Pond 2E was provided in October 2016. The preparation of this history of construction report in accordance with 40 CFR § 257.73(c) does not concede and should not be construed to concede that any one of West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E or the Primary Ash Pond is subject to the Design Criteria or all Operating Criteria in the CCR Rule.

BACKGROUND

40 CFR § 257.73(c)(1) requires the owner or operator of an existing coal combustion residual (CCR) surface impoundment that either (1) has a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) has a height of 20 feet or more to compile a history of construction by October 17, 2016 that contains, to the extent feasible, the information specified in 40 CFR § 257.73(c)(1)(i)–(xii).

The history of construction presented herein was compiled based on existing documentation, to the extent that it is reasonably and readily available (see 80 Fed. Reg. 21302, 21380 [April 17, 2015]) and AECOM's site experience. AECOM's document review included construction drawings, geotechnical investigations, construction specifications, operation and maintenance information, etc. for the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond at the Wood River Power Station.

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HISTORY OF CONSTRUCTION

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

Owner: Dynegy Midwest Generation, LLC

Address: 1500 Eastport Plaza Drive
Collinsville, IL 62234

CCR Units: Primary East Ash Pond, IDNR Dam ID No. IL50536
West Ash Pond 1
West Ash Pond 2W
West Ash Pond 2E, IDNR Dam ID No. IL50281

West Ash Pond 1 and West Ash Pond 2W do not have a state assigned identification number.

§ 257.73(c)(1)(ii): The location of the CCR unit identified on the most recent USGS $7^1/_2$ or 15 minute topographic quadrangle map or a topographic map of equivalent scale if a USGS map is not available.

The locations of the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond have been identified on an USGS 7-1/2 minute topographic quadrangle map in **Appendix A**.

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

The following captures the purpose of each CCR unit:

- The West Ash Pond 1 (inactive) was used to store and dispose bottom ash with bottom ash mined for beneficial reuse continuing into 2016.
- The West Ash Pond 2W (inactive) was used to store and dispose of bottom ash and fly ash.
- The West Ash Pond 2E (inactive) was used to store and dispose of bottom ash and fly ash (no CCR received on or after October 14, 2015) and is being used to clarify non-CCR plant wastewaters and CCR contact stormwater prior to discharge in accordance with the station's NPDES permit.
- The Primary East Ash Pond (no longer receiving CCR) was used to store and dispose of fly ash, bottom ash, and other CCR materials.

§ 257.73(c)(1)(iv): The name and size in acres of the watershed where the CCR unit is located.

The West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are located at the southeastern edge of the City of Alton-Mississippi River Watershed with a 12-digit Hydrologic Unit Code (HUC) of 071100090402 and a drainage area of 22,942 acres (USGS, 2016).

§ 257.73(c)(1)(v): A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

The foundation materials for the West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E consist of native alluvial clay and native alluvial sand. The physical properties of the native alluvial clay are classified as fat clay, with some zones lean clay. The consistency of the clay varies from soft to stiff, generally improving from east to west. The clay thickness generally thins from east to west. The physical properties of the native alluvial sand are described as medium dense with occasional zones of looser material. The sands are typically saturated, and are relatively clean (fines content typically in the range of 5 to 20%). An available summary of the engineering properties of the West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E foundation materials is presented in **Table 1** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 1. Summary of West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E Material Engineering Properties

Material	Unit Weight (pcf)	Properties For Static Operating Case (drained)		Properties For Post-Seismic Case (undrained)	
		Φ' (°)	*c' (psf)*	Φ (°)	*c (psf)*
Dike Fill (Clay)	130	30	200	30	200
Dike Fill (Sand)	120	33	0	33	0
Native Alluvial Clay	130	30	0	s_u/σ'_v = 0.20	
Native Sand Alluvium	120	32	0	s_u/σ'_v = 0.20 to 0.25	

Physical and engineering properties of the foundation materials for the Primary East Ash Pond are described in this paragraph. The current Primary East Ash Pond embankments are constructed over previously sluiced ash materials and possibly fill materials (ash mixed with native soils) that were impounded by the historical CCR storage area. The sluiced ash materials are primarily fly ash with a general consistency of very loose and have a general classification of silt and silty sand. The historical CCR storage area embankments and sluiced ash material are underlain primarily by (from top to bottom) floodplain clay and alluvium sand. The floodplain clay is classified as fat clay with interbedded zones of lean clay. The consistency of the clay layer varies from very soft to medium stiff with an average consistency of soft. The alluvium sand is classified as poorly-graded sand that was typically saturated and relatively clean materials. The consistency of the sand material is generally medium dense to dense with an occasional zone of looser material. An available summary of the engineering properties of the foundation materials is presented in **Table 2** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 2. Summary of Primary East Ash Pond Material Engineering Properties

Material	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters		
		c' (psf)	Φ' (°)	c (psf)	Φ (°)	s_u/ σ'_v
Compacted Ash Embankment	115	0	35	0	35	-
Sluiced Ash	100	0	29	-	-	0.30
Floodplain Clay	115	150	28	-	-	0.25
Recent Alluvium Sand	120	0	32	0	32	-
Original East Pond Dike	125	170	33	430	20	-

The West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are enclosed impoundments with embankments and do not have abutments.

§ 257.73(c)(1)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The physical properties of the perimeter embankment materials for the West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E are described as fine-grained soils classified as lean clay and fat clay. The clays are generally stiff to hard in consistency and appears to be well-compacted materials. The West Ash Pond 1 construction consisted of raising the southeastern embankments of historical Pond A and constructing a separator dike over existing ash deposits within the footprint. The West Ash Pond 1 embankment raise was constructed of silty sand and sandy silt. The fill material used to raise the embankments is medium dense in consistency and appears to be well-compacted. Construction of West Ash Pond 2E included clearing ash deposits (from historical Pond A), re-working existing subgrade and side slopes, and constructing an interior dike separating West Ash Pond 2W and West Ash Pond 2E. An available summary of the engineering properties of the embankment materials for West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E is presented in **Table 1** above. West Ash Pond 2E is a lined impoundment with a 1-foot thick clay layer overlain by a polypropylene membrane with an unknown thickness. The physical and engineering properties of the clay liner are not reasonably and readily available.

The physical and engineering properties of the materials used for the Primary East Ash Pond embankments are described as compacted ash materials. The compacted ash materials are generally ash materials with coarse-grained soil classifications of silty sand, silt with sand, and poorly-graded sand with silt. The ash is predominately bottom ash with some interbedded layers of fly ash. The ash material is generally medium dense to dense in consistency and appears to be well-compacted. An available summary of the engineering properties of the embankment materials is presented in **Table 2** above. The Primary East Ash Pond is lined with an 18-inch thick clay layer overlain by a 60-mil HDPE liner. The clay

liner consists of a mixture of low plastic fat clay and lean clay. The specifications indicate that the clay liner was to be installed with a permeability no more than $1.0x10^{-7}$ cm/s. The engineering properties of the clay liner as compacted are not reasonably and readily available. The physical and engineering properties of the clay liner are not reasonably and readily available.

Site preparation and construction of the historical Pond A (West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E) and Primary East Ash Pond were completed in accordance with the applicable construction specification (see §257.73(c)(1)(xi) below for corresponding construction specifications).

The approximate dates of construction of each successive stage of construction of the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are provided in **Table 3** below.

Table 3. Approximate dates of construction of each successive stage of construction.

Date	Event
Late 1970's	Construction of historical Pond A (which includes West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E exterior perimeter dike)
1993	Construction of West Ash Pond 1 (berm raise and interior dike)
1999	Construction of West Ash Pond 2E
2005	Construction of Primary East Ash Pond
2015	Grouting of former storm sewer force main under the West Ash Pond 2W and West Ash Pond 2E

§ 257.73(c)(1)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Drawings that contain items pertaining to the requested information for the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are listed in **Table 4** below. Items marked as "Not Available" are items not found during a review of the reasonably and readily available record documentation.

Table 4. List of drawings containing items pertaining to the information requested in §257.73(c)(1)(vii).

	West Ash Pond 1	West Ash Pond 2W	West Ash Pond 2E	Primary East Ash Pond
Dimensional plan view (all zones)	CE-WDR1-C2, E-WDR1-C12	CE-WDR1-C2	CE-WDR1-C2, E-WDR1-C143	WDR1-C161, WDR1-C162
Dimensional cross sections	CE-WDR1-C6, CE-WDR1-C34 to C39, CE-WDR1-C41	CE-WDR1-C6	CE-WDR1-C6, E-WDR1-C145-C146	WDR1-C170 to C172
Foundation Improvements	CE-WDR1-C6	CE-WDR1-C6	CE-WDR1-C6, E-WDR1-C146	WDR1-C170 to C172
Drainage Provisions	Not Applicable	Not Applicable	Not Applicable	WDR1-C163, WDR1-C164
Spillways and Outlets	E-WDR1-C31, E-WDR1-C32	Not Applicable	E-WDR1-C108	WDR1-C173, WDR1-C179
Diversion Ditches	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Instrument Locations	Fig. No. 2B	Fig. No. 2B	Not Applicable	Fig. No. 2A
Slope Protection	CE-WDR1-C6	CE-WDR1-C6	CE-WDR1-C6	WDR1-C170 to C172
Normal Operating Pool Elevation	Not Available	Not Available	E-WDR1-C145	Not Available
Maximum Pool Elevation	Not Available	Not Available	Not Available	Not Available
Approximate Maximum Depth of CCR in 2016	35 feet	18 feet	32feet	21 feet

All drawings referenced in Table 4 above can be found in **Appendix B** and **Appendix C**.

Based on the review of the drawings listed above, no natural or manmade features that could adversely affect operation of these CCR units due to malfunction or mis-operation were identified.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Existing instrumentation at the West Ash Pond 1, West Ash Pond 2W, and Primary East Ash Pond consists of fourteen (14) open-standpipe piezometers installed in 2015. The purpose of the piezometers is to measure the pore water pressures within and around the West Ash Pond 1, West Ash Pond 2W, and Primary East Ash Pond. Location maps of the existing instrumentation are presented in **Appendix C**.

The West Ash Pond 2E does not contain existing instrumentation used for monitoring the operation of the CCR unit.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

Area-capacity curves for West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are not reasonably and readily available.

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

West Ash Pond 1 and West Ash Pond 2W do not contain an active spillway or diversion feature. Stormwater collected in West Ash Pond 1 and West Ash Pond 2W is manually pumped to West Ash Pond 2E at the judgement of plant personnel. The West Ash Pond 2E contains a 24-inch-diameter (dia.) high-density polyethylene (HDPE) culvert that discharges stormwater into the Pond 3.

The Primary East Ash Pond drains into a concrete box that contains three 12-inch dia. HDPE pipe inlets. From the concrete box, the water flows through a 30-inch dia. HDPE pipe that discharges into the Secondary East Polishing Pond. In 2016, the discharge capacity of the Primary East Ash Pond was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. The model results indicated that the Primary East Ash Pond had enough storage capacity above the current pool level and will not overtop the embankment during the 1,000-year, 24-hour storm event. The results of the HydroCAD 10 analysis are presented below in **Table 5**.

Table 5. Results of HydroCAD 10 analyses

	Primary East Ash Pond
Approximate Minimum Berm Elevation[1] (ft)	450.0
Approximate Emergency Spillway Elevation[1] (ft)	Not Applicable
Starting Pool Elevation[1] (ft)	445.6
Peak Elevation[1] (ft)	448.2
Time to Peak (hr)	24.0
Surface Area (ac)	19.0
Storage[2] (ac-ft)	28.0

Note: 1. Elevations are based on NAVD88 datum
2. Storage given is from Starting Pool Elevation to Peak Elevation

§ 257.73(c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

As indicated on the construction drawings, the construction specifications for the historical Pond A (West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E) are located in Construction Specification No. J-3648 but that document is not reasonably and readily available. The construction specifications for West Ash Pond 2E are not reasonably and readily available. The construction specifications for the Primary East Ash Pond are located in *Dynegy Wood River East Ash Pond Expansion to El. 453: Specifications* (presented in **Appendix D**).

The provisions for surveillance, maintenance, and repair of the West Ash Pond 1, West Ash Pond 2W, and West Ash Pond 2E are located in *DMG Wood River Power Station West Ash Pond System – Operation and Maintenance Plan* (2013) (presented in **Appendix E**). The provisions for surveillance, maintenance, and repair of the Primary East Ash Pond are located in *DMG Wood River Power Station East Ash Pond System – Operation and Maintenance Plan* (2013) (presented in **Appendix F**).

The operations and maintenance plan for the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond are currently being revised by Dynegy Midwest Generation, LLC.

§ 257.73(c)(1)(xii): Any record or knowledge of structural instability of the CCR unit.

There is no record or knowledge of structural instability of the West Ash Pond 1, West Ash Pond 2W, West Ash Pond 2E, and Primary East Ash Pond at the Wood River Power Station.

LIMITATIONS

The signature of AECOM's authorized representative on this document represents that to the best of AECOM's knowledge, information and belief in the exercise of its professional judgment, it is AECOM's professional opinion that the aforementioned information is accurate as of the date of such signature. Any recommendation, opinion or decisions by AECOM are made on the basis of AECOM's experience, qualifications and professional judgment and are not to be construed as warranties or guaranties. In addition, opinions relating to environmental, geologic, and geotechnical conditions or other estimates are based on available data and that actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Sincerely,

Claudia Prado
Project Manager

Victor Modeer, P.E., D.GE
Senior Project Manager

REFERENCES

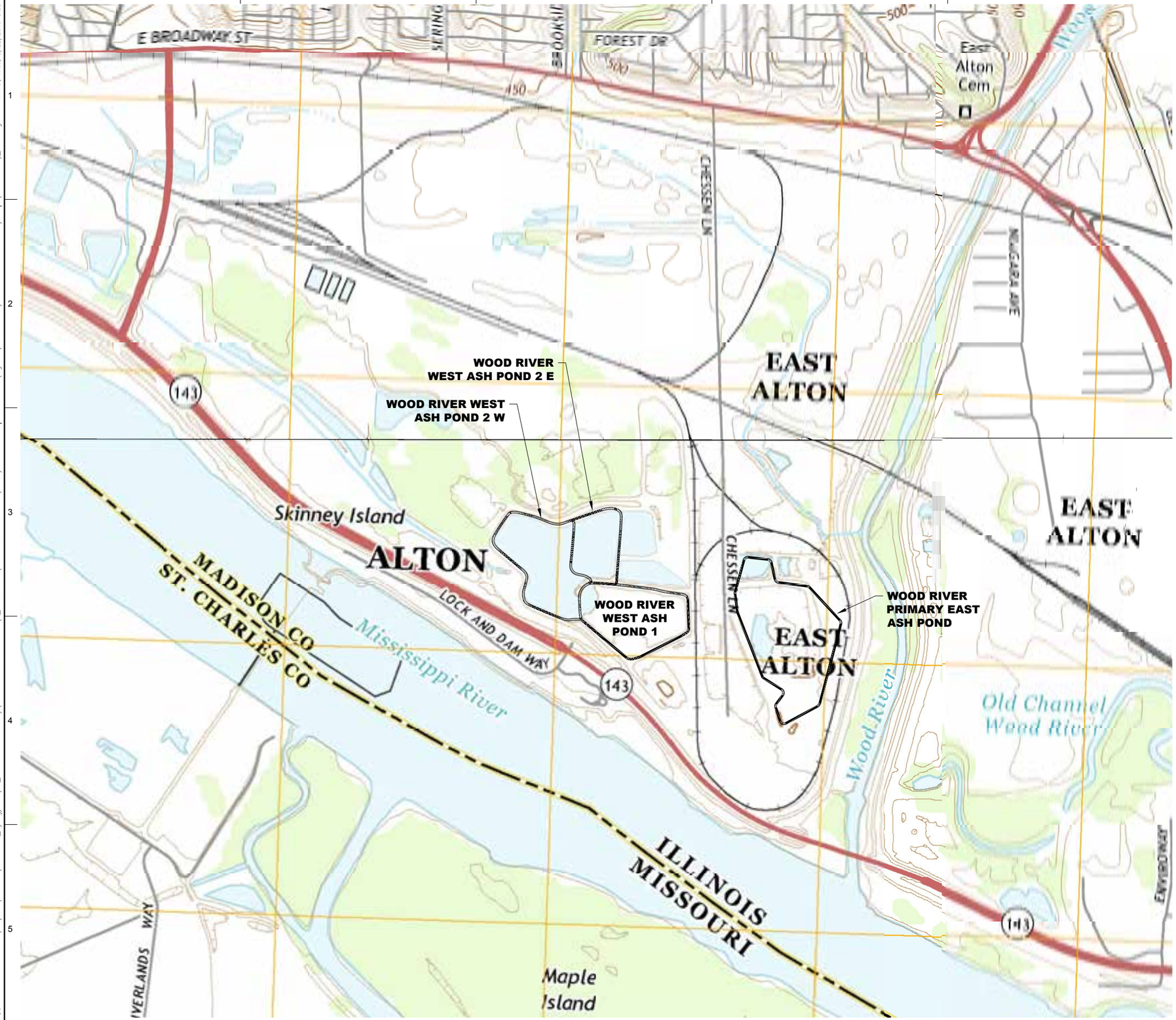
United States Environmental Protection Agency (USEPA). (2015). *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule.* 40 CFR Parts 257 and 261, 80 Fed. Reg. 21302, 21380 April 17, 2015.

United States Geological Survey (USGS). (2016). The National Map Viewer. http://viewer.nationalmap.gov/viewer/. USGS data first accessed in March of 2016.

APPENDICES

Appendix A: History of Construction Vicinity Map
Appendix B: Wood River Power Station Drawings
Appendix C: Wood River Piezometer Locations
Appendix D: Dynegy Wood River East Ash Pond Expansion to El. 453: Specifications, URS (2004) (Excerpt)
Appendix E: DMG Wood River Power Station West Ash Pond System – Operation and Maintenance Plan (2013)
Appendix F: DMG Wood River Power Station East Ash Pond System – Operation and Maintenance Plan (2013)

Appendix A: History of Construction Vicinity Map



LEGEND

CCR UNITS

SOURCE:
MAP PROVIDED FROM ELECTRONIC USGS DIGITAL RASTER GRAPHIC 7.5 MINUTE TOPOGRAPHIC MAP OF ALTON ILLINOIS, BETHALTO ILLINOIS, COLUMBIA BOTTOMS ILLINOIS AND WOOD RIVER ILLINOIS, REVISED 2015.

QUADRANGLE LOCATION

N

0 600 1200 1800
SCALE IN FEET

AECOM
1001 Highlands Plaza Drive, Suite 300
St. Louis, Mo. 63110
314 429-0100 (phone)
314-429-0462 (fax)

Dynegy Midwest Generation, LLC
#1 Chessen Lane
Alton, IL 62002

HISTORY OF CONSTRUCTION

WOOD RIVER POWER STATION
ALTON, ILLINOIS

ISSUED FOR BIDDING — DATE BY

ISSUED FOR CONSTRUCTION — DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
△		
△		
△		
△		
△		

AECOM PROJECT NO:	60489731
DRAWN BY:	DJD
DESIGNED BY:	DJD
CHECKED BY:	MN
DATE CREATED:	2016-04-13
PLOT DATE:	
SCALE:	1" = 600'
ACAD VER:	2014

SHEET TITLE

HISTORY OF CONSTRUCTION VICINITY MAP

01

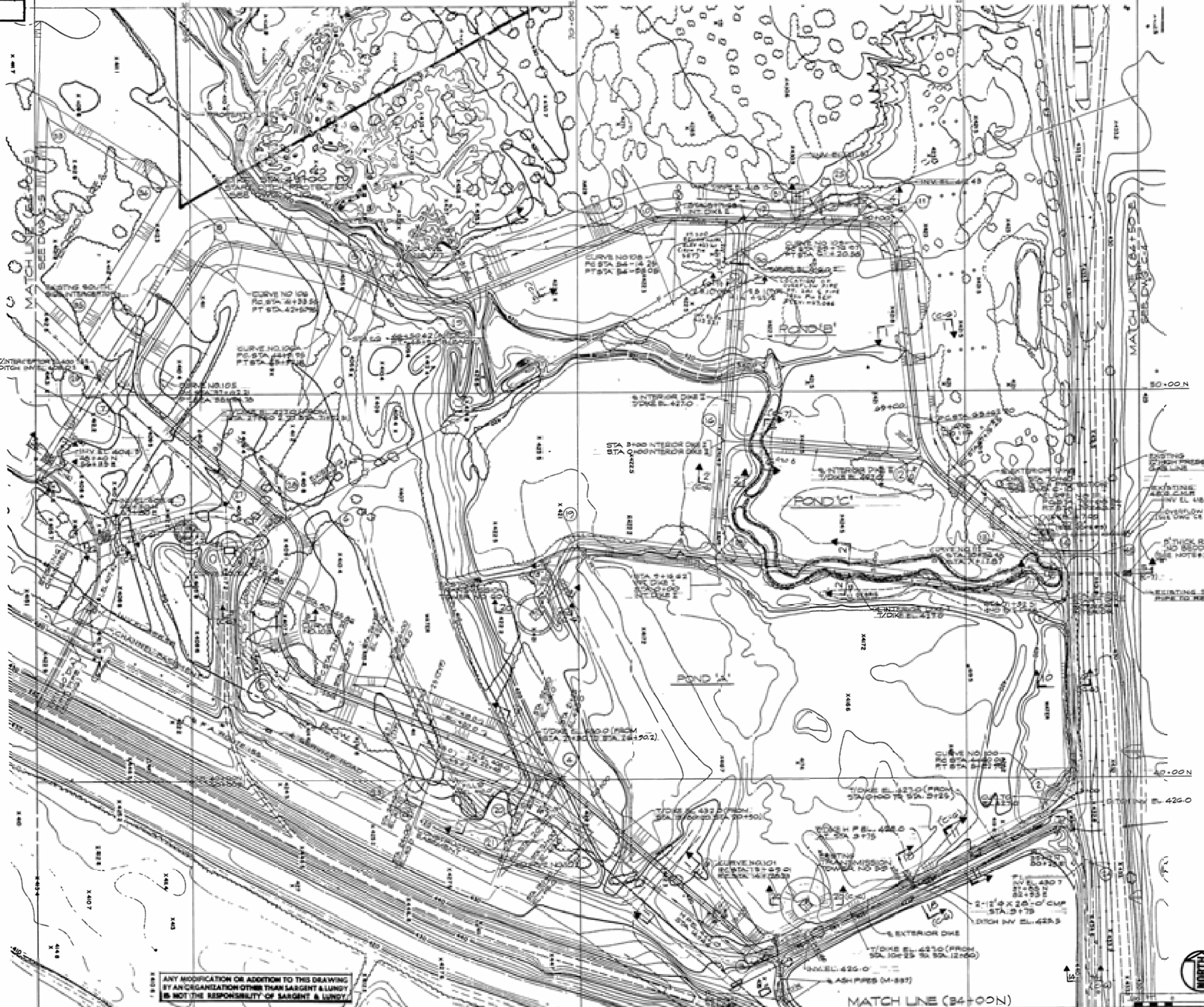
AECOM DRAWING PATH: P:\Projects\Geotech\60428794_DynegyCCR\13_Construction History\04 Technical Production\3_Wood River\Reference Documents\Vicinity Location Map References\Figures\C-01 History of Construction Vicinity Map (Wood River)_MAIN.dwg NANAK, MATT, 8/22/2016 3:53 PM

Appendix B: Wood River Power Station Drawings

1. “Ash Pond Plan, Sheet 1”, Drawing No. CE-WDR1-C-2, Revision I, 3 March, 1992, Sargent & Lundy Engineers.
2. “Ash Pond Dike Sections”, Drawing No. CE-WDR1-C-6, Revision E, 30 April, 1986, Sargent & Lundy Engineers.
3. “Site Plan – Dike Extension, Ash Pond Area”, Drawing No. E-WDR1-C12, Revision 3, 13 July, 1993, Illinois Power Company.
4. “Plan and Profile – Outlet Structure, For Berm Raising to Elevation 445”, Drawing No. E-WDR1-C31, 10 October, 1997, Illinois Power Company.
5. “Details – Outlet Structure, For Berm Raising to Elevation 445”, Drawing No. E-WDR1-C32, 10 October, 1997, Illinois Power Company.
6. “Cross Sections – Dike Extensions, Sections 0+64.5, 5+65.24, 7+00, & 9+10”, Drawing No. E-WDR1-C34, Revision 1, 25 May, 1993, Illinois Power Company.
7. “Cross Sections – Dike Extensions, Sections 15+85, 16+45.62, & 18+40”, Drawing No. E-WDR1-C35, Revision 1, 25 May, 1993, Illinois Power Company.
8. “Cross Sections – Dike Extensions, Sections 19+10, 20+05, & 23+35”, Drawing No. E-WDR1-C36, Revision 1, 25 May, 1993, Illinois Power Company.
9. “Cross Sections – Dike Extensions, Sections 24+03, 24+65, & 29+05”, Drawing No. E-WDR1-C37, Revision 1, 25 May, 1993, Illinois Power Company.
10. “Cross Sections – Dike Extensions, Sections 30+10, 32+30, & 33+80”, Drawing No. E-WDR1-C38, Revision 1, 25 May, 1993, Illinois Power Company.
11. “Cross Sections – Dike Extensions, Section 35+80”, Drawing No. E-WDR1-C39, Revision 1, 25 May, 1993, Illinois Power Company.
12. “Typical Cross Sections of Berm Raising to Elevation 445 Stage #2”, Drawing No. E-WDR1-C41, 24 May, 1993, Illinois Power Company.
13. “Piping Details, New Ash Surface Impoundment”, Drawing No. E-WDR1-C108, Revision 1, 17 November, 1997, Illinois Power Company.
14. “Ash Removal, Baseline, Survey Layout, Proposed Pond #2”, Drawing No. E-WDR1-C143, Revision 1, 12 January, 1999, Illinois Power Company.
15. “Typical Cross Sections, Proposed Pond #2”, Drawing No. E-WDR1-C145, Revision 1, 12 January, 1999, Illinois Power Company.
16. “Miscellaneous Membrane and Piping, Proposed Pond #2”, Drawing No. E-WDR1-C146, Revision 1, 12 January, 1999, Illinois Power Company.
17. “Overall Site Plan, Boring Locations and Survey Control Points, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C161, Revision 2, 27 October, 2006, URS.
18. “Site Clearing and Laydown Area, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C162, Revision 2, 27 October, 2006, URS.
19. “Hydraulic Structures and Piping Layout, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C163, Revision 2, 27 October, 2006, URS.
20. “Hydraulic Structures, Piping Plan/Profile, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C164, Revision 2, 27 October, 2006, URS.

Appendix B: Wood River Power Station Drawings (continued)

21. “Typical Sections No. 1 and No. 2, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C170, Revision 2, 27 October, 2006, URS.
22. “Typical Sections No. 3 and No. 4, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C171, Revision 2, 27 October, 2006, URS.
23. “Typical Sections No. 5 and No. 6, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C172, Revision 2, 27 October, 2006, URS.
24. “Details – Outlet Hydraulic Structure for Primary Ash Pond, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C173, Revision 2, 27 October, 2006, URS.
25. “Details - Miscellaneous, East Ash Pond Expansion to Elevation 453”, Drawing No. WDR1-C179, Revision 3, 27 October, 2006, URS.



POINT NO	COORDINATES		POINT NO	COORDINATES	
1	44+62.09N	82+58.10E			
2	56+42 N	82+78 E			
3	35+35.2 N	74+73 E			
4	40+00 N	65+48 E			
5	43+20 N	61+55 E			
6	46+16 N	69+17 E			
7	50+25 N	58+50 E			
8	54+04.50N	60+65.15E			
9	53+16 N	66+16 E			
10	54+60 N	72+10 E			
11	54+88 N	78+20 E			
12	46+27 N	78+85 E			
13	45+75 N	81+86 E			
14	48+75 N	82+86 E			
15	43+24.47N	64+12.38E			
16	48+74.42N	73+77.39E			
17	34+45.87N	74+25.51E			
18	45+75.5 N	73+45.68E			
19	46+21.78N	69+88.46E			
20	35+30 N	68+40 E			
21	35+36 N	68+11 E			
22	35+89 N	65+50 E			
23	40+10 N	65+70 E			
24	37+80 N	65+15 E			
25	54+80 N	72+78 E			
26	50+40 N	57+68 E			
27	47+20 N	60+98 E			
28	44+75 N	62+48 E			
30	53+54 N	74+27 E			
31	54+40 N	75+75 E			
32	54+68 N	84+28 E			
33	57+20 N	84+30 E			
34	58+86 N	80+84 E			
35	51+76 N	87+16 E			
45	46+78 N	88+55 E			

ASH POND CURVE DATA

CURVE NUMBER	CURVE DATA	CURVE NUMBER	CURVE DATA
100	Δ = 42°25'10" D = 45°50'24" R = 125.0' T = 50.40' L = 142.50'	108	Δ = 27°8'50" D = 28°38'52" R = 200.0' T = 43.00' L = 85.80'
101	Δ = 47°9'12" D = 14°20'40" R = 80.0' T = 35.69' L = 56.32'	109	Δ = 82°9'53" D = 57°17'45" R = 100.0' T = 87.56' L = 45.4'
102	Δ = 57°7'54" D = 5°43'50" R = 300.0' T = 81.01' L = 101.09'	110	Δ = 45°30'8" D = 28°38'52" R = 200.0' T = 80.80' L = 159.09'
103	Δ = 84°47'39" D = 57°44'36" R = 175.0' T = 87.10' L = 248.23'	111	Δ = 40°1'20" D = 10°38'50" R = 80.0' T = 15.3' L = 54.55'
104	Δ = 32°40'37" D = 45°50'31" R = 125.0' T = 102.49' L = 71.28'	112	Δ = 87°29'3" D = 143°14'22" R = 40.0' T = 38.27' L = 61.25'
105	Δ = 6°4'12" D = 57°17'45" R = 100.0' T = 84.45' L = 142.9'	106-A	Δ = 17°8'3" D = 37°4'45" R = 275.0' T = 50.47' L = 100.23'
106	Δ = 3°08'28" D = 57°17'45" R = 100.0' T = 7.45' L = 134.40'		
107	Δ = 45°32'9" D = 22°55'5" R = 250.0' T = 104.87' L = 87.62'		

NOTES

1. FOR GENERAL NOTES SEE DWG C-1
2. ALL WORK SHOWN ON THIS DRAWING SHALL BE DONE BY THE ASH STORAGE POND CONTRACTOR IN ACCORDANCE WITH PROJECT SPECIFICATION J-3448 UNLESS OTHERWISE NOTED
3. BM #1 EL 407.42 - ON THE N.E. CORNER OF HEADWALL TWIN 60" UNDER LEVEE
4. BM # 2 EL 410.20 - ON TOP OF CONCRETE MONUMENT CENTER OF SECT 15
5. PROVIDE 12" THICK RIPRAP ON 6" BEDDING, SEE DWG. C-10 SECTION 'B' FOR DETAILS.

REFERENCE DRAWINGS

C-1	ASH POND DEVELOPMENT PLAN
C-3	ASH POND PLAN SHEET 2
C-4	ASH POND PLAN SHEET 3
C-5	ASH POND PLAN SHEET 4
C-6	ASH POND DIKE SECTIONS
C-7	ASH POND DISCHARGE STRUCTURES SECTIONS & DETAILS
M-337	OUTDOOR ASH PIPING PLANS & SECTIONS UNITS 1-5
C-10	ASH POND SECTIONS & DETAILS

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
G	4-30-86				SENT TO CLIENT (BY [illegible])	X
H	1-8-87	L Fisher		M T Justice	ADDED OVERFLOW WEIR N 46+28, E 84+15	
I	3-3-92	W J M			ADDED OVERFLOW PIPE.	

DRAWING RELEASE RECORD

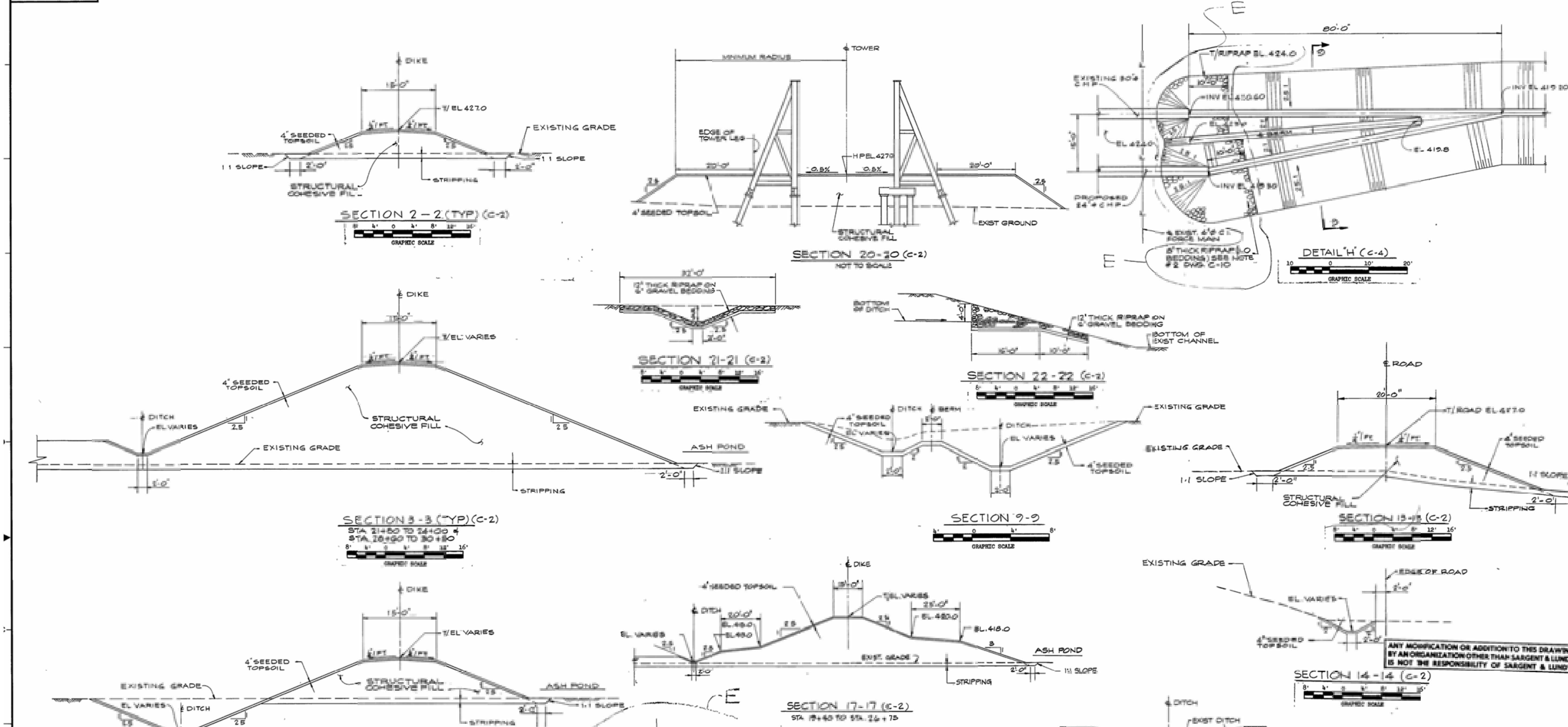
REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	12-21-77	[illegible]			FOR BIDS, SPEC NO. J-3448	X
B	1-10-78	J. Cuyano			FOR BID ADDENDUM # 2	X
C	3-30-78	J. Cuyano			100% REVISED DIKEWORK	X
C	5-11-78	J. Cuyano	R F Pahal	[illegible]	FOR CONSTRUCTION, SPEC NO. J-3448	X
D	9-10-78	J. Cuyano	R F Pahal	[illegible]	REVISED DIKEWORK	X
E	11-03-78	[illegible]	R F Pahal	[illegible]	ADDED BERM FROM STA. 13+60 TO STA. 24+75	X
F	6-14-79	[illegible]	R F Pahal	[illegible]	REVISED CULVERT LOCATION & ADDED RIPRAP AT END OF PIPE	X
G	8-14-79	[illegible]	R F Pahal	[illegible]	REVISED DITCH PROTECTION GRADATION	X

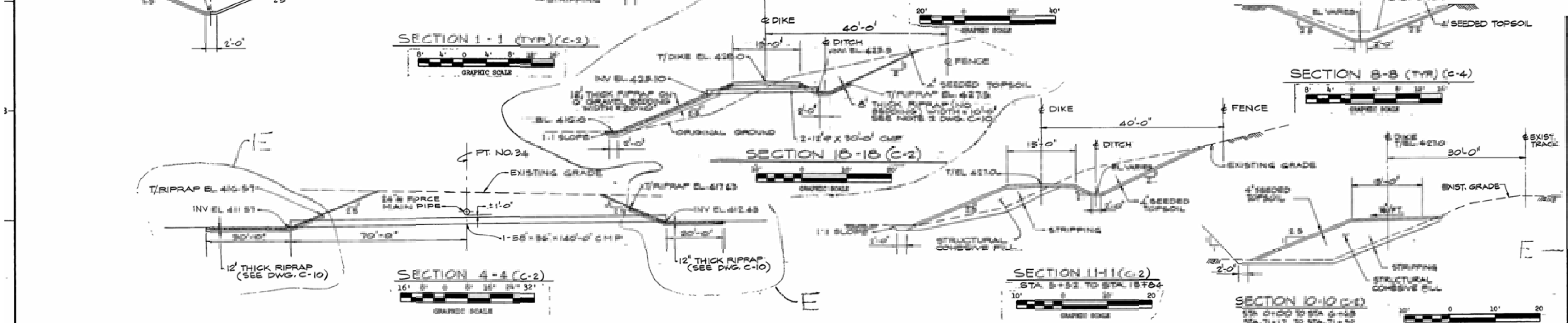
SCALE: 1" = 100'-0"
PROJECT NUMBER: 5505-00

ASH POND PLAN
SHEET 1
WOOD RIVER POWER STATION UNITS 4 & 5
ILLINOIS POWER COMPANY
WOOD RIVER, ILLINOIS

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO: CE-WDR1-C-2
REV: H
SHEET OF





NOTES

1. FOR GENERAL NOTES SEE DWG C-1
2. ALL WORK SHOWN ON THIS DRAWING SHALL BE DONE BY THE ASH STORAGE POND CONTRACTOR IN ACCORDANCE WITH PROJECT SPECIFICATION J-3648 UNLESS OTHERWISE NOTED.

REFERENCE DRAWINGS

C-1	ASH POND DEVELOPMENT PLAN
C-2	ASH POND PLAN SHEET 1
C-4	ASH POND PLAN SHEET 3
C-10	ASH POND SECTIONS & DETAILS

DRAWING RELEASE RECORD

REV	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM

DRAWING RELEASE RECORD

REV	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	12-2-77	[illegible]			FOR BIDS, SPEC NO. J-3648	X
B	1-16-78	[illegible]			FOR BID ADDENDUM # 1	X
C	3-30-78	[illegible]			REVISED DIKEWORK	X
G	9-11-78	[illegible]	[illegible]	[illegible]	FOR CONSTRUCTION, SPEC NO. J-3648	X
D	11-03-78	[illegible]	[illegible]	[illegible]	ADDED SECTION	X
E	6-14-79	[illegible]	[illegible]	[illegible]	ADDED SECTION AND RIPRAP	X
E	4-3-80				SENT TO CLIENT [illegible]	

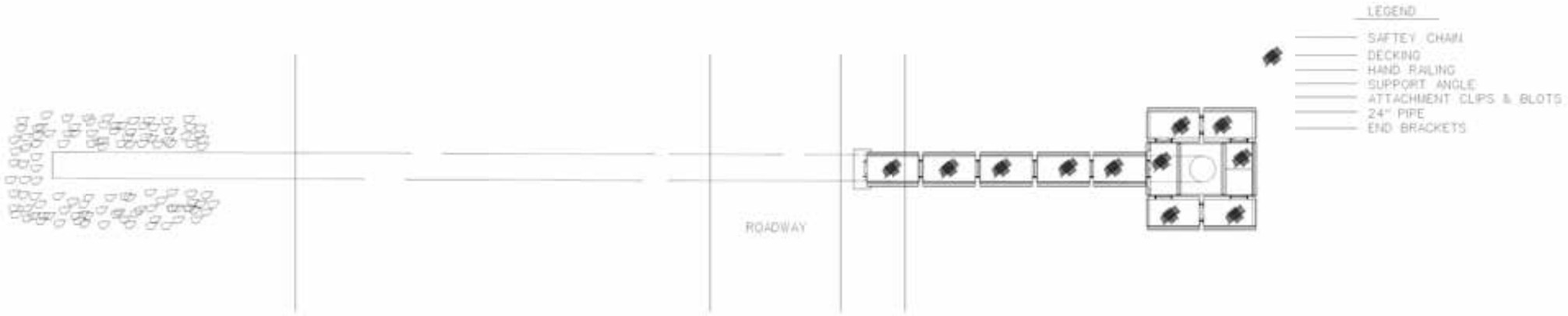
SCALE: AS NOTED
PROJECT NUMBER: [illegible]

ASH POND
DIKE SECTIONS
WOOD RIVER POWER STATION UNITS 4 & 5
ILLINOIS POWER COMPANY
WOOD RIVER, ILLINOIS

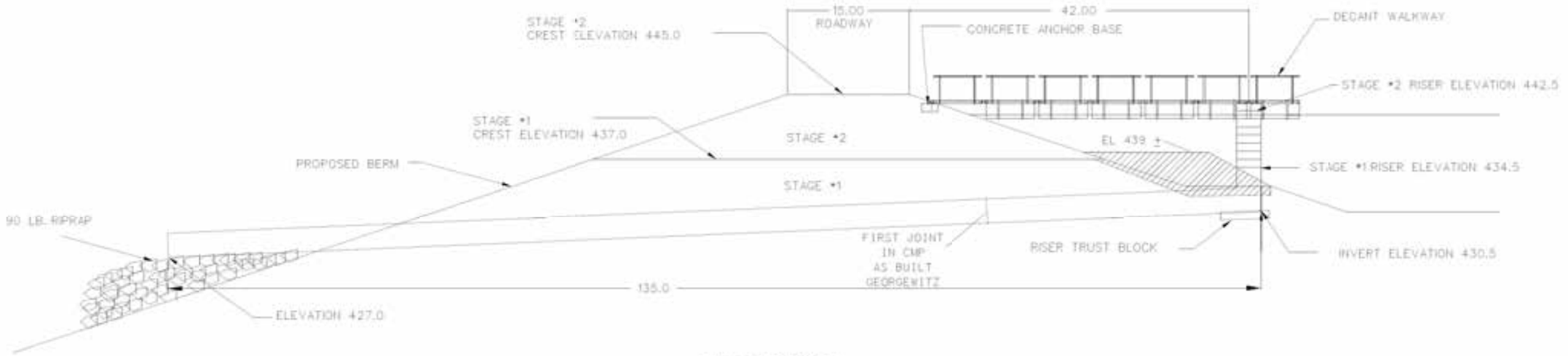
SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO: CE-WDR1-C-6
REV: E
SHEET OF

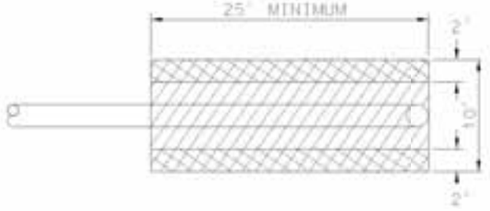

N
ILLINOIS POWER COMPANY
SITE PLAN - DIKE EXTENSION
ASH POND AREA
WOOD RIVER POWER STATION
E-WDR1-C12

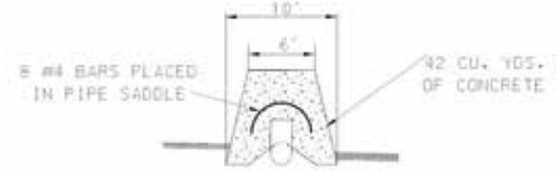


OUTLET PIPE PLAN



OUTLET PIPE PROFILE



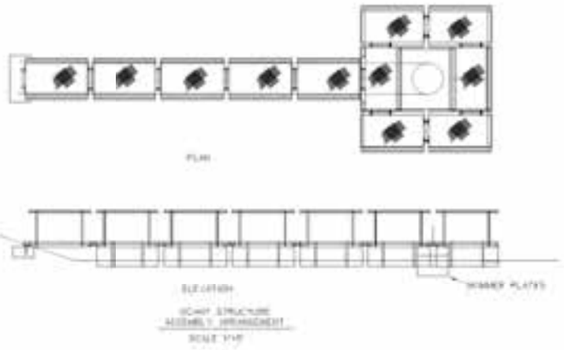


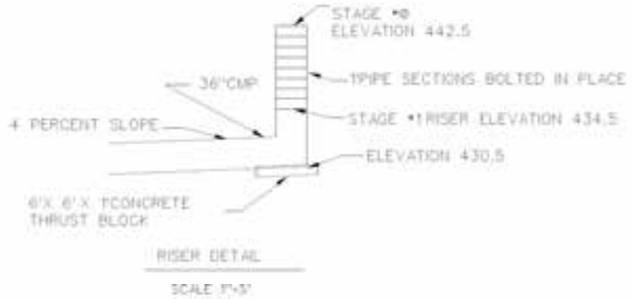
END VIEW AT ELBOW

ILLINOIS POWER COMPANY

PLAN AND PROFILE -OUTLET STRUCTURE
FOR BERM RAISING TO ELEVATION 445
WOODRIVER POWER STATION

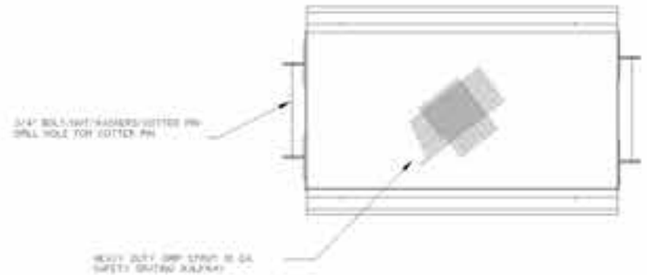
E-WDR1-C31

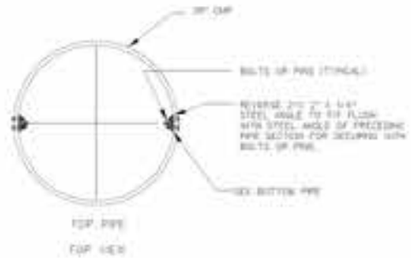




RISER DETAIL

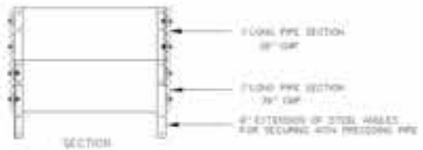
SCALE 1"=3'



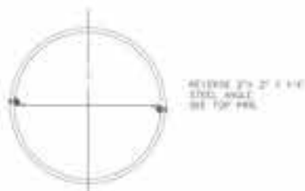


TOP PIPE

TOP VIEW



SECTION

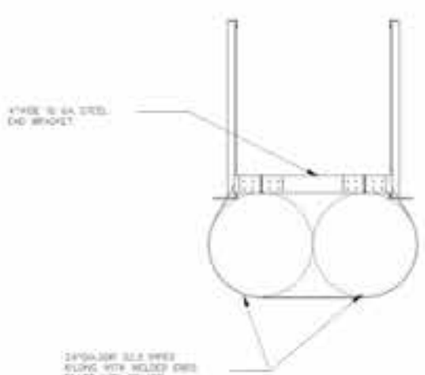


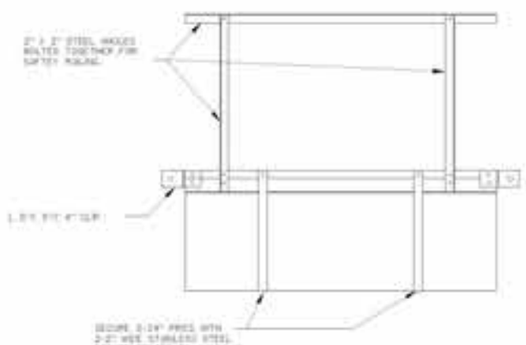
BOTTOM PIPE

TOP VIEW

STACKABLE PIPE SECTIONS DETAIL

SCALE 1"=1'



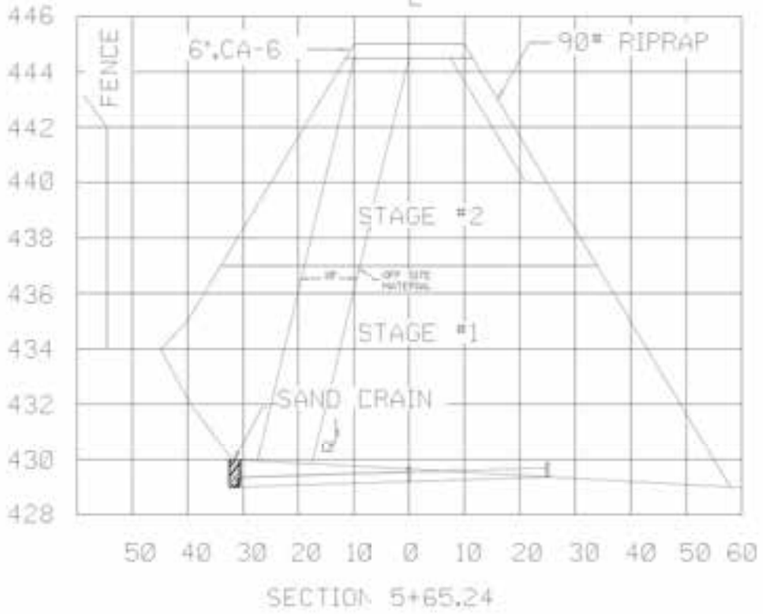


NOTE
ALL STEEL SHALL BE HOT DIPPED GALVANIZED
BEFORE FABRICATION.

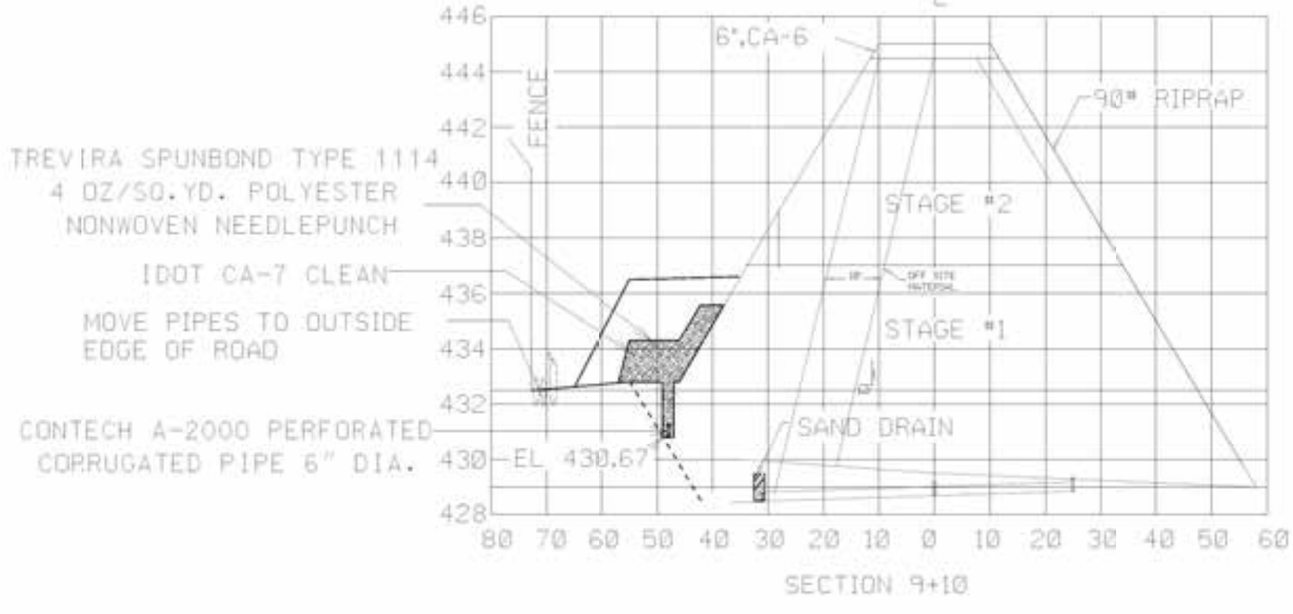
ILLINOIS POWER COMPANY

DETAILS OUTLET STRUCTURE
FOR WEIR RISING TO ELEVATION 442
HUDSON POWER STATION

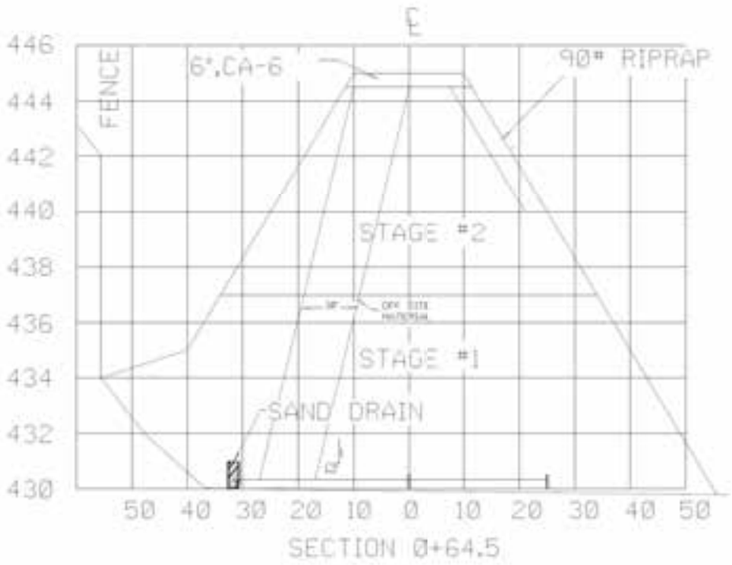
E-WDR1-C32



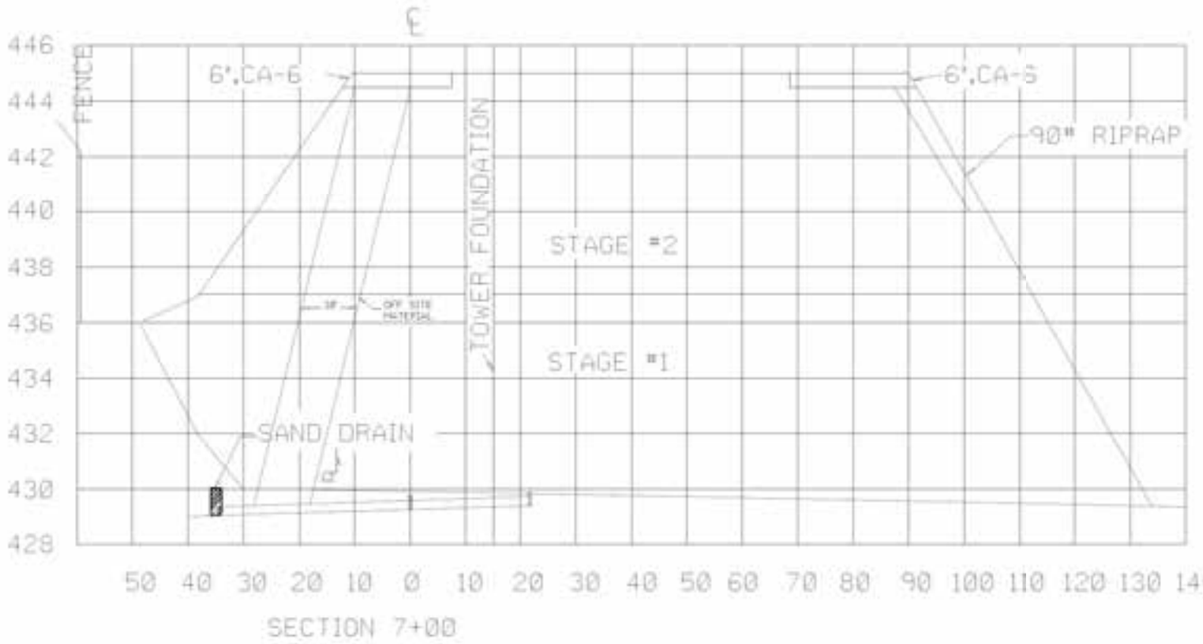
SECTION 5+65.24



SECTION 9+10



SECTION 0+64.5

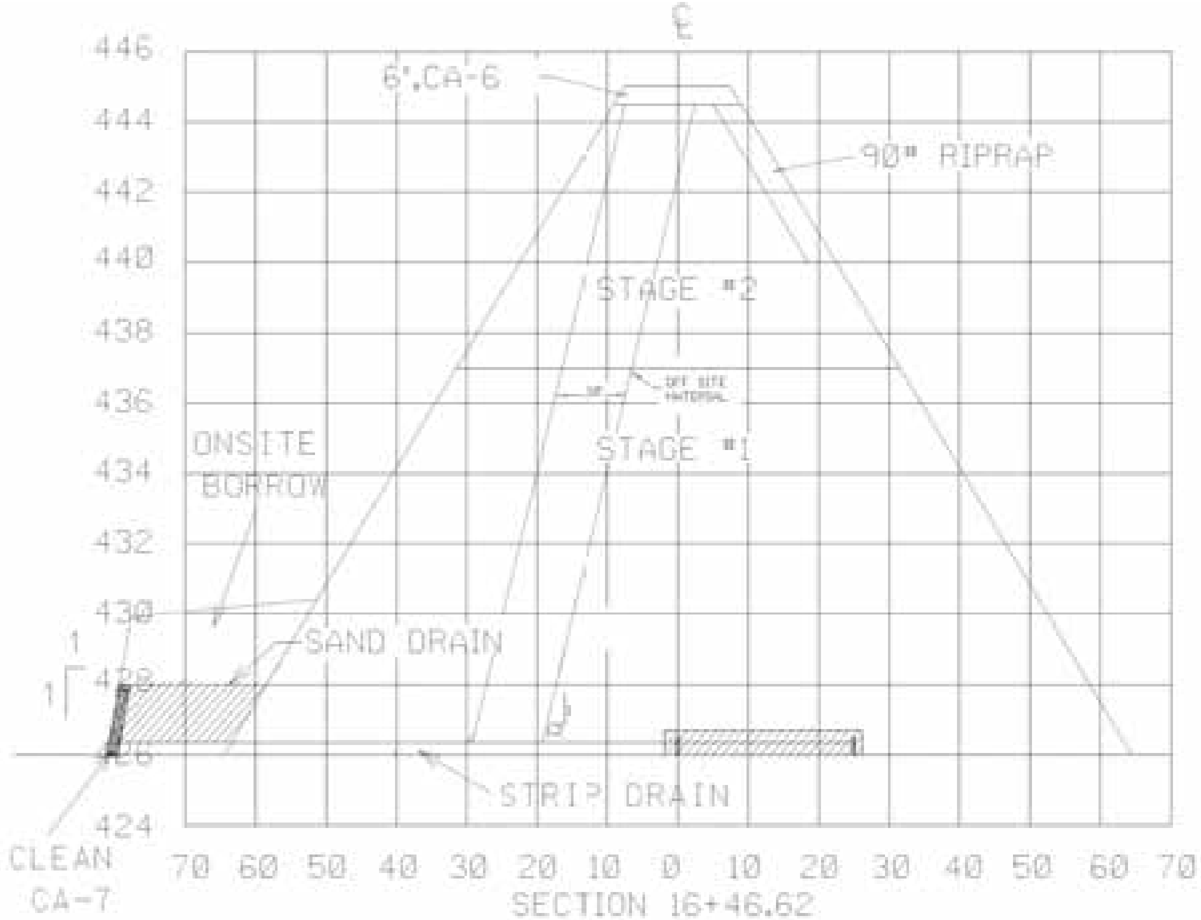


SECTION 7+00

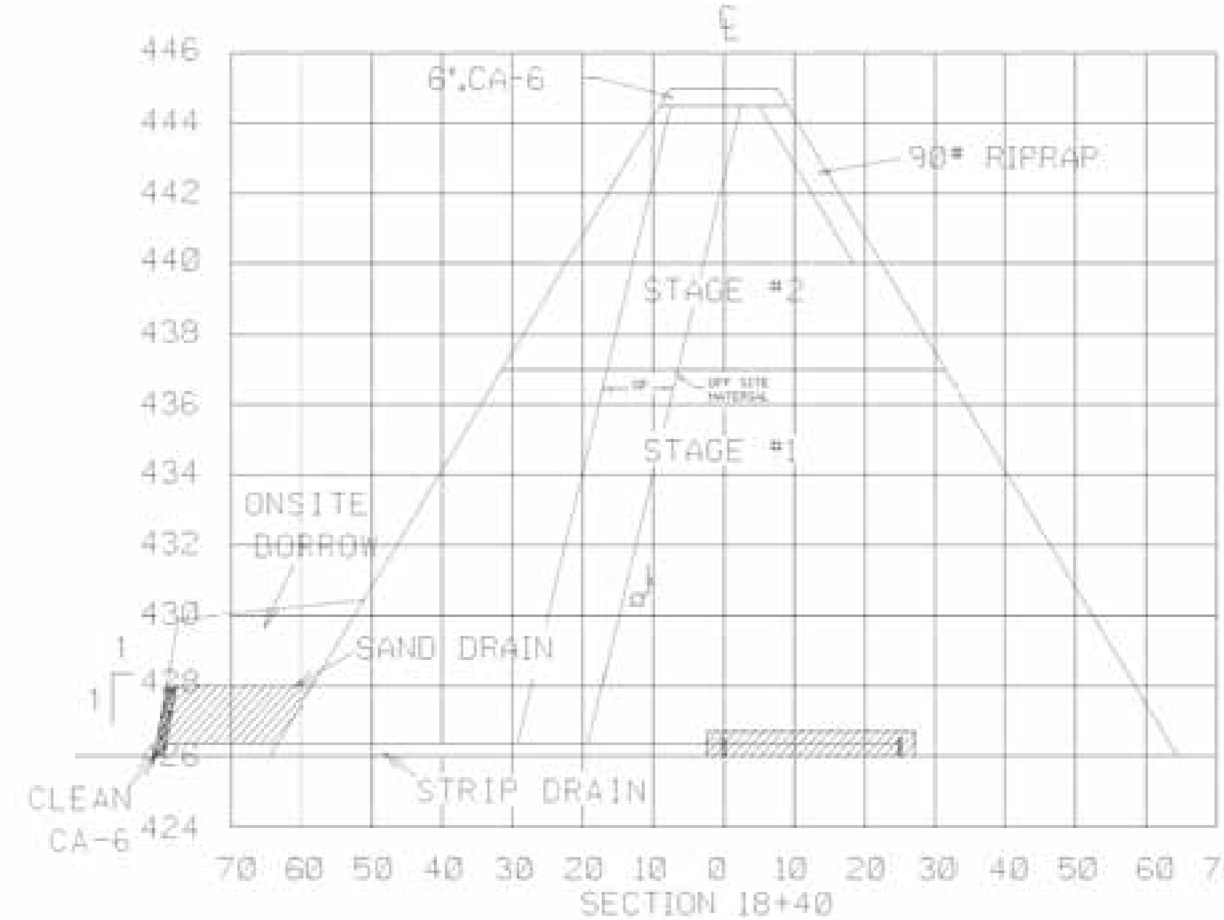
ILLINOIS POWER COMPANY

CROSS SECTIONS-DIKE EXTENSIONS
SECTIONS 0+64.5, 5+65.24, 7+00 & 9+10
WOODRIVER POWER STATION

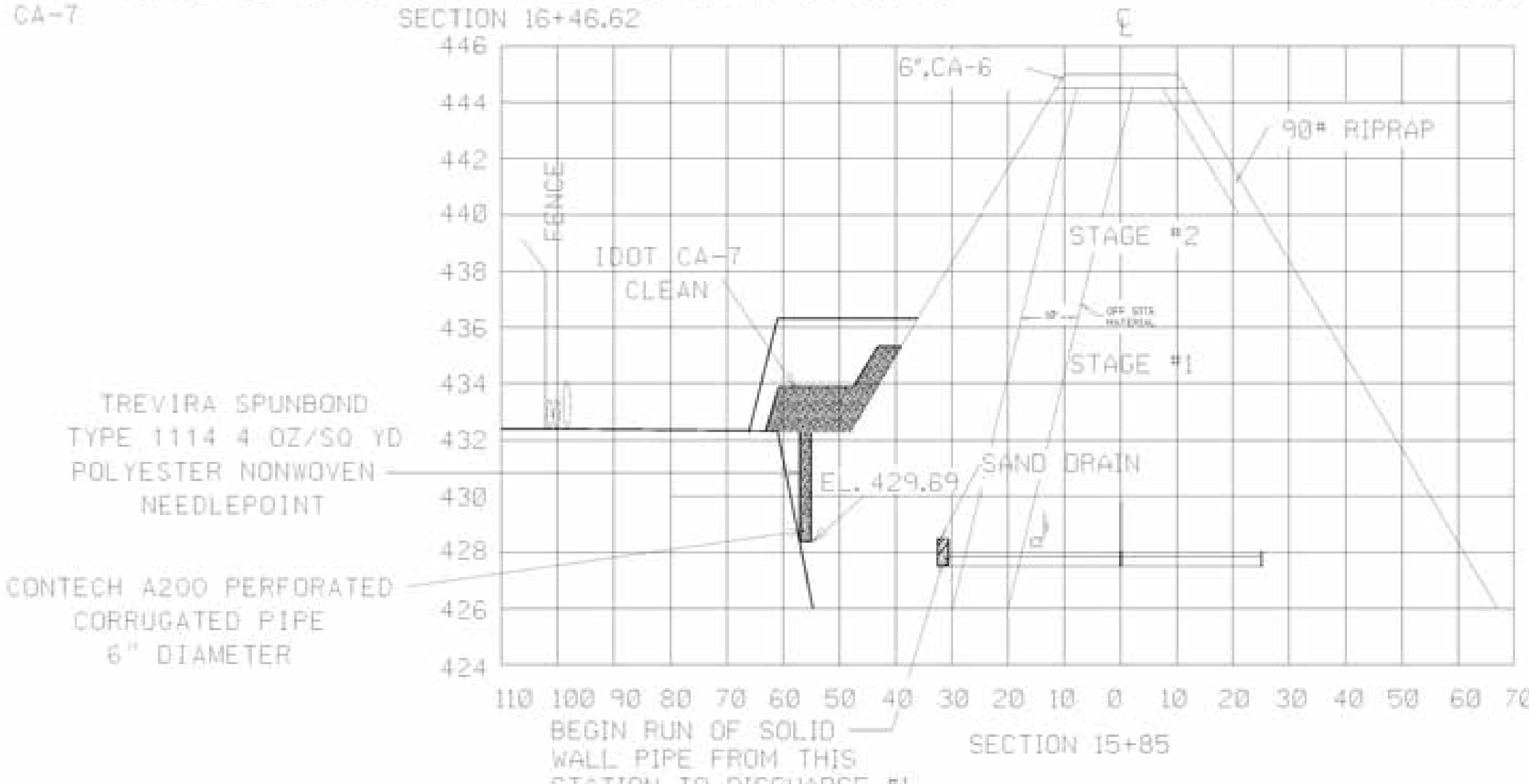
E-WDR1-C34



SECTION 16+46.62



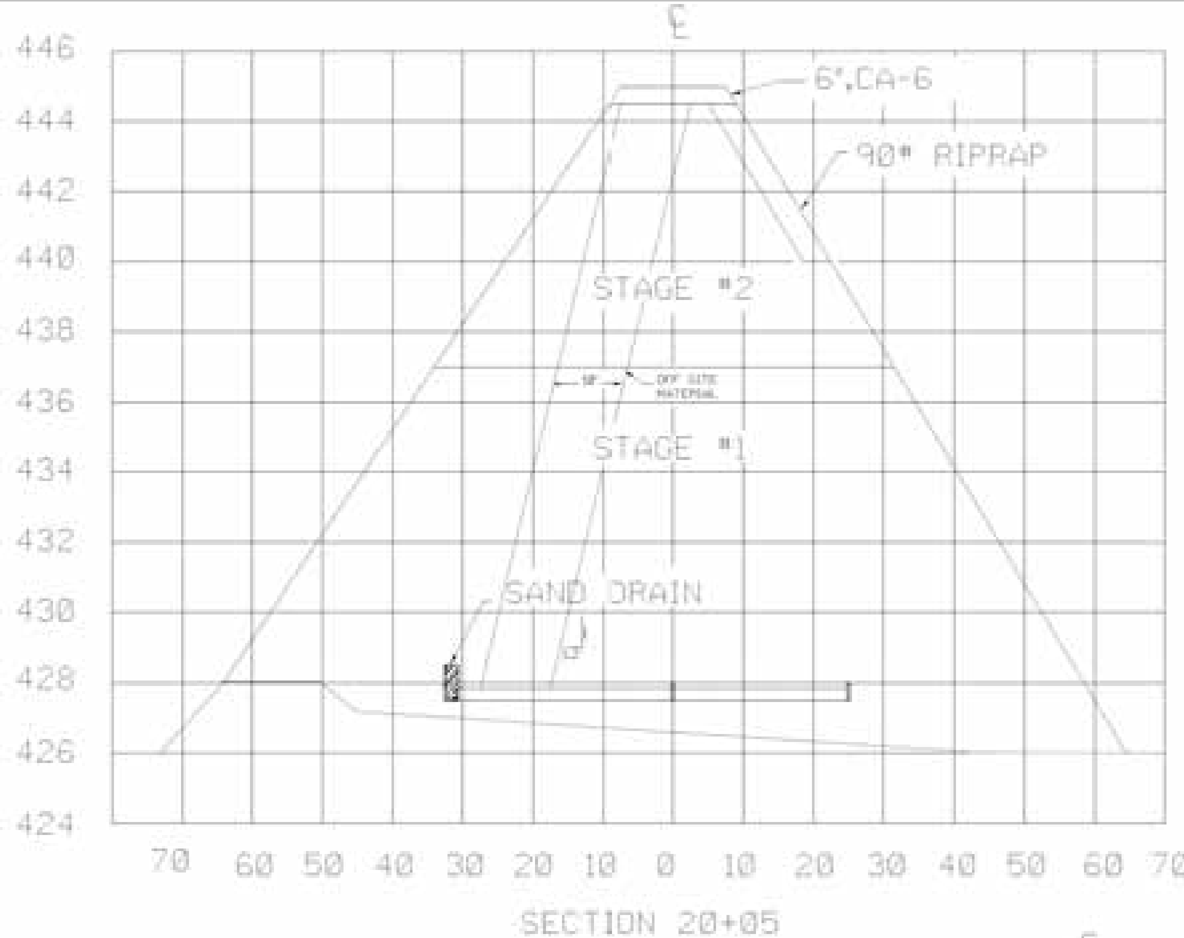
SECTION 18+40

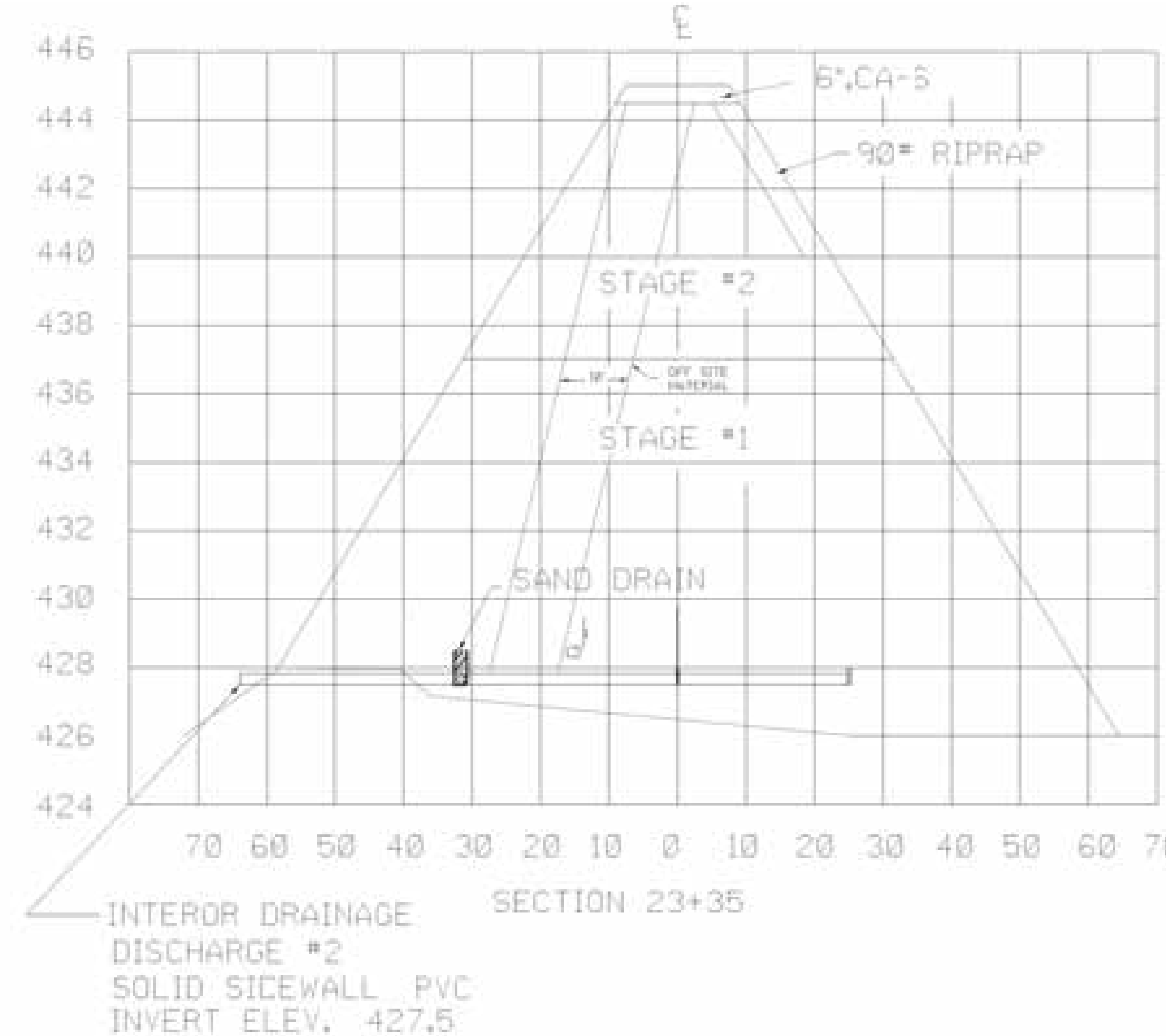


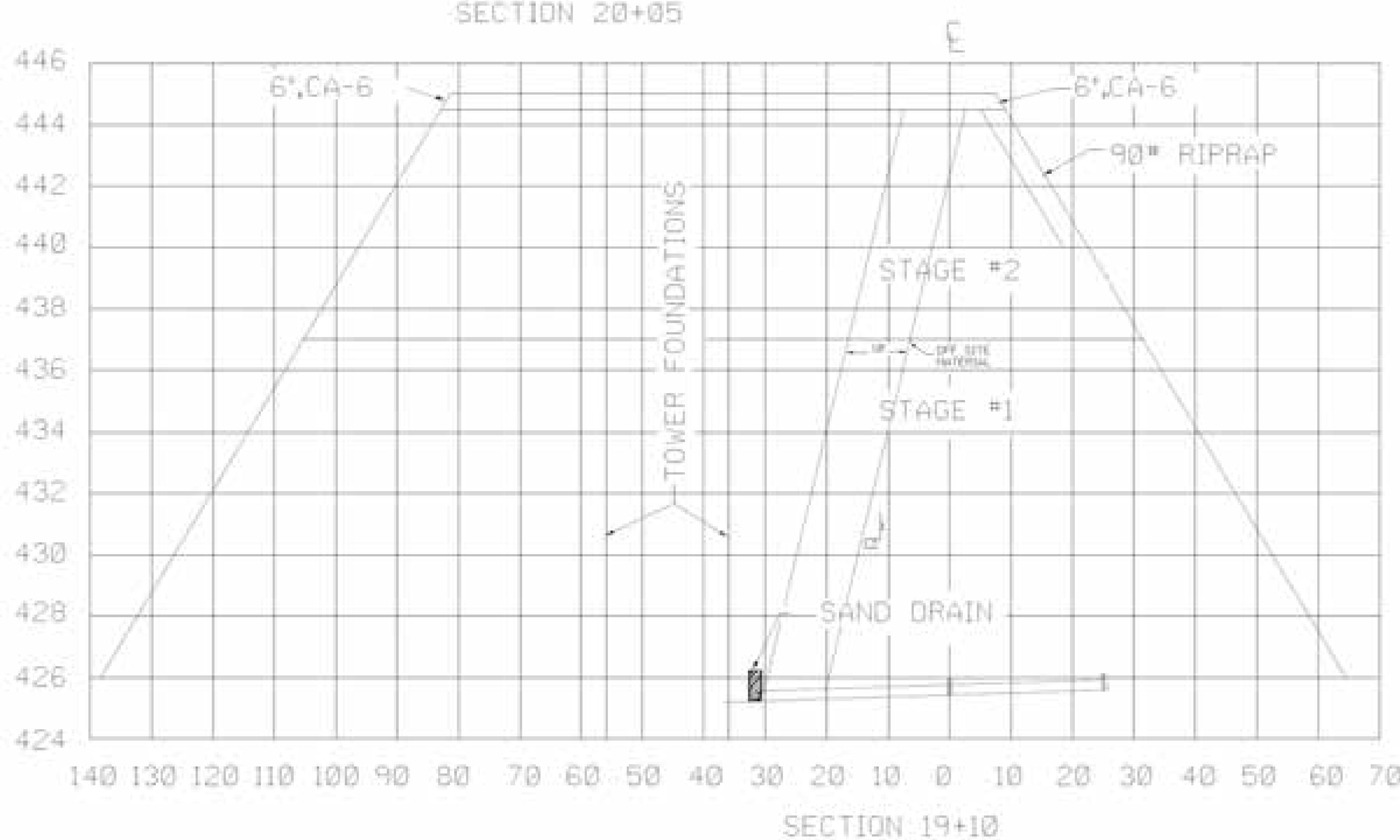
SECTION 15+85

ILLINOIS POWER COMPANY

E-WDR1-C35



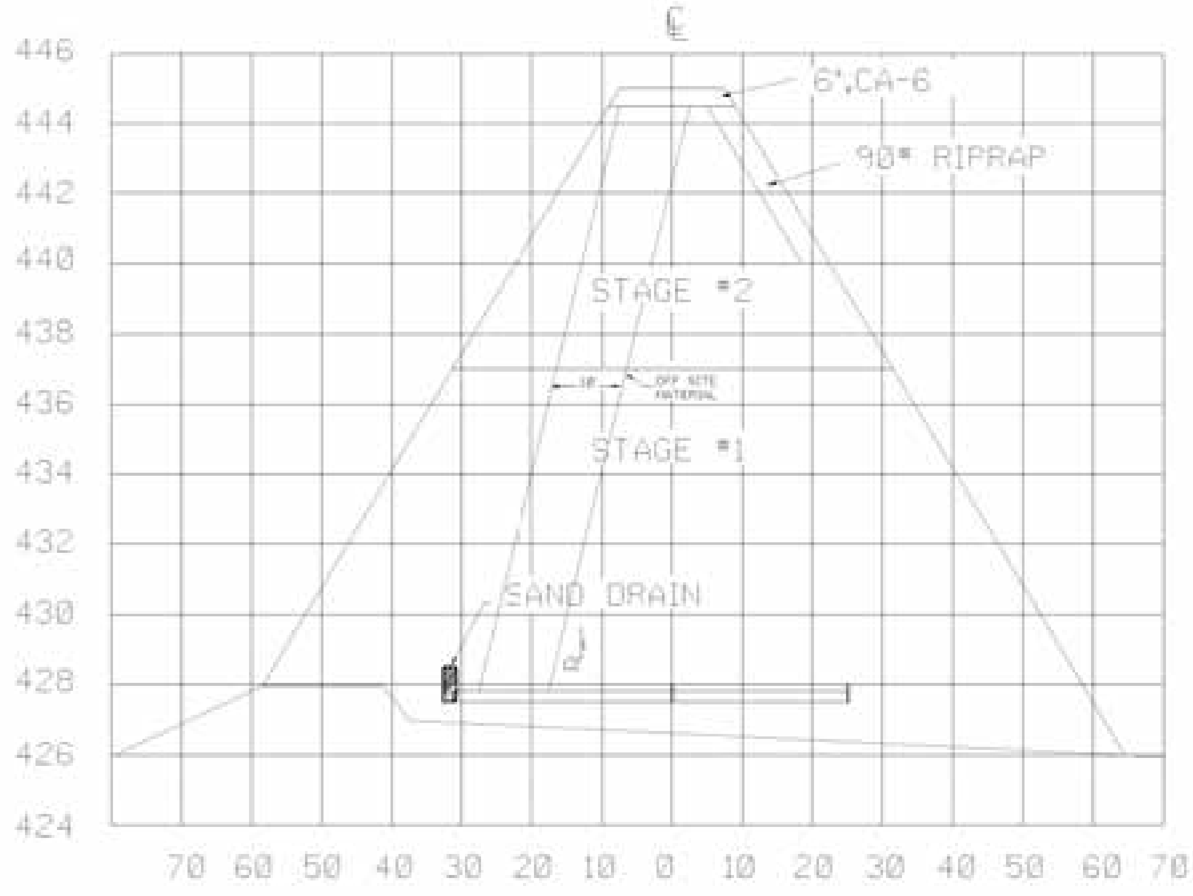




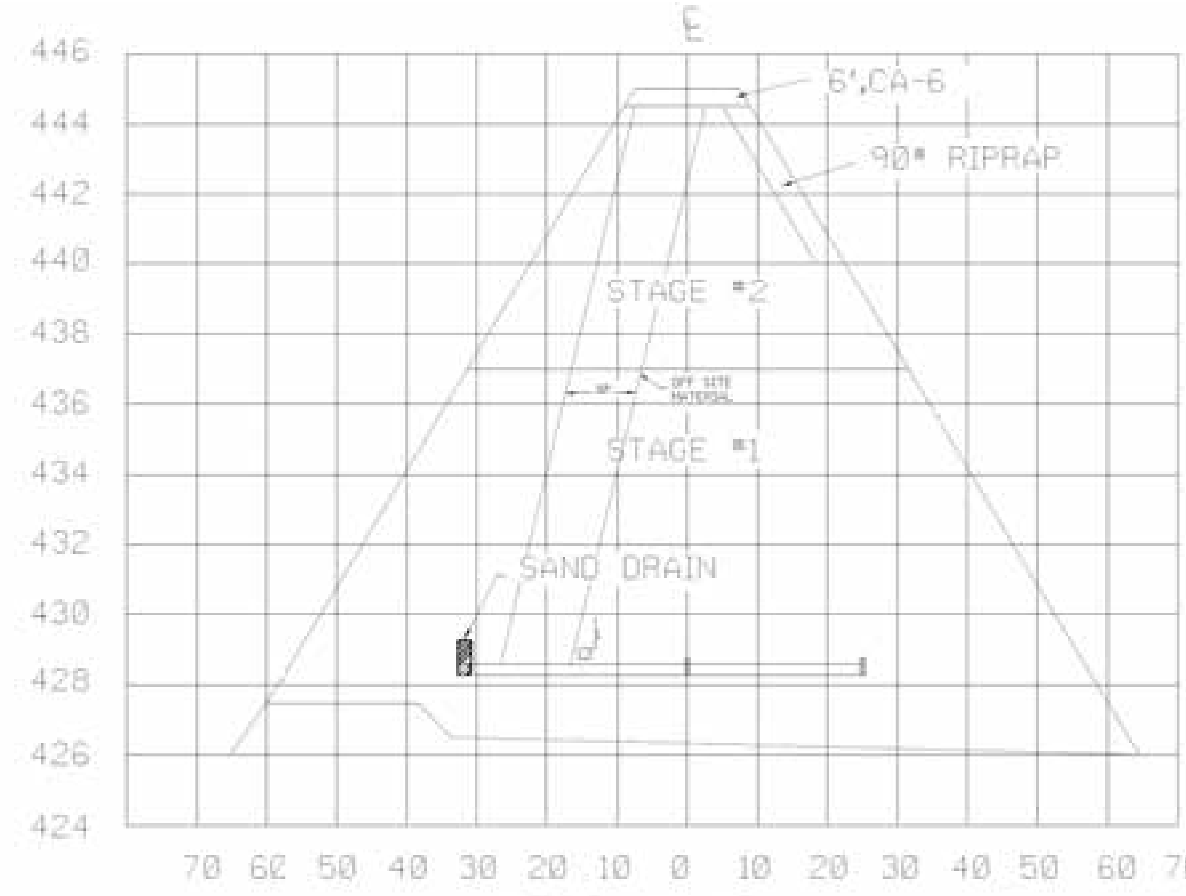
ILLINOIS POWER COMPANY

CROSS SECTIONS-DIKE EXTENSIONS
SECTIONS 19+10, 20+05 & 23+35
WOODRIVER POWER STATION

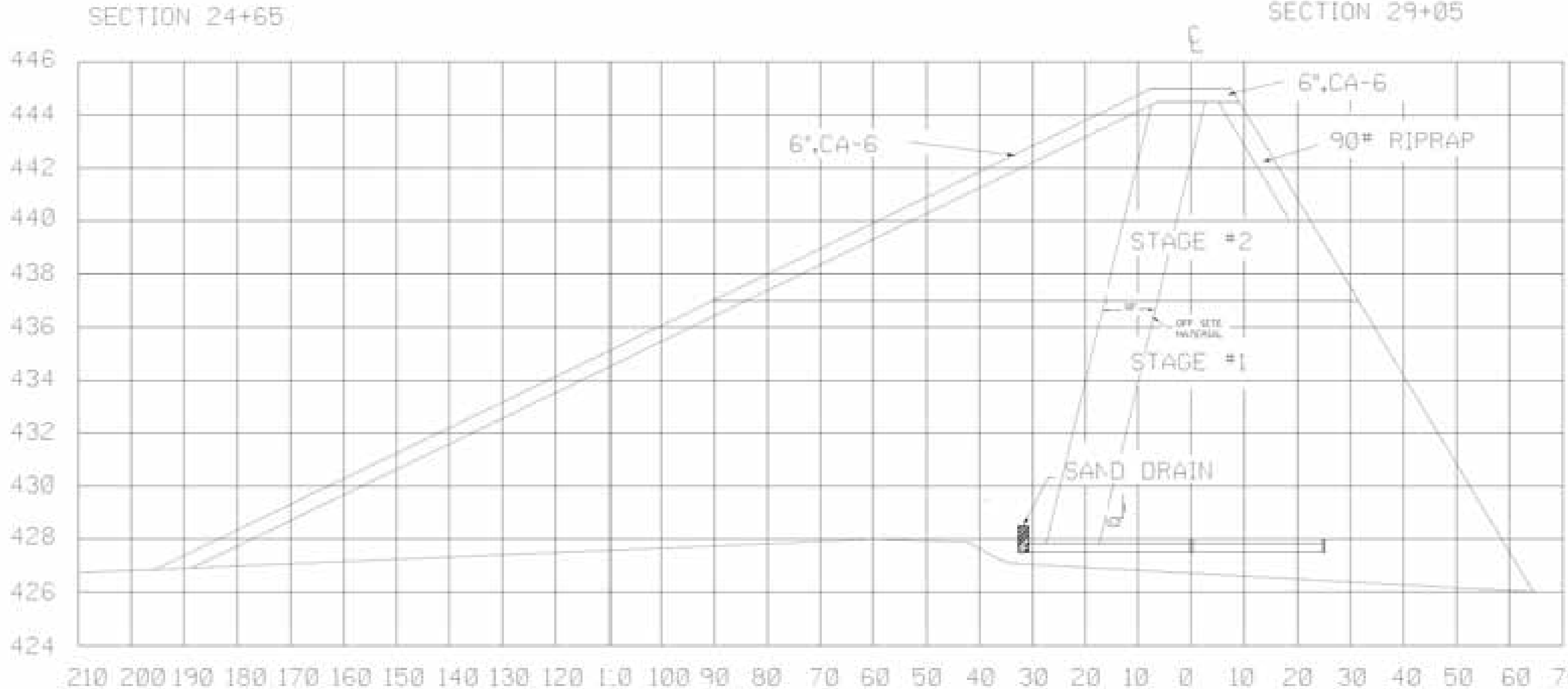
E-WDR1-C36



SECTION 24+65



SECTION 29+05



SECTION 24+03

REVISION STATUS: C-CONSTRUCTION R-RECORD

NO	DATE	APP	DESCRIPTION				NO	DATE	APP	DESCRIPTION			
C1	5/25/83	GMM	ADDED OFF SITE MATERIAL										

NOTES

REFERENCES

ILLINOIS POWER COMPANY

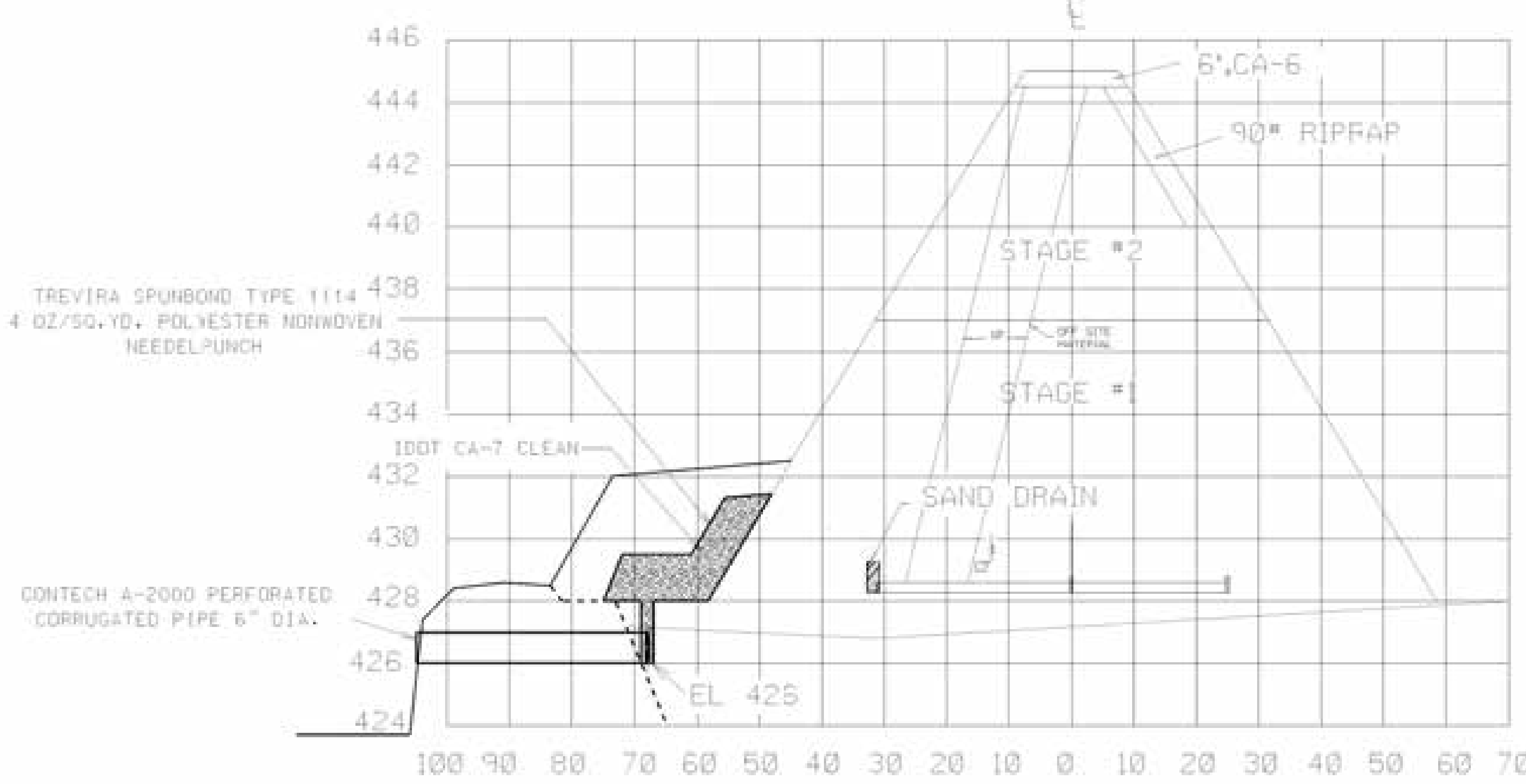
DECATUR

CROSS SECTIONS-DIKE EXTENSIONS

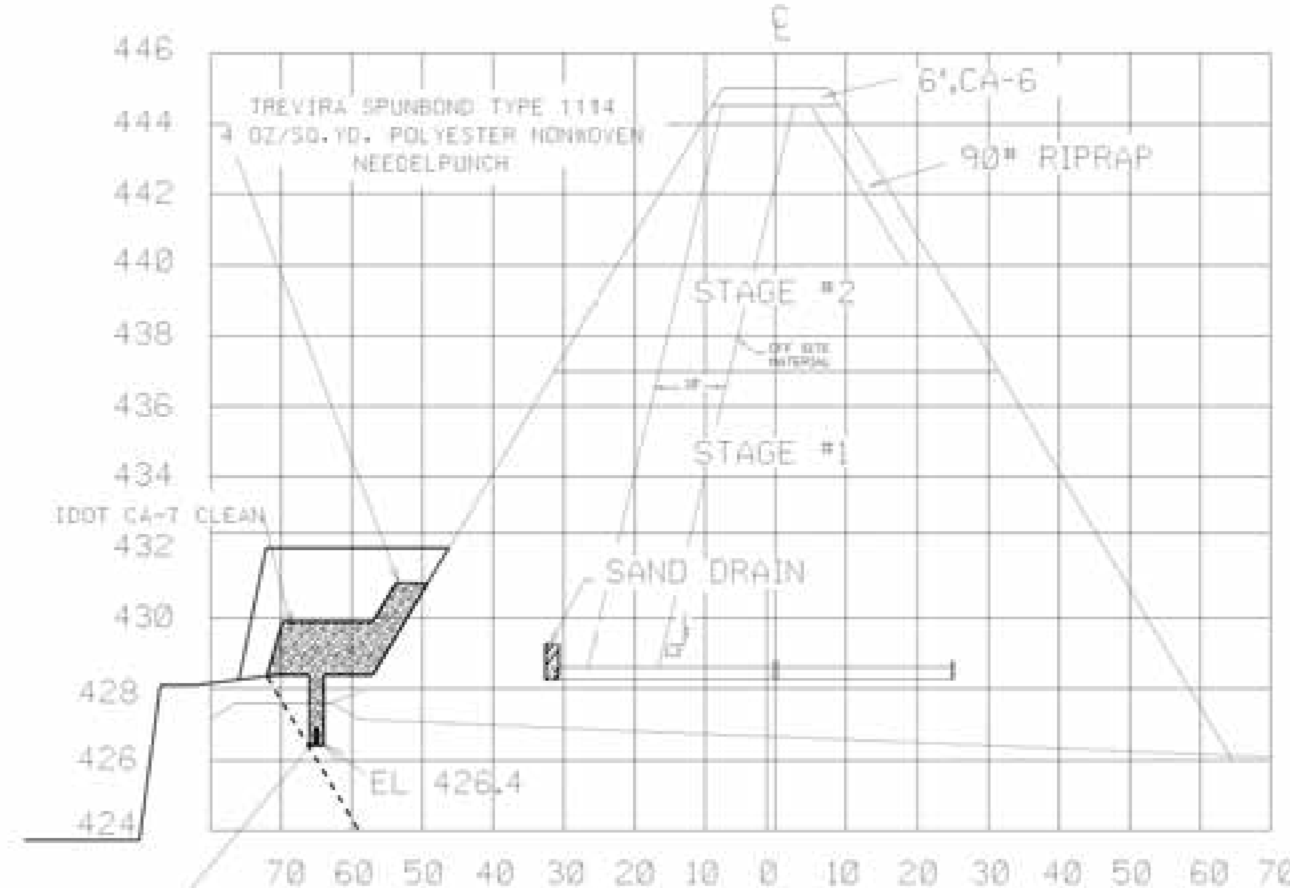
SECTIONS 24+03, 24+65 & 29+05

WOOD RIVER POWER STATION

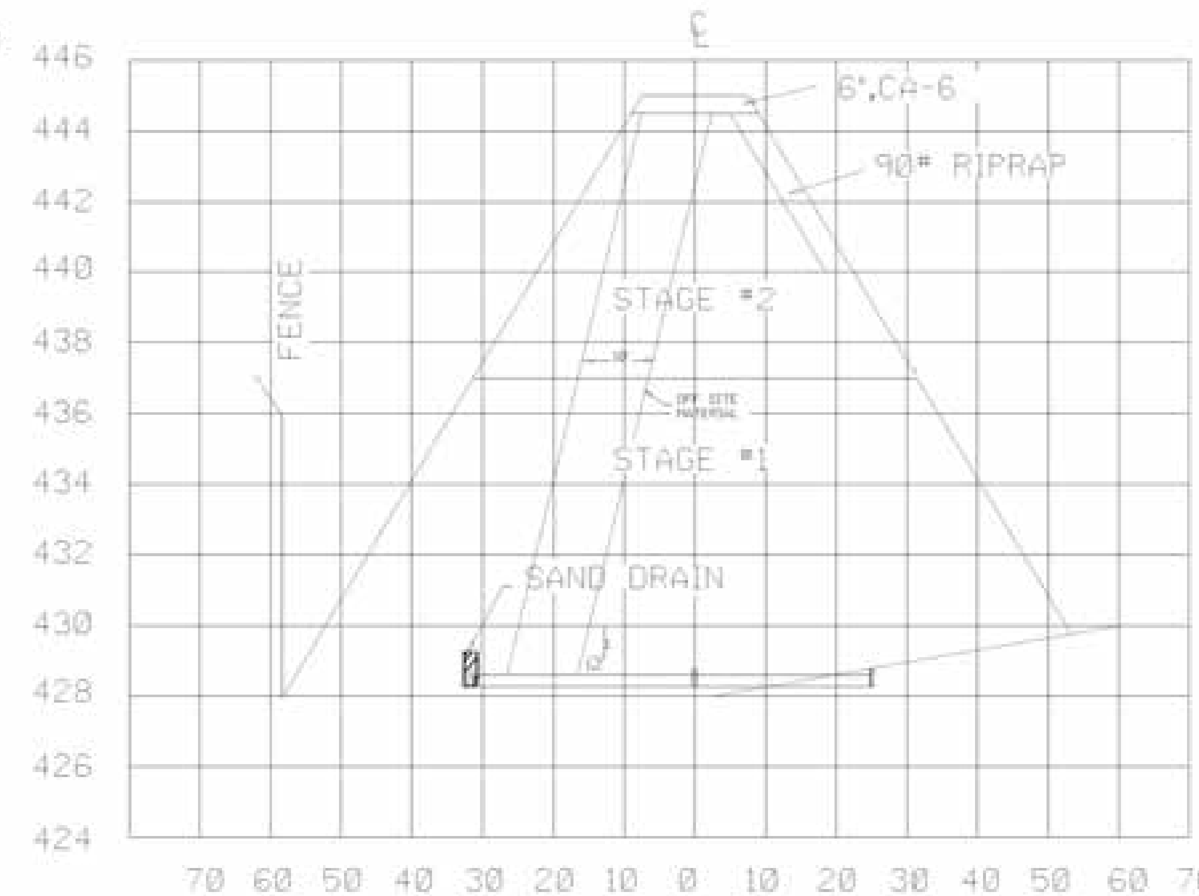
E-WDR1-C37



SECTION 32+60



SECTION 30+00

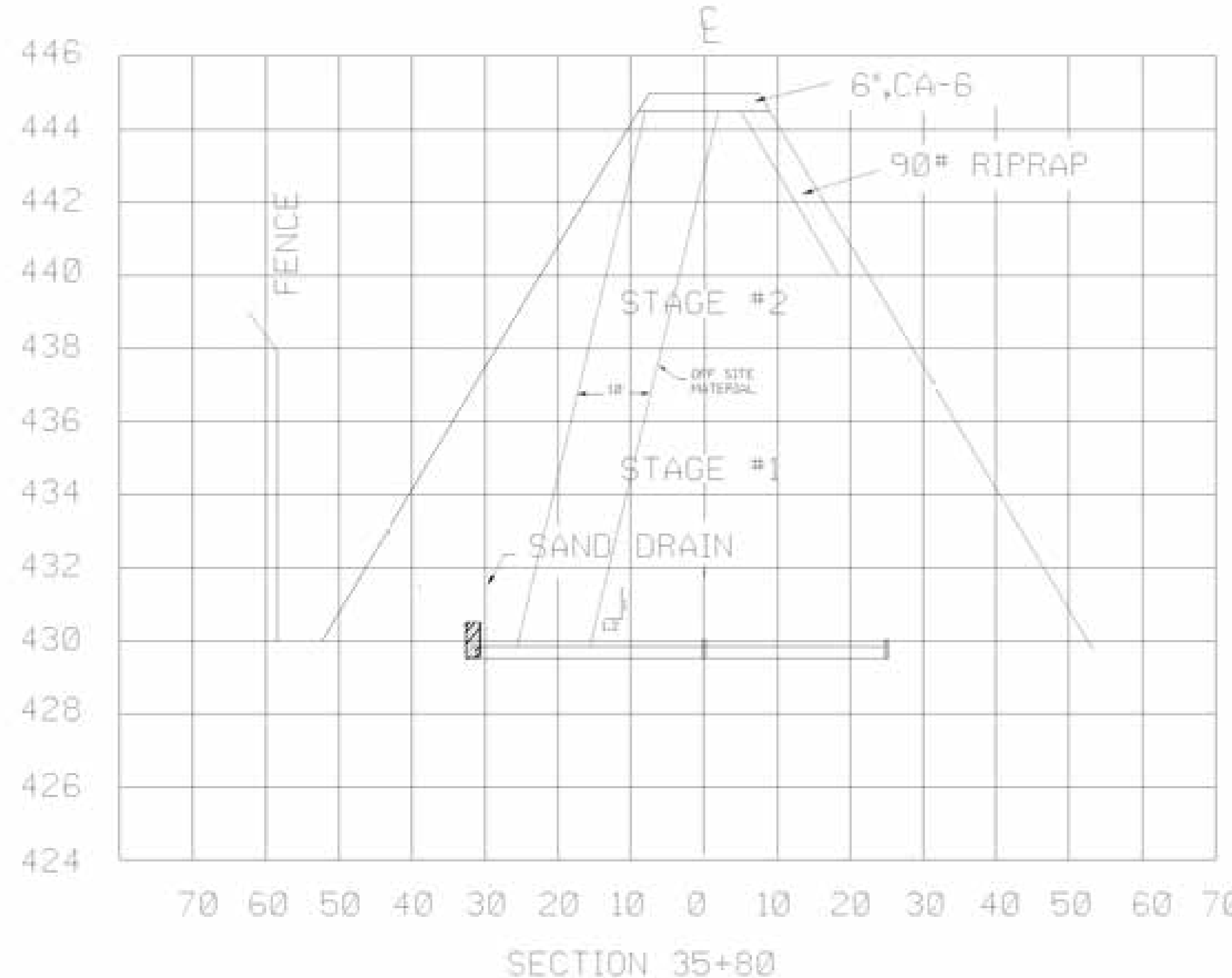


SECTION 33+80

ILLINOIS POWER COMPANY

CROSS SECTIONS-DIKE EXTENSIONS
SECTIONS 30+00, 32+60 & 33+80
WOODRIVER POWER STATION

E-WDR1-C38



REVISION STATUS: C-CONSTRUCTION R-RECORD

NO	DATE	DFT	DESCRIPTION	E	C	A
C1	5/25/93	DRW	ADDED OFF SITE MATERIAL			

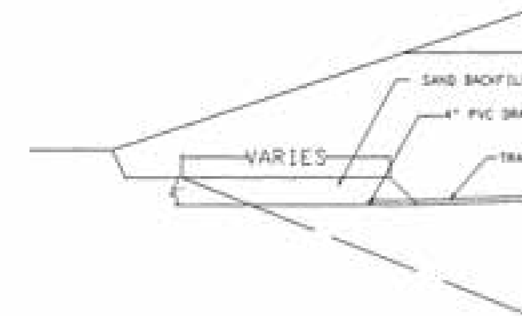
NOTES:

REFERENCES:

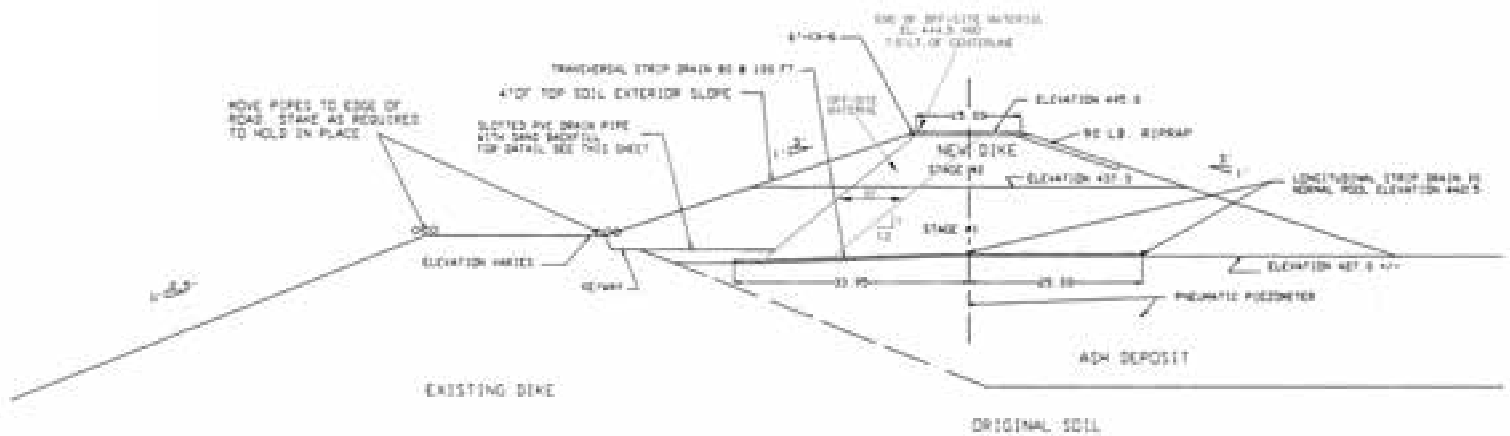
ILLINOIS POWER COMPANY
DECATUR

CROSS SECTIONS-DIKE EXTENSIONS
SECTION 35+80
WOOD RIVER POWER STATION

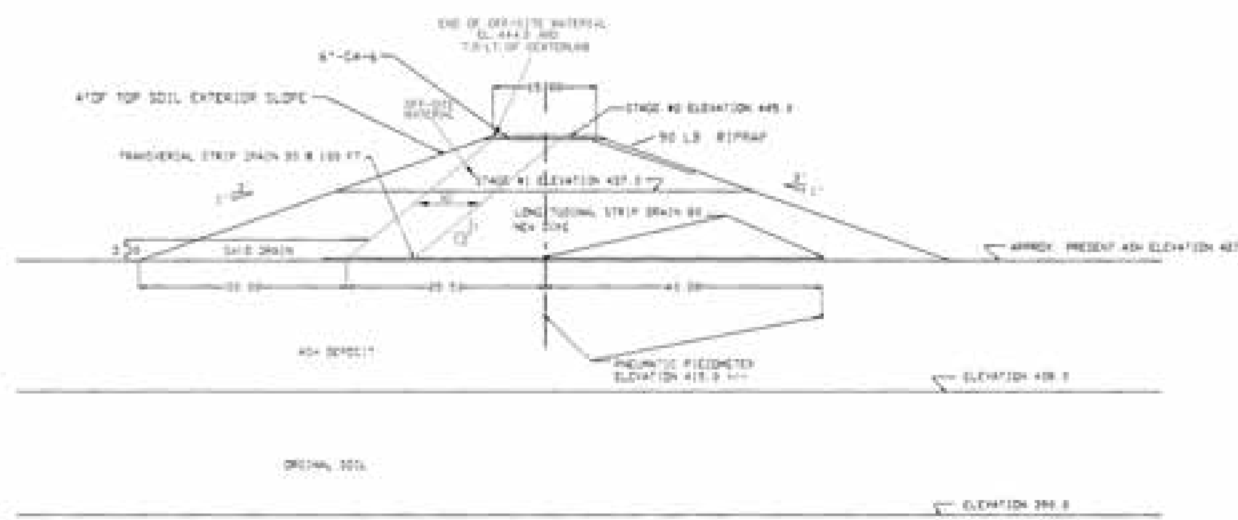
E-WDR1-C39



DETAIL SAND DRAIN*
SCALE 1"=5'



TYPICAL SECTION #1*
SCALE 1"=10'



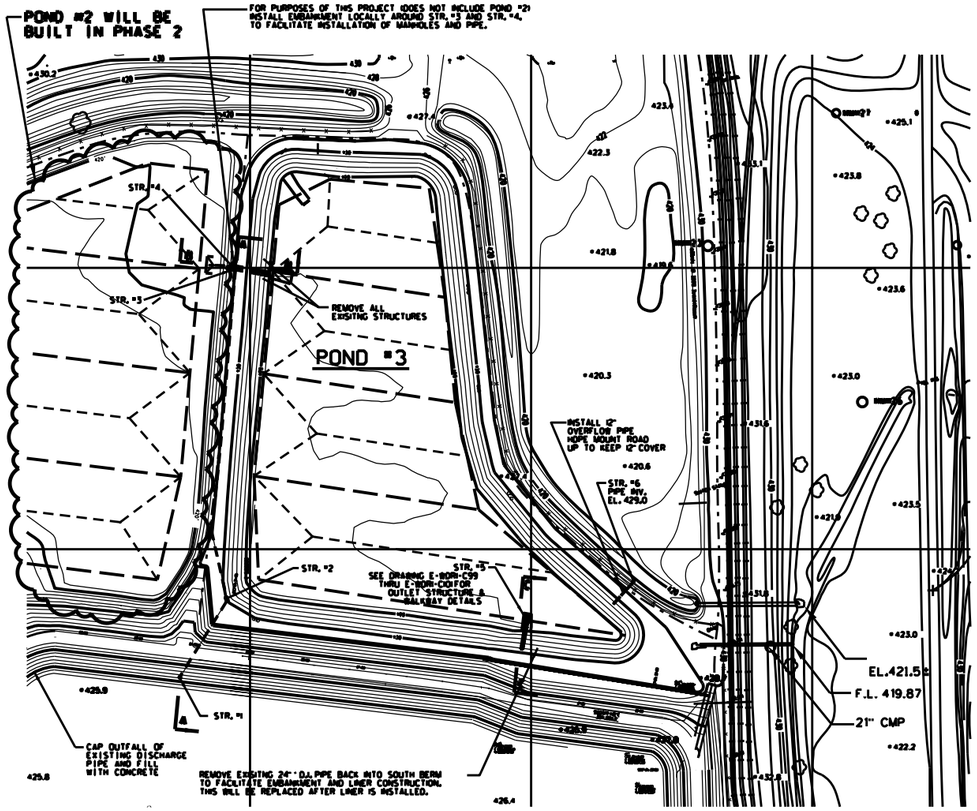
TYPICAL SECTION #2*
SCALE 1"=10'

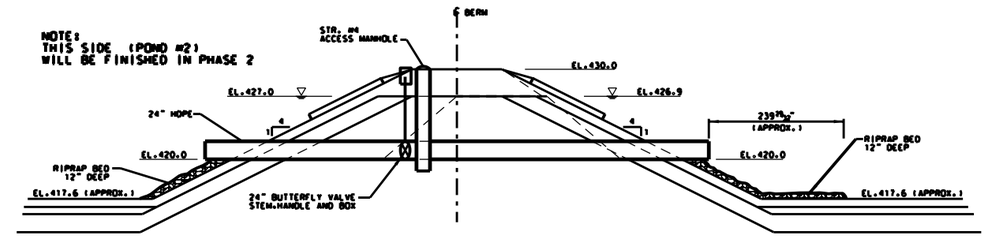
* PROPOSED TYPICAL SECTIONS
SEE AS BUILT CROSS SECTIONS
FOR LOCATIONS OF COMPONENTS

ILLINOIS POWER COMPANY
DECATUR

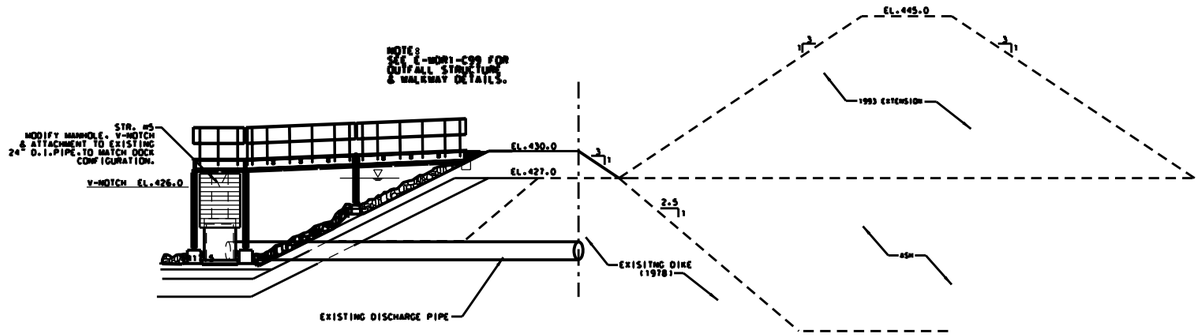
TYPICAL CROSS SECTIONS OF BERM RAISING
TO ELEVATION 445 STAGE #2
WOODRIVER POWER STATION

CE-WDR1-C41

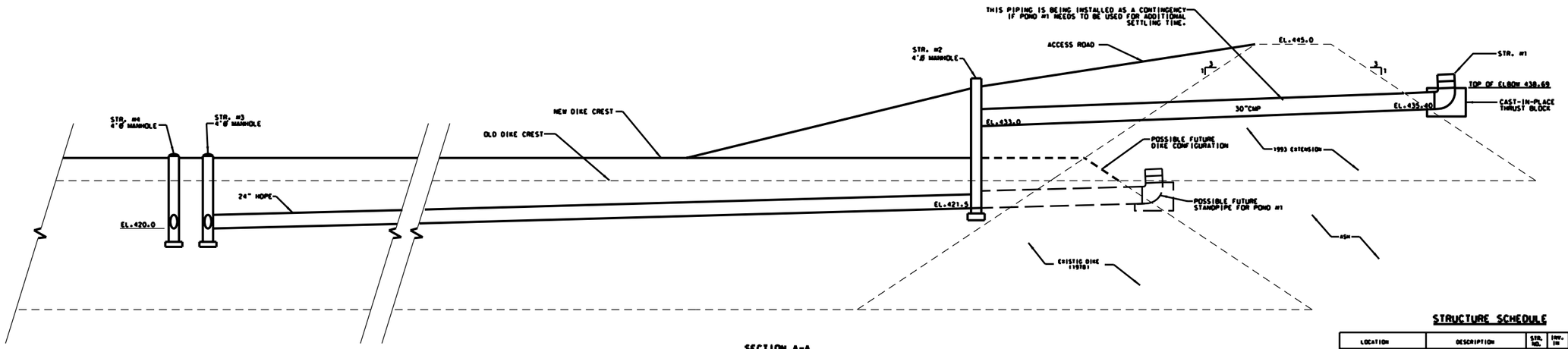




SECTION B-B



SECTION C-C



SECTION A-A

STRUCTURE SCHEDULE

LOCATION	DESCRIPTION	STR. NO.	INV. IN	MTL IN	INV. OUT	MTL OUT
STA. 11+32.50 RT. 36.23'	STANDPIPE WITH RINGS	1	440	CMP	435	CMP
STA. 10+01.00 RT. 0+0	ACCESS MANHOLE	2	433	CMP	421.5	HDPE
STA. 3+06 RT. 0+0	ACCESS MANHOLE	3	420	HDPE	420	HDPE
STA. 4+94 RT.34.00'	DISCHARGE PIPE WITH MANHOLE	4	420	HDPE	420	HDPE
STA. 9+60 RT. 593.80'	WEIR/ MANHOLE AND PIPE	5	426.0	RCCP	EXIST.	RCCP
	OVERFLOW PIPE	6	429.0	HDPE	429.0	HDPE

NO	DATE	ORF	DESCRIPTION	E	C	A
0						
①	11-17-97	DEC	AS BUILT	JPK		

NOTES
THE HYDRAULICS OF THE FUTURE POND #1 OUTFALL PIPE WILL REQUIRE THAT THE DIKES FOR POND ONE BE BUILT TO AN ELEVATION OF 431.0 OR HIGHER. THIS WILL ALLOW FULL UTILIZATION OF POND #3.

REFERENCES

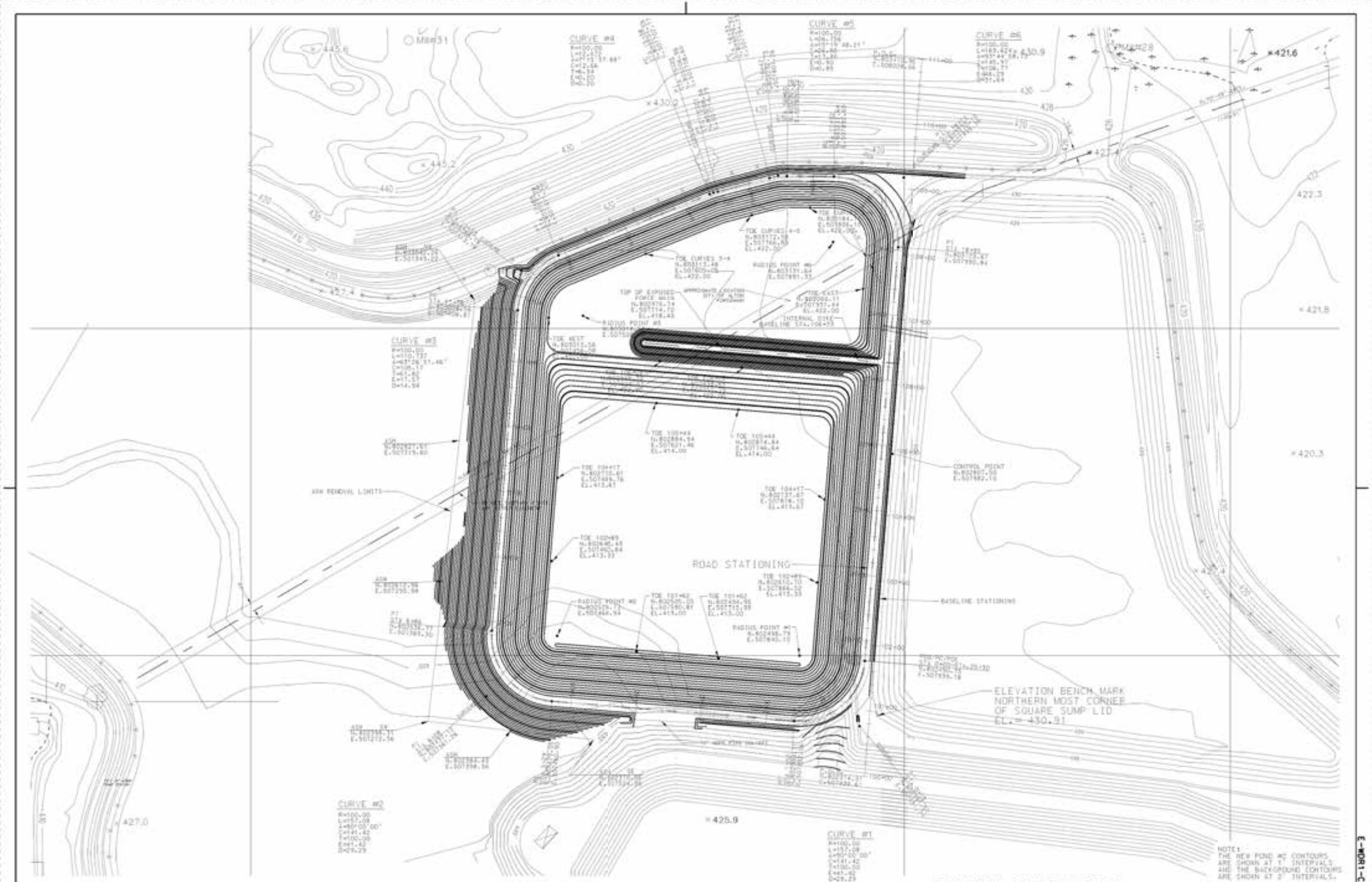
REVISION STATUS
O -CONSTRUCTION
①-RECORD

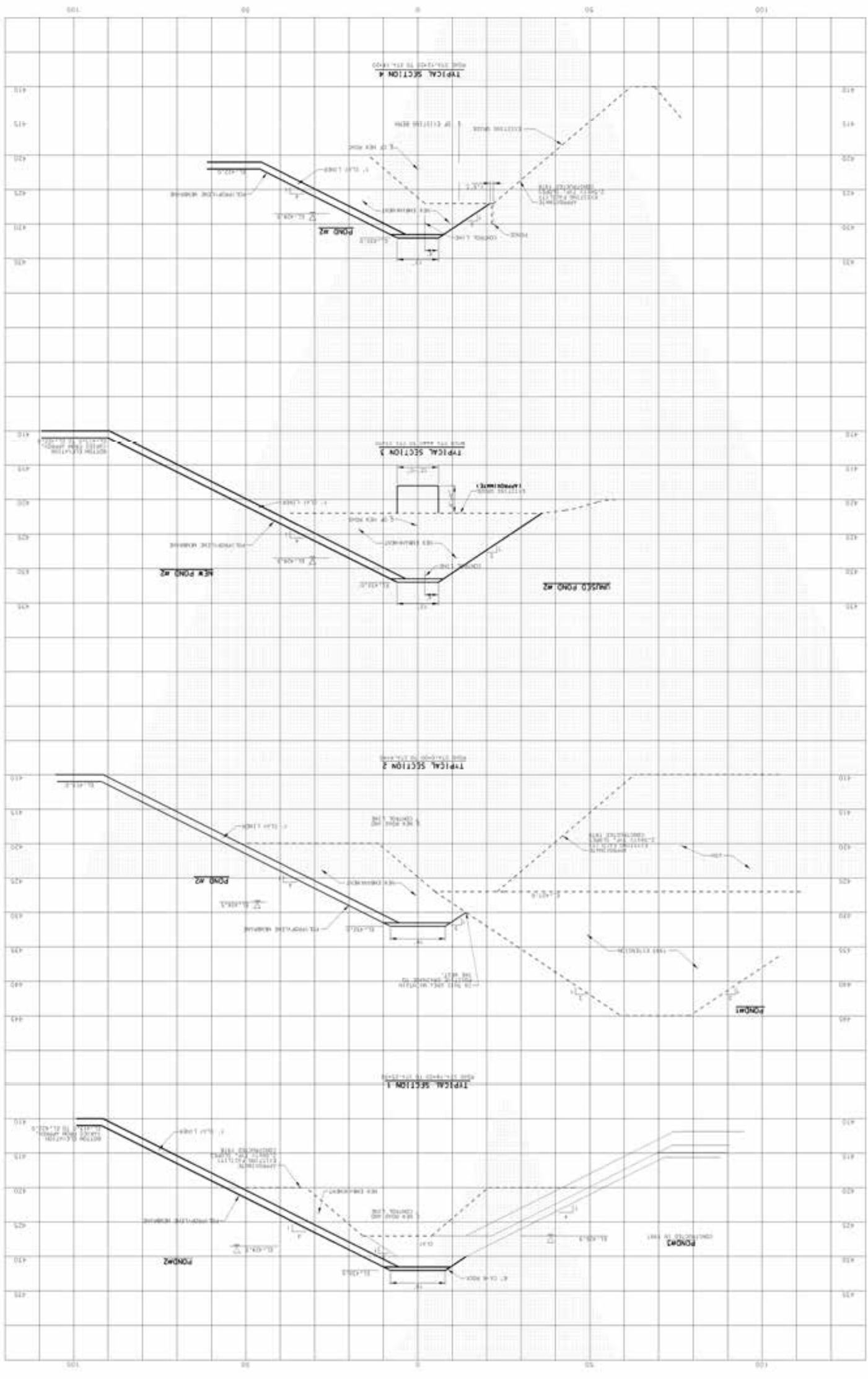
ILLINOIS POWER COMPANY
DECATUR

PIPING DETAILS
NEW ASH SURFACE IMPOUNDMENT
WOOD RIVER POWER STATION

DR	CAD DEC	DATE 4-23-97
DR	CKD	SCALE 1"=100' PLAN ONLY
APP	PLOTTED 11-17-97	E-WDR1-C108
APP		

E-WDR1-C108


CURVE #4
CURVE #5
CURVE #6
CURVE #3
CURVE #2
CURVE #1
ROAD STATIONING
BASELINE STATIONING
ASH REMOVAL LIMITS
ELEVATION BENCH MARK
NORTHERN MOST CORNER
OF SQUARE SUMP LID
EL. = 430.91
NOTE:
THE NEW POND #2 CONTOURS
ARE SHOWN AT 1' INTERVALS
AND THE BACKGROUND CONTOURS
ARE SHOWN AT 2' INTERVALS.
REDESIGNED. REVISION 7-20-98
ILLINOIS POWER COMPANY
ASH REMOVAL-BASELINE- SURVEY LAYOUT
PROPOSED POND #2
WOOD RIVER POWER STATION
E-WDR1-C143

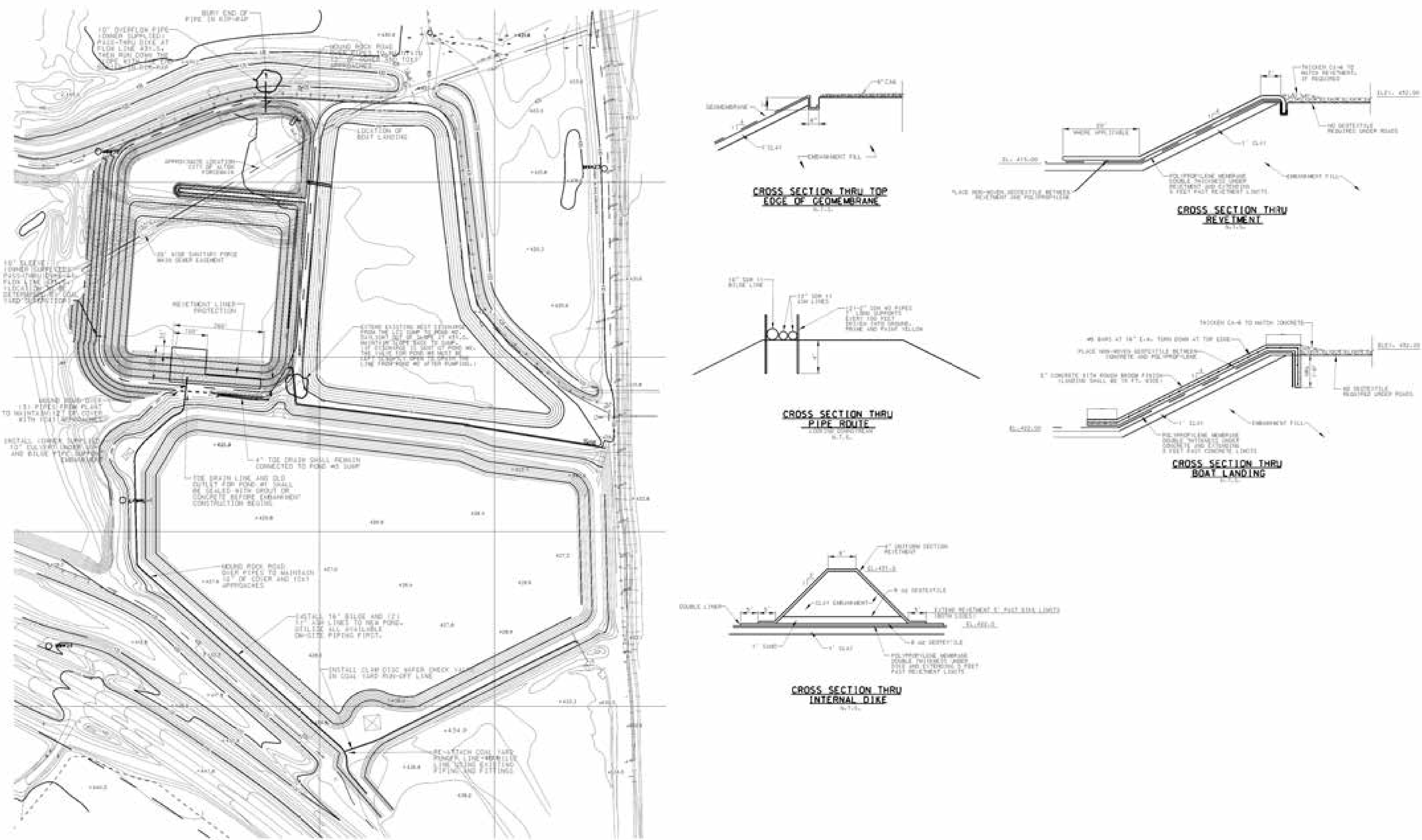


REDESIGNED, REVISION 7-20-98

ILLINOIS POWER COMPANY

TYPICAL CROSS SECTIONS
PROPOSED POND #2
BALDWIN POWER STATION

E-WDR1-C145



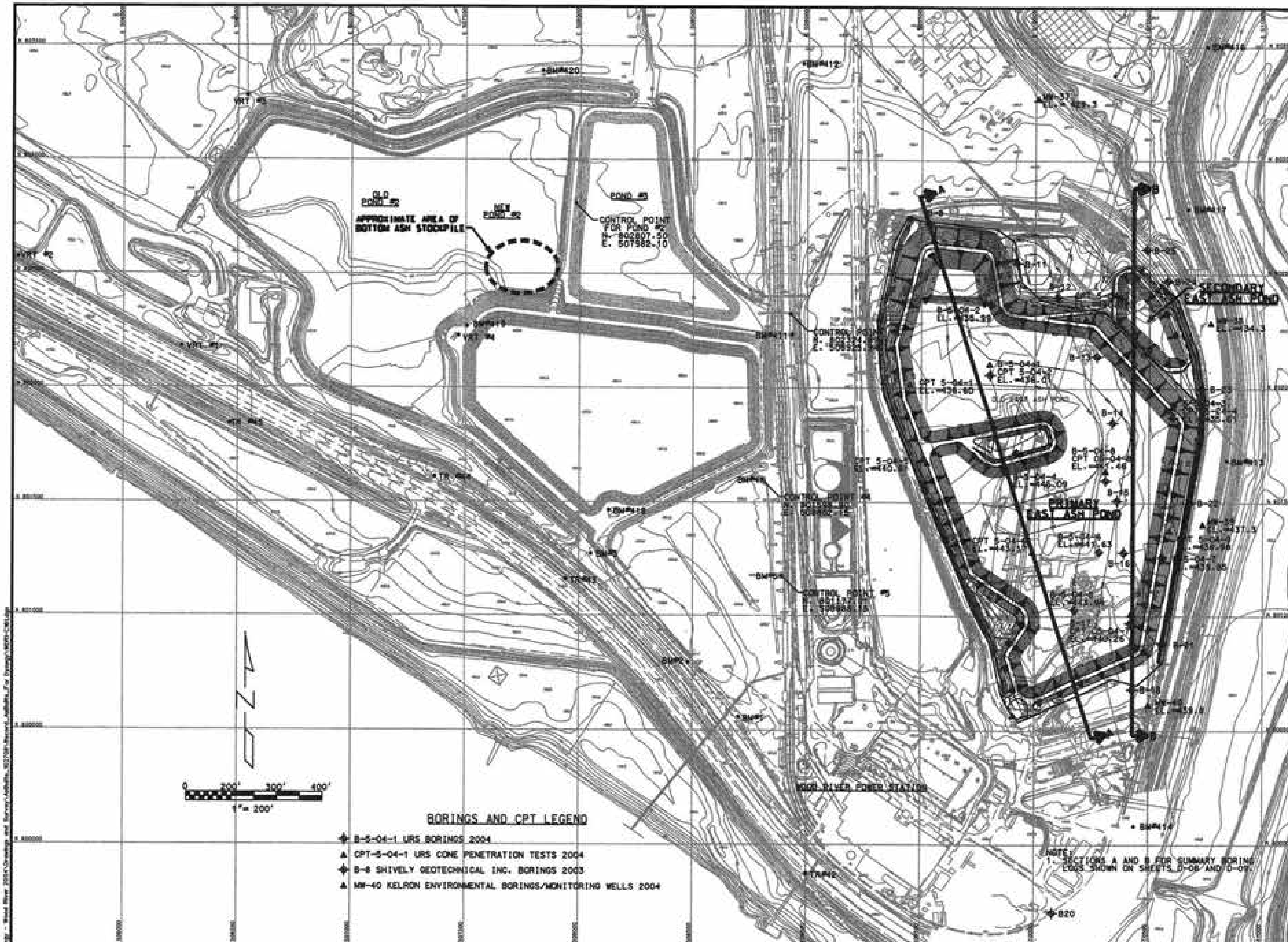
NOTE:
8 oz. GEOTEXTILE SHALL BE PLACED UNDER FORMS FOR BOAT RAMP. NO STAKING OF FORMS WILL BE ALLOWED DUE TO THE POLYPROPYLENE MEMBRANE.

REDESIGNED. REVISION 7-20-98

ILLINOIS POWER COMPANY

MISCELLANEOUS MEMBRANE AND PIPING
PROPOSED POND #2
WOOD RIVER POWER STATION

E-WDR1-C146



BENCH MARK DESCRIPTION

BM #1 = BRASS PLUG SET IN CONC. MON.
N. 800559.2216
E. 508701.1972
ELEV. 434.52

BM #2 = BRASS PLUG SET IN CONC. MON.
N. 800792.6555
E. 509480.0206
ELEV. 432.82

BM #3 = BRASS PLUG SET IN CONC. MON.
N. 801271.2000
E. 508052.3851
ELEV. 433.45

BM #4 = BRASS PLUG SET IN CONC. MON.
N. 801598.9010
E. 508802.1050
ELEV. 434.40

BM #5 = BRASS PLUG SET IN CONC. MON.
N. 801177.0049
E. 508888.1451
ELEV. 434.06

BM #411 = BRASS PLUG SET IN CONC. MON.
N. 802234.1470
E. 508931.8602
ELEV. 431.00

BM #412 = BRASS PLUG SET IN CONC. MON.
N. 803423.5176
E. 508978.3487
ELEV. 431.55

BM #413 = BRASS PLUG SET IN CONC. MON.
N. 801686.3595
E. 510839.8307
ELEV. 446.16

BM #414 = BRASS PLUG SET IN CONC. MON.
N. 800081.6255
E. 510437.2363
ELEV. 451.26

BM #415 = BRASS PLUG SET IN CONC. HEADWALL
N. 000000.0000
E. 000000.0000
ELEV. 445.35

BM #416 = BRASS PLUG SET IN CONC. HEADWALL
N. 803501.4738
E. 510747.7246
ELEV. 445.23

BM #417 = BRASS PLUG SET IN CONC. MON.
N. 802786.4345
E. 510668.6144
ELEV. 450.32

BM #418 = BRASS PLUG SET IN CONC. MON.
N. 801493.8786
E. 508129.8729
ELEV. 444.76

BM #419 = BRASS PLUG SET IN CONC. MON.
N. 802285.6778
E. 507508.6149
ELEV. 443.81

BM #420 = BRASS PLUG SET IN CONC. MON.
N. 803390.5112
E. 507835.6478
ELEV. 433.49

TRAVERSE DESCRIPTIONS

TR #1 = IRON PIN WITH IP CAP
N. 799534.4869
E. 509920.0159
ELEV. 446.32

TR #2 = PK NAIL SET IN BITUMINOUS CONC.
N. 799870.5735
E. 508999.7698
ELEV. =

TR #3 = IRON PIN WITH IP CAP
N. 801158.7257
E. 507941.7734
ELEV. =

TR #4 = PK NAIL SET IN BITUMINOUS CONC.
N. 801610.0224
E. 507366.0792
ELEV. = 437.36

TR #5 = USGS VERTICAL CONTROL MON.
N. 801841.3536
E. 506465.5065
ELEV. =

ADDITIONAL VERTICAL CONTROL POINTS

VRT #1 = TOP OF AND CENTER OF CONC. HEADWALL
ELEV. = 417.78

VRT #2 = TOP OF AND CENTER OF CONC. HEADWALL
ELEV. = 416.86

VRT #3 = NORTH RIM OF SANITARY MANHOLE
ELEV. 409.30

VRT #4 = TOP OF TRIANGLE SHAPE BASE PLATE OF THE NORTHEAST LEG OF TOWER
ELEV. 446.93

NO.	DATE	REVISION DESCRIPTION	APPROVED
(1)	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
(0)	4/06/05	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:

URS

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SEAL

DATE:	1/26/05
SCALE:	1"=200'
DESIGNED:	M.L.B.
DRAWN:	J.T.M.
CHECKED:	D.A.G.
APPROVED:	D.A.G.
SUBMITTED:	1/26/05

DYNEGY

DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

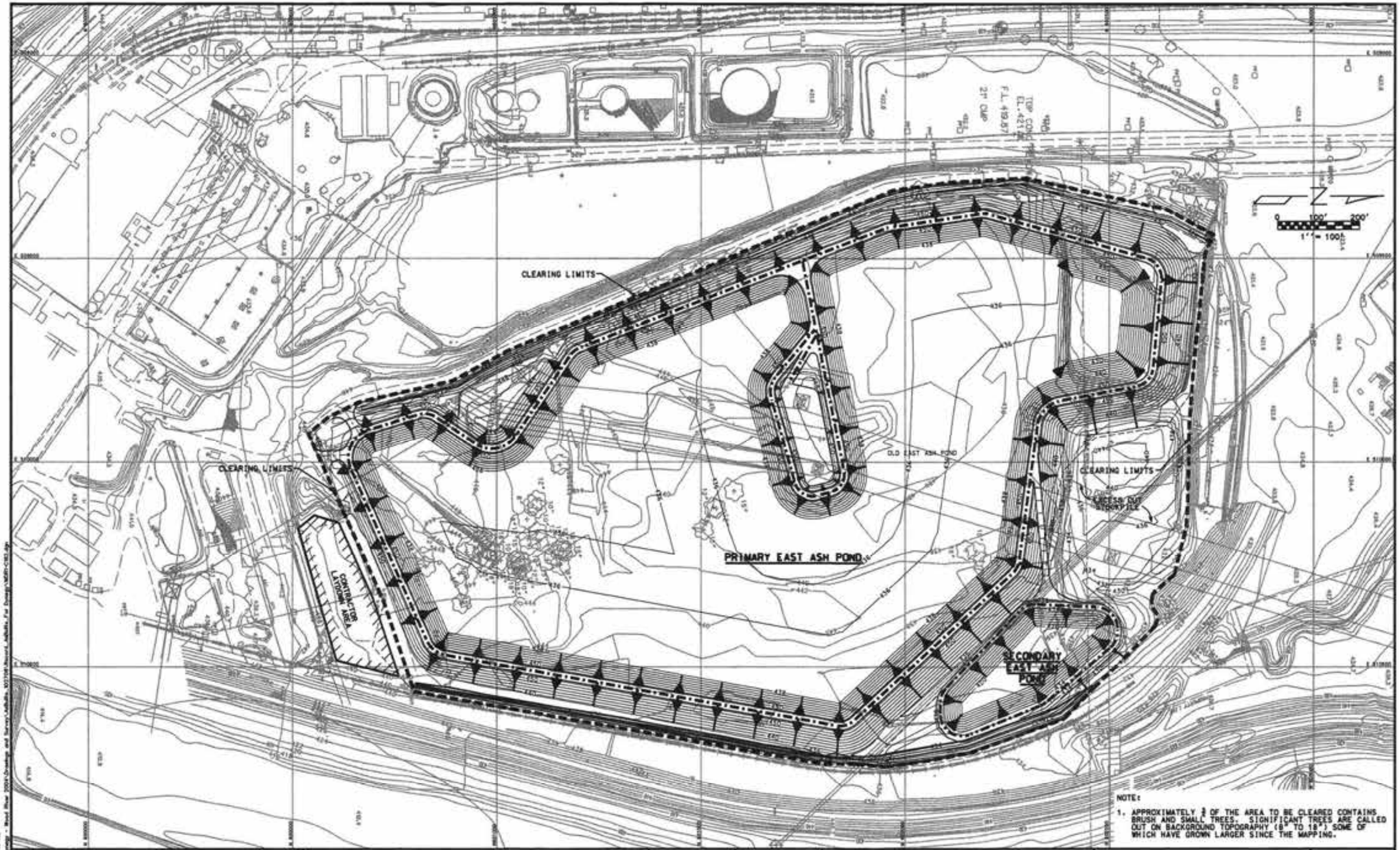
EAST ASH POND EXPANSION

OVERALL SITE PLAN,
BORING LOCATIONS AND
SURVEY CONTROL POINTS
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000

SHEET NO. P-02

WDR1-C161



NOTE:

1. APPROXIMATELY ⅓ OF THE AREA TO BE CLEARED CONTAINS BRUSH AND SMALL TREES. SIGNIFICANT TREES ARE CALLED OUT ON BACKGROUND TOPOGRAPHY (8" TO 18") SOME OF WHICH HAVE GROWN LARGER SINCE THE MAPPING.

NO.	DATE	REVISION DESCRIPTION	APPROVED
2	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
1	6/6/06	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:
URS
1001 Highlands Plaza Dr. West
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Tel: 314-429-0100
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SEAL

DATE: 1/25/06
SCALE: 1"=100'
DESIGNED: M.L.B.
DRAWN: J.T.M.
CHECKED: D.A.G.
APPROVED: D.A.G.
SUBMITTED: 1/25/06

DYNEGY
DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

EAST ASH POND EXPANSION

SITE CLEARING AND LAYDOWN AREA,
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO.
21561435.00000

SHEET NO.
P-03

WDR1-C162

PRIMARY OUTLET STRUCTURE

PRIMARY EAST ASH POND

SECONDARY EAST ASH POND

SECONDARY OUTLET STRUCTURE

2-12" HPDE PIPE CULVERTS

NOTE:

1. SEE SHEET P-05 AND SHEET P-06 FOR PIPING PLAN/PROFILE CONTROL.

NO.	DATE	REVISION DESCRIPTION	APPROVED
2	10/21/08	CONSTRUCTION AS-BUILT	D.A.S.
1	6/6/08	ISSUES FOR CONSTRUCTION	D.A.S.

PREPARED BY:

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SEAL

DATE:	1/25/08
SCALE:	1"=100'
DESIGNED:	M.L.S.
DRAWN:	J.T.M.
CHECKED:	D.A.S.
APPROVED:	D.A.S.
SUBMITTED:	1/25/08

DYNEGY

DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

EAST ASH POND EXPANSION

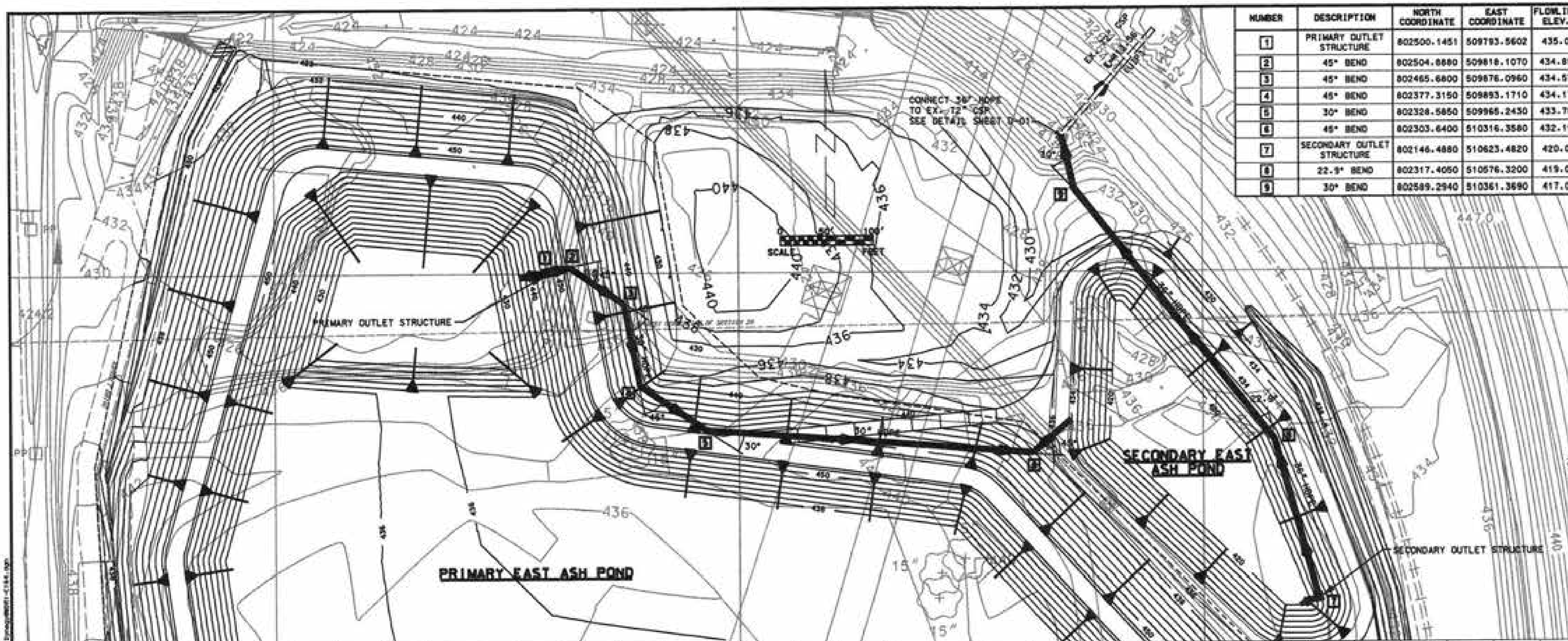
HYDRAULIC STRUCTURES
AND PIPING LAYOUT
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

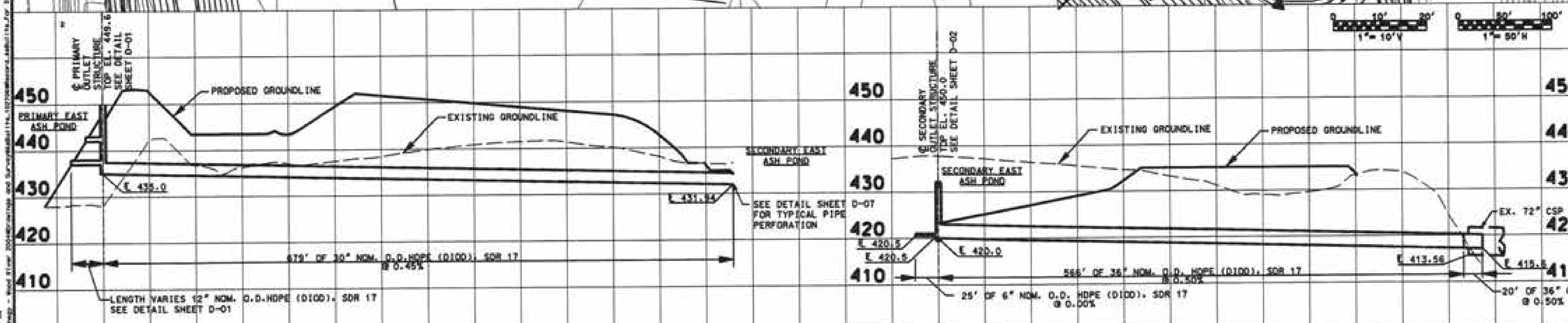
URS PROJECT NO.
21561435.00000

SHEET NO.
P-04

WDR1-C163

NUMBER	DESCRIPTION	NORTH COORDINATE	EAST COORDINATE	FLOWLINE ELEV.
1	PRIMARY OUTLET STRUCTURE	802500.1451	509793.5602	435.0
2	45° BEND	802504.8880	509818.1070	434.89
3	45° BEND	802465.6800	509876.0960	434.57
4	45° BEND	802377.3150	509893.1710	434.17
5	30° BEND	802328.5850	509965.2430	433.78
6	45° BEND	802303.6400	510316.3580	432.19
7	SECONDARY OUTLET STRUCTURE	802146.4880	510623.4820	420.0
8	22.9° BEND	802317.4050	510576.3200	419.0
9	30° BEND	802589.2940	510361.3690	417.0





NO.	DATE	REVISION DESCRIPTION	APPROVED
2	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
1	6/6/05	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:

URS

1001 Highlands Plaza Dr. West
Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
Fax: 314-429-0462

SEAL

DATE: 1/25/05
SCALE: 1"=60'
DESIGNED: M.L.S.
DRAWN: J.T.M.
CHECKED: D.A.G.
APPROVED: D.A.G.
SUBMITTED: 1/25/05

DYNEGY

DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

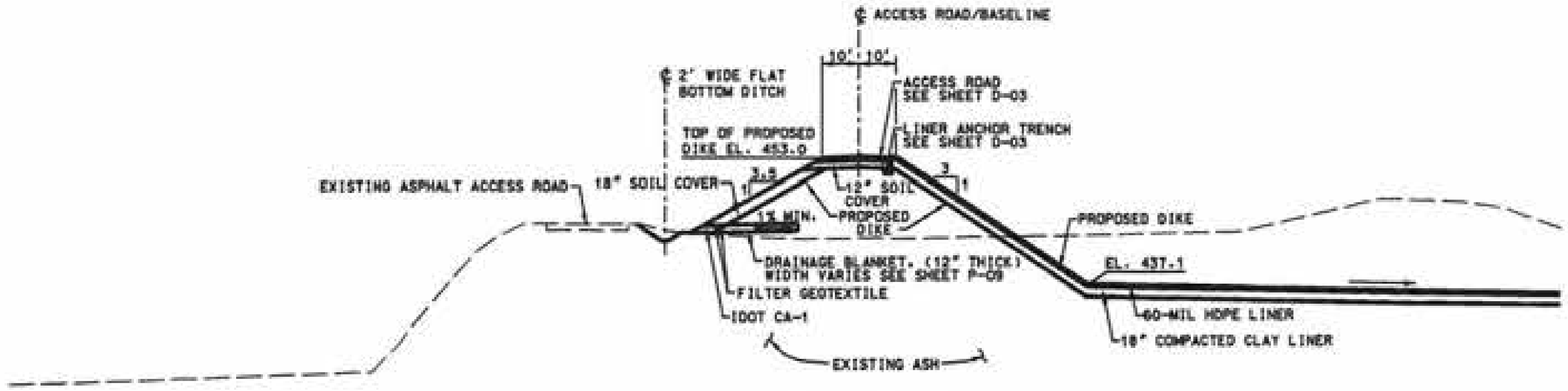
EAST ASH POND EXPANSION

HYDRAULIC STRUCTURES
PIPING PLAN/PROFILE
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

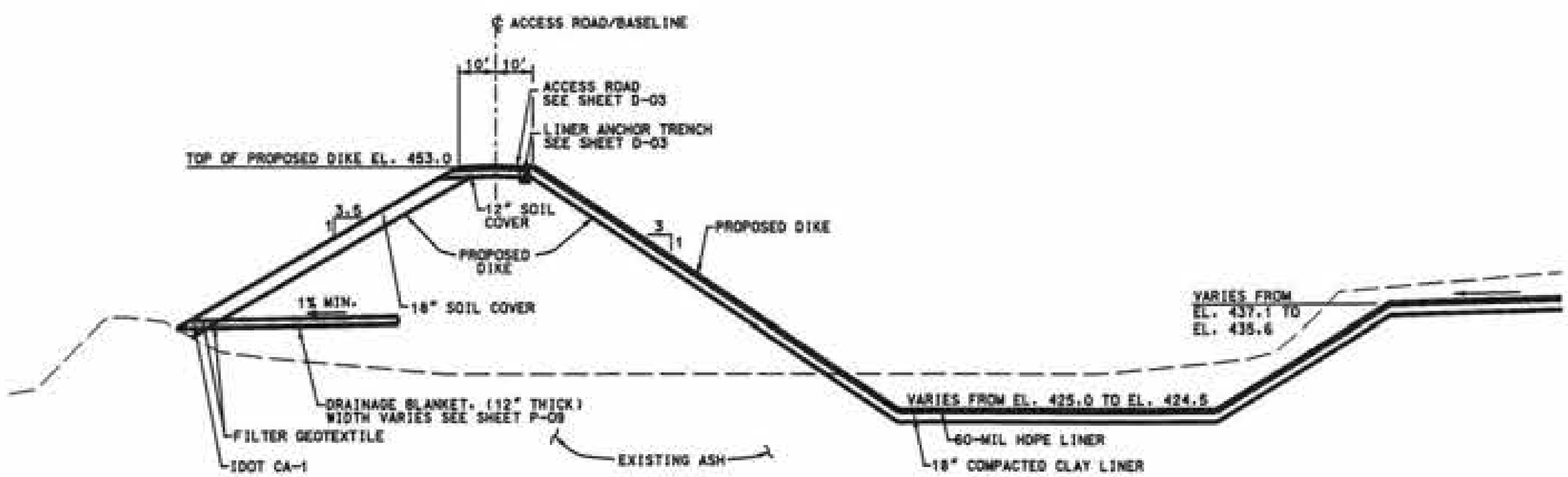
URS PROJECT NO. 21561435.00000

SHEET NO. P-05

WDR1-C164



TYPICAL SECTION NO. 1
STA. 17+00 TO STA. 27+00



TYPICAL SECTION NO. 2
STA. 32+00 TO STA. 34+00

NO.	DATE	REVISION DESCRIPTION	APPROVED
2	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
1	4/4/06	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:

URS

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Fax: 314-429-0462

SEAL

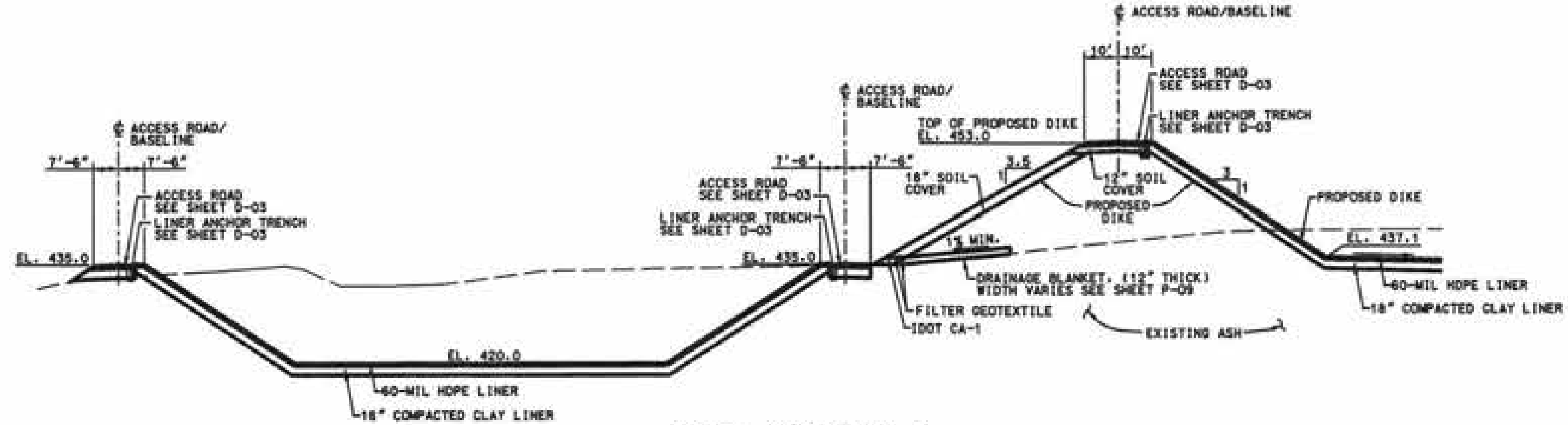
DATE: 1/26/06
SCALE: N.T.S.
DESIGNED: M.L.B.
DRAWN: J.T.B.
CHECKED: D.A.G.
APPROVED: D.A.G.
SUBMITTED: 1/26/06

DYNEGY
DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

EAST ASH POND EXPANSION

TYPICAL SECTIONS NO. 1 AND NO. 2
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000
SHEET NO. TS-01
WDR1-C170



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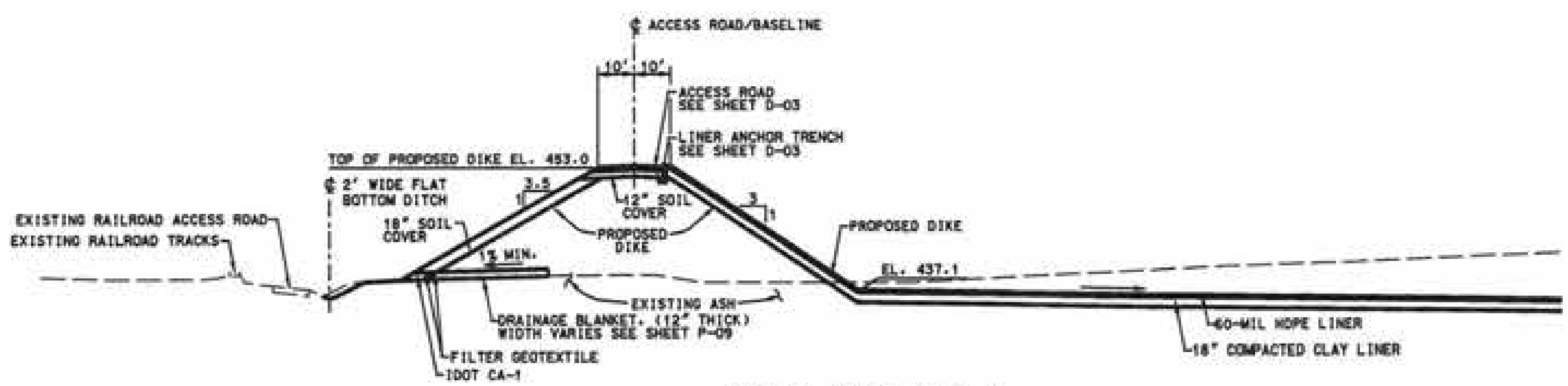
STA. 42+00 TO STA. 44+00



TYPICAL SECTION NO. 4
STA. 47+00 TO STA. 57+00

NO.	DATE	REVISION DESCRIPTION	APPROVED
2	10/21/06	CONSTRUCTION AS-BUILT	D.A.G.
1	6/6/05	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:
URS
1001 Highlands Plaza Dr. West
Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
Fax: 314-429-0462

SEAL

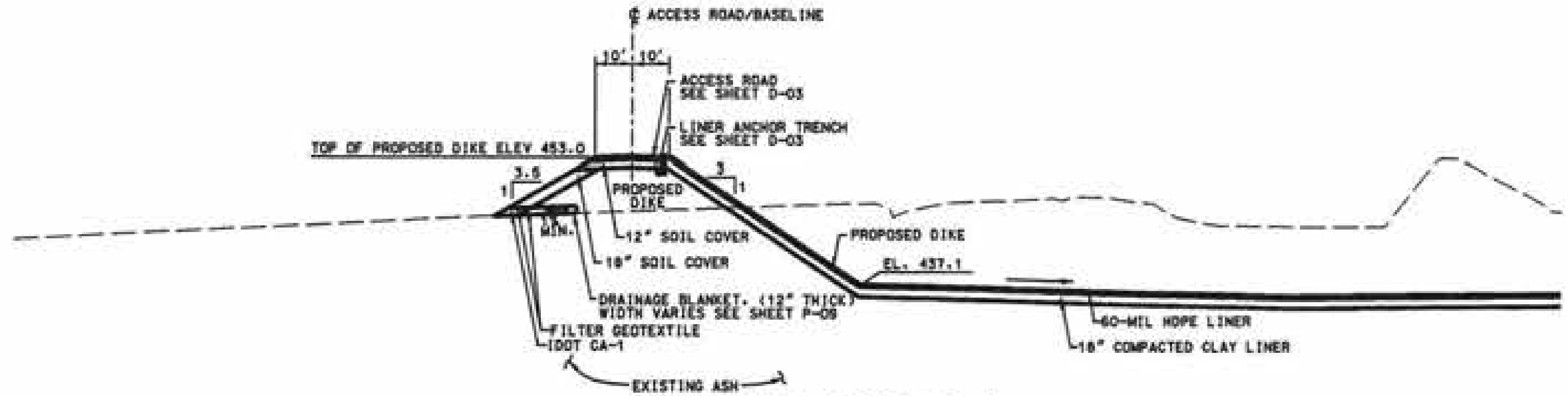
DATE:	1/25/05
SCALE:	N.T.S.
DESIGNED:	M.L.B.
DRAWN:	J.T.W.
CHECKED:	D.A.G.
APPROVED:	D.A.G.
SUBMITTED:	1/25/05

DYNEGY
DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

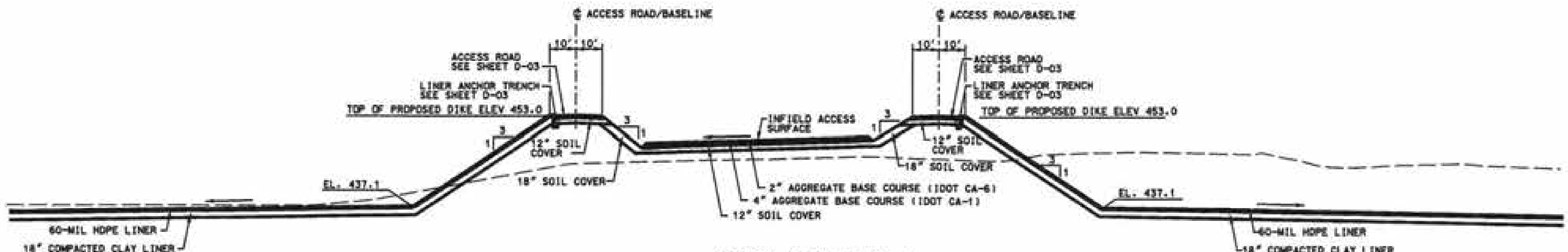
EAST ASH POND EXPANSION

TYPICAL SECTIONS NO. 3 AND NO. 4
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000
SHEET NO. **TS-02**
WDR1-C171



TYPICAL SECTION NO. 5
STA. 58+00 TO STA. 62+00



TYPICAL SECTION NO. 6
THROUGH INFIELD

NO.	DATE	REVISION DESCRIPTION	APPROVED
0	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
1	6/6/06	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:

URS
1001 Highlands Plaza Dr. West
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Tel: 314-429-0100
Fax: 314-429-0462

SEAL

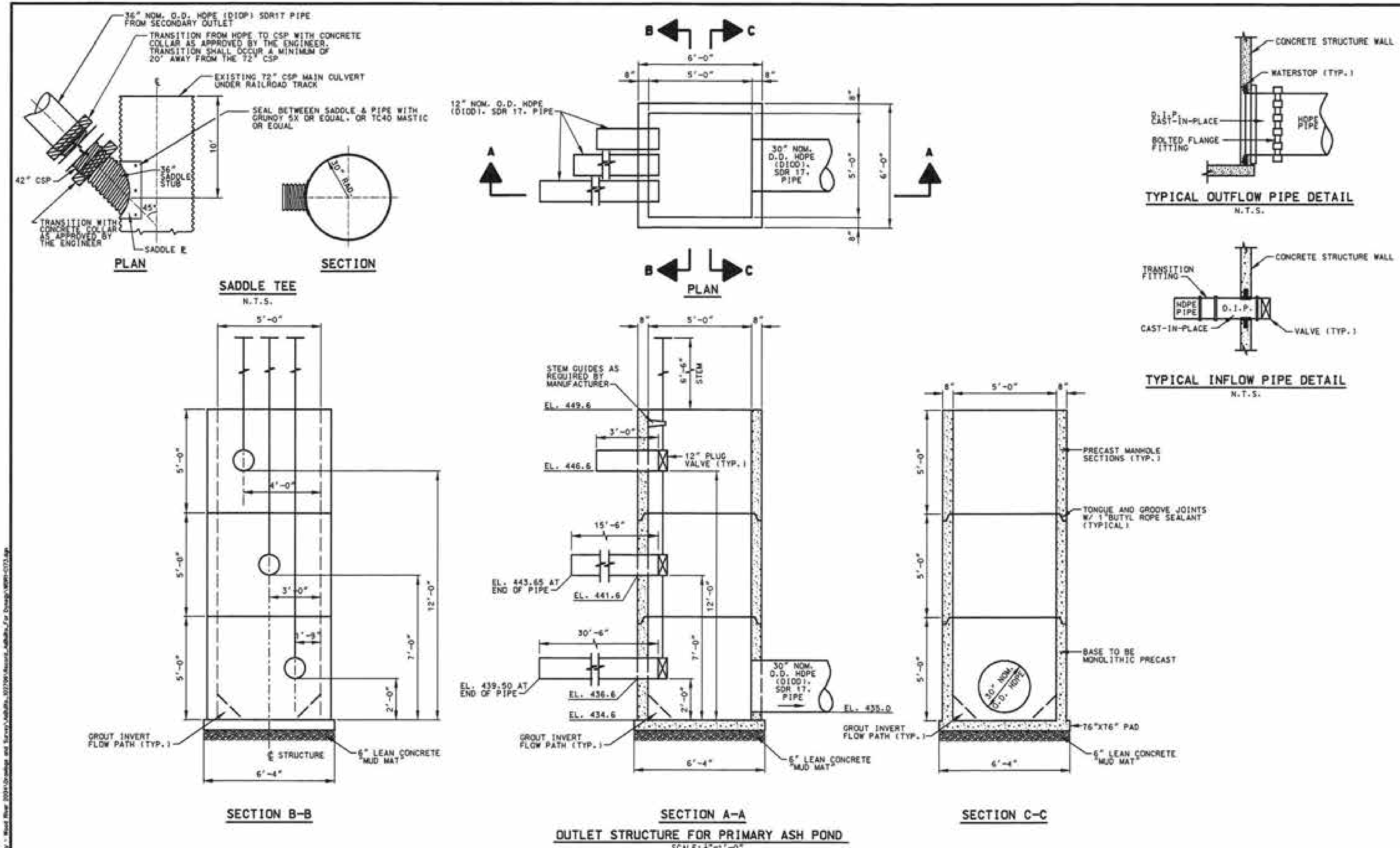
DATE: 1/25/06
SCALE: N.T.S.
DESIGNED: W.L.S.
DRAWN: J.T.M.
CHECKED: D.A.G.
APPROVED: D.A.G.
SUBMITTED: 1/25/06

DYNEGY
DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

EAST ASH POND EXPANSION

TYPICAL SECTIONS NO. 5 AND NO. 6
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000
SHEET NO. TS-03
WDR1-C172



NO.	DATE	REVISION DESCRIPTION	APPROVED
(2)	10/27/05	CONSTRUCTION AS-BUILT	D.A.G.
(1)	6/6/05	ISSUED FOR CONSTRUCTION	D.A.G.

PREPARED BY:

URS

1001 Highlands Plaza Dr. West
Suite 300
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Fax: 314-429-0462

SEAL

DATE:	1/25/05
SCALE:	AS SHOWN
DESIGNED:	W.G.L.
DRAWN:	J.T.M.
CHECKED:	D.A.G.
APPROVED:	D.A.G.
SUBMITTED:	1/25/05

DYNEGY

DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

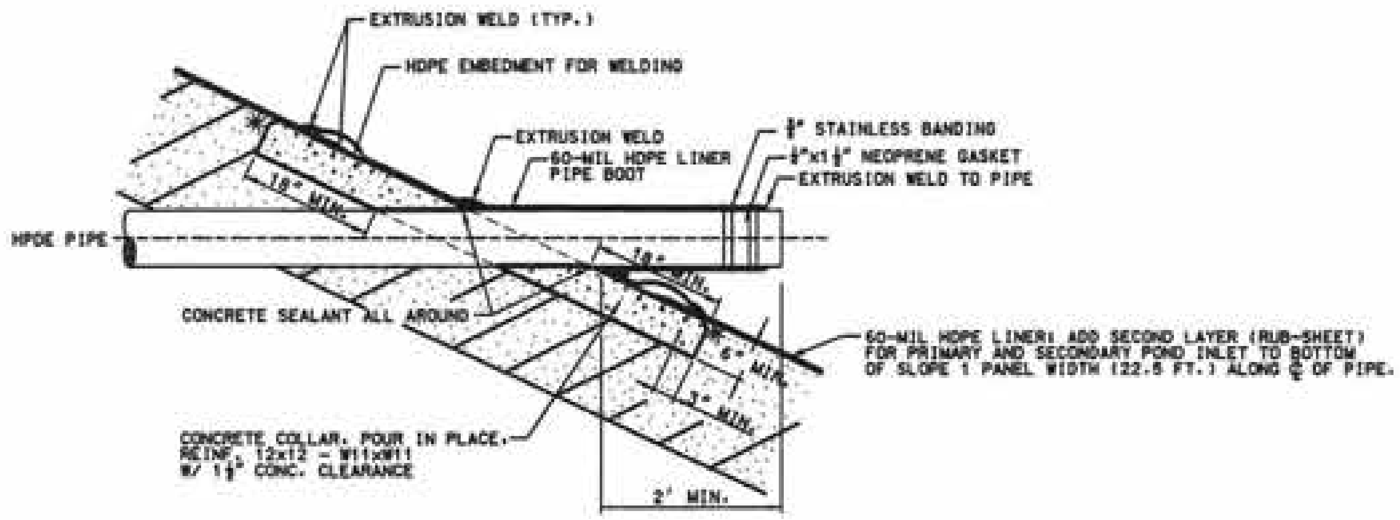
EAST ASH POND EXPANSION

DETAILS -
OUTLET HYDRAULIC STRUCTURE
FOR PRIMARY ASH POND
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000

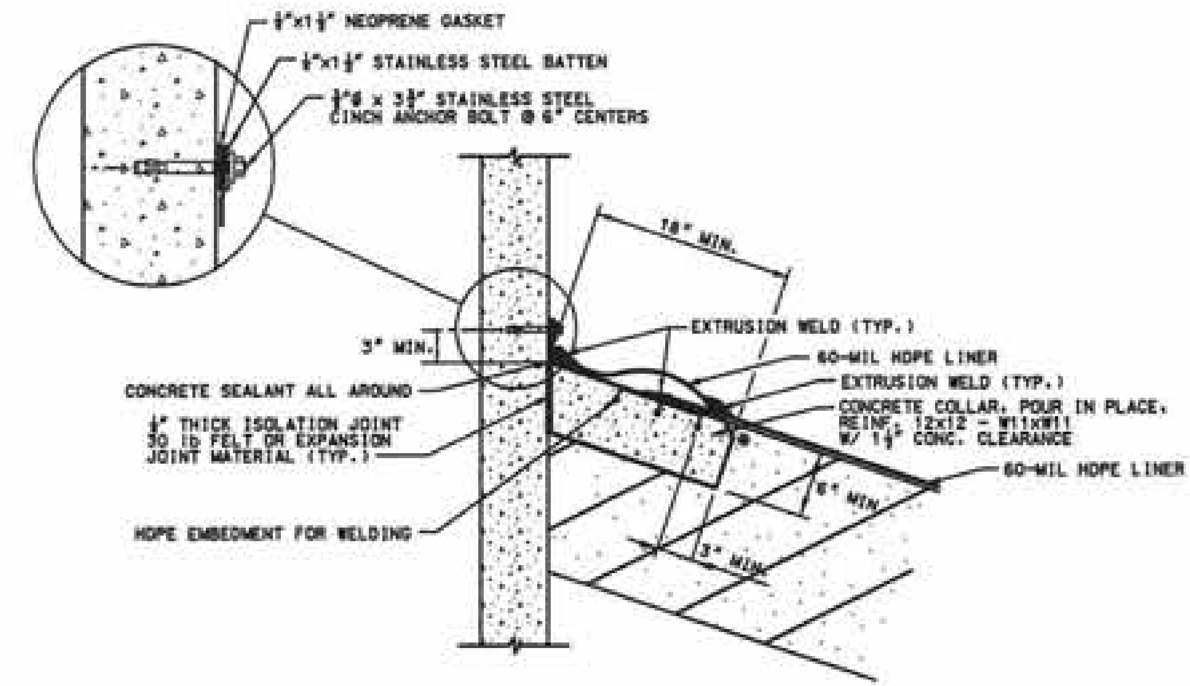
SHEET NO. D-01

WDR1-C173



TYPICAL PIPE PENETRATION

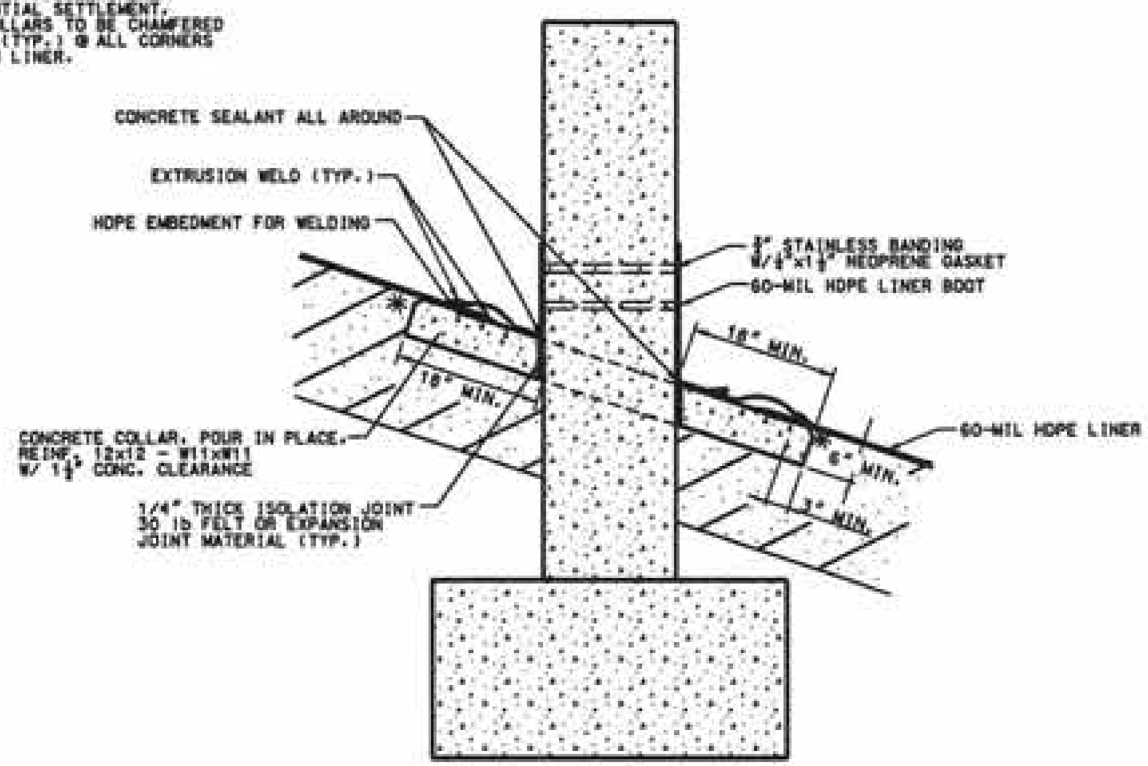
NOT TO SCALE



TYPICAL STRUCTURE PENETRATION BATTEN DETAIL

NOT TO SCALE

✱ NOTE
EARTH ADJACENT TO CONCRETE COLLAR TO BE WELL COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLEMENT.
ALL CONCRETE COLLARS TO BE CHAMFERED A MINIMUM OF 1" (TYP.) @ ALL CORNERS IN CONTACT WITH LINER.



TYPICAL COLUMN PENETRATION

NOT TO SCALE

NO.	DATE	REVISION DESCRIPTION	APPROVED
3	10/27/06	CONSTRUCTION AS-BUILT	D.A.G.
2	6/6/06	ISSUED FOR CONSTRUCTION	D.A.G.
1	6/6/06	CHANGED NOTE ON TYPICAL PIPE PENETRATION	D.A.G.

PREPARED BY:

URS

1001 Highlands Plaza Dr. West
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St. Louis, MO 63110
Tel: 314-429-0100
Fax: 314-429-0462

SEAL

DATE:	1/25/06
SCALE:	N.T.S.
DESIGNED:	M.L.B.
DRAWN:	J.T.M.
CHECKED:	D.A.G.
APPROVED:	D.A.G.
SUBMITTED:	1/25/06

DYNEGY

DYNEGY MIDWEST GENERATION
WOOD RIVER POWER STATION
WOOD RIVER, ILLINOIS

EAST ASH POND EXPANSION

DETAILS - MISCELLANEOUS
EAST ASH POND EXPANSION
TO ELEVATION 453
WOOD RIVER POWER STATION

URS PROJECT NO. 21561435.00000

SHEET NO. D-07

WDR1-C179

Appendix C: Wood River Piezometer Locations

EXPLORATION METHOD (B=BORING, C=CPT, P=PIEZOMETER)

XXX-X###

ID NUMBER

STATION ABBREVIATION

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

LEGEND

PIEZOMETER LOCATION

CCR UNIT BERM ALIGNMENT

0 300

APPROXIMATE SCALE FEET

N

Dynegy Midwest Generation, LLC		PROJECT NO. 60440115
AECOM		
DRN. BY: djd October 2015 DSGN. BY: eg/djd CHKD. BY: vm	Wood River Primary East Ash Pond Piezometer Locations	FIG. NO. 2A

File: P:\PROJECTS\GEOTECH\60428794_DYNEGYCCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 2A_2B PIEZOMETER LOCATION PLAN (WOOD RIVER).DWG Last edited: NOV. 03, 15 @ 11:27 a.m. by: david_deguire

EXPLORATION METHOD (B=BORING, C=CPT, P=PIEZOMETER)

XXX-X###

ID NUMBER

STATION ABBREVIATION

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

LEGEND

PIEZOMETER LOCATION

CCR UNIT BERM ALIGNMENT

0 300

APPROXIMATE SCALE FEET

N

Dynegy Midwest Generation, LLC		PROJECT NO. 60440115
AECOM		
DRN. BY: djd October 2015 DSGN. BY: eg/djd CHKD. BY: vm	Wood River Primary East Ash Pond Piezometer Locations	FIG. NO. 2B

File: P:\PROJECTS\GEOTECH\60428794_DYNEGYCCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 2A_2B PIEZOMETER LOCATION PLAN (WOOD RIVER).DWG Last edited: NOV. 03, 15 @ 11:27 a.m. by: david_deguire

Appendix D: Dynegy Wood River East Ash Pond Expansion to El. 453: Specifications, URS (2004) (Excerpt)

S P E C I F I C A T I O N S

DYNEGY WOOD RIVER EAST ASH POND EXPANSION TO EL. 453

Prepared for

Dynegy Midwest Generation
No. 1 Chessen Lane
Alton, IL 62002

February 8, 2005

URS

21561435.00000

TABLE OF CONTENTS

SECTION 1: PROJECT DESCRIPTION

1.0 GENERAL DESCRIPTION AND SCOPE OF WORK

1.1 Background

The ash generated from burning coal during the production of power at the Wood River Power Station is washed (or sluiced) through pipes from the plant to a primary ash settling/disposal pond. Water is detained in the pond to allow the ash to settle out before being routed to a secondary settling pond. The secondary pond provides additional detention time before the water is discharged into a drainage ditch, which eventually drains into the Wood River. The primary pond provides most of the settling and, therefore, storage/disposal of the ash. The secondary pond is considered a "polishing" pond for final treatment before discharge.

DMG has identified that the existing ash disposal pond system at the Wood River Power Station is nearing capacity. A Feasibility Study investigating alternatives of expanding the existing ash pond system or constructing a new pond was prepared. That study determined that expansion of the existing, inactive, East Ash Pond would be the best option. The overall goal for Dynegy Midwest Generation (DMG) is to increase the water storage capacity of their Wood River Power Station East Ash Pond and prepare it as a facility permitted by the IDNR and IEPA.

The East Ash Pond Expansion will be operated as generally described above. The primary and secondary ponds have been designed as Class I small dams. The ponds will be stand-alone structures constructed above existing grades using a lined, earthen and fly ash structural fill ring-berm or dike with 3H:1V inside slopes and 3.5H:1V outside slopes.

The site is located in the City of Alton in Madison County, IL. Refer to the site location Drawings for the general and detailed layout of the facility.

1.2 Scope of Work

Generally, the work will consist of:

- Clearing the existing grass, brush and trees on the surface of the existing pond.

- Re-grading the upper portion of existing pond to construct the dike embankment and foundation for the liner in the new primary and secondary pond area (including wasting excess cut, if required). Existing fly ash and bottom ash from within the pond will be used for structural fill. Soft areas in the subgrade may require base stabilization with reinforcing geotextile and gravel. Bottom ash will be used as a drainage layer in the lower section of the dike embankment on the primary pond.

- Installing hydraulic structures, piping and access structures connecting the ponds to each other and discharging to a culvert on the north end of the ponds.

- Installing a clay and geomembrane liner in the bottom and on the slopes of the graded pond areas.

- Installing soil cover on the top and outside slopes of the dike embankments (seeded and mulched).

- Installing gravel access roads on top of the dike embankments and in the infield area around the power line towers.

Time is of the essence on this project. This work is being done in accordance with the Drawings and Specifications making up these bid documents and under the supervision of the Project Manager.

1.3 General Pond Parameters

The overall footprint of the proposed primary east ash pond is approximately 36 acres. The bottom area is 23.7 acres. The majority of the pond floor is at approximately El. 436. A small area of the bottom of the primary pond is at El. 420 near the outlet. The primary pond will have a maximum operating pool of El. 450. The ground elevation outside the area of the existing pond varies from approximately El. 420 to 435. Within the area of the existing pond, the existing ground elevation is approximately El. 435 to 450. The primary east ash pond will operate with a varying water elevation. The water will be maintained at four to five feet above the ash level in the pond during normal operation.

The footprint for the secondary east ash pond will be approximately 2.1 acres. The floor will be at El. 420 and be about 0.7 acres. The secondary east ash pond water level will maintained at El. 432 ft water during normal operation.

END OF SECTION ONE

SECTION 5: CLEARING AND GRUBBING

5.0 GENERAL

5.1 WORK INCLUDES

5.1.1 Removal of all surface debris, trees, brush, shrubs, and grasses from the area within the clearing limits shown on the drawings.

5.1.2 The general work areas that require site clearing includes:

5.1.2.1 Area within clearing limits as shown on the Drawings.

5.1.3 Grubbing all tree stumps and root systems from cleared work areas as shown on the Drawings.

5.1.4 Dispose of cleared shrubs, trees, stumps, and debris by burning in an area as directed by the Owner.

5.2 DEFINITIONS

5.2.1 Site Clearing as defined herein shall mean the removal, stripping, hauling, and disposal of surface debris, grass, trees, and shrubs from within the clearing limits shown on the drawings.

5.2.2 Grubbing trees as defined herein shall mean the removal, hauling, and burning of all tree stumps and root systems and backfilling the grubbed holes where necessary.

5.3 VERIFICATION

5.3.1 The Contractor shall verify with the Engineer prior to initiating any clearing operations in that area. Unauthorized clearing will not be entitled for payment.

5.4 RELATED SECTIONS

5.4.1 Section 6: Earthwork

5.5 PRODUCTS

Not Used

5.6 EXECUTION

5.7 PREPARATION

5.7.1 Prior to initiating any clearing and grubbing operations, the Contractor shall verify with the Owner's Representative that existing plant life and features designated to remain or to be protected are tagged or identified.

5.8 PROTECTION

5.8.1 The Contractor shall protect any trees, plant growth, and features designated to remain as final landscaping or slope protection. The Contractor shall remove only those trees and plant growth required to be removed, as determined by the Engineer. The Contractor shall be liable for damage to protected vegetation and other features that are damaged by clearing operations.

5.8.2 The Contractor shall protect bench marks and survey monuments from damage or displacement. Any bench marks or survey monuments damaged during clearing and grubbing by the Contractor will be repaired or replaced by the Owner, and the costs will be back-charged to the Contractor.

5.9 CLEARING

5.9.1 The Contractor shall remove all trees, tall shrubs, deadwood, rocks larger than one foot in diameter, and other surface debris from the entire area within the limits of site disturbance shown on the drawings, except for those trees and shrubs designated to be protected.

5.9.2 Cut tree trunks to approximately 18 inches from the existing ground surface.

5.9.3 Stripping grass is considered as part of site clearing. All grass and weeds shall be stripped.

5.10 GRUBBING STUMPS

5.10.1 The Contractor shall remove all stumps, the main root ball, and root systems from within the clearing limits as shown on the drawings.

5.10.2 Removal of root systems shall continue until all roots larger than 1/2 inch in diameter are removed.

5.10.3 Grubbing operations are not considered as excavation.

5.11 DISPOSAL BY BURNING

5.11.1 Burn all cleared and grubbed vegetation by burning in the area designated by the Owner in accordance with Owner's safety regulations and obtain all permits required to conduct the burning operations.

5.12 MAINTENANCE OF CLEARED AREAS

5.12.1 The Contractor shall be responsible for maintaining cleared work areas in a condition free from additional vegetation growth for the duration of the project. Use of herbicides to discourage plant growth will not be allowed. The Contractor will be compensated for clearing each work area only once. If weed and brush growth require additional clearing, this shall be performed solely at the Contractor's expense

END OF SECTION 5.

SECTION 6: EARTHWORK

6.0 SCOPE

This Specification covers the minimum performance requirements, materials, and references necessary to govern earthwork and related operations. Earthwork is the movement of soil, sand, fly ash, bottom ash, or rock from one location to another, shaping the materials in accordance with the plans and specifications, and achieving the desired physical condition of the materials by various methods.

Earthwork associated with this project includes, but is not necessarily limited to, the following:

Stripping topsoil, if any.

Mass excavation

Selective base stabilization as agreed with Owner's Representative and Engineer

Dike construction (structural fill)

Disposal of excess fly ash and bottom ash excavation

Soil cover construction

Clay liner construction

Drainage blanket construction

Grading and ditch construction

Excavation and backfill for manhole(s) and piping

Furnishing, placing, and compacting

- coarse aggregate base course
- coarse aggregate base stabilization material
- coarse aggregate under concrete outlet structures
- coarse aggregate at outlet end of drainage blanket

Most of the material for dike construction will come from the mass excavation of the materials in the existing East Ash Pond and the proposed Secondary East Ash Pond. Bottom ash for the drainage blanket will be obtained from the existing bottom ash stockpile in the southeastern

corner of New Pond No. 2 about 1/2 mile west of the Proposed Primary East Ash Pond. Material for relatively impervious soil cover and the compacted clay liner will be imported from approved offsite sources submitted by Contractor. The top of dike surfacing will be coarse aggregate base course meeting IDOT material specifications for CA-1 and CA-6. A "plug" of IDOT CA-1 coarse aggregate will be placed on the outlet end of the drainage blanket to improve stability, and reduce seepage piping and runoff erosion. IDOT CA-3 coarse aggregate will be used for base stabilization at selected locations as agreed with the Owner's Representative.

Existing vegetation shall be stripped from the area within the clearing limits shown on the drawings and burned in an area designated by the Owner's Representative in accordance with Section 5, Clearing and Grubbing.

6.1 DIKE EMBANKMENT (STRUCTURAL FILL)

Dike embankment shall be constructed using a mixture of fly ash and bottom ash from the mass excavation required to construct the ash pond. The material shall be placed in maximum 8-inch thick loose lifts for fill compacted with large, self-propelled rollers and 4-inch thick loose lifts for fill compacted by other methods, at a moisture content between 2% below and 3% above the optimum moisture content specified in ASTM D 698 "Standard Proctor" and shall be compacted to at least 95% of maximum density as determined by ASTM D 698 "Standard Proctor".

6.2 CLAY LINER

Impervious borrow from an approved offsite source shall be used to construct the clay liner as shown on the Drawings. Materials for the clay liner shall include only materials meeting the following classifications of ASTM D 2487, "Classification of Soils for Engineering Purposes," placed as described in these Specifications or as approved by the Engineer.

Clays: CL, CH, CL-ML

Combinations of the above

Contractor shall thoroughly investigate and test proposed source of borrow for clay liner and submit results of his investigation to Owner's Representative for approval. To verify that the material to be obtained from the Contractor's borrow source will be suitable, Contractor shall engage a qualified independent geotechnical laboratory with demonstrated experience in performing flexible wall permeameter tests on clay to prepare

test specimens and perform tests in accordance with ASTM D-5084[2]. The experience and qualifications of the laboratory shall be submitted for approval, as well as the resume of the registered engineer who will oversee the testing and sign the test reports. The investigation and scope of each borrow source shall be in general conformance with EPA Technical Guidance Document 600/R/-93-182 [3](latest revision), pages 61 through 65 (Article 2.4). Relevant excerpts from this document are included in Appendix B. Adequate subsurface explorations will be made to verify that the borrow source contains an adequate volume of suitable clay for the liner construction. Material testing shall include (at minimum) water content, Atterberg limits, particle size distribution, ASTM D698 compaction curve, and hydraulic conductivity in accordance with ASTM D-5084. Procedures for preparation of test specimens shall be in accordance with the procedures given in EPA 600/R-93/182. The target water content shall be optimum water content and the target dry density shall be 95% of the maximum dry density. The minimum frequencies of the various types of tests to be performed shall be in accordance with Table 2.3 on Page 65 of the EPA guidance document (see Appendix B).

The liner material shall be placed in maximum 8-inch thick loose lifts for fill compacted with large, self-propelled rollers or and 4-inch thick loose lifts for liner compacted by other methods, at a moisture content between optimum and 3% above the optimum moisture content as determined by ASTM D 698 and shall be compacted to at least 95% of maximum density as determined by ASTM D 698. The maximum particle size in clay liner compacted with large, self-propelled rollers shall be 3 inches and the maximum particle size in clay liner compacted using other equipment shall be 2 inches. Oversize material shall be removed from the liner.

Contractor shall be responsible for maintaining clay liner in a condition such that its hydraulic conductivity is not increased above 1.0×10^{-7} cm/sec by drying, physical disturbance, or other factors. Steps that Contractor may take toward this end include but are not limited to wetting the surface periodically, applying a suitable membrane curing compound, adding moisture and recompacting, or a combination of such actions. Contractor shall submit a plan for maintenance of hydraulic conductivity to Engineer for approval.

[2] "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter"
[3] EPA/600/R-93-182, Quality Assurance and Quality Control for Waste Containment Facilities, September 1993, pp 60-65

Contractor shall be responsible for preparing and maintaining the surface of the clay liner for placement of the geomembrane liner. The surface will be smooth, which will be accomplished by a smooth drum roller. The surface shall be fee of all rocks larger than 3/8 inch, roots, sharp object or debris of any description. The surface of the clay liner shall provide a firm, unyielding foundation for the geomembrane with no voids or depressions greater than 2 inches in any dimension, nor abrupt changes or breaks in grade. No standing water or excessive moisture shall be permitted during installation of the liner material. Any voids and depressions shall be filled with clay liner material to complete a level surface.

6.3 DRAINAGE BLANKET

Bottom ash shall be used to construct the drainage blanket as shown on the Drawings. Materials available for construction of drainage blanket shall be obtained from the on-site stockpile of bottom ash at the southeast corner of New Ash Pond No. 2 and shall include materials meeting the following classifications of ASTM D 2487 placed as described in the Specifications or as approved by the Engineer.

Sands: SW, SP

Gravels: GW, GP

Combinations of the above

The Drainage Blanket shall be compacted with large, self-propelled vibratory rollers or track-laying tractors and shall be placed in maximum 14-inch thick loose lifts and shall be compacted by 2 passes of the equipment used for compaction. The maximum loose lift thickness for fill compacted by other methods shall be 8 inches.

6.4 SOIL COVER

Soil cover shall be used to construct the portion of the dike as shown on the Drawings. Materials available for construction of soil cover shall be obtained from approved off-site borrow sources. Relatively impervious materials having ASTM D2487 classifications of CL and CL-ML may be used as soil cover.

The maximum particle size in fill compacted with large self-propelled rollers shall be 3 inches and the maximum particle size in other fill shall be 2 inches. Oversize material shall be removed from the fill. The material shall be placed in maximum 8-inch thick loose lifts with large, self-propelled rollers and 4-inch thick loose lifts for fill compacted

by other methods, at a moisture content between 2% below and 3% above the optimum moisture content determined by ASTM D 698 and shall be compacted to at least 95% of maximum density determined by ASTM D 698.

6.5 BASE STABILIZATION

Base stabilization material shall be placed and compacted in selected locations as detailed on the drawings and as agreed with Owner's Representative. The material shall consist of IDOT CA-3 coarse aggregate, shall be placed in one 24-in. thick lift, and shall be compacted with 4 passes of a large, self-propelled roller or 140+-HP track-laying tractor.

6.6 ROADWAY BASE

Roadway base shall consist of a 4-inch thick layer of IDOT CA-1 topped with 2 inches of IDOT CA-6. Contractor shall place and compact coarse aggregate base along the top of the dike and in the infield as shown on the drawings. The base rock shall be distributed in layers of uniform thickness using a Jersey spreader or comparable equipment. The subgrade shall be prepared in accordance with current IDOT construction requirements[4] for aggregate base course (Section 351.04). The base shall be constructed in accordance with IDOT Section 351.05 for Type B base course. The Contractor shall submit samples of the base course materials to the Owner's Representative for approval.

6.7 COARSE AGGREGATE PLUG ALONG OUTBOARD SIDE OF DRAINAGE BLANKET

IDOT CA-1 shall be used for the plug on the outboard side of the drainage blanket as shown on the drawings. Filter geotextile shall be placed as shown on the drawings and trimmed to within ½ in. of the slope. The aggregate shall be placed in one lift and compacted to the satisfaction of the Engineer by tracking or tamping with a loader, bulldozer, or other equipment approved by the Engineer with care taken not to damage the filter geotextile.

6.8 CRUSHED ROCK UNDER STRUCTURES

Crushed rock meeting the requirements for IDOT CA-6 shall be placed and compacted under structures as shown on the drawings. The rock may be placed in a 12-in. thick layer if it can be compacted with a large self-propelled roller. If such compaction is not

[4] Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, Adopted January 1, 2002, and Supplemental Specifications and Recurring Special Provisions adopted March 1, 2005.

possible, the material shall be placed in 6-in. thick layers and compacted with other equipment to the satisfaction of the Engineer.

Contractor shall be responsible for dust control in all construction areas.

Payment for earthwork shall be as indicated on the Bid Form and as specified in this section.

6.9 DEFINITIONS

Excavation: Work done in obtaining material for dikes, liners, or fills.

Channel Excavation: The removal and satisfactory disposal or reuse of all materials encountered in the construction of ditches, stream channels, or swales.

Clay: Soils meeting the classifications of ASTM D 2487 for CL, CH and combination thereof.

Clearing: The removal and disposal of all obstructions such as fences, walls, foundations, buildings, trees, stumps, brush, accumulations of rubbish of whatever nature, and existing structures.

Construction Inspector: The Owner's on-site representative.

Contractor: The party or parties proposing to provide all labor, equipment and materials required to perform the work specified herein or on the plans.

Crushed Gravel: Fractured particles resulting from the crushing of gravel which, prior to crushing, would have been retained on a screen with an opening 1.5 times as large as the maximum size of the resulting crushed material.

Crushed Stone: Angular fragments resulting from the mechanical crushing of granite, limestone, or dolomite from undisturbed, consolidated deposits: (Dolomite shall be a carbonate rock containing 11.0% or more magnesium oxide (MgO). Limestone shall be a carbonate rock containing less than 11.0% magnesium oxide).

Dike: Consists of the construction of fill areas by hauling, depositing, placing and compacting the specified material above the natural surface to a specified grade line.

Engineer: The Owner's engineer which may be Dynegy Midwest Generation or their designated representative.

Footing Excavation: See Structure Excavation.

Gravel: Coarse, granular, unconsolidated material resulting from the reduction of rock by the action of the elements and having subangular to rounded surfaces conforming to the definitions set forth in the Unified Soil Classification System.

Inorganic Silt: Fine-grained soil possessing little or no plasticity or cohesion conforming to the definitions set forth in the Unified Classification System for ML.

Owner: Dynegy Midwest Generation, Wood River Power Station, or its designated representative.

Pipe Excavation: The excavation, removal and satisfactory disposal or reuse of all materials encountered constructing a trench for installation of the specified pipe.

Porous Backfill: Fine aggregate (clean sand) placed and compacted in excavations, around structures or other items as indicated in the plans and specifications.

Rock: Natural aggregate of mineral grains connected by strong and permanent cohesive forces.

Sand: Fine granular material resulting from the natural disintegration of rock conforming to the gradations set forth in the Unified Soil Classification System.

Soil: Natural aggregate of mineral grains, with or without organic constituents that can be separated by gentle mechanical means such as agitation in water. Gravel and sand are coarse-grained soils, while silts and clays are fine-grained soils.

Stripping: The excavation, removal and satisfactory disposal (if required) of all materials taken between the original surface and the top of suitable material for the construction of dikes, subgrade, sub-base, shoulders, intersections, ditches, waterways, entrances, approaches and incidental work.

Structure Excavation: Removal of any and all materials encountered during installation of any designated structure and the satisfactory disposal or reuse of all materials.

Unclassified Excavation: The removal of any combination of topsoil, earth, rock, muck or obstacles carried out to the lines and grades specified or shown on the plans without regard to percentage of moisture and type of material found.

Bottom Ash: The portion of the ash generated during coal combustion formed of angular particles ranging from sand to gravel-size. Bottom ash is free draining and has essentially no cohesion.

Fly Ash: The portion of the ash generated during coal combustion formed of silt-sized particles. Fly ash behaves as a silt soil with no cohesion.

6.10 REFERENCES

The reference to specifications or organizations (such as ASTM) together with any diagrams, drawings or plans shall be considered as part of this specification. In the event of conflict between this specification and the referenced documents, the requirements of this specification shall take precedence. The latest editions of the following specifications, standards, and codes apply:

American Society for Testing and Materials (ASTM)

ASTM D 75: Practice for Sampling Aggregates

ASTM D 420: Recommended Practice for Investigating and Sampling Soil and Rock for Engineering Purposes

ASTM D 421: Method for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

ASTM D 422: Method for Particle-Size Analysis of Soils

ASTM D 653: Terms and Symbols Relating to Soil and Rock Mechanics

ASTM D 698: Test Methods for Moisture - Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49 kg) Rammer and 12- inch Drop

ASTM D 854: Test Method for Specific Gravity of Soils

ASTM D 1140: Test Method for Amount of Material in Soils Finer than the No. 200 (0.074-mm) Sieve

ASTM D 1452: Practice for Soil Investigation and Sampling by Auger Borings

ASTM D 1556: Test Method for Density of Soil in Place by the Sand-Cone Method

ASTM D 2168: Methods for Calibration of Laboratory Mechanical-Rammer Soil Compactors

ASTM D 2216: Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures

ASTM D 2217: Method for Wet Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants

ASTM D 2487: Test Method for Classification of Soils for Engineering Purposes

ASTM D 2922: Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017: Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3740: Practice for the Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM D 4220: Practices for Preserving and Transporting Soil Samples

ASTM D 4318: Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM C 29: Test Method for Unit Weight and Voids in Aggregate

ASTM C 127: Test Method for Specific Gravity and Absorption of Coarse Aggregate

ASTM C 128: Test Method for Specific Gravity and Absorption of Fine Aggregate

ASTM C 136: Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM C 566: Test Method for Total Moisture Content of Aggregate by Drying

ASTM C 702: Methods for Reducing Field Samples of Aggregate to Testing Size

ASTM D 75: Practice for Sampling Aggregates

ASTM E 11: Specification for Wire-Cloth Sieves for Testing Purposes

ASTM D 3665: Practice for Random Sampling of Construction Materials

Standard Specifications for Road and Bridge Construction - Illinois Department of Transportation (IDOT)

6.11 MATERIALS

6.11.1 The clay liner shall be constructed of impervious fill with a permeability of not more 1.0 x 10^{-7} cm/sec as placed and compacted.

6.11.2 Additional soil tests may be made by the Engineer to confirm that actual materials used meet the permeability requirements. If the soil proves unsatisfactory, one or more of the following measures shall be taken:

6.11.3 The unsatisfactory material shall not be used in the liner, but may be used in other portions of the dike as shown on the Drawings provided that its properties meet the requirements for those portions of the dike.

6.11.4 With the approval of the Engineer, the compaction and/or moisture content requirements for the clay liner may be adjusted in some cases to reduce the permeability and allow its use in the liner.

6.11.5 The type of material and gradation to be used at a particular location will be as designated in this section, other portions of the specifications, and on the plans for the project.

6.11.6 Unsatisfactory material used in any portion of the dike (or other parts of this work) shall be removed and replaced at the Contractor's expense.

6.11.7 In most instances, coarse-grained material (gravels, crushed stone, sand) will be designated by an IDOT gradation. Materials with these gradations are readily available statewide. The drainage blanket shall be constructed from an on-site source of bottom ash as discussed in this section.

6.11.8 Fine-grained materials (clay, silty clay) will be designated by a Unified Soil System Classification Symbol (ASTM D 2487).

6.12 CONSTRUCTION REQUIREMENTS

6.12.1 Unless noted otherwise below, compaction requirements for all phases of the work shall be at least 95% of the maximum dry density and within -2% to +3% of the optimum moisture content as determined by ASTM D 698 (commonly referred to as the Standard Proctor test).

The clay liner shall be compacted to at least 95% of the maximum dry density at a moisture content between 0% and +3% of optimum moisture content as determined by ASTM D 698.

6.12.2 Compaction shall be obtained by mechanical means in a timely manner so as not to delay construction. Loose lift thickness may vary depending upon the condition of the material and equipment used, but shall not exceed 8 inches unless expressly allowed by this specification. Each lift may be tested by the Engineer or an outside agency.

6.12.3 Material placed that does not meet the minimum compaction requirements shall be reworked as necessary to obtain the specified compaction at no extra cost to the Owner. Reworking may include removal, rehandling, reconditioning (including drying or adding water), re-compacting, or combinations of these procedures. No further placement of material will be allowed until the compaction requirements are met. If the material becomes unsuitable for use after placement, even if previously compacted to the specified percentage, it shall be modified (or removed and replaced by suitable material) and compacted in accordance with the specifications at no extra cost to the Owner.

6.12.4 No material shall be placed on wet or frozen subgrade.

6.12.5 The Contractor shall maintain his work in such a manner to prevent ponding of water in the project area. In foundation excavations where water collects the Contractor shall pump as required to keep the excavation free of water. A layer of oversize rock (4 inches ±) covered by a layer of crushed stone (IDOT CA-6 or CA-10) or a mud mat shall be placed to allow work to proceed in the excavation without contamination by mud or water.

6.12.6 Erosion control is the responsibility of the Contractor.

6.12.7 Contractor shall submit sediment control plans meeting the requirements of the Federal and State EPA to the Owner for approval prior to the start of work. The plans shall clearly show routing of stormwater discharge and sediment control measures such as settling basins, silt fences, etc. The plans shall be fully implemented and maintained throughout the project at both the pond and borrow site locations.

6.12.8 The Contractor shall provide the Owner plans for control of sediment in stormwater runoff meeting the requirements for a construction-related stormwater discharge permit for both the pond and borrow sites. The Owner will submit these plans to the State for the permit. The Contractor shall provide and maintain sediment control systems that meet the State requirements. If the Owner requires additional sediment control measures beyond those required by the State, the Contractor shall be reimbursed at cost for the additional measures. The contractor shall submit with his bid an estimate of the cost of the materials to be used for sediment control.

6.12.9 Installation of sediment and erosion control measures shall be paid for as lump sum items. Maintenance of sediment and erosion control measures shall be considered incidental to the earthwork and will not be paid for separately

Contractor shall repair all erosion damage that occurs during the project at no additional cost to the Owner.

6.12.10 Disposal of all unsuitable material in a legal, safe, and satisfactory manner is the responsibility of the Contractor. This includes, but is not limited to, materials resulting from clearing and stripping and excess fly ash and bottom ash cut. Organics from stripping, clearing, and grubbing shall be burned in an area designated by the Owner. Excess fly ash and bottom ash cut shall be disposed of on site as directed by the Owner's Representative.

6.12.11 The Contractor shall be responsible for, and shall take all necessary precautions to preserve and protect all existing tile drains, sewers, other subsurface drains, underground utilities, above ground utilities, private transmission lines, and appurtenances which may be affected by his operations and shall repair, at his own expense, any and all damages resulting from his actions or inactions.

6.12.12 The Contractor shall notify the Engineer two days in advance of beginning or resuming work.

6.12.13 Unless shown differently on the Drawings or called for in these Specifications, trenches for pipe installation shall be excavated at least 18 inches wider than the outside diameter of the pipe in order to permit thorough tamping of the backfill against the pipe. Where a firm foundation is not encountered at the grade established all such unsuitable soil shall be removed for the width of the trench and replaced with well-compacted bedding material or suitable compacted aggregate. In areas requiring impervious backfill, the trench bottom shall be shaped to conform to the pipe's shape in lieu of bedding. Alternatively, the pipe trench can be backfilled with "flowable fill." Flowable fill shall be a flowable, hand-excavatable mixture of cement, pozzolan, coarse and fine aggregate, and water mixed in accordance with ASTM C 94. Contractor shall submit details for approval if he intends to use flowable fill, including mix proportions, entrained air, density range, slump, and compressive strength at 28 days.

6.12.14 Maintain access to the project site at all times. If the work is being performed at an existing facility the Contractor shall make the necessary arrangements to maintain access to vital areas.

6.12.15 Various portions of the work will require testing by the Engineer or an outside designated testing agency. The Contractor will cooperate with the testing program and make his work accessible at all times.

6.12.16 If the work generates sufficient dust to cause complaints to be received by the Owner, the Contractor shall remedy the situation to the satisfaction of the Owner at no cost to the Owner.

6.12.17 All holes, ruts, soft areas, and other defects shall be corrected. In no case shall the surface course, base course, or other items be placed on soft or unstable material or over areas that are not properly drained.

6.12.18 In cut sections where excessively wet soil is encountered, the Contractor will be required to dry the soil and to obtain compaction of the material in accordance with the requirements of these specifications.

6.12.19 The subgrade shall be constructed so that after being compacted it will conform to the alignment, grade, and cross section shown on the Drawings. Ruts in the finished subgrade of one inch or more in depth shall be removed from the work or the rutting shall otherwise be prevented. Rutted areas shall be graded and re-rolled with a smooth-wheeled roller.

6.12.20 A smooth surface is desired at the termination point of each type of material used whether it is virgin subgrade, dike material, crushed stone, or other construction materials. When a sheepsfoot roller is used, the area must be leveled at the finished grade. The interfaces between continuing layers of dike are not to be leveled and are expected to exhibit a normal amount of "fluff" associated with an ongoing fill operation.

6.12.21 Traffic control, including provisions for the necessary barricades, flagmen and other items, is the responsibility of the Contractor.

6.12.22 Earthwork operations shall comply with the following requirements:

6.12.23 Before any dike material is placed, all clearing and stripping over the entire area shall be performed. The top six inches of the exposed surface shall be disced, and then compacted to meet the requirements of this specification. When construction is resumed after any freezing weather the top eight inches of all partially completed dikes will be reworked and compacted to meet the requirements of this specification prior to placing more fill.

6.12.24 Dike material will be as specified in Section 6.1 of this specification, other portions of the specifications, or on the Drawings for the project. If required, the material shall be disced sufficiently to break down oversize clods, mix the material, secure a uniform moisture content, and insure uniform density and compaction. Each layer of material shall extend the entire length of dike, if possible, and shall be leveled when placed. Fill around structures is not to be placed until the concrete has attained its specified strength.

6.12.25 All irregularities in the final soil cover surface shall be filled or smoothed out before the seedbed is prepared. If the existing surface has become hardened or crusted it shall be disced or raked until broken up. All unsuitable debris and stones larger than 2 inches in diameter shall be removed from the area.

6.12.26 Road surfaces shall consist of crushed rock aggregate shown on the plans. The aggregate shall be deposited full-lane width directly on the subgrade or previous layer of compacted base course in such a way to prevent segregation and require a minimum amount of blade work. Immediately after placement of the material it shall be compacted by a rubber-tired roller or vibratory smooth steel drum roller to the requirements of IDOT Section 351 (Type B base course). If any subgrade material is worked into the base material during the operations affected base material shall be removed and replaced with new aggregate at no cost to the Owner.

6.13 INSPECTION BY OWNER

6.13.1 The Owner is responsible for testing the project materials and results of the work performed at regular intervals. Materials that fail to meet the specified requirements shall be reworked or replaced at the Contractor's expense.

6.13.2 The Contractor shall cooperate with the Owner at all times to provide access to the materials and site for testing purposes.

6.14 MEASUREMENT

6.14.1 The Owner reserves the right to increase or decrease quantities, as required, with no increase in the unit price except as noted in the Special Conditions.

6.14.2 Items measured in units of weight may be paid for on a dry-weight basis at the discretion of the Engineer if the moisture content is found to be excessive. The bid units will not be affected unless the moisture content of coarse-grained soils exceeds 12%.

6.14.3 Stripping, clearing and grubbing will be measured in acres.

6.14.4 Pipe excavation and furnishing, placing, and compacting bedding will not be measured for payment and are to be included in the bid price for the pipe.

6.14.5 Cross section measurements and the average end area method shall be used to determine volumes of excavations and required material for dikes unless otherwise approved by the Owner.

6.14.6 Borrow material and dike quantities shall be in net cubic yards of material moved and placed. The plan quantities will be used for bidding purposes. If there is a discrepancy between the successful bidder's take off quantities of more than plus or minus 5% of the plan quantities, the Contractor shall notify the Owner and Engineer in writing prior to starting work. The Owner will make arrangements to cross-section the project areas before and after earthwork is done to determine the amount of material moved in accordance with these specifications.

In determining the volumes, no allowance will be made for settlement, consolidation, or similar factors. Volume for Dike Embankment (Structural Fill) will be based on the before and after topographies of the completed embankment. Volume for Excavation and Disposal of Excess Cut will based on the before and after topographies of the borrow areas within the pond.

The following items will be measured in cubic yards:

Dike Embankment (Structural Fill)

Excavation and Disposal of Excess Cut

Soil cover

Clay Liner

Drainage Layer

Crushed Gravel

END OF SECTION SIX

SECTION 7: CONCRETE

7.0 SCOPE

7.0.1 This specification covers the minimum requirements for concrete foundations and slabs on grade.

7.0.2 Except as noted otherwise, the Contractor shall furnish all labor, material, tools, and equipment necessary for concrete work shown on the Drawings and specified herein.

7.0.3 Exceptions to the requirements of this specification will be considered only if submitted in writing with the bid and an increase (or decrease) in cost for complying with the requirements of this specification is provided.

7.1 DEFINITIONS

All design terms and symbols shall be as defined in ACI 318.

7.2 REFERENCES

7.2.1 Any specification or document referred to in this specification is to be considered as part of this specification. In the event of conflict between this specification and referenced documents, the requirements of this specification shall take precedence. The following specifications, standards, and codes apply:

7.2.1.1 American Concrete Institute (ACI)

ACI 305R: Recommended Practice for Hot-Weather Concreting.

ACI 306: Recommended Practice for Cold-Weather Concreting.

ACI 308: Recommend Practice of Curing Concrete.

ACI 315R: Manual of Standard Practice for Detailing R enforced Concrete Structures.

ACI-318: Building Code Requirements for Reinforced Concrete.

ACI 347: Recommend Practice for Concrete Formwork.

7.2.1.2 American Society for Testing and Materials (ASTM)

ASTM A 82: Cold Drawn Steel Wire for Concrete Reinforcement.

ASTM A 615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM C 31: Making and Curing Concrete Test Specimens in the Field.

ASTM C 33: Concrete Aggregates.

ASTM C 94: Ready-Mixed Concrete.

ASTM C 150: Portland Cement.

ASTM C 171: Sheet Materials for Curing Concrete.

ASTM C 309: Liquid Membrane - Forming Compounds for Curing Concrete.

ASTM C 494: Chemical Admixtures for Concrete.

Illinois Department of Transportation (IDOT) - 2002 Specifications for Roads and Bridges.

Standard Specifications For Highway Bridges 1996 with 2000 Interim Revisions, AASHTO.

Concrete Reinforcing Steel Institute (CRSI) Handbook 2002.

7.3 GENERAL REQUIREMENTS

7.3.1 All concrete work shall conform to ACI 347 unless otherwise specified. This work shall also be performed under the personal and constant supervision of a competent Construction Superintendent or Foreman experienced in concrete work.

7.3.2 The Contractor shall provide all forms required for concrete work above and below ground.

7.3.3 The Owner reserves the right to inspect all materials and make concrete tests to verify compliance with these specifications.

7.3.4 If requested, the Contractor shall provide concrete test cylinders in accordance with ASTM C 31 (two from each truckload) from the concrete placed for the structure foundations. Cylinders shall be dated and labeled as to the foundation and truckload number.

7.3.5 If the concrete test cylinders, whether made by the Contractor or a testing agency, fail to meet specified compressive strength, the Contractor shall replace any and all affected areas at his own cost.

7.3.6 The Contractor shall notify the Owner at least one day in advance of any concrete pour to allow scheduling of testing.

7.4 MATERIALS

7.4.1 Cement shall be Portland Cement conforming to ASTM C 150, Type I.

7.4.2 Fly ash shall be Class C or Class F conforming to AASHTO M-295

7.4.3 Fine aggregate shall be sand - clean, hard, durable, uncoated grains, free from deleterious substances, conforming to ASTM C 33. Gradation shall conform to IDOT specifications.

7.4.4 Coarse aggregate shall be natural rock or crushed limestone - clean, hard, durable uncoated particles without flat or elongated pieces. Aggregate shall be free from deleterious materials and shall conform to ASTM C 33. Gradation shall conform to IDOT specifications.

7.4.5 Water shall be clean and free from injurious amounts of oils, acids, salts, organic, or other deleterious matter.

7.4.6 Reinforcing bars shall conform to ASTM A 615, Grade 60 unless otherwise noted on the foundation Drawings. Reinforcing wire shall conform to ASTM A 82. All reinforcing shall be free from loose rust, dirt and oil.

7.4.7 Removable forms shall be wood, metal, approved fiber tubes, or other approved materials.

7.4.8 Curing materials shall conform to ASTM C 171. Curing compounds shall conform to ASTM C 309.

7.4.9 Water-reducing admixtures shall conform to ASTM C 494.

7.4.10 IDOT CA-6 road mix for backfill material shall conform to IDOT specifications.

7.5 EXCAVATION

7.5.1 All excavated materials shall be reused or properly disposed of on site by the Contractor, unless otherwise noted on the plans or in the specifications. Any affected ground area shall be returned to its former condition.

7.5.2 The actual depth of the foundation excavation shall be within $\pm$1 inches from the required foundation depth given on the Drawings.

7.5.3 If over-excavation occurs, the hole shall be filled at Contractor's expense with compacted CA-6 road mix or additional concrete up to the required level.

7.6 FORMS

7.6.1 Forms shall conform to the shape, line, and dimensions of the members indicated on the Drawings, and shall be substantial and tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape. Lumber, once used in forms, shall have nails withdrawn, and the surfaces to be exposed to concrete shall be carefully cleaned before reuse.

7.6.2 Forms for exposed surfaces shall be coated with nonstaining mineral oil, applied before the reinforcing steel is placed. Before concrete is placed, surplus oil shall be removed from the contact face of forms. All oil shall be removed from reinforcing steel and other surfaces requiring bond with concrete.

7.6.3 Forms shall not be disturbed until the concrete has adequately hardened and has gone through the first stage of curing, a minimum of 16 hours. Care shall be taken to avoid spalling the concrete surfaces. Wood forms and all particles of wood shall be completely removed.

7.7 REINFORCING

7.7.1 All bars shall be bent accurately, placed in position as shown on the Drawings, securely tied with #16 gauge black, annealed wire at all intersections, and securely held in place by spacers, chairs, or other approved supports in accordance with ACI 315R. At time of placing concrete, all reinforcing shall be free of loose rust, scale, oil, paint, mud, or other coatings that will destroy or reduce the concrete bond. Unless otherwise shown on the Drawings or specified, the spacing, amount of concrete coverage, splicing, and bending of reinforcing steel shall conform to the requirements of ACI 318.

7.7.2 Reinforcing shall not be welded unless approved by the Engineer.

7.7.3 Anchor bolts (when used) shall be a minimum of 6 inches from the bottom of the foundation. All steel shall have a minimum of 3 inches concrete cover.

7.7.4 Lap splices for reinforcement shall conform to requirements of ACI 318 Class B splices.

7.7.5 All anchor bolt threads shall be taped to protect them from dirt and concrete during construction.

7.7.6 Foundation anchor bolts shall be connected to the reinforcing cage as detailed on the plans. If no details are shown, the Contractor shall provide a minimum of four No. 4 bar cross ties, two at the top and two at the bottom of the anchor bolt cage, wired to diagonal anchor bolts, each other, and the reinforcing cage per 9.0 tolerances. For foundations with only two anchor bolts, only two No. 4 bars will need to be wired to the reinforcement and anchor bolts (one at the top and one at the bottom).

7.8 TOLERANCES

7.8.1 Formwork shall be designed, constructed and maintained so as to insure completed concrete work within tolerance limits.

7.8.2 Top elevation of the finished slab or foundation shall not vary more than + 1/4 inch from the elevation indicated on the Drawings.

7.9 CONCRETE MIX

7.9.1 The concrete mix design(s) to be used on the project shall be submitted to the Owner by the Contractor two weeks prior to any concrete placement at the job site

or at the preconstruction meeting. All materials incorporated into the concrete mix shall be identified by brand name, gradation, and the supplier.

7.9.2 All concrete shall have a minimum compressive strength of 3,500 psi at 28 days. The mix shall have a minimum of 5 1/2 sacks of cement per cubic yard and a maximum water cement ratio of 0.50 (by weight). Concrete mixes incorporating fly ash are strongly recommended. Fly ash from DMG facilities is preferred but not required.

7.9.3 All concrete shall have 5 to 7 percent entrained air.

7.9.4 All concrete shall have a slump of 4 to 5 inches unless otherwise approved by the Engineer.

7.9.5 Water-reducing admixtures may be used to help meet the above concrete mixture specifications, following admixture manufacturer recommendations.

7.10 MIXING CONCRETE

Unless otherwise approved by Engineer, "Ready-Mixed" concrete shall be used for all concrete. It shall be mixed and delivered in accordance with the requirements set forth in ASTM C 94.

7.11 PREPARATION FOR PLACING CONCRETE

7.11.1 Water shall be removed from excavations before depositing concrete. Hardened concrete, ice, debris, and foreign materials shall be removed from form interiors and from mixing and conveying equipment.

7.11.2 The On-Site Representative shall be notified sufficiently in advance of the scheduled time for concrete placement to permit examination of forms and reinforcement. No concrete shall be poured until the On-Site Representative has approved reinforcing and forms. This inspection is a precautionary measure and in no way relieves the Contractor of responsibility for the accuracy of form and reinforcement.

7.12 PLACING OF CONCRETE

7.12.1 Equipment for conveying concrete shall be of such size and design as to insure a continuous flow of concrete without material separation at the delivery end.

7.12.2 Concrete shall be conveyed from the mixer as rapidly as practical without segregation or loss of ingredients. Concrete shall be placed in forms as nearly as practical in final position to avoid rehandling. Vibrators shall not be used to transport concrete within forms. The concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the spaces between the reinforcing bars. No concrete that has partially hardened, been contaminated by foreign materials, or retempered shall be used. Immediately after depositing, concrete shall be compacted in an approved manner by spading, rodding, forking, or vibrating to eliminate air pockets. All concrete shall be worked into corners around reinforcement and inserts to prevent voids, trapped water, or stone pockets.

7.12.3 Care shall be exercised in use of a vibrator to prevent segregation, sand pockets, or bleeding. The vibrator shall be moved continuously in and out of concrete, remaining stationary only a few seconds in any position.

7.12.4 Once concreting has begun, it shall be carried on as a continuous operation until the placement is completed.

7.12.5 Adjacent surfaces shall be protected from concrete drippings, spillage, or splashes. Damaged surfaces shall be cleaned immediately.

7.13 HOT-WEATHER REQUIREMENTS

7.13.1 All hot-weather concreting shall conform to ACI 305R unless otherwise specified.

7.13.2 The maximum temperature of mixed concrete shall be 90°F. Temperature of aggregates and mixing water shall be reduced by the use of chilled water or ice.

7.14 COLD-WEATHER REQUIREMENTS

7.14.1 All cold-weather concreting shall conform to ACI 306 unless otherwise specified.

7.14.2 Concrete damaged by freezing shall be removed and replaced.

7.15 CURING AND PROTECTION

7.15.1 All curing shall conform to ACI 308 unless otherwise specified.

7.16 CONCRETE FINISHES ON EXPOSED SURFACES

7.16.1 Tops of all slabs shall be floated and brought to a true level with a 3/4-inch beveled or rounded edges or as shown on the drawings. Top surface shall be given a rough broom finish.

7.16.2 Exposed, formed surfaces shall be left unfinished except that larger voids shall be filled in with an approved concrete patching material. The On-site Representative will determine the voids that require filling. Small "bug holes" need not be filled.

7.17 JOINTS

7.17.1 Construction joints shall not be allowed unless otherwise shown on the Drawings or as directed and approved by the Engineer. Where a joint is to be made, it shall be formed with a keyway.

7.17.2 Immediately before the placing of new concrete, the hardened concrete surface shall be thoroughly cleaned, all laitance removed, and the surface dampened with clean water.

END OF SECTION SEVEN

SECTION 8: SEEDING

8.0 SCOPE

This specification covers the minimum requirements for seeding construction areas.

8.0.1 Use the seed mixture herein specified. Compositions of seed mixtures are given in Part 8.2 of this Section. Fertilizer requirements are given in Part 8.3, Fertilization of this Section.

8.0.2 Seed all disturbed areas at the pond site within the clearing limits that are not covered with geomembrane liner, stone, or concrete. This includes, but is not limited to, the following areas:

8.0.3 The outside faces of the dikes.

8.0.4 Disturbed areas adjacent to the outside toe of the dike.

8.0.5 Disturbed areas around piping and roadwork.

8.1 GENERAL REQUIREMENTS

8.1.1 All work shall be performed under the supervision of a competent Construction Superintendent or Foreman.

8.1.2 The Owner reserves the right to inspect all materials and perform all tests necessary to determine compliance with the specifications. If the materials or finished product fail to meet the controlling criteria for these tests, the Contractor shall replace all affected areas at the Contractor's expense.

8.1.3 Each lot of seed furnished shall be tested by a State Agriculture Department (including states other than Illinois).

8.1.4 Each bag shall be tagged or labeled as required by the Illinois Seed Law.

8.2 SEEDS

8.2.1 Rate of Application

Seed	lbs./Acre
Brome	30
Alfalfa	0
Oats	40

Seed mixtures shall be proportioned by weight.

8.2.2 No seeds shall be sown until they have been tested for purity and until such tests indicate that the seeds do not contain any seeds of the noxious weeds classed as "Primary Noxious Weed Seed" in the existing Illinois Seed Law, and not more than the maximum number per ounce sample, specified in Table 1 of this specification, "Secondary Noxious Weed Seed."

8.2.3 In determining the viable germination percent of legumes, the percent hard seed is to be added to the percent test germination; however, the percent hard seed added shall not exceed the maximum specified in Table 1 of this specification when planted in the fall season.

8.2.4 Seed having a purity that is below the purity specified in Table 1 of this specification will be rejected. Seeds that fail to meet the requirements of Table 1, "Maximum Weed Seed Percent" and "Remarks" will be rejected.

8.2.5 Pure, live seed shall be defined as the sproutable seed of a specified variety and calculated as the product of the viable germination times the purity. The seed weights per acre listed are designed to yield specific amounts of pure, live seed per acre based on the pure, live seed percent values listed in Table 1 of this specification. Seed that has actual pure, live seed yield according to tests less than the intended yield will be rejected.

8.3 FERTILIZER

8.3.1 Fertilizer shall be applied at the rates given below. Fertilizer will be measured by weight (in pounds) of actual nutrients supplied. Weight of each nutrient shall be

determined by the following formula: *(total wt. of fertilizer) x (percent of nutrient in fertilizer) = (wt. of nutrient provided).*

8.3.2 Fertilizer shall be supplied in either liquid or granular form. It shall be properly incorporated into the soil during application or immediately afterwards.

8.3.3 Fertilizer shall contain the following nutrients: Nitrogen (N), Phosphorus (P_2O_5), and Potassium (K_2O).

8.3.4 From 30 to 40% of the total nitrogen provided shall be in a slow-release form.

8.3.5 Provide 90 pounds of nitrogen (N) per acre, 30 pounds of phosphorus (P_2O_5) per acre, and 60 pounds of potassium (K_2O) per acre for all areas to be seeded.

8.3.6 No lime is required.

8.4 MULCH

8.4.1 Straw shall be stalks of air-dried wheat, rye, oats, or other approved straw.

8.4.2 Hay shall be air-dried. Hay shall be obtained from field of timothy, redtop, or mature brome grass.

8.5 OPERATIONS

8.5.1 Seedbed Preparation

8.5.1.1 Immediately prior to the seedbed preparation, fertilizer nutrients shall be uniformly spread at the designated rate over the areas indicated on the plans.

8.5.1.2 Stones, boulders, debris and similar material larger than two inches in diameter shall be removed from the seedbed area. The seedbed will be worked to a minimum depth of three inches, reducing all soil particles to a size smaller than two inches in the largest dimension. The prepared surface shall be relatively free from weeds, clods, stones, roots, sticks, rivulets, gullies, crusting, and caking.

8.5.2 Seeding

8.5.2.1 No seed shall be sown during unfavorable climatic conditions or when the ground is not in a proper condition for seeding.

8.5.2.2 All seeded areas, including slopes up to 3H:1V or flatter, shall be rolled at right angles within 12 hours of seeding to compact the seed bed and place the seed in contact with the soil. Slopes steeper than 3H:1V do not need to be rolled.

8.5.2.3 Seeding shall be done in a way that incorporates the seed at the optimum depth of 1/4 inch.

8.5.2.4 All legumes shall be inoculated per the manufacturer's recommendations immediately before sowing.

8.5.2.5 Seeding shall be done between April 1 and December 1.

8.5.2.6 Within 24 hours from the time the seeding has been performed, the seedbed shall be given a covering of mulch. On slopes steeper than 3H:1V, mulch shall be applied on the same working day.

8.5.2.7 Mulch shall be used on all seeded areas not specified otherwise.

8.5.2.8 Hay or straw mulch shall be hand or machine applied loose enough to permit air to circulate, but compact enough to prevent erosion. If baled material is used, care shall be taken that the material is in a loosened condition.

8.5.2.9 The mulch shall be stabilized by working the area with dull blades or disks.

8.6 SEED SPECIFICATIONS

TABLE 1

Variety of Seeds	Hard Seed % Max.	Purity % Min.	Pure, Live Seed % Min.	Weed % Max.	Secondary Noxious Weeds Number/Oz Maximum Permitted	Remarks
Alfalfa	20	92	89	0.50	6	Note 1
Brome Grass	--	75	68	2.00	5	--
Dawson Red Fescue	0	97	85	0.10	3	--
Fescue, Alta or KY. 31	--	92	88	1.00	6	--
Fescue, Creeping Red	--	75	82	1.00	6	--
Fults Salt Grass	0	98	85	0.10	2	--
Kentucky Bluegrass	--	75	72	0.50	7	Note 5
Lespedeza, Korean	20	92	84	0.50	6	Note 3
Oats	--	92	88	0.50	2	Note 4
Orchard Grass	--	75	70	1.50	5	Note 4
Redtop	--	75	78	1.80	5	Note 4
Reed Canary Grass	--	92	63	1.00	5	--
Ryegrass, Perennial, Annual	--	92	88	0.50	5	Note 4
Rye, Grain, Winter	--	92	83	0.50	2	Note 4
Scaldis Hard Fescue	0	97	85	0.10	3	--
Timothy	--	92	84	0.50	5	Note 4
Wheat, Hard Red Winter	--	92	89	0.50	2	Note 4

Note 1. Shall be grown in Kansas or farther north; shall be free from any mixture with southern or foreign seeds, blends or adulterations with screenings, frosted or damaged seeds; and shall not contain more than 0.2 percent bur or sweet clover mixture.

Note 2. Shall be free from blends or adulterations with screenings, blasted, shriveled or immature seeds.

Note 3. Shall be hulled and free from blends or adulterations with blasted, shriveled or immature seeds.

Note 4. Shall be re-cleaned.

Note 5. Shall not contain more than 5 percent adulteration with Canada Blue Grass, Merion Blue Grass or other hybrids or varieties of blue grass.

*No primary Noxious Weeds are permitted

END OF SECTION EIGHT

SECTION 9: MISCELLANEOUS STEEL AND OTHER METAL

9.0 SCOPE

This specification covers the minimum requirements for the design, material, fabrication, inspection, protective coating, drawings, and delivery of miscellaneous steel and other metal. Corrugated steel and ductile iron pipe are not included in the scope of this section.

In the event of discrepancies between the Vendor's proposal and this Specification, the terms of this Specification shall govern unless written justification for exception is submitted by the Vendor and approved by the Engineer.

9.1 DEFINITIONS

9.1.1 The term "Vendor", as used in this Specification, shall refer to the party or parties proposing to perform the work and provide the material herein specified to the Contractor.

9.1.2 All design terms and symbols shall be as defined in the AISC - Steel Construction Manual (latest edition).

9.2 REFERENCES

The reference to specifications of organizations (such as ASTM), together with any diagrams, drawings, and loading schedules, shall be considered part of this Specification. In the event of conflict between this Specification and referenced documents, the requirements of this Specification shall take precedence. The following specifications, standards, and codes apply:

9.2.1 American Society for Testing and Materials (ASTM)

ASTM A 6 - General Requirements

ASTM A 143 - Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

ASTM A 194 - Carbon and Alloy Steel Nuts for Bolts for High Pressure and High-Temperature Service.

ASTM A 325 - High Strength Bolts for Structural Steel Joints.

ASTM A 384 - Safeguarding Against Warpage and Distortion during Hot-Dip Galvanizing of Steel Assemblies.

ASTM B 209 - Specification For Aluminum And Aluminum-Alloy Sheet And Plate

9.2.2 American Institute of Steel Construction (AISC)

AISC - Steel Construction Manual (latest edition)

9.2.3 Steel Structures Painting Council Surface Preparation Specification (SSPC-SP)

SSPC-SP6 - No. 6 Commercial Blast Cleaning (latest edition)

9.2.4 American National Standards Institute (ANSI)

9.2.5 National Electrical Safety Code (NESC) Part 2

ANSI C135.1 - American National Standard for Galvanized Steel Bolts and Nuts for Overhead Line Construction

American Welding Society (AWS) "Structural Welding Code" AWS D 1.1 (latest edition)

9.3 GENERAL CONSIDERATIONS

9.3.1 All steel is to be hot dipped galvanized in accordance with ASTM A 123 after fabrication.

9.3.2 All aluminum plate shall conform to ASTM B 209.

9.3.3 All structural steel shapes and plates shall be ASTM A 36, hollow structural sections (HSS) shall be ASTM A 500, Grade A and steel grating shall conform to ANSI/NAAMM MBG 531-00.

9.3.4 Welds shall be with E70 electrodes. Bolts shall be hot dipped galvanized A325 bolts.

9.3.5 Concrete anchors and other accessories and manufactured components shall be as shown on the plans.

9.4 DRAWINGS

9.4.1 After acceptance of a proposal, the Contractor shall submit to the Engineer three prints of each detail drawing. One set of these Drawings will be returned to the Contractor marked as "approved" or "approved as noted" or "not approved". Fabrication shall not begin until the appropriate detail drawings have been approved.

9.4.2 Engineer's approval of the Vendor's drawings is approval of intent of design and detail only, and in no way relieves the Vendor of responsibility for adequacy or the correctness of dimensions and details.

9.4.3 Each detail drawing shall include, as a minimum, the following information:

Dimensions.

Description and strength of material.

Weld locations and sizes.

Size, description, quantity, and location of all holes and hardware.

Any other special information.

9.5 MATERIAL

9.5.1 All structural plate material shall be selected with sufficient ductility to avoid brittle fracture.

9.5.2 The Vendor shall use suitable quality control procedures to insure that the correct steel strength is used in the fabrication of the hardware.

9.5.3 Materials the Vendor proposes to substitute for those stated herein shall be identified with the applicable ASTM or ANSI designation and shall be subject to the approval of the Engineer.

9.5.4 Fasteners

9.5.4.1 All bolts shall conform to ASTM A325 or ANSI C135.1. Nuts shall conform to ASTM A 194 Grade 2, and shall be tapped 0.020 inches oversize for pitch and major diameter. All nuts, bolts, and washers shall be hot dipped galvanized.

9.5.4.2 For galvanized hardware, nuts and bolts shall be galvanized in accordance with ASTM standards, but hot-dip galvanizing will not be allowed for any material with a yield strength greater than 100 ksi.

9.5.6 All bolts of any one diameter and similar length shall be of the same type and strength.

9.5.7 All bolt locations shall permit easy wrench access to both the bolt head and the nut.

9.5.8 Fasteners for aluminum plate shall be stainless steel and insulating washers shall be used to minimize galvanic corrosion.

9.6 FABRICATION AND QUALITY CONTROL

9.6.1 Fabrication tolerances will be in accordance with ASTM A 6.

9.6.2 Fabrication shall be in strict accordance with shop detail drawings prepared by the Vendor and approved by the Engineer.

9.6.3 Straightening Material - Before being laid out or worked in any manner, structural material shall conform to ASTM A 6 for permissible variations in straightness. If straightening is necessary, it shall be done by methods that will not injure the metal. Members that are bent or warped or otherwise improperly fabricated will be rejected by the Owner.

9.6.4 Bending - All forming or bending during fabrication shall be done by methods that will prevent embrittlement or loss of strength in the material being worked.

9.6.5 Holes for connection bolts shall be 1/16 inch larger than the nominal diameter of the bolts. The details of all connections and splices shall be subject to the approval of the Engineer. Connections shall be detailed in accordance with AISC 1.1.5.2 to avoid rust expansion (pack-out).

9.6.7 All holes shall be cylindrical, perpendicular to the member, clean-cut, and chamfered (when specified). Where necessary to avoid hole distortion, holes close to the points of bends shall be made after bending. The use of a burning torch for cutting holes will not be permitted without approval from the Engineer.

9.7 PROTECTIVE COATINGS

9.7.1 Surface preparation

9.7.1.1 For galvanized structures, all fabricated steel components shall be blast cleaned in accordance with SSPC-SP6, or cleaned with an acid-pickling procedure with approval from the Owner.

9.7.2 Galvanizing

9.7.2.1 Hardware shall be galvanized in accordance with the applicable ASTM standard and shall remain corrosion-free for 10 years.

9.7.2.2 Precautions shall be taken against embrittlement, warping, and distortion in accordance with ASTM A143 and in accordance with ASTM A384.

9.8 SHIPPING

9.8.1 Steel shall be suitably protected to prevent damage to the surface finish during shipment.

9.8.2 Each shipment shall be accompanied by a checklist of all parts on that particular shipment. Bolts, nuts, and other hardware shall be either boxed or bundled.

9.9 INSPECTION BY OWNER

9.9.1 Materials and workmanship shall, at all times, be open to inspection and acceptance or rejection by the Owner either at the Vendor's plant or at the point of delivery. Any omission or failure on the part of the Owner to disapprove or reject any work or materials at the time of inspection shall not be construed as an acceptance of any defective work or materials.

9.9.2 The Owner shall have free entry to all parts of the Vendor's plant at all times while work is being carried on. The Vendor shall afford the Owner reasonable facilities, without charge, to satisfy Owner that the materials are being furnished strictly in accordance with this Specification. The Owner will comply with the Vendor's safety rules.

9.9.3 The Owner reserves the right to make additional tests and/or inspections deemed necessary to verify compliance with this Specification. Generally, the cost of these tests and inspections shall be borne by the Owner. However, the direct cost of all tests directly related to, and indicating noncompliance with this Specification shall be borne by the Vendor.

END OF SECTION NINE

SECTION 10: HYDRAULIC STRUCTURES

10.0 GENERAL

All concrete hydraulic structures shall be constructed of precast reinforced concrete. The Contractor or his pre-cast concrete vendor shall be responsible for the structural design of such structures in accordance with American Concrete Institute Building Code Requirements for Structural Concrete and Commentary, Document No. ACI 318-02/318R-02 (1 Jan 2002).

10.1 PRE-CAST DESIGN RECOMMENDATIONS

The structures shall be designed assuming the earth outside of the structure exerts a total equivalent fluid weight of 104 lbs/cu ft. The designs shall assume that there will be water outside of the structure level with the top of each structure and that there is no compensating head of water inside the structure. The allowable soil bearing capacity shall be assumed to be 2,000 lbs/sq ft. Passive pressures to resist horizontal loads may be computed assuming the ash backfill is cohesionless and has an angle of internal friction of 30 degrees (for fly ash compacted to at least 95% of the ASTM D698 maximum dry density). The structures shall be designed to be watertight and shall be designed to resist buoyancy.

The fabrication, modifications, and installation of concrete hydraulic structures shall comply with Section 602 of the Illinois Dept. of Transportation "Standard Specifications for Road and Bridge Construction," adopted January 1, 2002.

Overall dimensions of structure sections shall be as shown in the plans. Minimum thickness and reinforcement shall be as shown in the Illinois Dept. of Transportation "Highway Standards." In addition to these minimums, the fabricator of precast concrete structures shall design and construct the products to support the anticipated loads and meet industry standards.

10.2 SUBMITTALS

Submittals for structures shall include all precast concrete products, frames, and grates. All design drawings shall be sealed by a Structural Engineer registered in Illinois.

END OF SECTION TEN

SECTION 11: RIPRAP

11.0 SCOPE

This Specification covers the minimum requirements for furnishing, transporting, and placing a protective course of stone as riprap on slopes or in channels.

Except as noted otherwise, the Contractor shall furnish all labor, material, tools, and equipment necessary for riprap work shown on the Drawings and specified hereinch

11.1 REFERENCES

11.1.1 The reference to specifications or organizations together with any diagrams, drawings, or plans shall be considered as a part of this Specification. In the event of conflict between this Specification and the referenced documents, this Specification shall take precedence. The following specifications, standards, and codes apply:

American Society for Testing and Materials (ASTM)

ASTM D-751-79: Standard Methods of Testing Coated Fabrics

ASTM D-1682-64: Standard Test Methods for Breaking Load and Elongation of Textile Fabrics

ASTM D-1777-64: Standard Method for Measuring Thickness of Textile Materials.

ASTM D-3776-85: Standard Test Methods for Mass Per Unit Area (Weight) of Woven Fabric

ASTM D-3786-87: Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Non-woven Fabrics – Diaphragm Bursting Strength Tester Method

ASTM D-3884-80: Standard Test Method for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)

11.2 GENERAL REQUIREMENTS

11.2.1 This work shall be performed under the personal and constant supervision of a competent Construction Superintendent or Foreman experienced in this type of work.

11.2.2 The Owner reserves the right to inspect all materials and reject all substandard materials and workmanship.

11.3 MATERIALS

11.3.1 Riprap shall be rock that is sound, dense, durable, angular, hard, free from cracks, seams, clay, and other defects that would lead to deterioration under water and/or frost action. Rounded boulders or cobbles will not be accepted as riprap. Neither the breadth nor the thickness of any piece of riprap shall be less than one-third of its length.

11.3.1.1 The riprap stone shall be quarried from ledges for Portland cement concrete quality stone provided the ledges are sufficiently thick to produce the desired dimensions. The riprap stone and bedding shall conform to Coarse Aggregate, Class A quality. The riprap shall be obtained from sources and locations that are approved by the Owner. The following tests shall be performed by the Contractor and submitted in advance of placing the proposed riprap, using the services of an independent testing laboratory acceptable to the Owner:

Na_2S0_4 Soundness – 5 cycle	
Max % Loss	10
Los Angeles Abrasion	
Max % Loss after 100 revolutions	10
Max % Loss after 500 revolutions	40
Minus No. 200 Sieve Material l %	2.5
Max % Deleterious	
Shale Max %	1.0
Clay Lumps Max %	0.25
Coal & Lignite Max %	0.25
Soft & Unsound Fragments Max %	4.0
Other Deleterious Max %	4.0
Total Deleterious Max %	5.0
Max % freeze-thaw loss (AASHTO T103)	5

11.3.2 Gradation: The riprap shall meet gradation requirements for IDOT Gradation 3.

11.3.3 A non-woven geotextile meeting the specifications in Section 12, Filter Geotextile shall be placed on the subgrade for the riprap:

11.4 CONSTRUCTION REQUIREMENTS

11.4.1 The area to be riprapped shall be cleared of vegetation and other debris. The subgrade for the riprap shall be trimmed and shaped so that the finished surface shall conform to the lines specified.

11.4.2 Riprap Placement

Geotextile shall be placed on the subgrade and anchored in accordance with the manufacturer's recommendations.

11.4.2.1 Stone shall be placed on the geotextile to produce a reasonably well-graded mass of rock with a minimum percentage of voids and constructed to the lines and grades shown.

11.4.2.2 Stone riprap shall be placed to its full course thickness at one operation and in such a manner as to avoid damage to the geotextile. Placing of the material shall start at the lower elevations and progress up the slope. The larger stones shall be well distributed and the entire mass of stones in their final positions shall be roughly graded to conform to the gradation specified. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Placing of material by methods that segregate particle sizes will not be permitted. Rearranging individual stones by mechanical equipment or by hand will be required to the extent necessary to obtain a reasonably well-graded distribution of stone sizes as specified.

11.4.2.3 Thickness: As shown on the Drawings.

11.4.3 Surplus or excess material resulting from clearing the work area and shaping of the subgrade shall be disposed of by the Contractor. This work shall be incidental to the contract.

11.4.4 Any ruts, depressions, mounds, or other damage caused by the Contractor shall be repaired by the Contractor at no cost to the Owner. Repairs to improved areas shall be with like materials and workmanship as the adjacent areas.

11.5 MEASUREMENT

11.5.1 Riprap shall be measured in cubic yards.

11.5.2 Geotextile fabric shall be measured in square yards.

END OF SECTION ELEVEN

SECTION 12: FILTER GEOTEXTILE

12.0 SCOPE

Contractor shall furnish all geotextile, labor, incidental materials, tools, supervision, transportation, and installation equipment necessary for the installation of geotextile, as specified herein, and as shown on the drawings.

12.1 REFERENCES

ASTM D 5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles

ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

ASTM D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles

ASTM D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products

ASTM D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity

ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile

ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing

ASTM D 4759, Standard Practice for Determining the Specifications Conformance of Geosynthetics

12.2 SUBMITTALS

12.2.1 Prior to material delivery to project site, the contractor shall provide the Owner with a written certification or manufacturers quality control data showing that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.

12.2.2 The contractor shall submit, if required by the Owner, a manufacturer's quality control manual for the geotextile to be delivered to the site.

12.3 PRODUCT

12.3.1 Geotextile

12.3.1.1 The non-woven needle punched geotextile specified herein shall be made from polypropylene staple or continuous fiber.

12.3.1.2 The geotextile shall be manufactured from first quality virgin polymer.

12.3.1.3 The geotextile shall be able to withstand direct exposure to ultraviolet radiation from Sun for up to 15 days without any noticeable effect on index or performance properties.

21.3.1.4 Geotextile shall meet or exceed all material properties listed in Table 1.1 for 8-oz/sq yd geotextile.

Table 1.1 – Minimum Average Roll Values (MARV) Required
for Nonwoven Needlepunched Geotextiles:

TESTED PROPERTY	TEST METHOD	FREQUENCY	NW4	NW6	NW8	NW10	NW12	NW16
Product Code			GEO 0409002	GEO 0609002	GEO 0809002	GEO 1009002	GEO 1209002	GEO 1609002
Mass per Unit Area, oz/yd² (g/m²)	ASTM D 5261	90,000 ft²	4 (135)	6 (200)	8 (270)	10 (335)	12 (405)	16 (540)
Grab Tensile Strength, lb (N)	ASTM D 4632	90,000 ft²	120 (530)	170 (755)	220 (975)	260 (1,155)	320 (1,420)	390 (1,735)
Grab Elongation, %	ASTM D 4632	90,000 ft²	50	50	50	50	50	50
Puncture Strength, lb (N)	ASTM D 4833	90,000 ft²	60 (265)	90 (395)	120 (525)	165 (725)	190 (835)	240 (1,055)
Trapezoidal Tear Strength, lb (N)	ASTM D 4533	90,000 ft²	50 (220)	70 (310)	95 (420)	100 (445)	125 (555)	150 (665)
Apparent Opening Size, Sieve No. (mm)	ASTM D 4751	540,000 ft²	70 (0.212)	70 (0.212)	80 (0.180)	100 (0.150)	100 (0.150)	100 (0.150)
Permittivity, sec⁻¹	ASTM D 4491	540,000 ft²	1.50	1.50	1.50	1.20	0.80	0.70
Permeability, cm/sec	ASTM D 4491	540,000 ft²	0.22	0.30	0.30	0.30	0.29	0.27
Water Flow Rate, gpm/ft² (l/min/m²)	ASTM D 4491	540,000 ft²	120 (4,885)	110 (4,480)	110 (4,480)	85 (3,460)	60 (2,440)	50 (2,035)
UV Resistance (% retained after 500 hours)	ASTM D 4355	per formulation	70	70	70	70	70	70
Roll Length, ft (m)			600 (182)	600 (182)	600 (182)	300 (91)	300 (91)	300 (91)
Roll Width, ft (m)			15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)
Roll Area, ft² (m²)			9,000 (836)	9,000 (836)	9,000 (836)	4,500 (418)	4,500 (418)	4,500 (418)

NOTES:

- The property values listed are in weaker principal direction. All values listed are Minimum Average Roll Values (MARV) except apparent opening size in mm and UV resistance. Apparent opening size (mm) is a Maximum Average Roll Value. UV is a typical value.

12.4 MANUFACTURE

All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.

12.5 TRANSPORT

12.5.1 Transportation of the geotextile shall be the responsibility of the contractor.

12.5.2 During shipment, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.

12.5.3 Upon delivery at the job site, the contractor shall ensure that the geotextile rolls are handled and stored in accordance with the manufacturer's instructions as to prevent damage.

12.6 EXECUTION

12.6.1 Quality Assurance

12.6.1.1 The Owner or Engineer shall examine the geotextile rolls upon delivery to the site and report any deviations from project specifications to the contractor.

12.6.1.2 The Owner or Engineer may decide to arrange conformance testing of the rolls delivered to the job site. For this purpose, the engineer shall take a sample three feet (along roll length) by roll width according to ASTM Practice D 4354. The sample shall be properly marked, wrapped, and sent to an independent laboratory for conformance testing.

12.6.1.3 The pass or fail of the conformance test results shall be determined according to ASTM Practice D 4759.

12.7 INSTALLATION

21.7.1 The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way. Should the contractor damage the geotextile to the extent that it is no longer usable as determined by these specifications or by the engineer, the contractor shall replace the geotextile at his own cost.

12.7.2 The geotextile shall be installed to the lines and grades as shown on the contract drawings and as described herein.

12.7.3 The geotextile shall be rolled down slopes in such a manner as to continuously keep the geotextile in tension by self weight. The geotextile shall be securely anchored in an anchor trench where applicable, or by other approved or specified methods.

12.7.4 In the presence of wind, all geotextiles shall be weighted by sandbags or approved equivalent. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.

12.7.5 The contractor shall take necessary precautions to prevent damage to adjacent or underlying materials during placement of the geotextile. Should damage to such material occur due to the fault of the contractor, the latter shall repair the damaged materials at his own cost and to the satisfaction of the Owner.

12.7.6 During placement of the geotextile, care shall be taken not to entrap soil, stones or excessive moisture that could hamper subsequent seaming of the geotextile as judged by the engineer.

12.7.7 The geotextile shall not be exposed to precipitation prior to being installed and shall not be exposed to direct Sun light for more than 15 days after installation.

12.7.8 The geotextile shall be overlapped a minimum of 12 inches or seamed using heat seaming or stitching methods as recommended by the manufacturer and approved by the engineer. Sewn seams shall be made using polymeric thread with chemical resistance equal to or exceeding that of the geotextile. All sewn seams shall be continuous. Seams shall be oriented down slopes perpendicular to grading contours unless otherwise specified. For heat seaming, fusion-welding techniques recommended by the manufacturer shall be used.

21.7.9 The contractor shall not use heavy equipment to traffic above the geotextile without approved protection.

12.7.10 The geotextile shall be covered as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 15 days.
Material overlying the geotextile shall be carefully placed to avoid wrinkling or damage to the geotextile.

12.8 MEASUREMENT

Filter Geotextile shall be measured as in-place square yards including overlaps, seams and wastage.

END OF SECTION TWELVE

Section 13: REINFORCING GEOTEXTILE

13.0 SCOPE

Contractor shall furnish all material, labor, incidental materials, tools, supervision, transportation, and installation equipment necessary for the installation of reinforcing geotextile, as specified herein, as detailed on the drawings in areas as directed by the Owner's Representative.

Reinforcing Geotextile will be part of "base stabilization" as required to prepare soft areas of the pond liner subgrade. Areas requiring "base stabilization", if any will be identified during regrading by the Owner's Representative.

13.1 REFERENCES

13.1.1 AASHTO Standards

T88 - Particle Size Analysis of Soils

T90 - Determining the Plastic Limit and Plasticity Index of Soils

T99 - The Moisture-Density Relations of Soils Using a 5.5lb (2.5 kg) Rammer and a 12in (305 mm) Drop.

M288-96 - Geotextile Specification for Highway Applications

13.1.2 American Society for Testing and Materials (ASTM):

D 123 - Standard Terminology Relating to Textiles

D 276 - Test Method for Identification of Fibers in Textiles

D 3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics

D 4354 - Practice for Sampling of Geosynthetics for Testing

D 4355 - Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)

D 4439 - Terminology for Geotextiles

D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity

D 4533 - Test Method for Index Trapezoid Tearing Strength of Geotextiles

D 4595 - Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

D 4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles

D 4751 - Test Method for Determining Apparent Opening Size of a Geotextile

D 4759 - Practice for Determining the Specification Conformance of

Geosynthetics

D 4833 - Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

D 4873 - Guide for Identification, Storage, and Handling of Geotextiles

D 5141 - Test Method to Determine Filtering Efficiency and Flow Rate for Silt Fence Applications Using Site Specific Soils

13.1.3 Texas Department of Transportation, Manual of Testing Procedures
TEX 616-J - Asphalt Retention and Potential Change of Area

13.1.4 Federal Highway Administration (FHWA) - Geosynthetic Design and Construction Guidelines, Publication No. FHWA HI-95-038, May 1995.
American Association for Laboratory Accreditation (A2LA)
Geosynthetic Accreditation Institute (GAl) - Laboratory Accreditation Program (LAP).

National Transportation Product Evaluation Program (NTPEP)

13.2 DEFINITIONS

Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

13.3 SUBMITTALS

Submit the following :

Certification: The contractor shall provide to the Engineer a certificate stating the name of the manufacturer, product name, style number, chemical composition of the filaments or yarns and other pertinent information to fully describe the geotextile. The

Certification shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the Manufacturer's quality control program. The Certification shall be attested to by a person having legal authority to bind the Manufacturer.

13.4 QUALITY ASSURANCE

13.4.1 Manufacturer Qualifications:

1. Geosynthetic Accreditation Institute (GAI)- Laboratory Accreditation Program (LAP)
2. American Association for Laboratory Accreditation (AALA)

13.5 DELIVERY, STORAGE, AND HANDLING

13.5.1 Geotextiles labeling, shipment, and storage shall follow ASTM D 4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

13.5.2 Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

13.5.3 During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

13.6 PRODUCTS

13.6.1 Materials

13.6.1.1 Geotextile:

The geotextile shall be manufactured with fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyesters. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages.

13.6.2.2 The geotextile shall meet the requirements of Table 1. All numeric values in Table 1 except AOS represent MARV in the weakest principal

direction. Values for AOS represent maximum average roll values.

TABLE 1 - REINFORCING GEOTEXTILE

Property	Test Method	Units	Elongation < 50%[1]
Grab Tensile Strength	ASTM D 4632	N (lbs)	1100 (247)
Sewn Seam Strength	ASTM D 4632	N (lbs)	990 (222)
Tear Strength	ASTM D 4533	N (lbs)	400 (90)
Puncture Strength	ASTM D 4833	N (lbs)	400 (90)
Burst Strength	ASTM D 3786	kPa (psi)	2700 (391)
Permittivity	ASTM D 4991	sec^{-1}	0.02
Apparent Opening Size	ASTM D 4751	mm (US Sieve)	0.60 max (30)
Ultraviolet Stability (after 500 hrs)	ASTM D 4355	%	50

[1] As measured in accordance with ASTM D 4632

13.7 QUALITY CONTROL

13.7.1 Manufacturing Quality Control: Testing shall be performed at a laboratory accredited by GAI-LAP and A2LA for tests required for the geotextile, at frequency meeting or exceeding ASTM D 4354.

13.7.2 Geotextile properties, other than Sewn Seam Strength, Burst Strength, and Ultraviolet Stability shall be as tested by NTPEP to verify conformance with this specification.

13.7.4 Sewn Seam Strength shall be verified based on testing of either conformance samples obtained using Procedure A of ASTM D 4354, or based on manufacturer's certifications and testing of quality assurance samples obtained using Procedure B of ASTM D 4354. A lot size for conformance or quality assurance sampling shall be considered to be the shipment quantity of the given product or a truckload of the given product, whichever is smaller.

Ultraviolet Stability shall be verified by an independent laboratory on the geotextile or a geotextile of similar construction and yarn type.

13.8 EXECUTION/INSTALLATION

13.8.1 The installation site shall be prepared by clearing, grubbing, and excavation or filling the area to the design grade. This includes removal of topsoil and vegetation.

13.8.2 The geotextile shall be laid smooth without wrinkles or folds on the prepared bgrade in the direction of construction traffic. Adjacent geotextile rolls shall be sewn in accordance with the Manufacturer's recommendations.

13.8.3 On curves, the geotextile may be folded or cut to conform to the curves. The fold or overlap shall be in the direction of construction and held in place by pins, staples, or piles of fill or rock.

13.8.4 Prior to covering, the geotextile shall be inspected by the Owner or Engineer to ensure that the geotextile has not been damaged during installation. Damaged geotextiles shall be repaired immediately. Cover the damaged area with a geotextile patch which extends 18 iches beyond the damaged area.

13.8.5 The subbase shall be placed by end dumping onto the geotextile from the edge of the geotextile, or over previously placed subbase aggregate. Construction vehicles shall not be allowed directly on the geotextile. The subbase shall be placed such that at least the minimum specified lift thickness shall be between the geotextile and equipment tires or tracks at all times. Turning of vehicles shall not be permitted on the first lift above the geotextile.

13.8.6 The subbase aggregate should be spread in its full thickness as soon as possible after dumping to minimize the potential of localized subgrade failure due to overloading of the subgrade.

13.8.7 Any ruts occurring during construction shall be filled with additional subbase material, and compacted to the specified density.

13.8.8 If placement of the backfill material causes damage to the geotextile, the damaged area shall be repaired as previously described above. The placement procedure shall then be modified to eliminate further damage from taking place.

13.9 MEASUREMENT

Reinforcing Geotextile shall be measured as in-place square yards including overlaps, seams and wastage.

END OF SECTION THIRTEEN

SECTION 14: DUCTILE IRON PIPE, VALVES, AND FITTINGS

14.0 SCOPE

The work consists of furnishing and installing ductile-iron pipe, fittings, and appurtenances as shown on the Drawings.

14.1 MATERIAL

Ductile-iron pipe and fittings shall conform to the following requirements. Thickness, class of pipe and rated working pressure shall be as shown on the Drawings.

14.1.1 Pipe

Ductile-iron pipe shall conform to the requirements of ANSI/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids, and ANSI/AWWA C115/A21.15, Flanged Ductile-Iron Pipe with Threaded Flanges.

14.1.2 Fittings

Ductile-iron pipe fittings shall conform to the requirements of ANSI/AWWA C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids, and ANSI/AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3-inch through 12-inch, for Water and Other Liquids.

14.1.3 Joints

Rubber-gasket joints for ductile-iron pipe and fittings where either mechanical or push-on joints are used shall conform to the requirements of ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings. Unless otherwise specified or indicated on the Drawings, all joints shall be mechanical joints.

14.1.4 Lining

Interior lining for ductile-iron pipe and fittings shall conform to the requirements of ANSI/AWWA C104/A21.4, Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water. Unless otherwise specified, special fittings and appurtenances shall be the same material as the pipe.

14.1.5 Plug Valves

The plug valves shall be Milliken Millcentric Series 610/611 or equal plug valves with ductile iron body, Class 125 flanged ends, and solid ductile iron plug. Valves shall be primed and painted black with Tnemec or equal two-part epoxy paint applied in accordance with the manufacturer's recommendations.

14.2 LAYING AND BEDDING THE PIPE

A minimal amount of ductile iron pipe will be installed at the connection to an outlet structure as shown on the drawings. Laying, bedding and handling pipe specification will not be included herein.

14.3 MEASUREMENT AND PAYMENT

The installation of the ductile iron pipe,valves, and fittings will be part of the lump sum for outfall hydraulic structures.

14.4 ITEMS OF WORK AND CONSTRUCTION DETAILS

14.8.2 All ductile iron pipe shall be Special Thickness Class 55 or heavier. All ductile iron pipe fittings shall be mechanical joint or flanged fittings, pressure class 350 or heavier.

14.8.3 Connection of the new 12-inch diameter pipe to the ductile iron wall connector shall be made with appropriate mechanical joint ductile iron coupling or fitting meeting the requirements of this Specification.

14.8.4 Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than 20 psi pressure. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure within 1 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

$L = 0.0001351(N)(D)P^{0.5}$

L = Allowable leakage in gallons per hour

N = Number of joints in the length of pipeline tested

D = Nominal diameter of the pipe in inches

P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Owner.

END OF SECTION FOURTEEN

SECTION 15: HIGH DENSITY POLYETHYLENE PIPE

15.0 SECTION INCLUDES

Furnishing and installing HDPE pipe and fittings.

15.1 RELATED SECTIONS

Section 4: Submittals.

15.2 REFERENCES

ASTM D 638: Test Method for Tensile Properties of Plastics.

ASTM D 790: Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

ASTM D 1238: Test Method for Flow Rates of Thermal Plastics Molding and Extrusion Materials.

ASTM D 1505: Test Method for Density of Plastics by the Density Gradient Technique.

ASTM D 1599: Test Method for Short Time Hydraulic Failure Pressure of Plastic Pipe Materials.

ASTM D 1693: Test Method for Environmental Stress Cracking of Ethylene Plastics.

ASTM D 2122: Method for Determining Dimensions of Thermal Plastic Pipe and Fittings.

ASTM D 2837: Method for Obtaining Hydrostatic Design Basis for Thermal Plastic Pipe Materials.

ASTM D 3350-84: Polyethylene Plastics Pipe and Fitting Material.

ASTM F 714-93: Polyethylene (PE) Plastic Pipe Based on Outside Diameter.

ASTM F 1248: Determination of Environmental Stress Crack Resistance (ESCR) of Polyethylene Pipe.

ASTM D 4218: Test Method for Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.

ASTM D1 248: Specification for Polyethylene Plastics Molding and Extrusion Material.

ASTM D 2240: Test Method of Rubber Property - Durometer Hardness.

ASTM D 695: Test Method for Compressive Strength of Rigid Plastics.

ASTM D 256: Test Method for Impact Resistance of Plastics and Electrical Insulating Material.

ASTM D 696: Test Method of Coefficient of Linear Thermal Expansion of Plastics.

ASTM C 177: Test Method for Steady-State Heat Flux Measurement and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

ASTM D 746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

ASTM D 152S:Test Method for Vicat Softening Temperature of Plastics.

15.3 Submittals

15.3.1 Submit in accordance with Section 4, Submittals.

15.3.2 Submit certifications, manufacturer's data, shop drawings, test results, and records as necessary to show that materials, methods, and workmanship meet or exceed the requirements of these specifications.

15.3.3 Submit the following to the Engineer for review and acceptance prior to shipment of the pipe:

15.3.3.1 A statement in writing from the pipe manufacturer that it is listed with the Plastic Pipe Institute as an extruder for polyethylene resin being used to manufacture the pipe for this project.

15.3.3.2 Catalog information confirming the pipe conforms to the requirements of these specifications.

15.4 PRODUCTS

15.4.1 HDPE Pipe Materials

15.4.2 Physical Properties for pipes and fittings:

Typical Physical Properties*

Property	Specification	Units	Nominal Values
Material Designation	PPI/ASTM	---	PE3408
Material Classification	ASTM D1248	---	III C 5 P34

Cell Classification		ASTM D3350	---	345434C
Density	(3)	ASTM D1505	gm/cm^3	0.955
Melt Flow	(4)	ASTM D1238	gm/10 min	0.11 @ 2.16 kg***
Flex Modulus	(5)	ASTM D790	psi	135,000
Tensile Str.	(4)	ASTM D638	psi	3,200
ESCR	(3)	ASTM D1693	F_0, Hrs	F_0>5,000
HDB @ 73^0F	(4)	ASTM D2837	psi	1,600
U-V Stabilizer	(C)	ASTM D1603	% C	2.5
Hardness		ASTM D2240	Shore "D"	65
Compressive Strength (Yield)		ASTM D695	psi	1,600
Tensile Strength @ Yield(Type IV Spec)		ASTM D638(2"/min)	psi	3,200
Elongation @ Yield		ASTM D638	% minimum	8
Tensile Strength @ Break(Type IV Spec)		ASTM D638(2"/min)	psi	5000
Elongation @ Break		ASTM D638	% minimum	750
Modulus of Elasticity		ASTM D638	psi	130,000
ESCR				
(Cond A, B, C: Mold. Slab)		ASTM D1693	F_0, Hrs	F_0>5,000**
Compressed Ring (Pipe)		ASTM F1248	F_{50}, Hrs	F_{50}>3,500**
Slow Crack Growth		Battelle Method	Days to Failure	F_0>64
Impact Strength (IZOD) (.125" THK)		ASTM D256(Method A)	in-lb/in Notch	42
Linear Thermal Expansion Coef.		ASTM D696	$in/in/^0F$	1.2×10^{-4}
Thermal Conductivity		ASTM C177	$BTU-in/Ft^2/hrs/^0F$	2.7
Brittleness Temp.		ASTM D746	^0F	<-180
Vicat Soft Temp.		ASTM D1525	^0F	+257
Heat Fusion Cond.		---	psi @ ^0F	75 @ 400

This list of Typical Physical Properties is intended for basic characterization of the pipe, and does not represent specific determinations or specifications.

**Tests were discontinued because no failures and no indication of stress crack initiation.

***Average Melt Index Value with a standard deviation of 0.01.

15.4.3 Materials used for the manufacture of polyethylene pipe and fittings shall be extra high molecular weight, high density ethylene/hexane copolymer PE 3408 polyethylene resin meeting the above physical properties and pipe performance requirements. The material shall be listed by the Plastics Pipe Institute in PPI TR-4 with a 73^0F hydrostatic design basis rating of 1600 psi and a 140^0F hydrostatic design basis rating of 800 psi. The PPI Listing shall be based on ASTM D2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe.

15.5 PIPE

15.5.1 Solid Pipes

Pipe shall be produced with nominal physical properties outlined in Paragraph 2.1.1 and to the dimensions and tolerances specified in ASTM F714. Pipe shall be inspected per industry accepted manufacturer standards for:

Diameter

Wall Thickness

Concentricity

Joint Length

Ovality

Toe-In

Overall Workmanship

Inspection on ID & 0D

Print Line

Pipe shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions or other deleterious defects, and shall be identical in color, density, melt index and other physical properties throughout.

Pipe shall be in compliance with the physical and performance requirements of Paragraph 2.1.1.

Pipe sizes and types: All pipe shall be sized as shown on drawings and shall be DR 17 ductile iron pipe size (DIPS).

15.6 FITTINGS

Furnish shop fabricated fittings as shown on the Drawings or required by the work. Fittings shall be molded or custom fabricated and shall have the same pressure ratings and wall thicknesses, or greater, than the pipe connected.

15.7 EXECUTION

15.7.1 Preparation

Inspect pipe and fittings prior to assembly. Mark and remove from the jobsite all materials that are damaged or do not meet the specifications.

15.7.2 Sections of pipe with cuts or gouges in excess of ten percent of the wall thickness of the pipe shall be cut out and removed.

15.7.3 Confirm location of pipe, fittings and connections.

15.8 PIPE INSTALLATION - GENERAL

15.8.1 Install pipe to the lines indicated on the Drawings.

15.8.2 Handle and install pipe in accordance with the manufacturer's recommendations.

15.8.3 Joining

Butt heat fusion weld the joints in strict accordance with the manufacturer's instructions. The butt fusion equipment shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400^0F, alignment and 75 psi interfacial fusion pressure.

Joint weld strength shall be equal to or greater than the tensile strength of the pipe.

Socket fusion shall not be used.

END OF SECTION FIFTEEN

SECTION 16: CORRUGATED STEEL PIPE

16.0 GENERAL

16.1 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM A 123/A 123M: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 742/A 742M: Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe

ASTM A 760/A 760M: Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

ASTM A 762/A 762M: Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

ASTM A 798/A 798M: Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

16.2 MATERIALS

16.2.1 Pipe for Skimmer (Pond Level Control Structure) and 36" secondary pond outlet pipe near the saddle tee connection to the existing 72" CSP as shown on the drawings

16.2.2 Pipe for the skimmer shall be 9-foot diameter 8-gauge pipe and pipe for the saddle tee connection shall be 36" diameter pipe as recommended by the manufacturer for the saddle tee connection and conforming to the requirements specified below:

16.2.3 Fully Bituminous Coated AASHTO M 190 Type A and ASTM A 760/A 760M zinc or aluminum (Type 2) coated pipe of either:

Type I pipe with helical 2-2/3 by 1/2 inch corrugations.

Type IR pipe with helical 3/4 by 3/4 by 7-1/2 inch corrugations.

16.3 EXECUTION

16.3.1 Handling

Materials shall be handled in a manner that ensures delivery is in a sound and undamaged condition. Pipe shall be carried, not dragged.

16.4 MEASUREMENT AND PAYMENT

16.4.1 Compensation for the CSP pipe, including furnishing and installing the pipe, will be not be paid for separately and will be incidental to the lump sum work required with the Outfall Hydraulic Structures.

END OF SECTION SIXTEEN

SECTION 17: GEOMEMBRANE (HDPE) LINER

17.0 SECTION INCLUDES

Specifications and guidelines for MANUFACTURING and INSTALLING geomembrane.

17.1 REFERENCES

17.1.1 American Society for Testing and Materials (ASTM)

D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting

D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer

D 1505 Test Method for Density of Plastics by the Density-Gradient Technique

D 1603 Test Method for Carbon Black in Olefin Plastics

D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry

D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics

D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes

D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods

D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

17.1.2 Geosynthetic Research Institute

GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

17.2 DEFINITIONS

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.

Construction Quality Assurance Consultant (CONSULTANT) - Party, independent from MANUFACTURER and INSTALLER that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

Engineer- The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

Geomembrane Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geomembrane rolls.

Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY)- Party, 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.

Installer- Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

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

Patch- Unit area of a geomembrane that will be seamed in the field that is less t han 100 ft^2.

Subgrade Surface- Soil layer surface which immediately underlies the geosynthetic material(s).

17.3 SUBMITTALS POST-AWARD

Furnish the following product data, in writing, to the OWNER prior to installation of the geomembrane material:

17.13.1 Resin Data shall include the following.

Certification stating that the resin meets the specification requirements below.

- Geomembrane Roll
- Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).

17.13.2 The INSTALLER shall furnish the following information to the OWNER prior to installation:

- Installation layout drawings
- Must show proposed panel layout including field seams and details
- Must be approved prior to installing the geomembrane
- Approved drawings will be for concept only and actual panel placement will be determined by site conditions.
- Installer's Geosynthetic Field Installation Quality Assurance Plan

17.3.3 The INSTALLER will submit the following to the OWNER upon completion of installation:

- Certificate stating the geomembrane has been installed in accordance with the Contract Documents
- Material and installation warranties
- As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail

17.4 QUALITY ASSURANCE

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

17.5 QUALIFICATIONS

17.5.1 Manufacturer

MANUFACTURER shall have manufactured a minimum of 10,000,000 square feet of polyethylene.

17.5.2 Installer

INSTALLER shall have installed a minimum of 10,000,000 square feet of HDPE geomembrane during the last 5 years.

INSTALLER shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and with at least 1,000,000 square feet of HDPE geomembrane installation on each project.

The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to this project.

The INSTALLER shall provide a minimum of one Master Seamer for work on the project.

Must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

17.6 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

17.6.1 Labeling - Each roll of geomembrane delivered to the site shall be labeled by the MANUFACTURER. The label will identify:

- manufacturer's name
- product identification
- thickness
- length
- width

- roll number

17.6.2 Delivery- Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

17.6.3 Storage- The on-site storage location for geomembrane material, provided by the CONTRACTOR to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:

- level (no wooden pallets)
- smooth
- dry
- protected from theft and vandalism
- adjacent to the area being lined

17.6.3 Handling- Materials are to be handled so as to prevent damage.

17.7 WARRANTY

17.7.1. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

17.7.2 Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

17.8 GEOMEMBRANE

17.8.1 Material shall be smooth high density polyethylene geomembrane as shown on the drawings.

17.8.2 Resin

Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.

Natural resin (without carbon black) shall meet the following minimum requirements:

Property	Test Method	HDPE	LLDPE
Density [g/cm^3]	ASTM D 1505	0.932	0.915
Melt Flow Index [g/10 min.]	ASTM D 1238 (190/2.16)	≤ 1.0	≤ 1.0
OIT [minutes]	ASTM D 3895 (1 atm/200°C)	100	100

17.8.3 Geomembrane Rolls

Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.

Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.

Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width and MANUFACTURER.

All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed herein, and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

17.8.4 The geomembrane liner shall be 60-mil, smooth HDPE meeting the requirements shown in the following table:

Property	Test Method[(1)]	
Thickness, mil (mm)	ASTM D 5199	
Minimum Average		60 (1.5)
Lowest Individual Reading		54 (1.4)

Density, g/cm^3	ASTM D 1505	0.94
Carbon Black Content, %	ASTM D 1603, mod.	2.0
Carbon Black Dispersion	ASTM D 5596	*Note 2*
Tensile Properties: *(each direction)*	ASTM D 6693	
Length at Yield, lb/in (kN/m)		130 (23)
Length at Break, lb/in (kN/m)		243 (43)
Elongation at Yield, %	(1.3" gauge length)	13
Elongation at Break, %	(2.0" gauge length)	700
Tear Resistance, lb (N)	ASTM D 1004	42 (187)
Puncture Resistance, lb (N)	ASTM D 4833	119 (530)
Notched Constant Tensile Load, hours	ASTM D 5397, app.	400
Oxidative Induction Time, min.	ASTM D 3895	100

[1] Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.

2 Only near spherical agglomerates are considered. 9 of 10 views shall be Category 1 or 2. No more than one view Category 3.

17.8.5 Extrudate Rod or Bead

1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

17.9 EQUIPMENT

17.9.1 Welding equipment and accessories shall meet the following requirements:

1. Gauges showing temperatures in apparatus (extrusion welder) or wedge (wedge welder) shall be present.

2. An adequate number of welding apparatus shall be available to avoid delaying work.

3. Power source must be capable of providing constant voltage under combined line load.

17.10 DEPLOYMENT

17.10.1 Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.

17.10.2 Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.

17.10.3 Deployment of the membrane panels shall be performed in a manner that will comply with the following guidelines:

1. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
2. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
3. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
4. Do not allow vehicular traffic directly on geomembrane.
5. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.
6. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

17.11 FIELD SEAMING

17.11.1 Seams shall meet the following requirements:

1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the OWNER representative/CQA consultant and INSTALLER.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.

6. Seam strength shall meet the following:

Property	Test Method	Minimum Value
Peel Strength (fusion), ppi (kN/m)	ASTM D 6392	98 (17.2)
Peel Strength (extrusion), ppi (kN/m)	ASTM D 6392	78 (13.7)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	121 (21.2)

17.11.2 Seam strengths should meet the following during welding operations: Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

17.11.3 Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

17.11.4. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

17.11.5 Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.

5. Quantitatively test specimens for peel adhesion, and then for shear s trength.
6. Trial weld specimens shall pass when the results shown in Table 3 are s how the required seam strengths are achieved in both peel and shear test.
7. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
8. The break is ductile.
9. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
10. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed a trial weld.

17.11.6 Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. INSTALLER shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

17.11.7 Defects and Repairs

Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.

Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

17.12 FIELD QUALITY ASSURANCE

17.12.1. MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the Owner's quality assurance program. CONTRACTOR shall be responsible for assuring this participation.

17.12.2 Field Testing

Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.

17.12.3 Vacuum Testing

Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

17.12.4 Air Pressure Testing

Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.

17.12.5 Destructive Testing (performed by the OWNER representative or CQA Consultant with assistance from INSTALLER)

17.12.5.1 Location and Frequency of Testing

Collect destructive test samples at a frequency of one per every 500 lineal feet of seam length.

Test locations will be determined after seaming.

17.12.5.2 Sampling Procedures are performed as follows:

1. INSTALLER shall cut samples at locations designated by the OWNER or ENGINEER as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
2. OWNER or ENGINEER will number each sample, and the location will be noted on the installation as-built.
3. Samples shall be twelve (12) inches wide by minimal length with the seam centered lengthwise.
4. Cut a 2-inch wide strip from each end of the sample for field-testing.
5. Cut the remaining sample into two parts for distribution as follows:
   - One portion for INSTALLER, 12-inches by 12 inches
   - One portion for the OWNER or ENGINEER, 12-inches by 18-inches
   - Additional samples may be archived if required.

17.12.5.3 Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

- INSTALLER shall repair all holes in the geomembrane resulting from destructive sampling.
- Repair and test the continuity of the repair in accordance with these Specifications.

17.12.5.4 Failed Seam Procedures

If the seam fails, INSTALLER shall follow one of two options:

1. Reconstruct the seam between any two passed test locations.
2. Trace sample and re-test the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.

The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.

If sample passes, then the seam shall be reconstructed or capped between the test sample locations.

If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

17.13 REPAIR PROCEDURES

Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

17.13.1 INSTALLER shall be responsible for repair of defective areas.

17.13.2 Agreement upon the appropriate repair method shall be decided between CONSULTANT and INSTALLER by using one of the following repair methods:

1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
2. Abrading and Re-welding- Used to repair short section of a seam.
3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
4. Capping- Used to repair long lengths of failed seams.

5. Flap Welding- Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap. Use of this method must be approved by the Owner or CQA Consultant on a case-by case basis.
6. Remove the unacceptable seam and replace with new material.

17.13.10 The following procedures shall be observed when a repair method is used:

1. All geomembrane surfaces shall be clean and dry at the time of repair.
2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

17.13.14. Repair Verification

Number and log each patch repair (performed by CQA CONSULTANT).

Non-destructively test each repair using methods specified in this Specification.

17.14 MEASUREMENT AND PAYMENT

17.14.1 Payment for geomembrane installation will be as per contract unit price per square foot, as measured parallel to liner surface, including designed anchor trench material and is based upon net lined area.

17.14.2 Net lined area is defined to be the true area of all surfaces to be lined plus designed burial in all anchor trenches, rubsheets, and sacrificial layers.

17.14.3 Prices shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals.

17.14.4 Prices also include doing all the work involved in performing geomembrane installation completely as shown on the Drawings, as specified herein, and as directed by the OWNER.

END OF SECTION SEVENTEEN

Appendix E: DMG Wood River Power Station West Ash Pond System – Operation and Maintenance Plan (2013)

DYNEGY MIDWEST GENERATION, LLC

Wood River Power Station
Alton, Illinois

Madison County

West Ash Disposal System

Small Class III Dam

IDNR Permit No. DS2011079

Dam ID No. IL50281

Operations and Maintenance Plan

Revised: August 2013

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1.0 General

The following maintenance procedures are provided to insure the structural integrity of the Wood River Power Station West Ash Pond facility, which is classified as a small Class III dam by the Illinois Department of Natural Resources, Office of Water Resources, Division of Water Resources, Dam Safety section.

2.0 Emergency Operations

2.1 Unusual Conditions

Any unusual condition discovered during routine inspection, which may constitute an emergency shall be handled as follows:

Notice of any type of emergency involving the berms or outfall shall be made to the Shift Leader on duty (618-462-9251). The Shift Leader on duty shall notify the Supervisor – Environmental and Chemistry, Tim Arnold (618-433-0110; cell: 618-225-9043) or the Manager - Production John Muehlenkamp (618-433-0112; cell: 618-410-8770). One of the above designated personnel shall notify the county, state and federal regulatory authorities and the DOC Environmental Compliance of the emergency condition.

- Division of Water Resources, Dam Safety Section (217-782-3863)
- Illinois Emergency Services & Disaster Agency (800-782-7860)
- Madison County Sheriff (618-692-4433)
- Environmental Compliance (Collinsville) – Rick Diericx, Sr. Director (618-343-7761; 217-519-4034; rick.diericx@dynegy.com) or Phil Morris. Env. Engineer (618-343-7794; 618-401-5060; Phil.L.Morris@dynegy.com)

2.2 Dewatering

The Supervisor – Environmental and Chemistry or the Manager – Production shall have the responsibility of determining whether dewatering of the disposal facility is necessary.

3.0 Maintenance

3.1 Vegetation

Berms shall be maintained to protect the structural integrity of the disposal facility. Damaged and barren areas shall be repaired as soon as appropriate after being discovered. Trees and shrubs observed during semiannual inspections shall be cut and removed from the berms. This shall be done frequently enough that no trees will reach the size where the root structure would require removal and filling. Woody vegetation, shrubs and trees shall be removed, probably by mowing, during the early stages of growth. Mowing of berms should be

conducted if necessary to facilitate improved inspecting during March and September. Routine mowing should maintain grass cover at the 8-10 inch height.

3.2 Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling.

3.3 Restriction of Unauthorized Vehicles

Berm approaches shall be posted to prevent unauthorized traffic on roadways and slopes.

3.4 Inspections/Remedial Measures

3.4.1 Daily Surveillance

During the normal course of business, Station Operations personnel make a routine surveillance of the plant property, including the ash impoundments. During this time, station personnel should look for any unusual conditions, and if discovered, report them to the Station Environmental and Chemistry Supervisor.

3.4.2 Weekly Inspections

Weekly inspection shall be made of the dam, embankments and outfall structures. A check should be made for seepage at and around the embankments.

3.4.3 Quarterly Inspections

Quarterly inspections shall be made during optimal conditions to determine the general condition of the berm, decant structure, spillway outlet works and catch basin discharge. Degradation of riprap, berm erosion, tree growth, animal burrows and levee seepage shall be monitored during these inspections. Appropriate actions shall be taken to remedy any concern. Any erosion on the interior face of the berms will be noted and repaired as soon as practical. These repairs could be accomplished by reseeding the area or by placing rock/riprap, etc. to stop erosion.

3.4.4 Five-Year Inspections by Registered Professional Engineer

Every five (5) years, an inspection shall be made by a licensed Professional Engineer. This inspection shall follow IDNR “Guidelines and Forms for Inspection of Illinois Dams”, and shall be followed by verbal and written reports by the consulting engineer. Based on the inspection, the Supervisor Environment and Chemistry shall implement corrective action as required to insure dam safety. Procedures and methods for corrective action shall be performed in accordance with the recommendation of the consulting engineer as outlined above.

Copies of the engineer's report, along with the corrective action taken, shall be forwarded by Environmental Compliance to the Illinois Department of Natural Resources, Office of Water Resources.

3.4.5 Inspection Checklists

The following Inspection checklists should be used during the weekly and quarterly inspections.

Wood River Power Station
West Ash Pond System

QUARTERLY DAM INSPECTION FORM

Dam Location: Wood River Power Station – West Ash Pond (cells # 2E and 3)
Owner: Dynegy Midwest Generation, LLC
Permit No.: DS2011079 **Class of Dam: III**
Type of Dam: Homogeneous earth embankment
Type of Spillway: Drop inlet concrete boxes, for both primary and 2nd cells

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

_____
Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Downstream Fill Slopes		.
Upstream Fill Slopes		
Unusual Movement or Cracking at or Beyond Toe		
Seepage (Condition/Color)		
Vegetative Cover (Tree growth)		
Animal Damage		
Embankment Erosion		
Water Passages		
Structural Cracking		
Outfall Structures		
Other		

Wood River Power Station
West Ash Pond (cells 2E and 3)
***Weekly* Inspection Form**

Dam Location: Wood River Power Station; Madison County
Owner: Dynegy Midwest Generation, LLC; Wood River Power Station
Permit No.: DS2011079 **Class of Dam:** Class III
Type of Dam: Homogeneous earth embankment
Type of Spillway: Drop inlet concrete boxes, for both primary and 2nd cells

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

_____ _____
Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

3.5 Annual Statement

An annual statement on forms furnished by IDNR/OWR certifying compliance with this maintenance plan shall be submitted to IDNR/OWR/Dam Safety section.

Appendix F: DMG Wood River Power Station East Ash Pond System – Operation and Maintenance Plan (2013)

DYNEGY MIDWEST GENERATION, LLC

Wood River Power Station

Alton, Illinois

Madison County

East Ash Disposal System

Small Class I Dam

IDNR Permit No. DS2011079

Dam ID No. IL50536

Operation and Maintenance Plan

Revised: August 2013

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1.0 General

1.1 Responsible Party

The Wood River Managing Director and his/her staff are responsible for the operations and maintenance of the Wood River East Ash Pond System.

1.2 General Description

The function of the Wood River East Ash Pond System is for ash disposal for the Wood River Power Station. This station is staffed with a full operation crew 24 hours/day, 365 days per year. The following maintenance procedures are provided to insure the structural integrity of the Wood River Power Station East Ash Pond facility, which is classified as a *Small* Class I dam by the Illinois Department of Natural Resources, Office of Water Resources, Division of Water Resources, Dam Safety section.

The Wood River East Ash Pond System is an ash disposal and water treatment facility with a foot print of approximately 38 acres. The impoundment has the capacity to store approximately 483 acre-feet of water and ash at a maximum nominal depth of 15 feet. The embankments are constructed out of previously disposed ash, with a soil cover on the outside and a composite liner on the inside. The composite liner consists of 1.5 feet of clay, overlain by a HDPE geosynthetic liner.

The water shed for the impoundment is limited to the impoundment itself; it does not receive any stormwater from outside of its perimeter. The only inflow to the facility, other than precipitation falling directly into the system, is miscellaneous Station water flows with the primary flow being ash sluice water. The outfall of the impoundment is directed into a CMP culvert under the rail loop which is termed an unnamed tributary to Wood River Creek. From there it discharges into the Wood River Creek and then into the Mississippi River.

2.0 Operating Plan

2.1 Normal Operating Procedures

The Wood River East Ash Pond is operated as a wastewater treatment facility. Since the drainage runoff area is nearly similar to the size of the facility, the only inflow (other than precipitation falling directly on the facility) will be flows pumped from the Station. Except when the water elevation is changed (an infrequent occurrence) the facility will be at a steady-state, flow-through condition. Average flows through the facility will be approximately 2 million gallons per day.

Normal pool elevation of the primary cell will change during the life of the facility since the pool will be staged at four elevations. The first stage will be

approximately 440.5, the second stage will be approximately 444.5, the third stage will be approximately 447.0, and the final stage will be at the top of the discharge structure of 450.0. The valves for each associated discharge pipe will be closed when it is determined the water level should be raised to maintain water over the deposited ash.

The final cell is operated in one stage at 432.0, with the pass-through flows being the same as through the primary cell.

2.2 Inspections and Surveillance

2.2.1 Daily Surveillance

During the normal course of business, Station Operations personnel make a routine surveillance of the plant property, including the ash impoundments. During this time, station personnel should look for any unusual conditions, and if discovered, report them to the Station Environmental and Chemistry Supervisor.

2.2.2 Weekly Inspections

Weekly inspection shall be made of the dam, embankments and outfall structures. A check should be made for seepage at and around the embankments.

2.2.3 Quarterly Inspection

Inspections shall be made quarterly by Station personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration.

2.2.4 Annual Inspection and Surveillance

The annual inspection of the dam and embankments shall be conducted by a professional civil engineer experienced in performing such inspections. This inspection shall be followed by a verbal and written list of recommendations. Based on the findings and recommendations of the inspection, corrective action shall be taken by the Station staff, as required, to assure safe and continued operation of the impoundment.

Procedures and the methods of correction shall be performed in accordance with the recommendations of the professional engineer and as outlined in the maintenance portion of this report. Copies of this engineer’s report, along with a listing of the corrective action taken, shall

be forwarded to the Environmental Compliance Group who shall then submit the report to the Illinois Department of Natural Resources, Office of Water Resources, Division of Water Resources Management, in Springfield, IL.

2.2.5 Annual Statement

An annual statement on forms furnished by IDNR/OWR certifying compliance with this operations and maintenance plan shall be submitted to IDNR/OWR/Dam Safety section.

3.0 Maintenance Plan

3.1 General

Regular inspections and repairs as required of the dam, outlet structures, and embankments shall be made as discussed in this report. These inspections, along with the review and recommendations made by the professional civil engineer, shall be the basis for all maintenance activities.

3.2 Operable Equipment

The only operable equipment within the primary cell (excluding environmental sampling equipment) is the plug valves in the three discharges pipes of the primary pond outfall structure. Up to the time when each particular valve is closed to raise the pool elevation (proceed to the next pool stage), each valve should be operated once per year from the fully open to the fully closed position, and back to the fully opened position. If any problems occur during the operation, the valve should be lubricated and repaired accordingly.

The 6” emergency draw-down pipe in the secondary cell also has a plug valve. This valve should be tested once per year to ensure that the valve moves. However, it should not be fully opened since the water in the secondary cell is to discharge over the top of the structure, per the NPDES permit requirements.

3.3 Vegetation

In order to protect and retain vegetation on the slopes of the dam and embankments, fertilizing and reseeding shall take place in damaged or barren areas. This shall be conducted as soon as appropriate after being discovered. The seeding mixture shall consist of 30 lbs./acre of Brome grass and 40 lbs./acre of Oats, to match the original seeding mixture.

Trees and shrubs observed during semi-annual inspections shall be cut and removed from the dam, embankments, and spillway areas.

Routine mowing should maintain grass cover at the 8-10 inch height to facilitate inspections.

3.4 Maintenance of Spillway Outlet

The outlet works from this impoundment flows in a buried pipe and discharges in a CMP pipe that takes water under the rail loop at the Station. The outlet areas inside the pond, as well as the areas around the CMP pipe shall be inspected to ensure there are no problems with the flow of outlet water from the impoundment. Problems may include pluggage or obstructions in the flow paths, erosion around the piping structures or weak or damaged equipment.

3.5 Animal Damage and Repairs

Animal burrows and holes discovered during inspections shall be filled with grout. Special attention shall be given to animal burrows in the embankments and dam.

3.6 Restriction of Unauthorized Vehicles

The embankments and dam approaches shall be fenced, and signs shall be posted to prevent unauthorized travel on the roadways and slopes. The operations of the gates, etc. shall be under the control of the Wood River Power Station staff.

4.0 Emergency Action Plan

A separate Emergency Action Plan has been developed for this facility. Response to any emergency condition shall be as set forth in the Plan.

5.0 Inspection Checklists

The following Inspection checklists should be used during the weekly and quarterly inspections.

Wood River Power Station
East Ash Pond
***Weekly* Inspection Form**

Dam Location: Wood River Power Station; Madison County
Owner: Dynegy Midwest Generation, LLC; Wood River Power Station
Permit No.: DS2011079 **Class of Dam:** Small Class I
Type of Dam: Earth and Ash Embankment for Ash Impoundment
Type of Spillway: **Drop Inlet for Primary and Secondary Ponds**

Date Inspected: _____
Weather Conditions: _____
Pool Elevation: _____

Inspection Personnel:

_____ _____
Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

SWPPP Items to Spot Check

ITEM	RESPONSE	NOTES
Storm water drainage inlets clear?	YES NO	
Any significant areas of ponding water?	YES NO	
Any significant areas of silt runoff into the creek or river?	YES NO	
Are exterior oil and chemical storage areas OK?	YES NO	

Wood River Power Station
East Ash Pond
***Quarterly* Inspection Form**

Dam Location: Wood River Power Station; Madison County
Owner: Dynegy Midwest Generation, LLC; Wood River Power Station
Permit No.: DS2011079 **Class of Dam:** Small Class I
Type of Dam: Earth and Ash Embankment for Ash Impoundment
Type of Spillway: **Drop Inlet for Primary and Secondary Ponds**

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

_____ _____
Name / Title **Signature**

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Downstream Fill Slopes		
Upstream Fill Slopes		
Unusual Movement or Cracking at or Beyond Toe		
Seepage (Condition/Color)		
Vegetative Cover (Tree growth)		
Animal Damage		
Embankment Erosion		
Water Passages		
Structural Cracking		
Outfall Structures		
Other		