October 2016

Electric Energy, Inc.
1500 Eastport Plaza Drive
Collinsville, IL 62234

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

On behalf of Electric Energy, Inc., AECOM has prepared the following history of construction for the East Ash Pond at the Joppa Power Station in accordance with 40 CFR § 257.73(c).

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 record drawings, geotechnical investigations, etc. for the East Ash Pond at the Joppa Power Station.

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: Electric Energy, Inc.

Address: 1500 Eastport Plaza Drive
Collinsville, IL 62234

CCR Unit: East Ash Pond

The East Ash Pond does 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 location of the East Ash Pond has 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 East Ash Pond is being used to store and dispose of sluiced bottom ash, fly ash, and dredged material from the coal pile runoff pond and to clarify other plant process wastewaters prior to discharge in accordance with the station's NPDES permit.

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

The East Ash Pond and the Joppa Power Station are located in the Bayou Creek-Ohio River Watershed with a 12-digit Hydrologic Unit Code (HUC) of 051402060701 and a drainage area of 47,283 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 consist of foundation clay and foundation sand layers. These layers are of Pleistocene origin and in the same geologic formation. The physical properties of the foundation clay layer for the East Ash Pond are described as lean clay and sandy clay with a generally stiff consistency. Some of these clay soils exhibit a dilative behavior while a limited amount of the clay soils exhibit a contractive behavior. The soils are highly interbedded; however, the contractive clay is generally identified in deeper stratum and is less prevalent in surficial and shallow foundation clays. Soft to very soft dark brown to brown clay with some organics is present in several locations immediately below the embankment. These areas are generally isolated and are generally located in areas of historic drainages. The physical properties of the foundation sand layer for the East Ash Pond are described as dense silty sand and poorly graded sand with some gravel. An available summary of the engineering properties of the foundation materials is presented in **Table 1** below.

In 2016, the soils located below the East Ash Pond southeast corner embankment were improved using the Deep Mixing Method (DMM). An available summary of the engineering properties of the foundation materials is presented in **Table 1** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 1. Summary of Material Engineering Properties

Material	Unit Weight (pcf)	Drained Strength		Peak Undrained Strength S_u (psf)	Post-Earthquake Strength S_u[1] (psf)
		Cohesion (psf)	Friction Angle[1] (deg)		
Embankment Clay [Fill]	131	Non-linear strength envelope. See Table 1A below.		$\sigma'_{fc} < 0.5$ ksf: $S_u = 600$ psf; $\sigma'_{fc} \geq 0.5$ ksf: $S_u/\sigma'_{fc} = 0.65$ and $c_o = 274$ psf	Peak undrained strength. Cyclic softening is not expected due to stiff nature of soil.
Foundation Clay	128	0	$\alpha > 5°$: 33 $-5° \leq \alpha \leq 5°$: 29 $\alpha < -5°$: 33	$S_u/\sigma'_{fc} = 0.41$ $c_o = 700$ psf	
Foundation Sand	130	0	35	Drained Strength	Drained Strength
Soft Clay (Miscellaneous Fill)[2]	125	0	24	$S_u/\sigma'_{fc} = 0.25$, min $S_u = 500$ psf	$S_u/\sigma'_{fc} = 0.18$, min $S_u = 400$ psf
DMM Material (soil and cement)	125	Not Applicable		7200 psf	Peak Undrained

1. Where applicable, α represents the failure plane angle measured from horizontal.

Table 1A: Embankment Clay [Fill] Non-linear Drained Strength Failure Envelope

Normal Effective Stress on Failure Plane (s'_{ff}), psf	Shear Strength (t_{ff}), psf
0	0
585.2	561
1308.6	1050.4
1497.4	1124.6
2000	1400.4
10000	7002.1

The East Ash Pond is an enclosed impoundment with embankments and does 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.

Physical properties for the original embankment construction are described as over-consolidated, silty clay and sandy clay with a general stiff consistency. Some isolated soft clay (dark brown in color) layers are presented. In 2016, the soils located within the East Ash Pond southeast corner embankment were improved using the Deep Mixing Method (DMM). An available summary of the engineering properties of the construction materials is presented in **Table 1** above. The engineering properties are based on previous geotechnical explorations and laboratory testing.

The method of site preparation and construction of the East Ash Pond is not reasonably and readily available.

The approximate dates of construction of each successive stage of construction of the East Ash Pond are provided in **Table 2** below.

Table 2. Approximate dates of construction of each successive stage of construction.

Date	Event
1973	Construction of the northern portion of the East Ash Pond
1977-1985	Construction of the southern portion of the East Ash Pond
1992	New outlet structure installed in the southern portion of East Ash Pond
1998	Changed the outlet from a high-density polyethylene (HDPE) tee drain to a ductile iron pipe (DIP) tee drain in the southern portion of East Ash Pond
2011	Perimeter berm repairs at select locations and rip-rap placement at select locations of the perimeter embankment.
2016	Ground improvement along the southeastern portion of the East Ash Pond using the wet soil cement deep mixing method (DMM)

§ 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 Ash Pond are listed in **Table 3** below. Items marked as "Not Available" are items not found during a review of the reasonably and readily available record documentation.

Table 3. List of drawings containing items pertaining to the information requested in § 257.73(c)(1)(vii).

	East Ash Pond
Dimensional plan view (all zones)	EE-AP-1, C-106, 4229-8211
Dimensional cross sections	C-106, 4229-8211
Foundation Improvements	C-100 to C-106
Drainage Provisions	EE-AP-2, C-107, 02199 (sheets 2 to 8)
Spillways and Outlets	02199 (sheets 2 to 8)
Diversion Ditches	Not Applicable
Instrument Locations	Plate 2, Fig. No. 2A
Slope Protection	Not Available
Normal Operating Pool Elevation	C-107, 02199 (sheet 8)
Maximum Pool Elevation	Not Available
Approximate Maximum Depth of CCR in 2016	52 feet

All drawings referenced in **Table 3** 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 this CCR unit 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 East Ash Pond include vibrating-wire and open-standpipe piezometers. The purpose of the piezometers is to measure the pore water pressures within and around the impoundment. Two (2) existing open-standpipe piezometers (B-1 and B-4) were installed in 2010 and the locations are presented on Plate 2 in **Appendix C**. Eighteen (18) vibrating-wire piezometers were installed in 2015 and the locations are presented on Figure 2A in **Appendix C**.

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

The area-capacity curves for the East Ash Pond are presented in **Figures 1** and **2** below. "Area-capacity curves", as defined by 40 CFR § 257.53, "means graphic curves which readily show the reservoir water surface area, in acres, at different elevations from the bottom of the reservoir to the maximum water surface, and the capacity or volume, in acre-feet, of the water contained in the reservoir at various elevations."

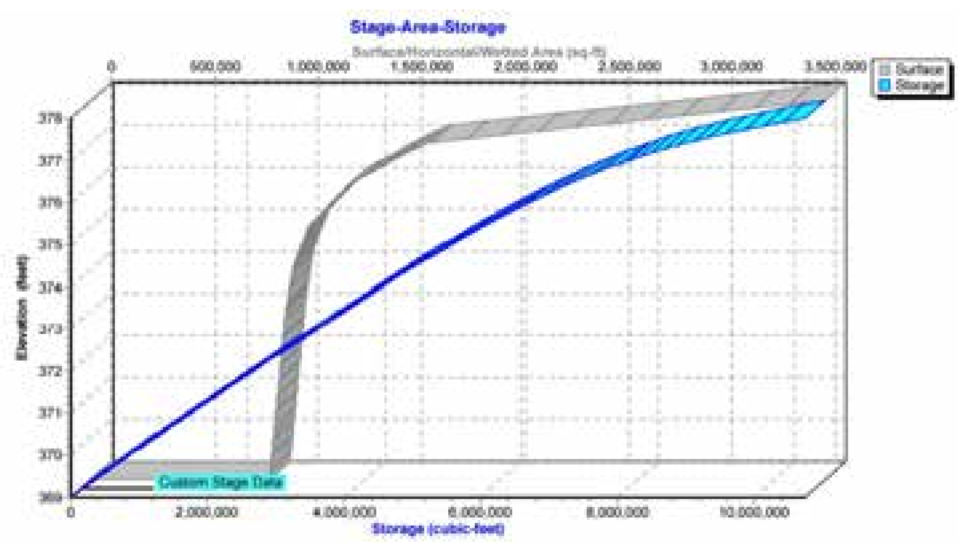

Figure 1. Area-capacity curve for East Ash Pond - south sub-basin

AECOM

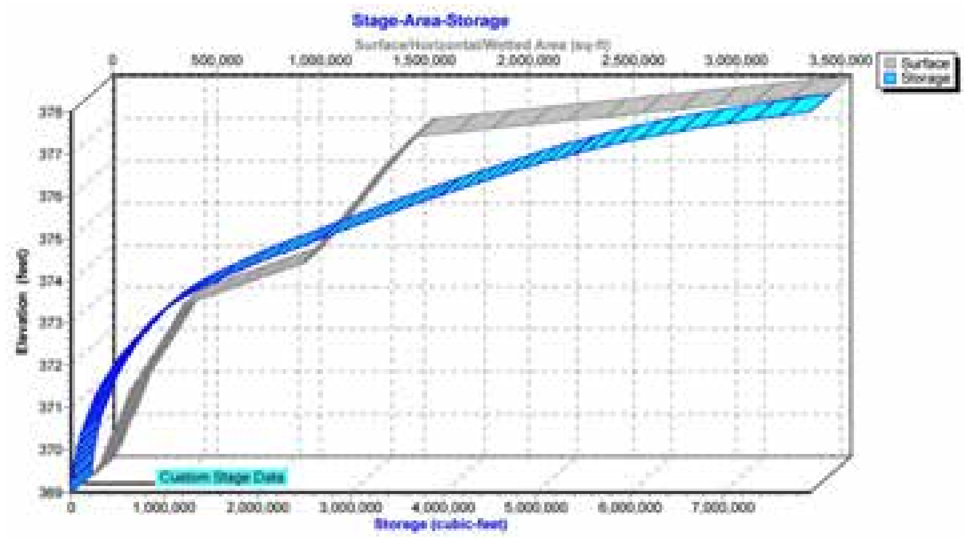

Figure 2. Area-capacity curve for East Ash Pond - north sub-basin

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

The northern portion of the East Ash Pond contains stacked 48-inch diameter (dia.) concrete pipe sections seated on a 72-inch dia. precast manhole. The structure discharges water through a 48-inch-dia. reinforced concrete pipe (RCP) to the effluent control basin. The southern portion of the East Ash Pond contains a 24-inch dia. ductile iron tee pipe drain located on the east side of the impoundment. The tee pipe drains into a 26-inch outer-dia. high-density polyethylene (HDPE) pipe that transports the water to the 48-inch-dia. RCP discharge line from the northern portion of the East Ash Pond. The East Ash Pond also contains an internal 36-inch-dia. corrugated HDPE pipe culvert to allow for water to flow from the southern portion of the pond to the northern portion. The East Ash Pond's discharge capability was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. The model results indicate that the East Ash Pond has enough storage capacity 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 4**.

The East Ash Pond includes a north sub-basin and a south sub-basin which is surrounded by a continuous perimeter embankment. The two sub-basins are separated by a common embankment and were modeled individually.

Table 4. Results of HydroCAD 10 analysis

	North Sub-Basin	South Sub-Basin
Approximate Berm Elevation[1] (ft)	378.0	378.0
Approximate Emergency Spillway Elevation[1] (ft)	Not Applicable	Not Applicable
Starting Pool Elevation[1] (ft)	370.0	373.2
Peak Elevation[1] (ft)	376.2	377.6
Time to Peak (hr)	14.0	15.4
Surface Area (ac)	31.8	63.4
Storage[2] (ac-ft)	93.9	129.9

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.

Drawings for the East Ash Pond refer to construction specification *Specifications for Construction of Waste Treatment Facilities*, but those specifications are not reasonably and readily available.

The operations and maintenance plan for the East Ash Pond is currently being prepared by Electric Energy, Inc.

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

In 2011, eight (8) separate surficial movements occurred along the downstream slope of the perimeter embankment. The soil movements were investigated by Hanson Professional Services (Hanson) and were believed to be caused by recent heavy rains and sliding along the interface of the original embankment and the subsequently placed ash materials. The surficial movements were recompacted with replacement material and portions of the south embankment were rock lined. Information about this event can be found in the 2011 letter by Hanson presented in **Appendix D**. Photos of the repaired slopes are presented in **Appendix E**.

There is no record or knowledge of any other structural instability of the East Ash Pond at Joppa Power Station.

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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

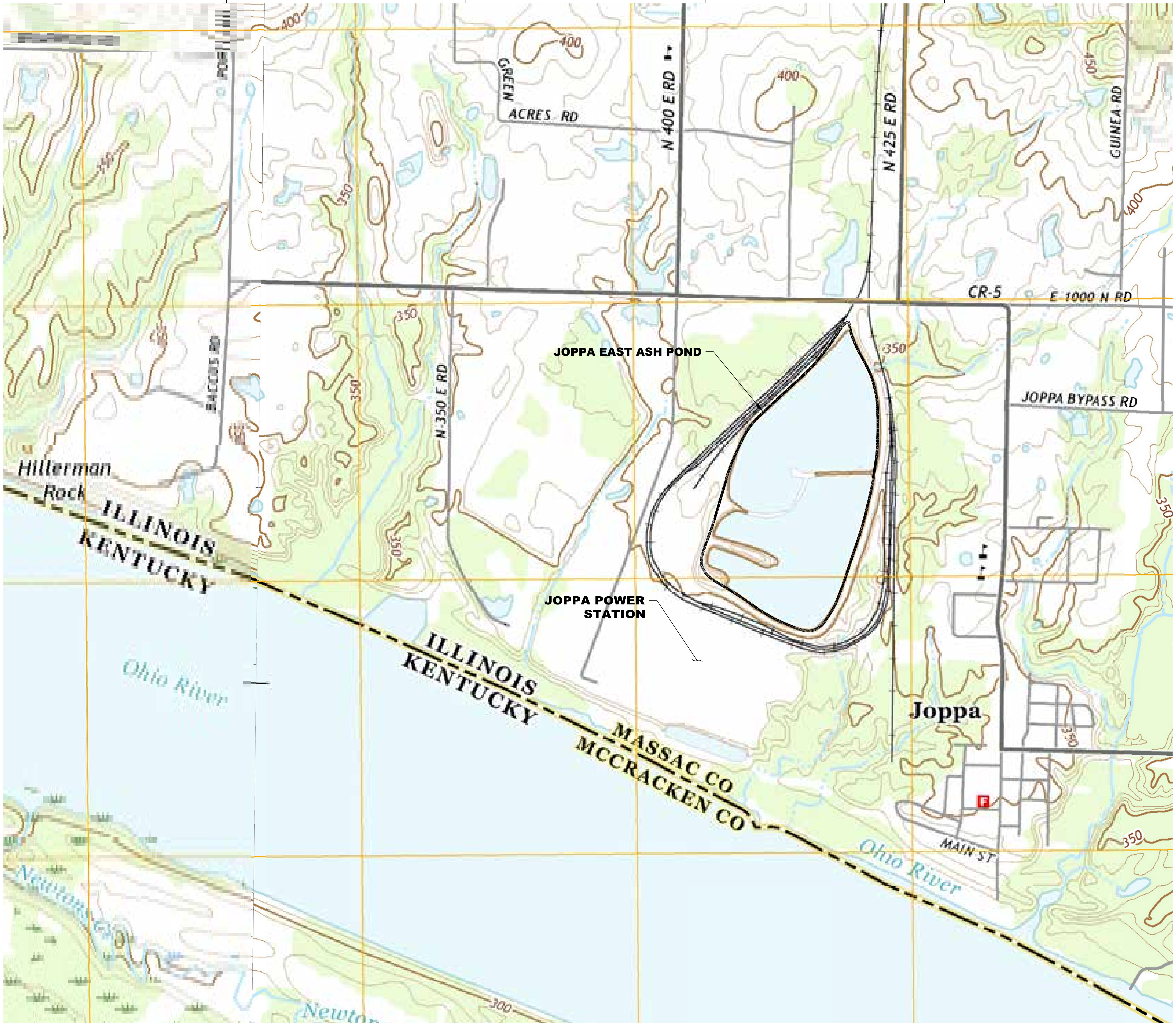
United States Environmental Protection Agency (USEPA). (2015). *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule.* 40 CFR Parts 257 and 261, 80 Fed. Reg. 21302, 21380 April 17, 2015.

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: Joppa Power Station Drawings
Appendix C: Joppa East Ash Pond Piezometer and Boring Locations
Appendix D: Ash Pond Embankment Instability, Hanson Professional Services Inc. (2011)
Appendix E: Photos of Slope Repairs

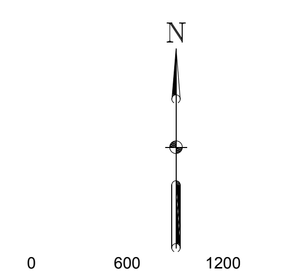
Appendix A: History of Construction Vicinity Map



LEGEND

CCR UNITS

SOURCE:
MAP PROVIDED FROM ELECTRONIC USGS DIGITAL RASTER GRAPHIC 7.5 MINUTE TOPOGRAPHIC MAP OF BANDANA, ILLINOIS AND JOPPA, ILLINOIS, REVISED 2015.



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ELECTRIC ENERGY, INC.

2100 Portland Road,
Joppa, IL 62953

HISTORY OF CONSTRUCTION

JOPPA POWER STATION
JOPPA, ILLINOIS

ISSUED FOR BIDDING DATE BY

ISSUED FOR CONSTRUCTION DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
△		
△		
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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

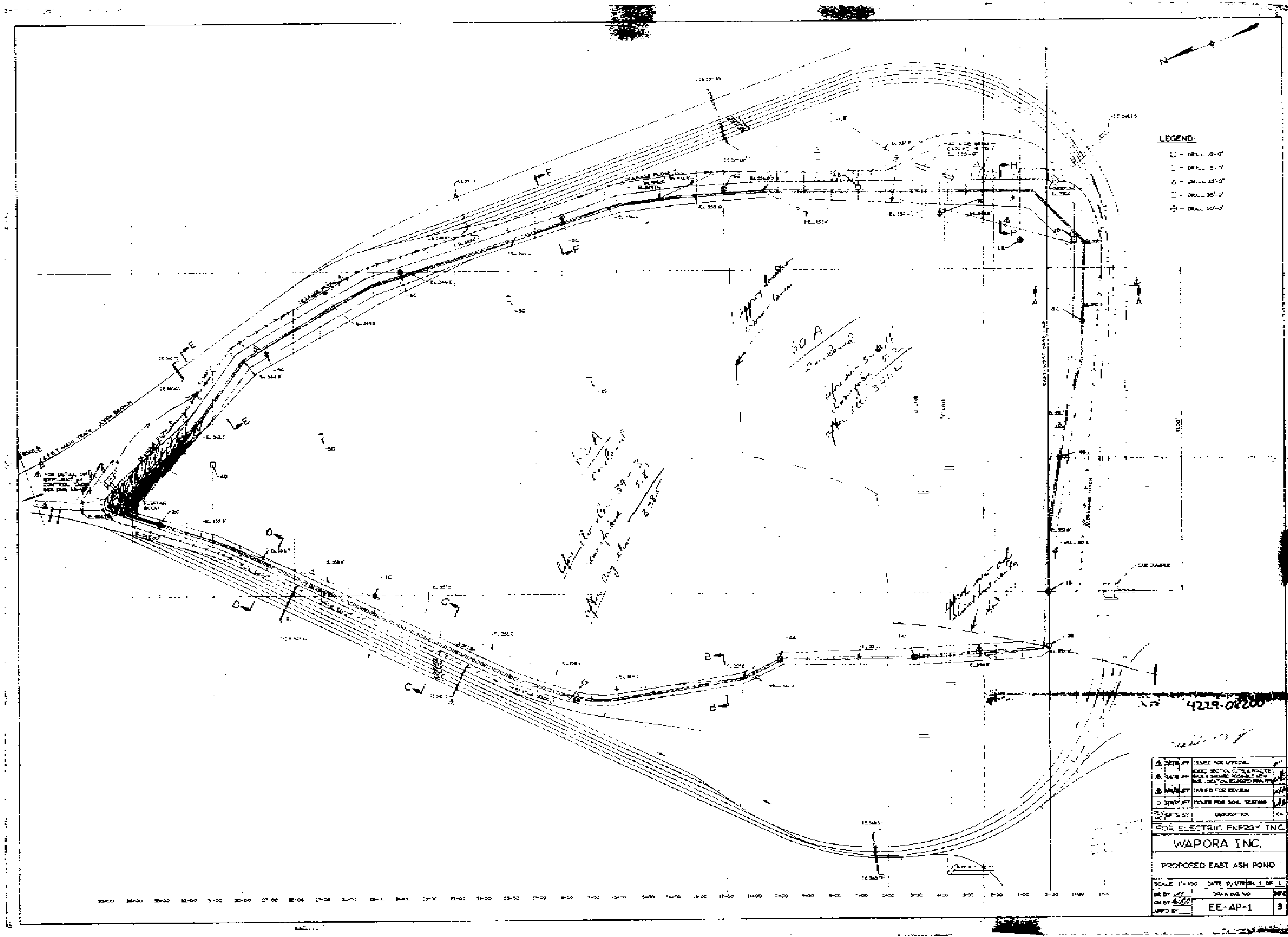
01

AECOM DRAWING PATH: P:\Projects\Geotech\60428794_DynegyCCR\13_Construction History\04 Technical Production\8_Joppa\Reference Documents\Vicinity Location Map References\Figures\C-01 History of Construction Vicinity Map (Joppa)_ZJF.dwg NANAK, MATT, 10/11/2016 12:04 PM

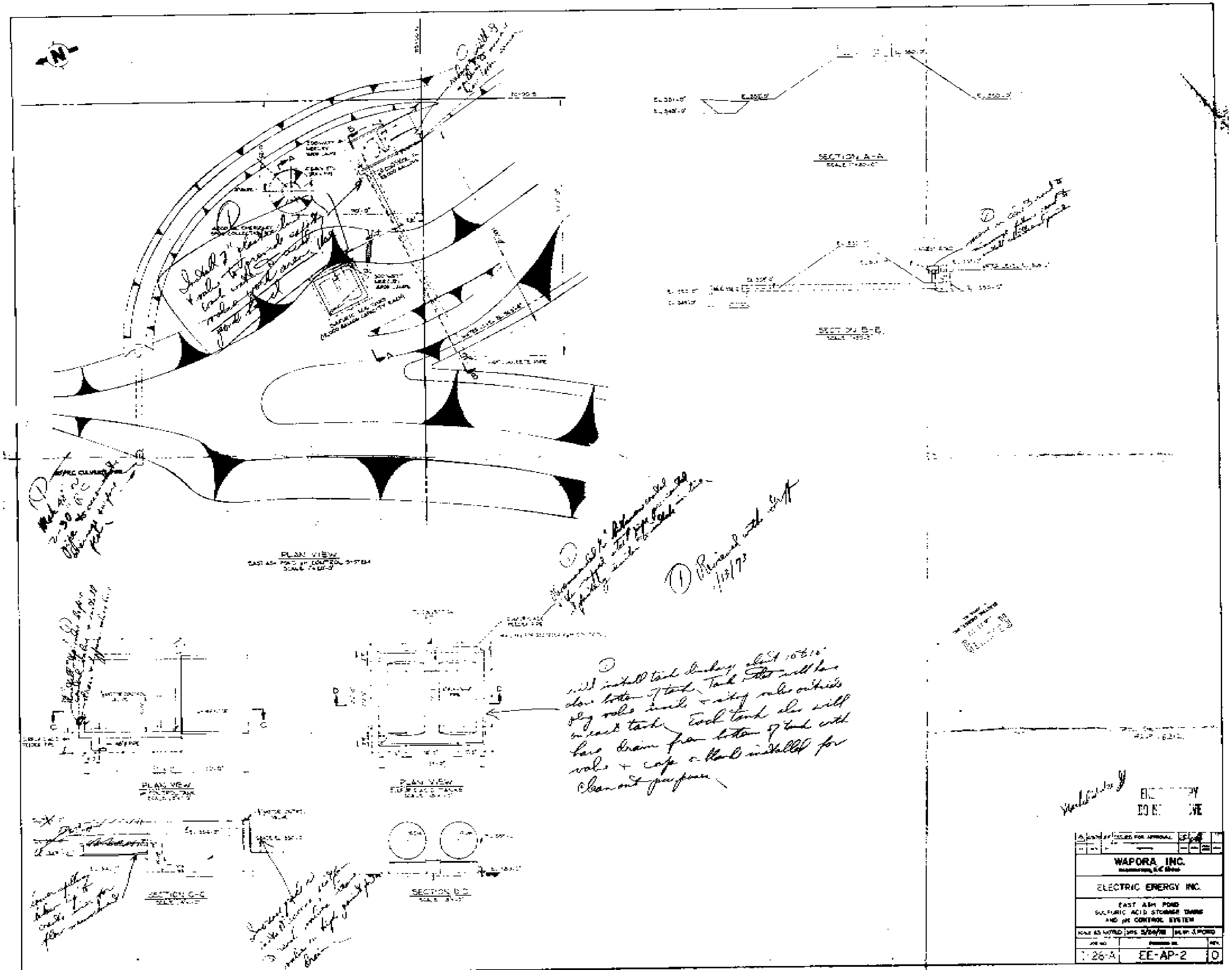
AECOM

Appendix B: Joppa Power Station Drawings

1. “Proposed East Ash Pond”, Drawing No. EE-AP-1, Revision 3, 7 December, 1972, Wapora Inc.
2. “East Ash Pond Sulfuric Acid Storage Tanks and pH Control System”, Drawing No. EE-AP-2, Revision 0, 24 May, 1973, Wapora Inc.
3. “East Ash Pond, Plan, Sections and Details”, Drawing No. C-106, Revision 5, 11 September, 1973, Wapora Inc.
4. “East Ash Pond, Sulfuric Acid Storage Tanks and pH Control System, Plan, Sections and Details”, Drawing No. C-107, Revision 4, 14 July, 1975, Wapora Inc.
5. “East Ash Pond, Plan”, Drawing No. 4229-8211, Revision 4, 13 June, 1986, Wapora Inc.
6. “Plan and Profile”, Drawing No. 02199 sh. 2, March, 1992, Keuffel & Esser Company.
7. “Plan and Profile”, Drawing No. 02199 sh. 3, March, 1992, Keuffel & Esser Company.
8. “Cross-Sections”, Drawing No. 02199 sh. 4, March, 1992, Keuffel & Esser Company.
9. “Cross-Sections”, Drawing No. 02199 sh. 5, March, 1992, Keuffel & Esser Company.
10. “Cross-Sections”, Drawing No. 02199 sh. 6, March, 1992, Keuffel & Esser Company.
11. “Cross-Sections”, Drawing No. 02199 sh. 7, March, 1992, Keuffel & Esser Company.
12. “Ash Lagoon Overflow, Miscellaneous Details”, Drawing No. 02199 sh. 8, 10 March, 1992, Brown, Roffmann & Roberts, Inc.
13. “Overall Site Plan”, Drawing No. C-100, Revision 1, 2 June, 2016, AECOM.
14. “Pre-DMM Site Clearing Plan”, Drawing No. C-101, Revision 1, 2 June, 2016, AECOM.
15. “Pre-DMM Site Plan”, Drawing No. C-102, Revision 1, 2 June, 2016, AECOM.
16. “Pre-DMM Cross Sections”, Drawing No. C-103, Revision 1, 2 June, 2016, AECOM.
17. “Pre-DMM Details”, Drawing No. C-104, Revision 1, 2 June, 2016, AECOM.
18. “Post-DMM Site Restoration Plan”, Drawing No. C-105, Revision 1, 2 June, 2016, AECOM.
19. “Post-DMM Details”, Drawing No. C-106, Revision 1, 2 June, 2016, AECOM.



LEGEND:
DRILL 25'-0"
DRILL 50'-0"
SAND
4229-08200
ISSUED FOR REVIEW
ISSUED FOR SOIL TESTING
DESCRIPTION
FOR ELECTRIC ENERGY INC.
WAPORA INC.
PROPOSED EAST ASH POND
SCALE 1"=100
DRAWING NO
EE-AP-1


SECTION A-A
SECTION B-B
PLAN VIEW
EAST ASH POND pH CONTROL SYSTEM
PLAN VIEW
PLAN VIEW
SECTION C-C
SECTION D-D
1 Revised with Staff 1/13/73
will install tank drainage about 10" & 16" TANK will have valve bottom of tank. Tank outlet will have plug valve inside & gate valve outside on each tank. Each tank also will have drain from bottom of tank with valve & cap or blank installed for clean out purpose
WAPORA INC.
ELECTRIC ENERGY INC.
EAST ASH POND
SULFURIC ACID STORAGE TANKS
AND pH CONTROL SYSTEM
SCALE AS NOTED
EE-AP-2
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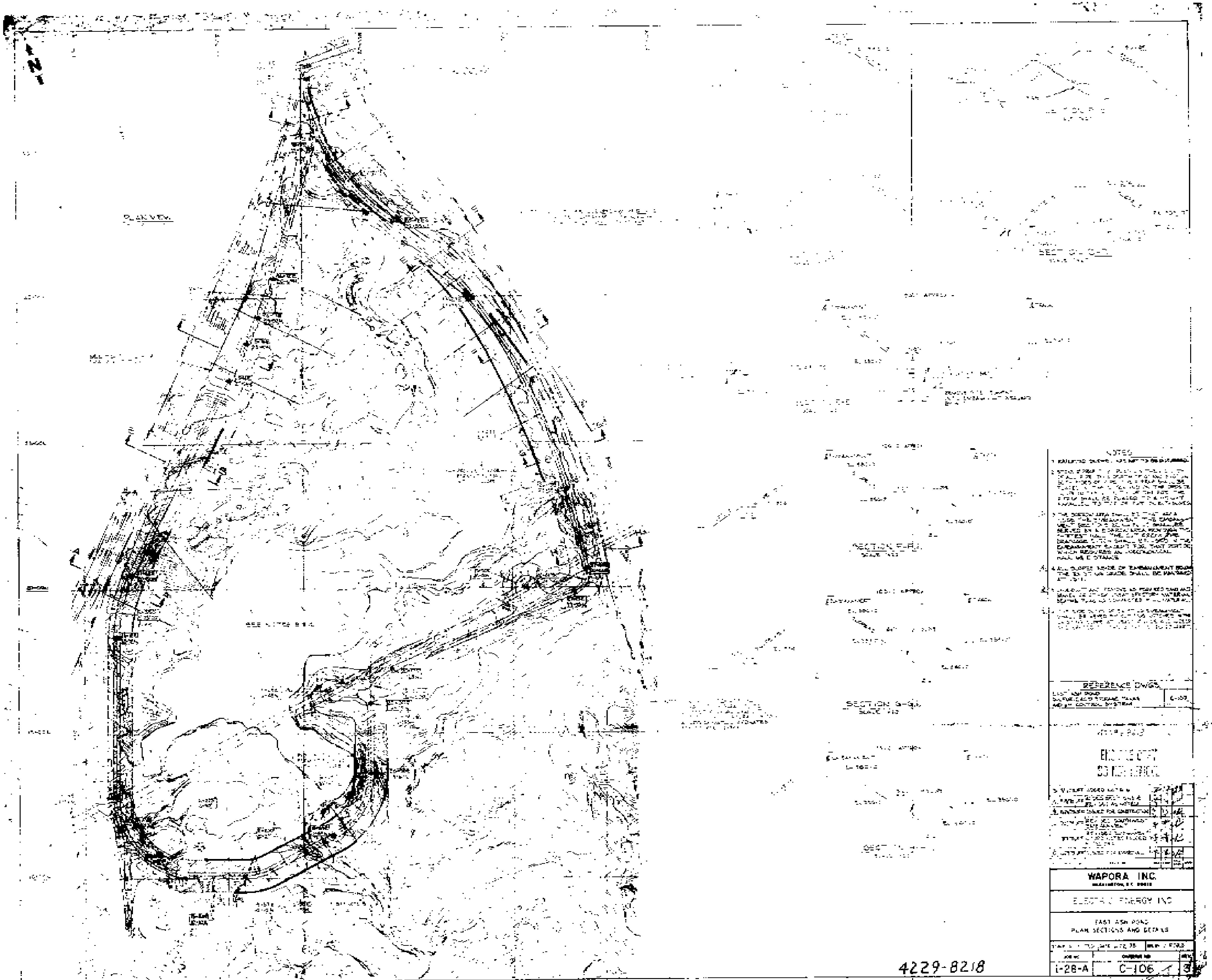

PLAN VIEW
SECTION F-F
SECTION G-G
NOTES
REFERENCE DWGS.
WAPORA INC.
EAST ASH POND
PLAN, SECTIONS AND DETAILS
1-28-A
C-106
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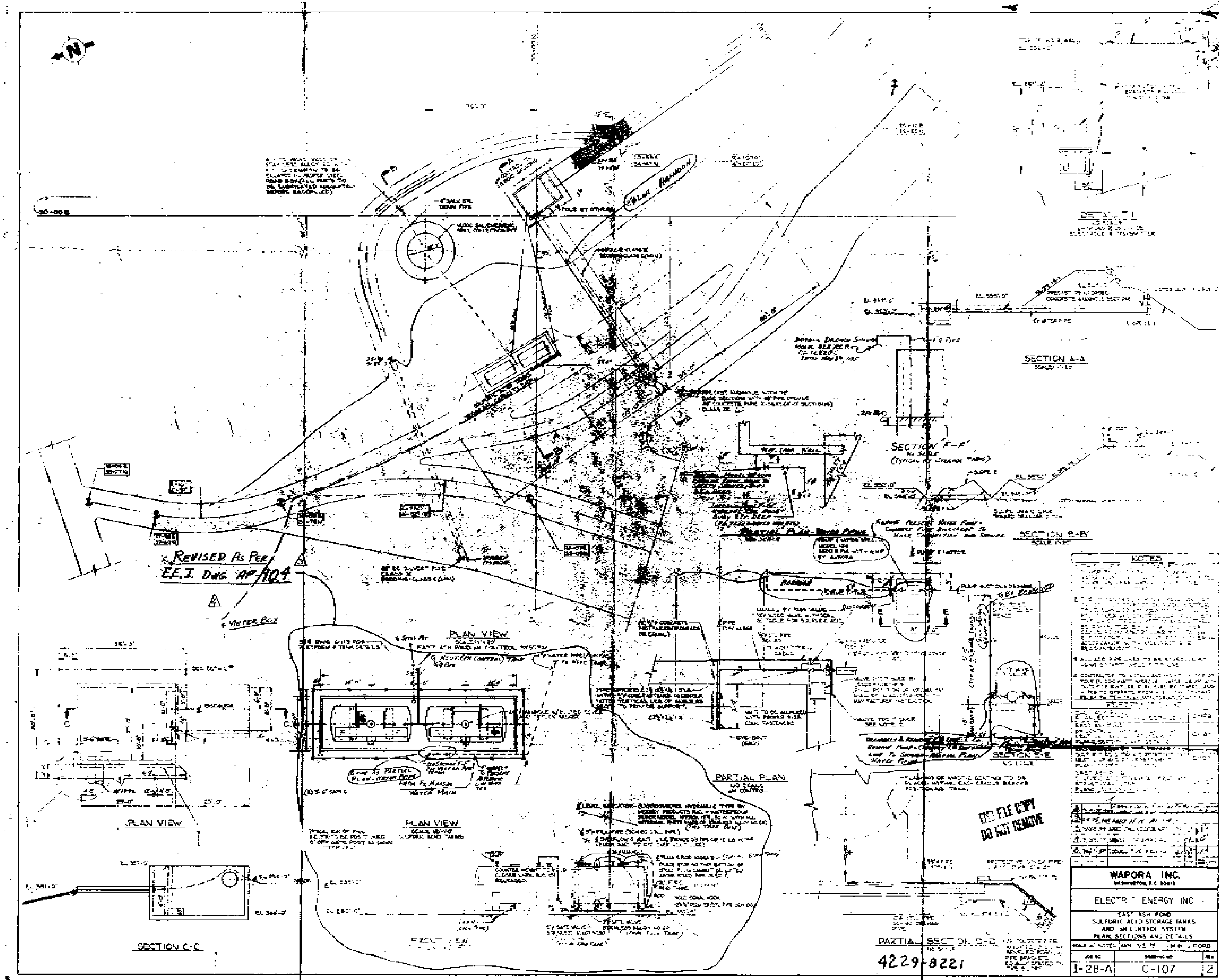
4229-8218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WATER BOX
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PLAN VIEW
PLAN VIEW
SECTION C-C
PARTIAL PLAN
PARTIAL PLAN - WATER PUMP
PARTIAL SECTION D-D
SECTION A-A
SECTION F-F'
SECTION B-B'
SECTION E-E
NOTES
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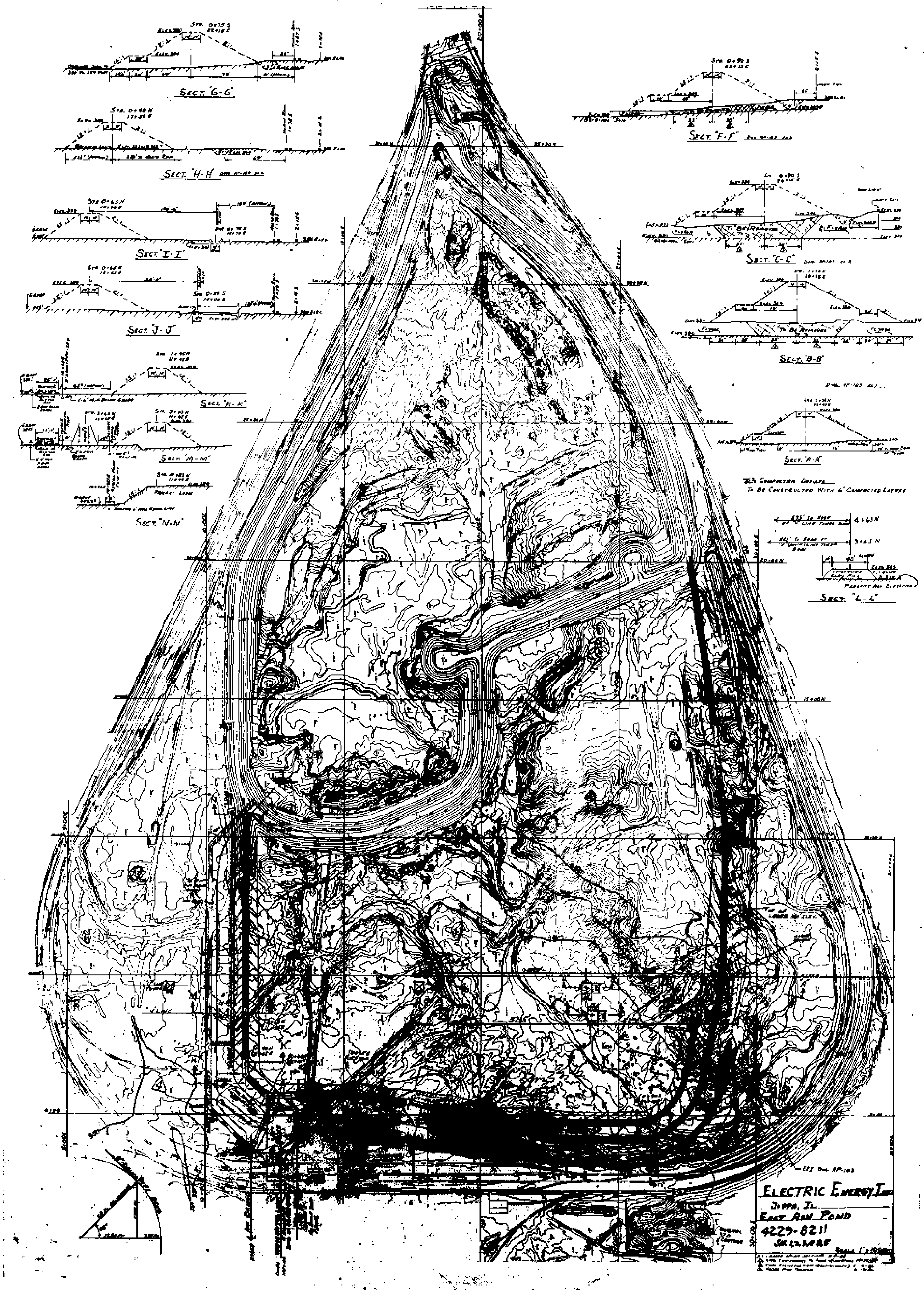

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SECT. "C-C"
SECT. "B-B"
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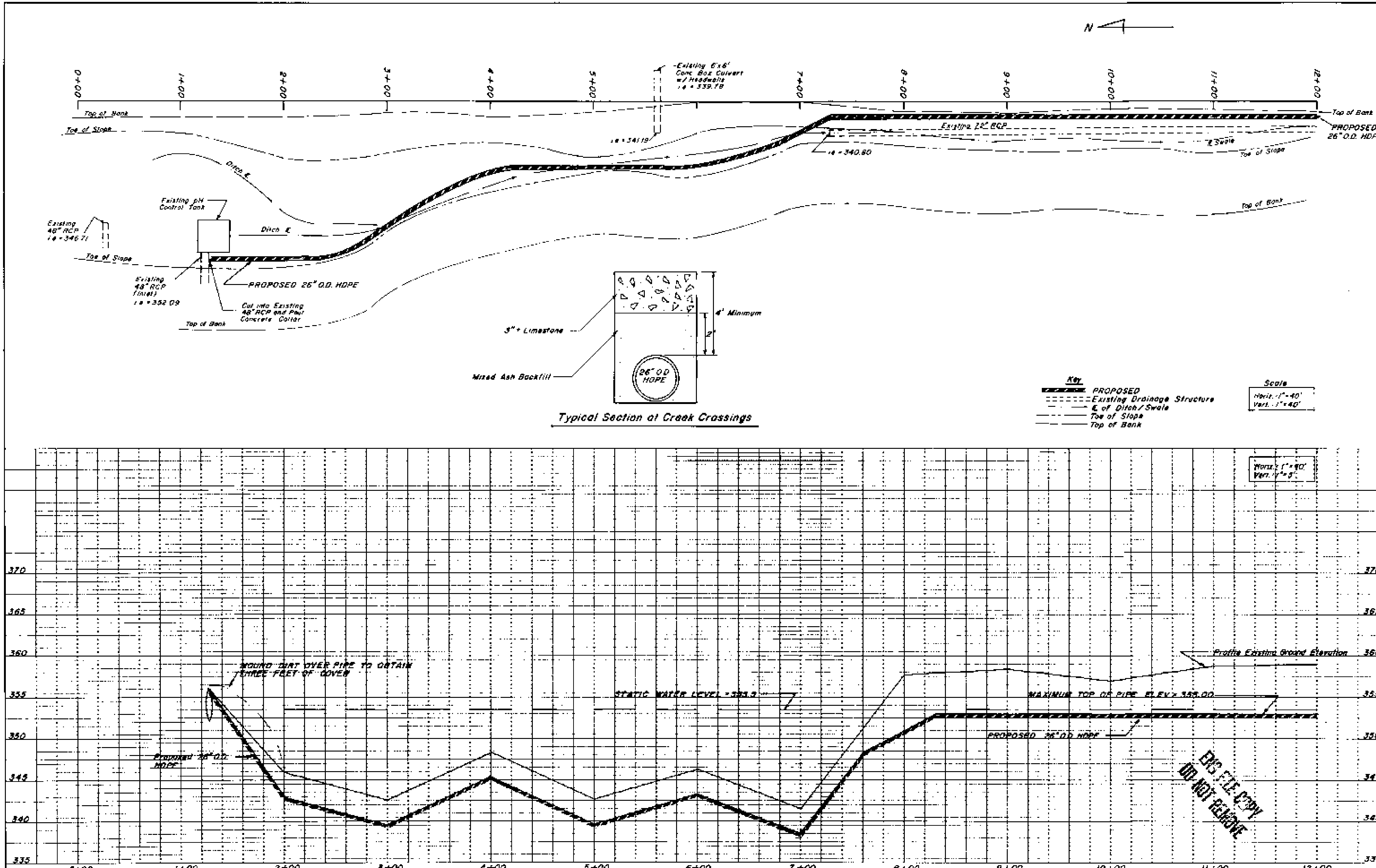
SECT. "L-L"
ELECTRIC ENERGY INC.
EAST ASH POND
4229-8211



Keuffel & Esser Company

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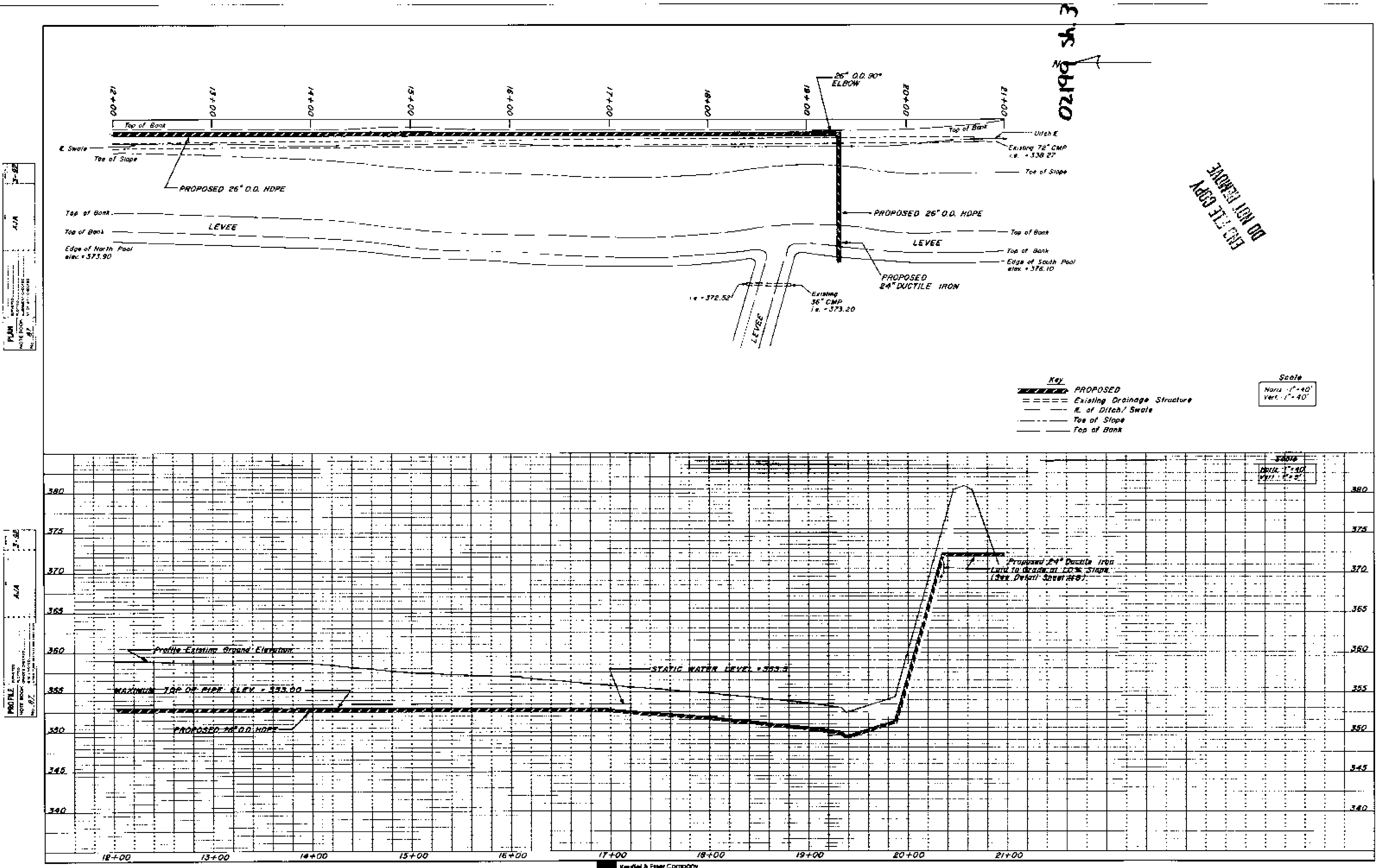
Sheet 2 of 8


02190 sh. 3
N
26" O.D. 90° ELBOW
Top of Bank
Ditch ℄
Existing 72" CMP i.e. = 338.27
Top of Slope
℄ Swale
Toe of Slope
PROPOSED 26" O.D. HDPE
Top of Bank
LEVEE
Edge of North Pool elev. = 373.90
PROPOSED 26" O.D. HDPE
LEVEE
Edge of South Pool elev. = 376.10
PROPOSED 24" DUCTILE IRON
i.e. = 372.52
Existing 36" CMP i.e. = 373.20
LEVEE
END FILE COPY
DO NOT REMOVE
Key
PROPOSED
Existing Drainage Structure
℄ of Ditch/ Swale
Toe of Slope
Top of Bank
Scale
Horiz. 1" = 40'
Vert. 1" = 40'
PLAN
PROFILE
A.J.A.
Profile Existing Ground Elevation
STATIC WATER LEVEL = 353.5
MAXIMUM TOP OF PIPE ELEV. = 353.00
PROPOSED 26" O.D. HDPE
Proposed 24" Ductile Iron Laid to Grade at 1.0% Slope (See Detail Sheet #8)
380
375
370
365
360
355
350
345
340
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16+00
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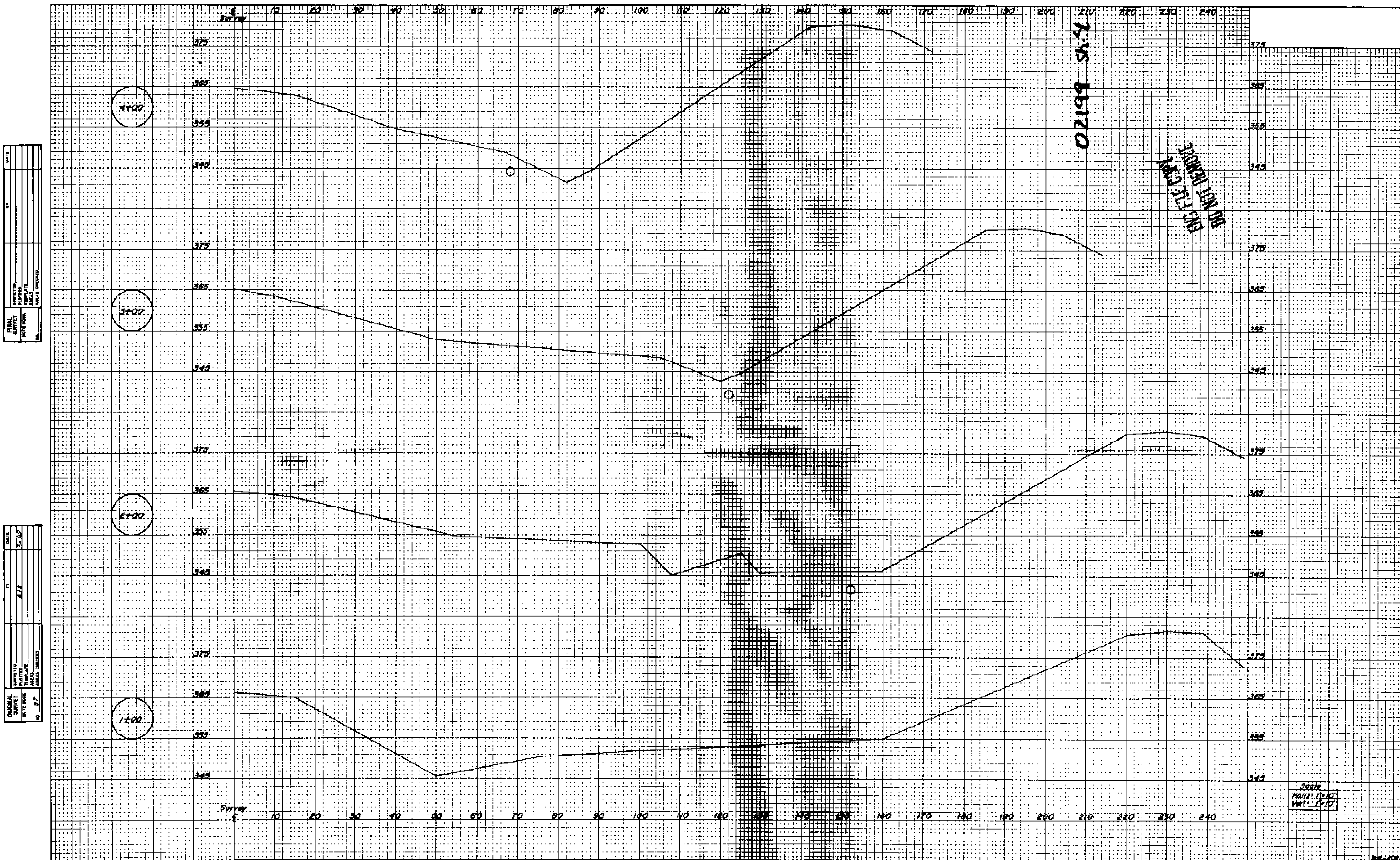
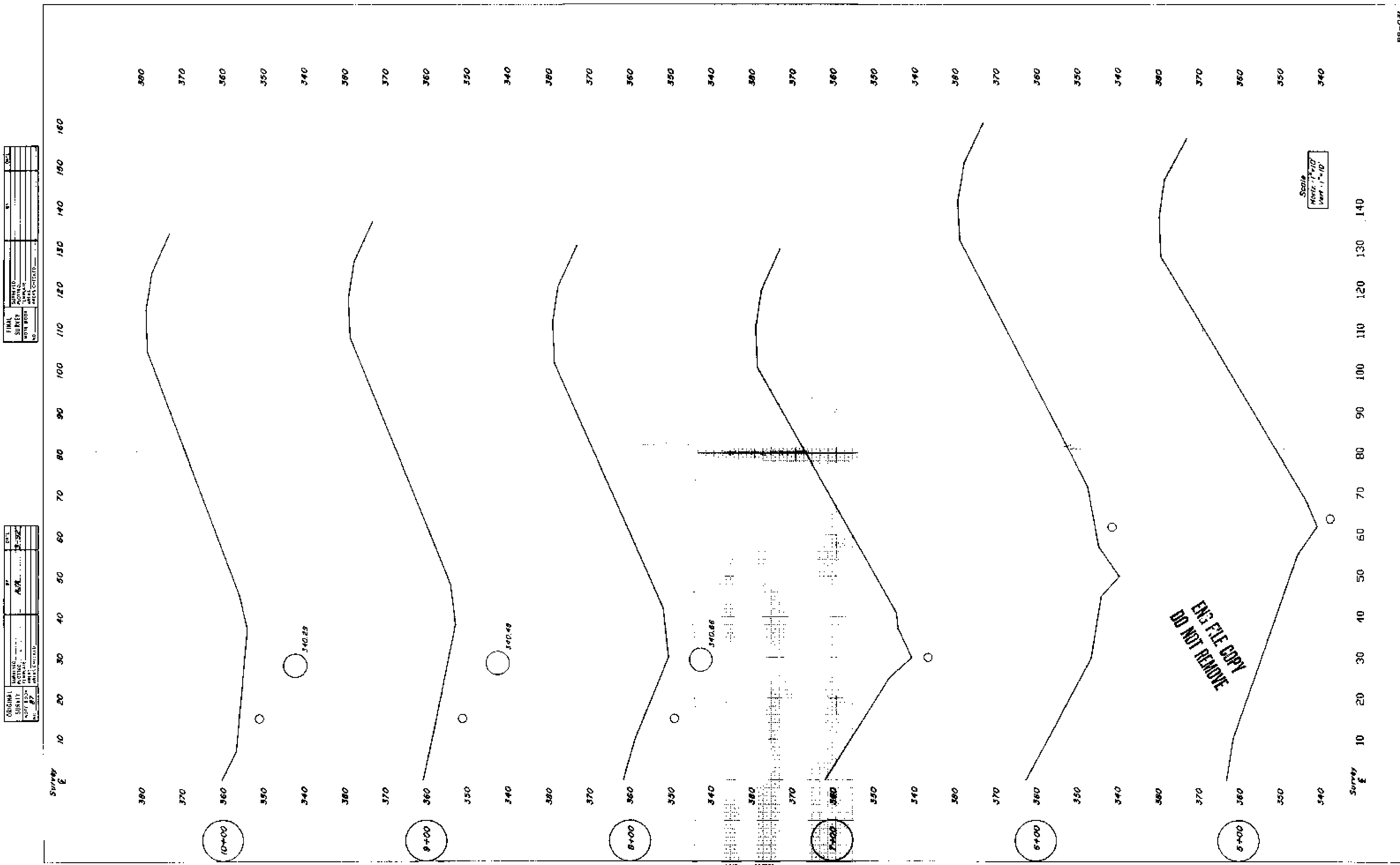
20+00
21+00
Keuffel & Esser Company



Cross-Sections



Cross-Sections

Sheet 5 of 8

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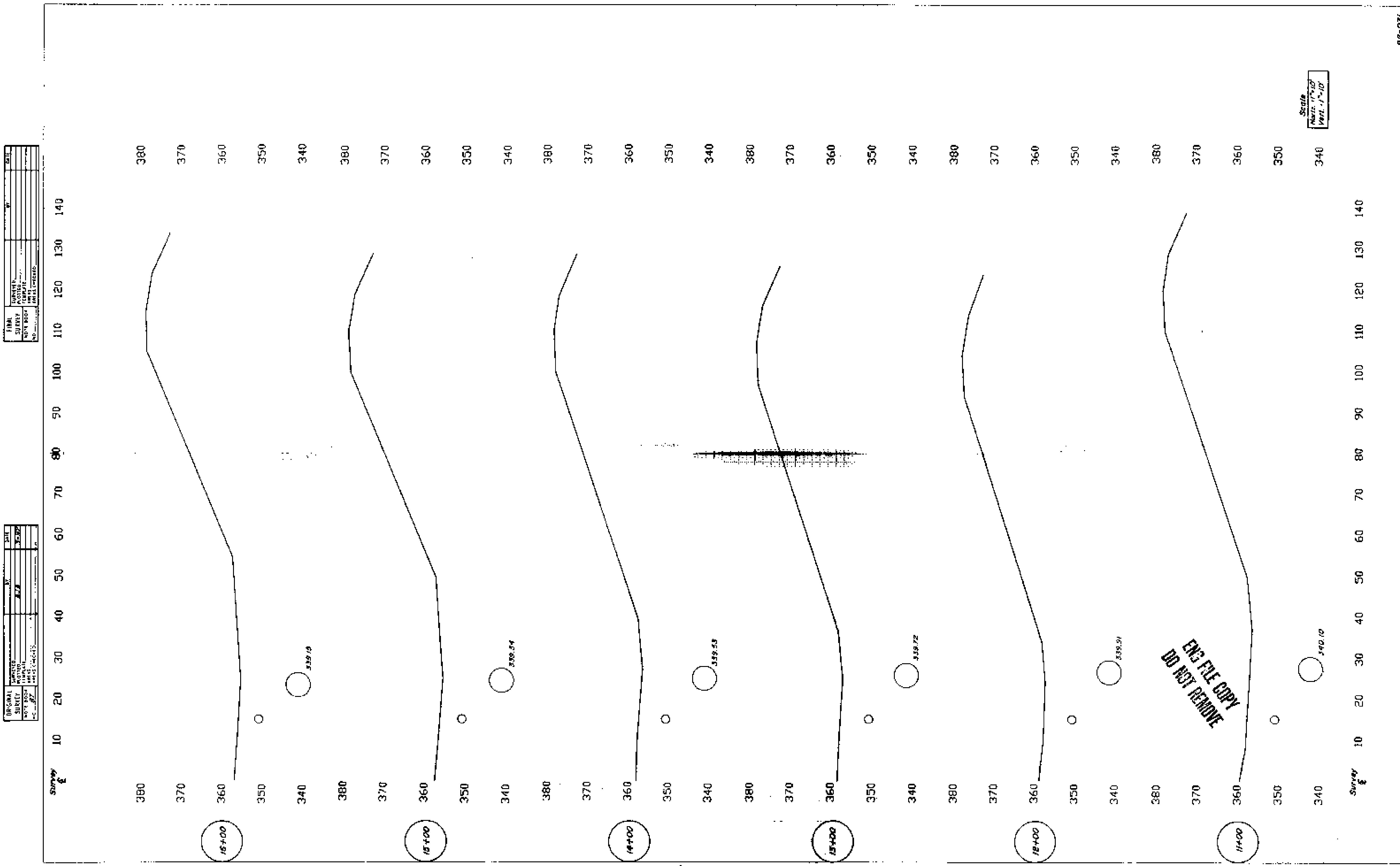
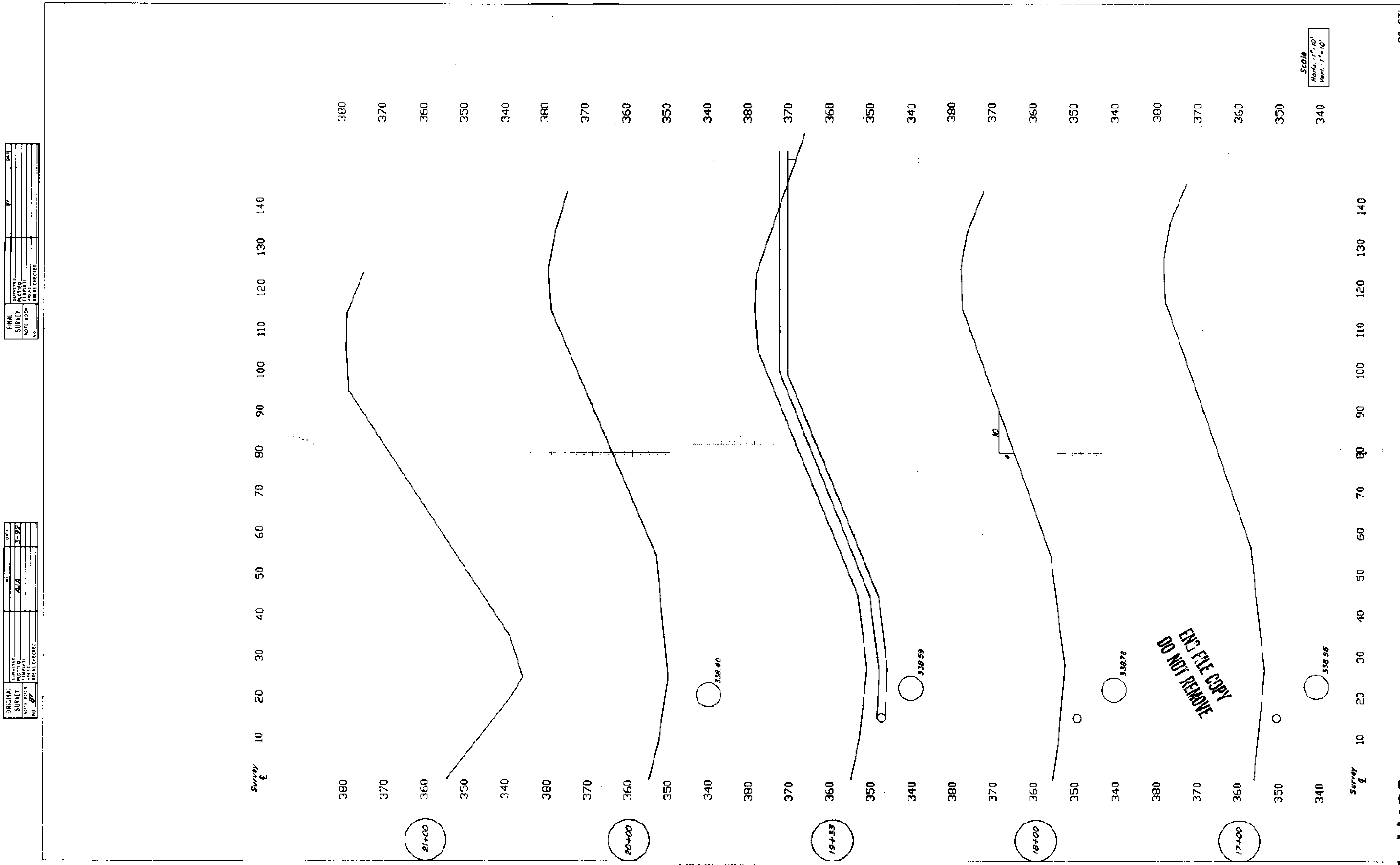


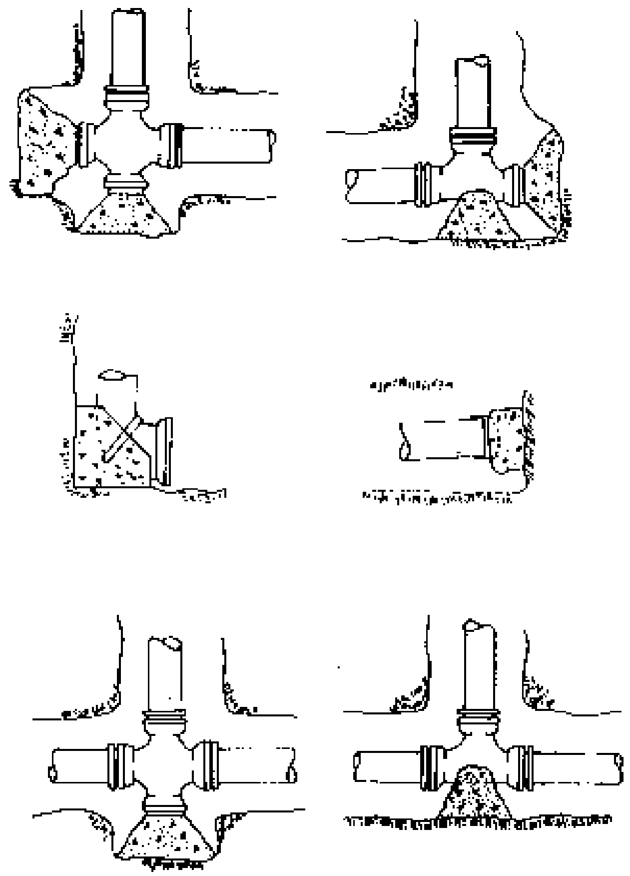
Cross-Sections



Cross-Sections

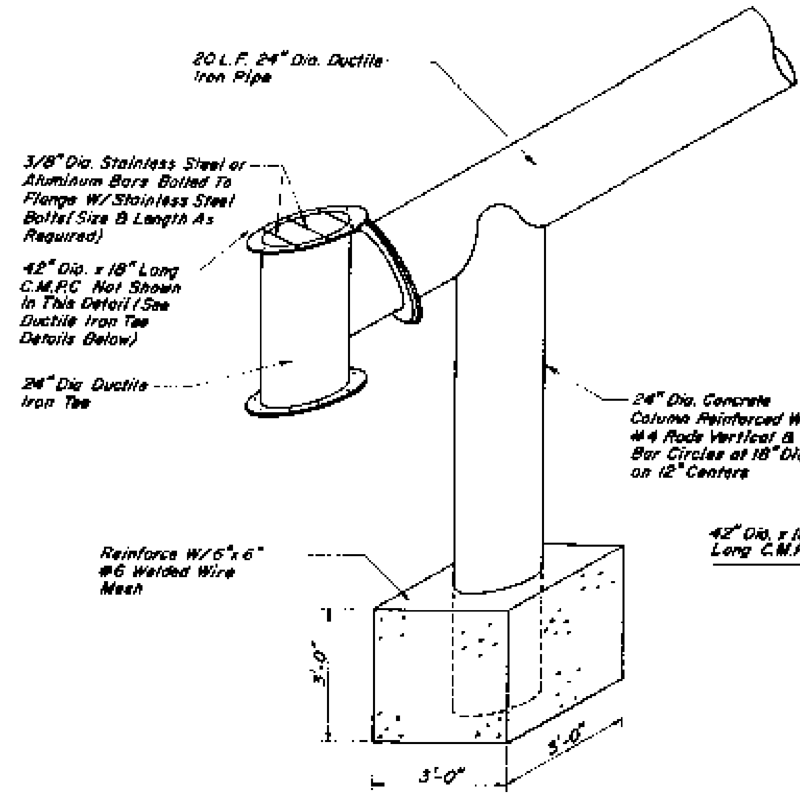
Sheet 7 of 8

02199 Sh. 7



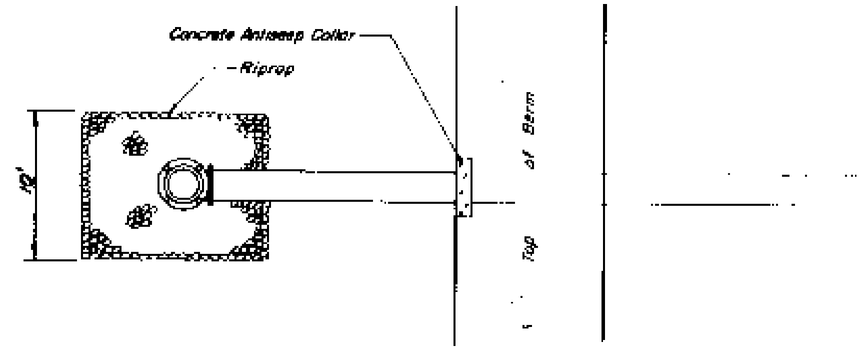
Typical Thrust Block Installation

ALL THRUST BLOCKING SHALL BE REDI-MIX CONCRETE POURED AGAINST UNDISTURBED EARTH AT ALL LOCATIONS ILLUSTRATED ABOVE

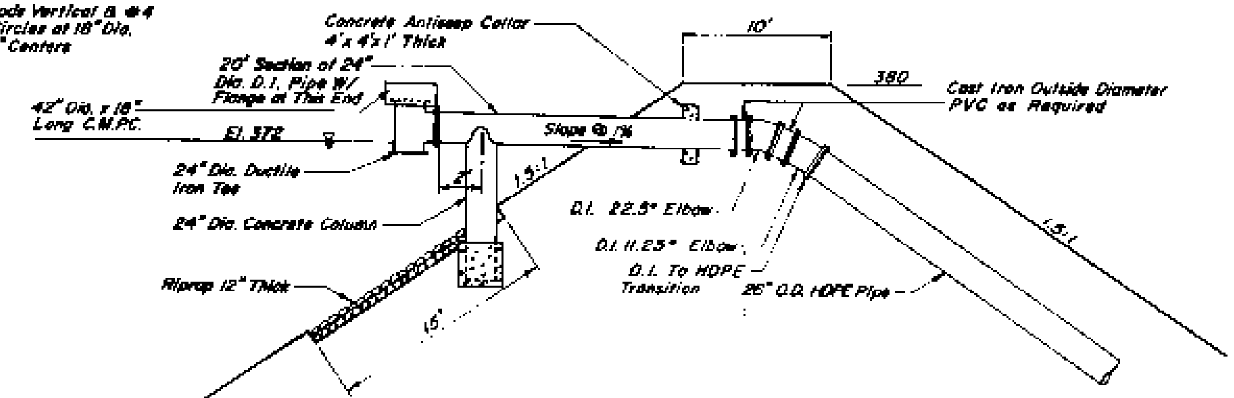


Section at Pipe Support

No Scale



Plan



Section Through Levee

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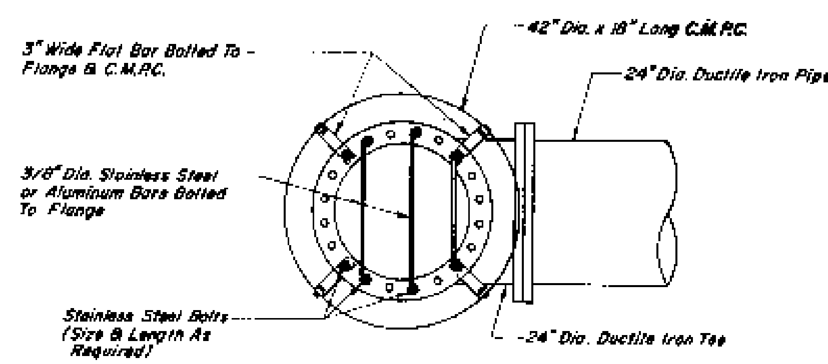
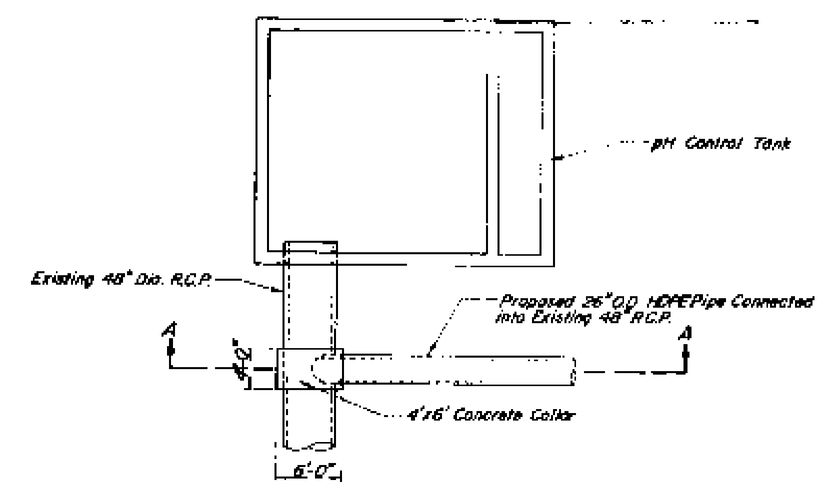
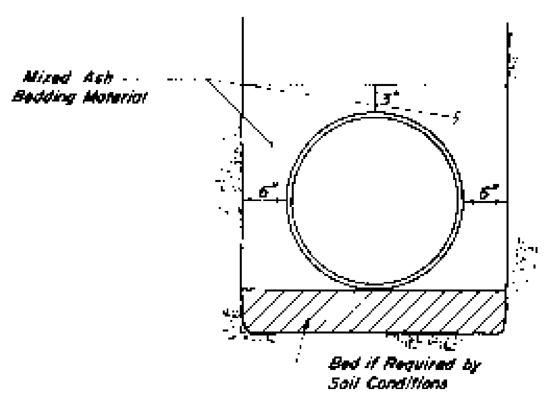


Plan View - Ductile Iron Tee

No Scale



Plan at pH Control Tank



Typical Bedding Detail

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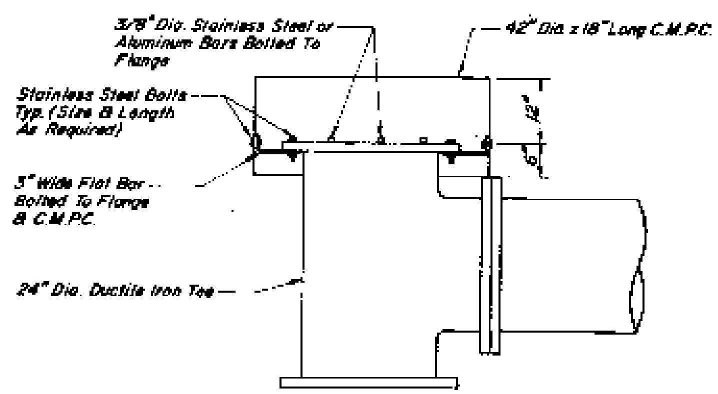
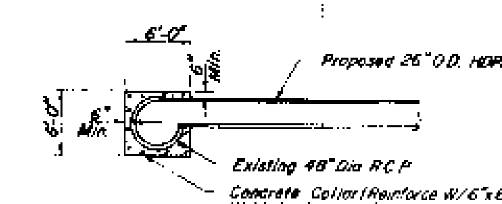


Elevation - Ductile Iron Tee

No Scale



Section A-A

No Scale

ENG FILE COPY
DO NOT REMOVE

BROWN, ROFFMANN & ROBERTS, INC.
CONSULTING ENGINEERS AND LAND SURVEYORS
500 W POPLAR ST. HARRISBURG, IL 62946 (618) 252-8111

ELECTRIC ENERGY, INC.
ASH LAGOON OVERFLOW

Miscellaneous Details

Drawn By | Checked By
Revisions
Item | Date | By
Scale As Shown
Job Number
Date
Sheet

8 / 8

02193-4-5

LEGEND:

- GROUNDWATER MONITORING WELL
- SURVEY CONTROL POINT

0 400 800 1200

SCALE IN FEET

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ELECTRIC ENERGY, INC.
2100 PORTLAND ROAD
JOPPA, IL 62953

WORK PAD AND SITE RESTORATION
EAST ASH POND

ISSUED FOR CONSTRUCTION

ISSUED FOR BIDDING		
ISSUED FOR CONSTRUCTION	05/24/16 DATE	VAM BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

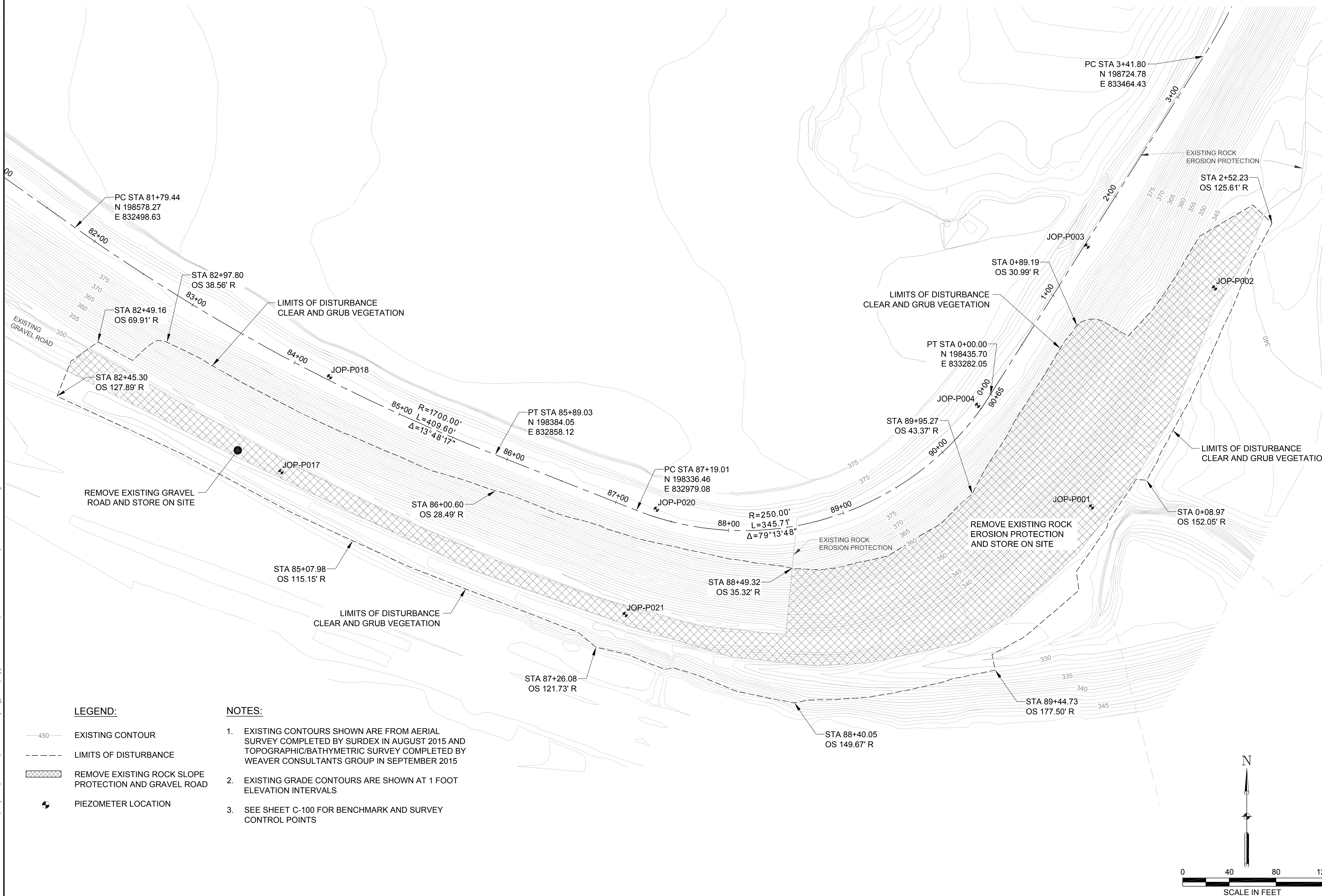
AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/13/2016
PLOT DATE:	6/2/2016
SCALE:	1" = 40'
ACAD VER:	2014

SHEET TITLE

OVERALL SITE PLAN

C-100

SHEET 4 OF 14



LEGEND:

450	EXISTING CONTOUR
- - - -	LIMITS OF DISTURBANCE
(hatch)	REMOVE EXISTING ROCK SLOPE PROTECTION AND GRAVEL ROAD
(symbol)	PIEZOMETER LOCATION

NOTES:

1. EXISTING CONTOURS SHOWN ARE FROM AERIAL SURVEY COMPLETED BY SURDEX IN AUGUST 2015 AND TOPOGRAPHIC/BATHYMETRIC SURVEY COMPLETED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2015
2. EXISTING GRADE CONTOURS ARE SHOWN AT 1 FOOT ELEVATION INTERVALS
3. SEE SHEET C-100 FOR BENCHMARK AND SURVEY CONTROL POINTS

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JOPPA, IL 62953

WORK PAD AND SITE RESTORATION
EAST ASH POND

ISSUED FOR CONSTRUCTION

ISSUED FOR BIDDING — DATE BY
ISSUED FOR CONSTRUCTION 05/24/16 VAM

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

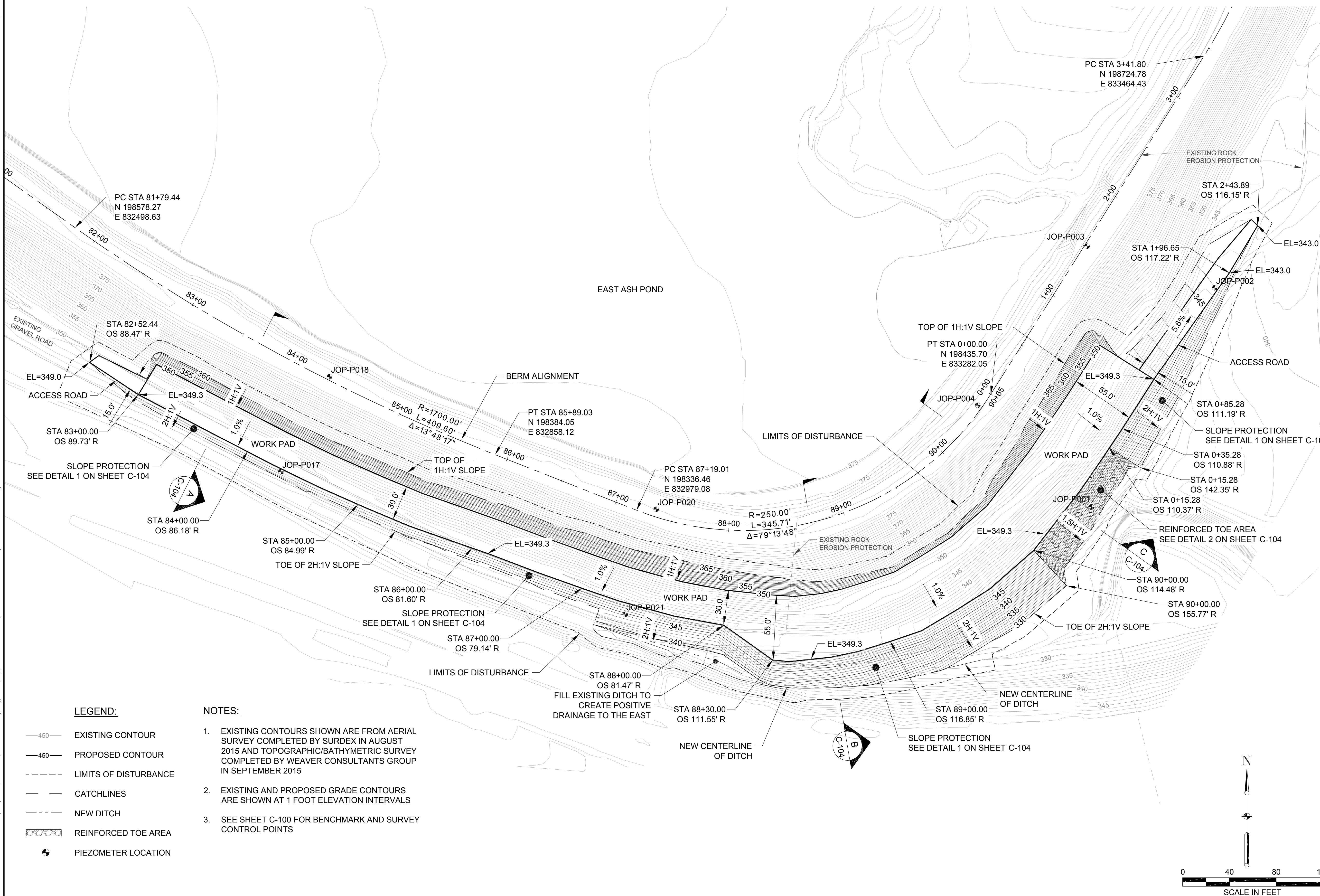
AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/13/2016
PLOT DATE:	6/2/2016
SCALE:	1" = 40'
ACAD VER:	2014

SHEET TITLE

PRE-DMM SITE CLEARING PLAN

C-101

SHEET 5 OF 14



LEGEND:

- 450 EXISTING CONTOUR
- 450 PROPOSED CONTOUR
- LIMITS OF DISTURBANCE
- CATCHLINES
- NEW DITCH
- REINFORCED TOE AREA
- PIEZOMETER LOCATION

NOTES:

1. EXISTING CONTOURS SHOWN ARE FROM AERIAL SURVEY COMPLETED BY SURDEX IN AUGUST 2015 AND TOPOGRAPHIC/BATHYMETRIC SURVEY COMPLETED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2015
2. EXISTING AND PROPOSED GRADE CONTOURS ARE SHOWN AT 1 FOOT ELEVATION INTERVALS
3. SEE SHEET C-100 FOR BENCHMARK AND SURVEY CONTROL POINTS

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2100 PORTLAND ROAD
JOPPA, IL 62953

WORK PAD AND SITE RESTORATION EAST ASH POND

ISSUED FOR CONSTRUCTION

ISSUED FOR BIDDING	DATE	BY
ISSUED FOR CONSTRUCTION	05/24/16	VAM

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/13/2016
PLOT DATE:	6/2/2016
SCALE:	1" = 40'
ACAD VER:	2014

SHEET TITLE

PRE-DMM SITE PLAN

C-102

SHEET 6 OF 14

CARUSO, MICHAEL, 6/2/2016 9:33 AM
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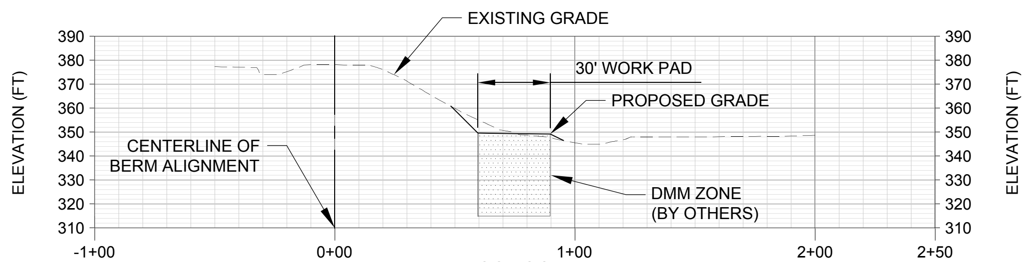
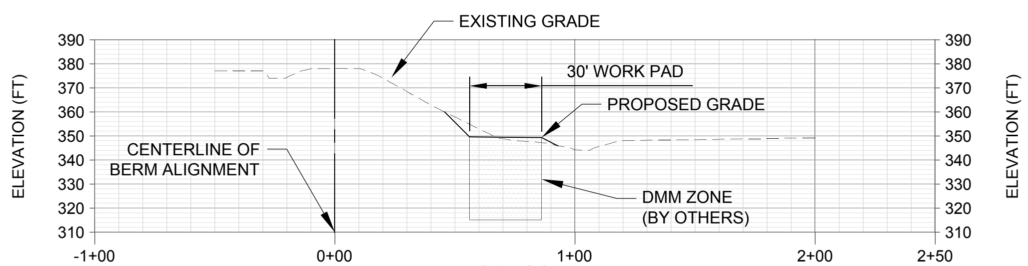
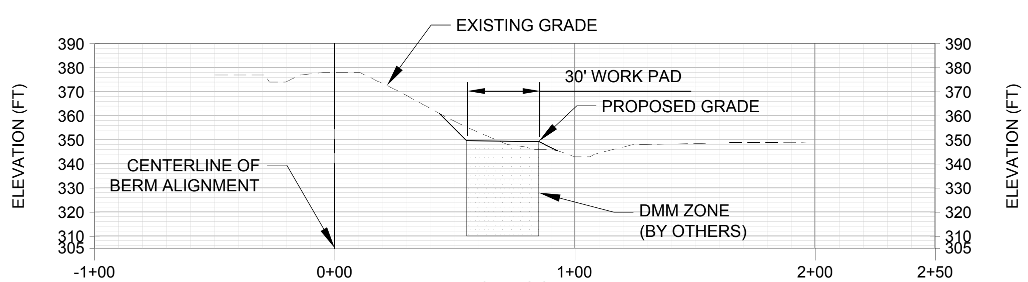


83+00
STATION (FT)



84+00
STATION (FT)



85+00
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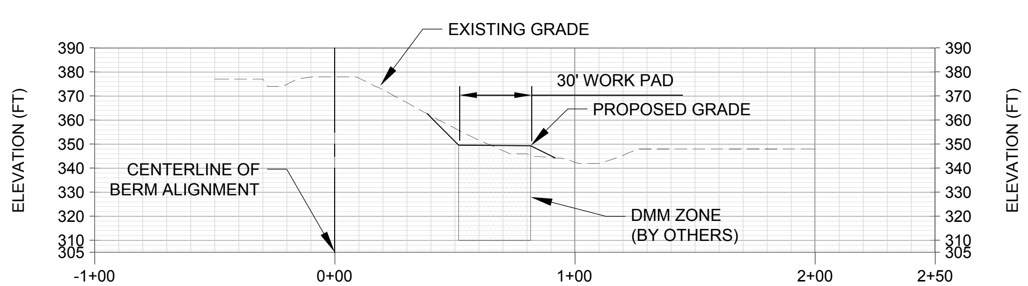

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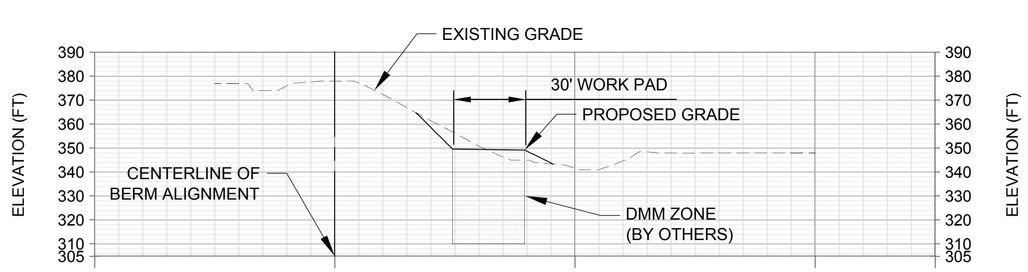

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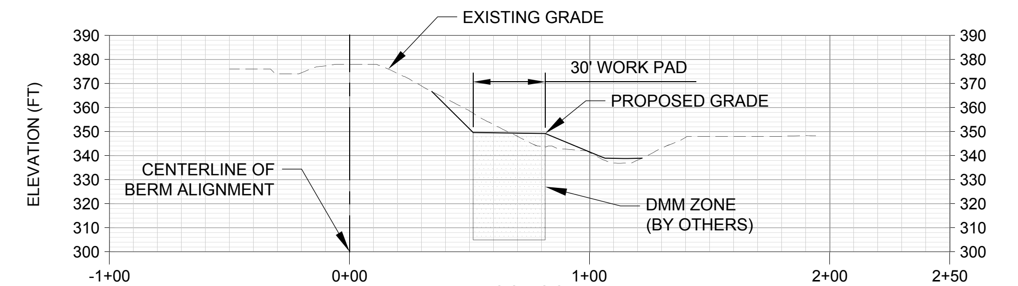

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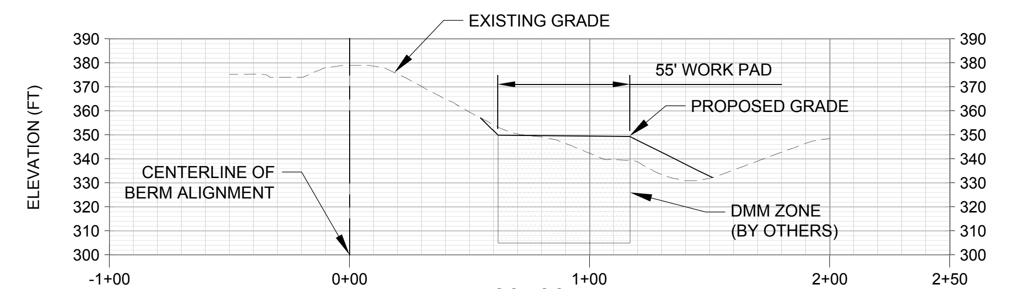
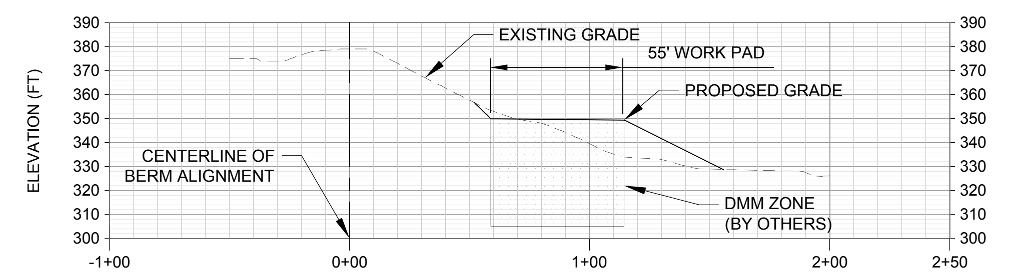
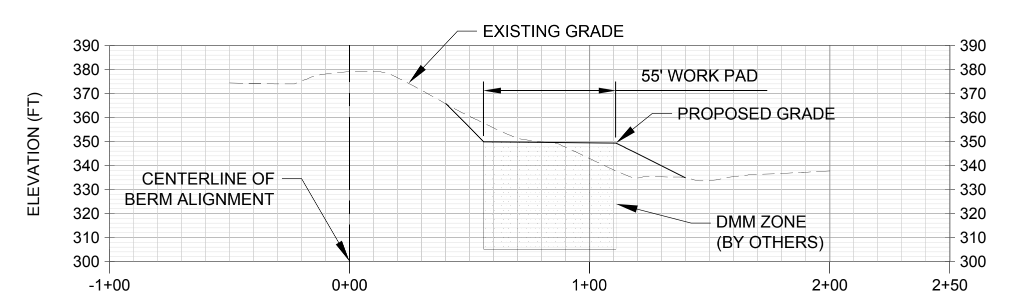
STATION (FT)



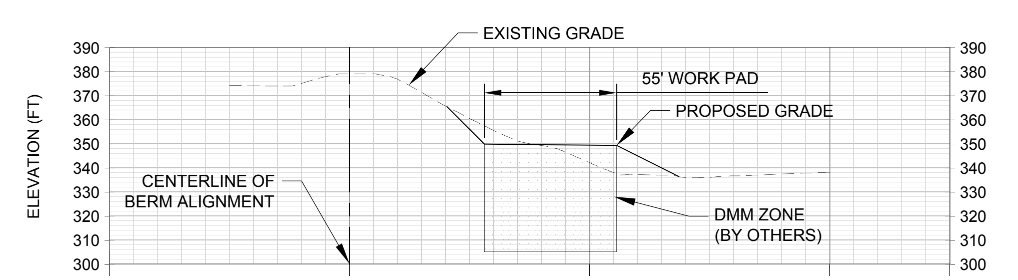
89+00
STATION (FT)



90+00
STATION (FT)



0+35
STATION (FT)



0+85
STATION (FT)

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1001 Highlands Plaza
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ELECTRIC ENERGY, INC.
2100 PORTLAND ROAD
JOPPA, IL 62953

WORK PAD AND SITE
RESTORATION
EAST ASH POND

ISSUED FOR
CONSTRUCTION

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ISSUED FOR CONSTRUCTION	05/24/16	VAM

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	TLE
DATE CREATED:	04/13/16
PLOT DATE:	6/2/2016
SCALE:	1" = 40'
ACAD VER:	2014

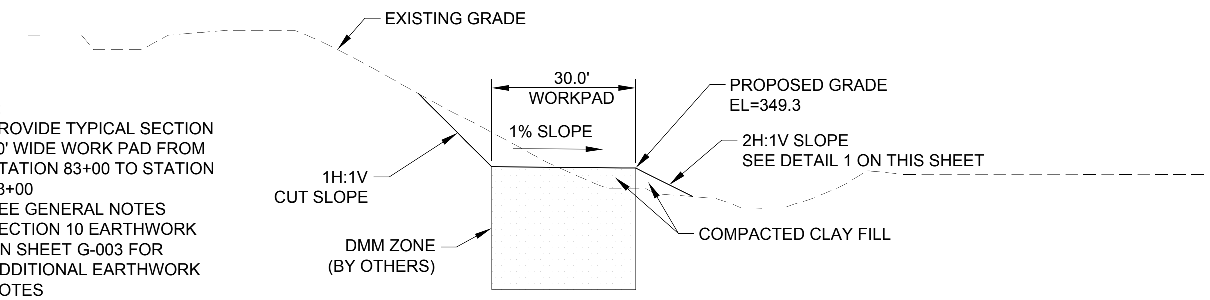
SHEET TITLE

PRE-DMM CROSS
SECTIONS

C-103

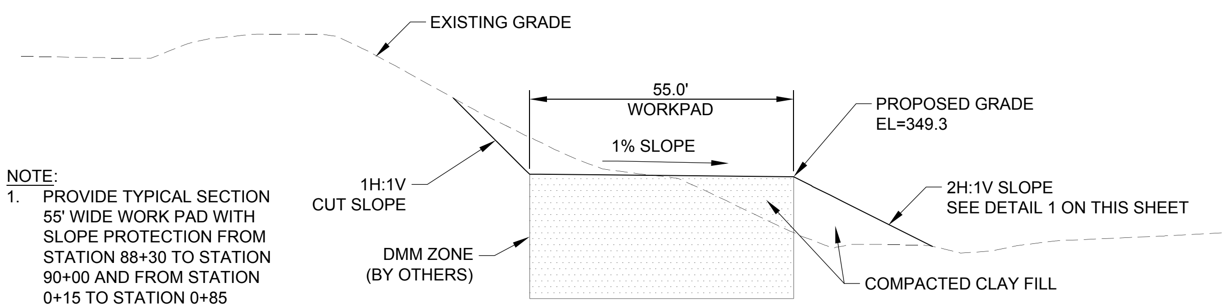
SHEET 7 OF 14

NOTE:
1. PROVIDE TYPICAL SECTION 30' WIDE WORK PAD FROM STATION 83+00 TO STATION 88+00
2. SEE GENERAL NOTES SECTION 10 EARTHWORK ON SHEET G-003 FOR ADDITIONAL EARTHWORK NOTES



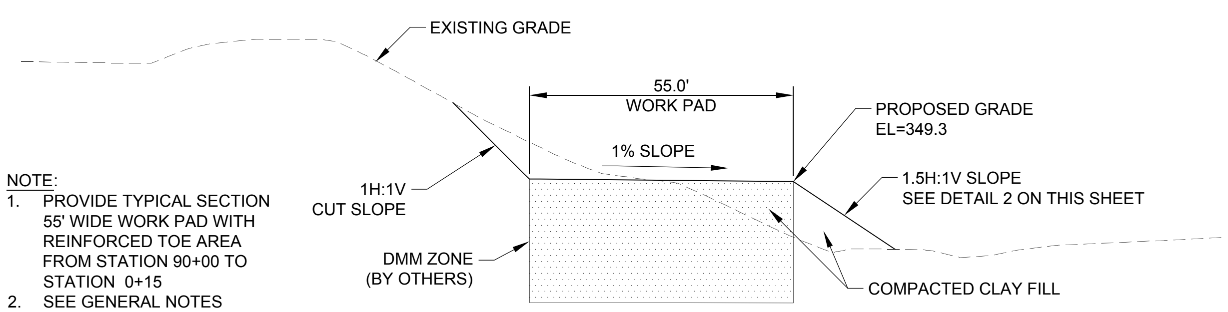
A / C-102 TYPICAL SECTION
30' WIDE WORK PAD WITH SLOPE PROTECTION
SCALE 1" = 20'

NOTE:
1. PROVIDE TYPICAL SECTION 55' WIDE WORK PAD WITH SLOPE PROTECTION FROM STATION 88+30 TO STATION 90+00 AND FROM STATION 0+15 TO STATION 0+85
2. SEE GENERAL NOTES SECTION 10 EARTHWORK ON SHEET G-003 FOR ADDITIONAL EARTHWORK NOTES



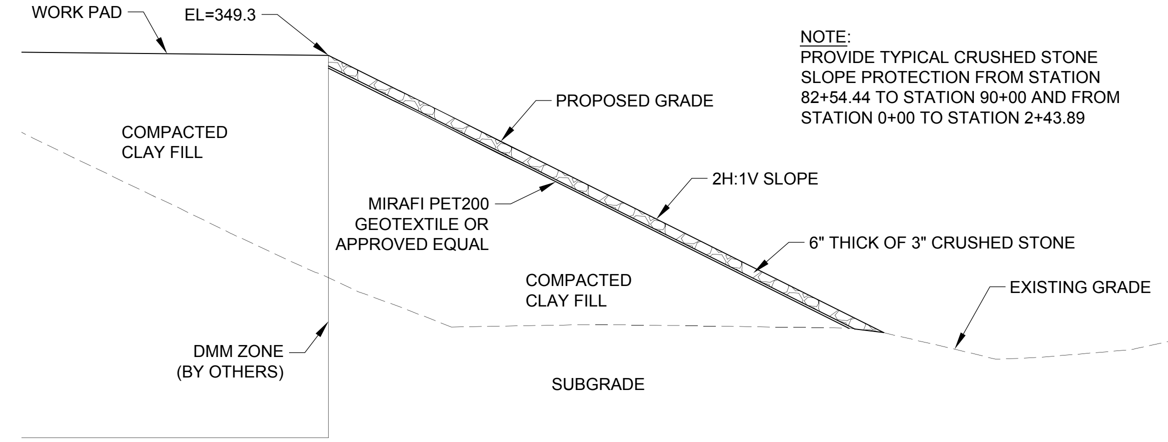
B / C-102 TYPICAL SECTION
55' WIDE WORK PAD WITH SLOPE PROTECTION
SCALE 1" = 20'

NOTE:
1. PROVIDE TYPICAL SECTION 55' WIDE WORK PAD WITH REINFORCED TOE AREA FROM STATION 90+00 TO STATION 0+15
2. SEE GENERAL NOTES SECTION 10 EARTHWORK ON SHEET G-003 FOR ADDITIONAL EARTHWORK NOTES



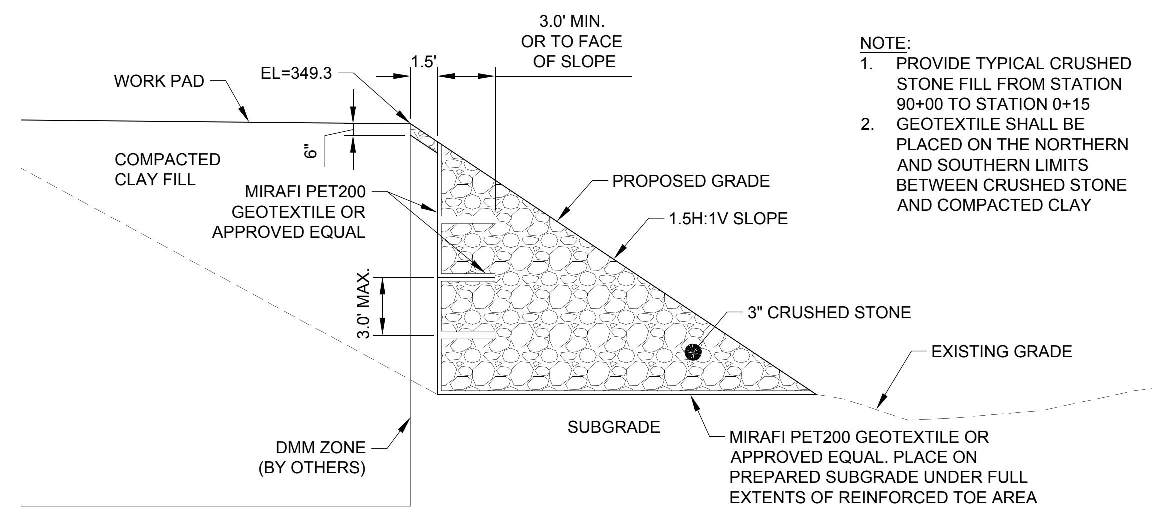
C / C-102 TYPICAL SECTION
55' WIDE WORK PAD WITH REINFORCED TOE AREA
SCALE 1" = 20'

NOTE:
PROVIDE TYPICAL CRUSHED STONE SLOPE PROTECTION FROM STATION 82+54.44 TO STATION 90+00 AND FROM STATION 0+00 TO STATION 2+43.89



1 / C-102 TYPICAL PRE-DMM SLOPE PROTECTION
SCALE 1" = 5'

NOTE:
1. PROVIDE TYPICAL CRUSHED STONE FILL FROM STATION 90+00 TO STATION 0+15
2. GEOTEXTILE SHALL BE PLACED ON THE NORTHERN AND SOUTHERN LIMITS BETWEEN CRUSHED STONE AND COMPACTED CLAY



2 / C-102 TYPICAL PRE-DMM REINFORCED TOE AREA
SCALE 1" = 5'

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2100 PORTLAND ROAD
JOPPA, IL 62953

WORK PAD AND SITE RESTORATION
EAST ASH POND

ISSUED FOR CONSTRUCTION

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ISSUED FOR CONSTRUCTION	05/24/16	VAM

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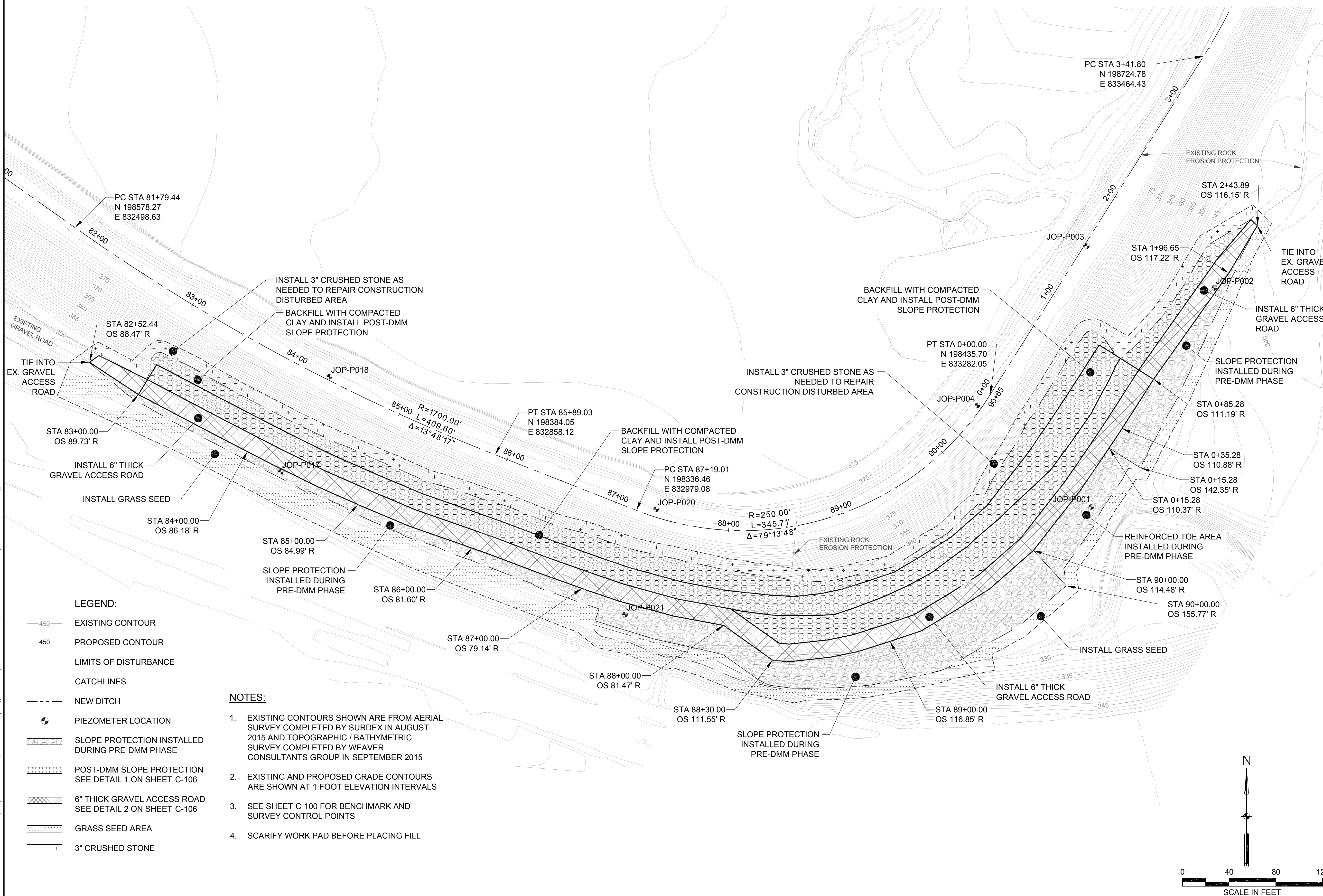
NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/13/2016
PLOT DATE:	6/2/2016
SCALE:	AS SHOWN
ACAD VER:	2014

SHEET TITLE

PRE-DMM DETAILS

C-104



LEGEND:

- EXISTING CONTOUR (450)
- PROPOSED CONTOUR (450)
- LIMITS OF DISTURBANCE
- CATCHLINES
- NEW DITCH
- PIEZOMETER LOCATION
- SLOPE PROTECTION INSTALLED DURING PRE-DMM PHASE
- POST-DMM SLOPE PROTECTION SEE DETAIL 1 ON SHEET C-106
- 6" THICK GRAVEL ACCESS ROAD SEE DETAIL 2 ON SHEET C-106
- GRASS SEED AREA
- 3" CRUSHED STONE

NOTES:

1. EXISTING CONTOURS SHOWN ARE FROM AERIAL SURVEY COMPLETED BY SURDEX IN AUGUST 2015 AND TOPOGRAPHIC / BATHYMETRIC SURVEY COMPLETED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2015
2. EXISTING AND PROPOSED GRADE CONTOURS ARE SHOWN AT 1 FOOT ELEVATION INTERVALS
3. SEE SHEET C-100 FOR BENCHMARK AND SURVEY CONTROL POINTS
4. SCARIFY WORK PAD BEFORE PLACING FILL

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JOPPA, IL 62953

WORK PAD AND SITE RESTORATION
EAST ASH POND

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ISSUED FOR CONSTRUCTION	05/24/16	VAM

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/13/2016
PLOT DATE:	6/2/2016
SCALE:	1" = 40'
ACAD VER:	2014

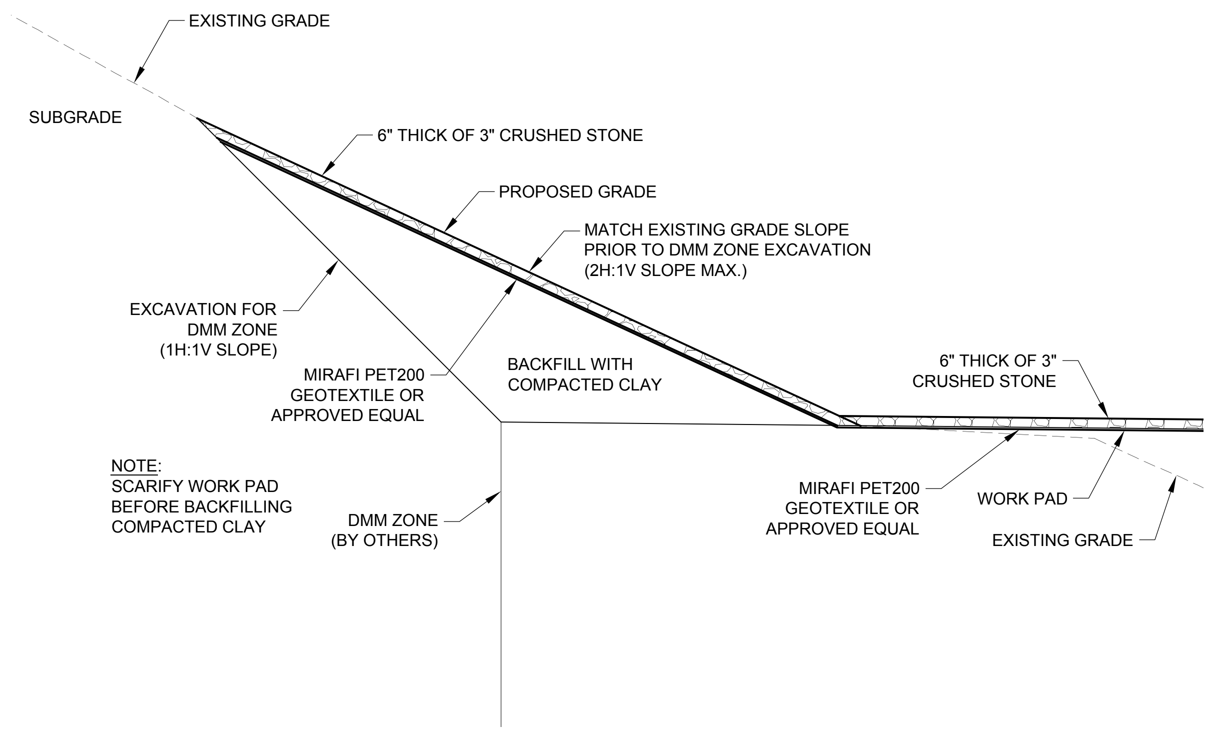
SHEET TITLE

POST-DMM SITE RESTORATION PLAN

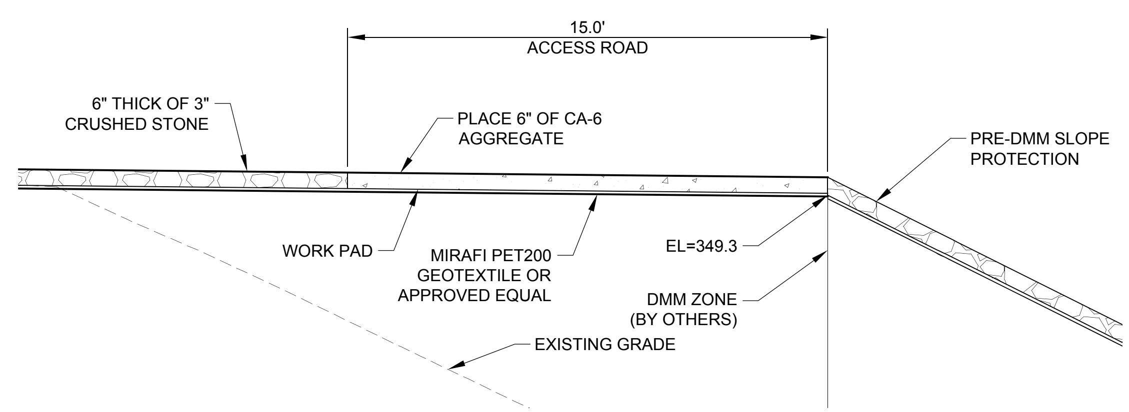
C-105

SHEET 9 OF 14

CARUSO, MICHAEL 6/2/2016 9:35 AM
AECOM DRAWING PATH: P:\Projects\Geotech\60428794_DynegyCCR\Joppa Remediation\CAD Files from SLC\JOP-SITE PLAN.dwg



1 / C-105 TYPICAL POST-DMM SLOPE PROTECTION
SCALE 1" = 5'



2 / C-105 TYPICAL ACCESS ROAD
SCALE 1" = 3'

AECOM
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Drive West, Suite 300
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314-429-0462 (fax)

ELECTRIC ENERGY, INC.
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JOPPA, IL 62953

WORK PAD AND SITE RESTORATION
EAST ASH POND

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ISSUED FOR CONSTRUCTION 05/24/16 VAM (DATE BY)

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NO.	DESCRIPTION	DATE
1	ADDED TRAFFIC PLAN	6/2/2016

AECOM PROJECT NO:	60440155
DRAWN BY:	MJC
DESIGNED BY:	MJC
CHECKED BY:	LPC
DATE CREATED:	4/25/2016
PLOT DATE:	6/2/2016
SCALE:	AS SHOWN
ACAD VER:	2014

SHEET TITLE

POST-DMM DETAILS

C-106

Appendix C: Joppa East Ash Pond Piezometer and Boring Locations

NOTES

1. Plan adapted from an aerial photograph courtesy of Google Earth.

LEGEND

Boring Location

A A' Slope Stability Cross Section

0 180 360

SCALE IN FEET

N

Drawn By: SLC	Ck'd By: SLC	App'vd By: RSP
Date: 08-12-10	Date: 9/20/10	Date: 9/20/10

GEOTECHNOLOGY INC.
ENGINEERING AND ENVIRONMENTAL SERVICES
ST. LOUIS • COLLINSVILLE • KANSAS CITY

Electric Energy Inc. Facility
Joppa, Illinois

AERIAL PHOTOGRAPH OF SITE AND BORING LOCATIONS

Project Number J017150.02	PLATE 2

XXX–X### — EXPLORATION METHOD (B=BORING, C=CPT, P=PIEZOMETER); 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

Electric Energy, Inc.	PROJECT NO. 60440155
AECOM	
DRN. BY: djd October 2015 DSGN. BY: eg CHKD. BY: eg	Joppa 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 PIEZOMETER LOCATION PLAN (JOPPA).DWG Last edited: NOV. 04, 15 @ 1:20 p.m. by: david_deguire

Appendix D: Ash Pond Embankment Instability, Hanson Professional Services Inc. (2011)

Hanson Professional Services Inc.
1525 South 6th Street
Springfield, IL 62703
(217) 788-2450
Fax: (217) 788-5241
www.hanson-inc.com

April 29, 2011

Mr. Mike Mercer
Electric Energy Inc.
P.O. Box 158
Joppa, Illinois 62953

RE: Ash Pond Embankment Instability
Joppa Ash Pond
Hanson No. 11E0054

Dear Mr. Mercer:

On April 26, 2011 the Joppa ash pond embankment was inspected by James Knutelski, P.E. from Hanson, and Mike Mercer from Electric energy Inc. (EEI) after instability in several areas of the downstream embankment slope was observed on April 25, 2011 by EEI personnel. The locations of the areas of instability that were observed during the April 26, 2011 inspection are shown on the aerial photograph that is attached to this letter. We understand that storms produced 4.75 in. of rain at the Joppa Power Station between April 22 and April 25, 2011.

Existing drawing indicate that the embankment was originally constructed in 1985 using local cohesive soils (ML or CL materials) with 1.5H:1.0V and 2.0H:1.0V exterior slopes. The embankment height varies between 15 ft and 40 ft. The design crest width was 20 ft. EEI employees reported that the completed embankment crest width was less than 20 ft and on the order of 10 ft or less in some areas. Between 1985 and 2011, the configuration of the embankment has been changed using flyash produced at the Joppa Power Station. Generally, fly ash has been placed over the downstream slope from the embankment crest in order to widen the embankment crest width in some areas. At some locations as much as 3 ft of additional embankment (flyash) has reportedly been added to the downstream embankment slope.

There have been previous reports of instability of the pond embankment on the northern portion of the west embankment. These areas of instability were repaired using riprap materials in a bench arrangement in order to provide more resistance to sliding in the affected areas. These areas appeared to be stable during the April 26, 2011 inspection.

During the inspection, sloughs at eight areas of instability were observed. The areas of instability are shown on the attached photographs. The sloughs appeared to be relatively shallow. The length of scarp varied from as little as 25 ft in length to as much as 150 ft in length. The scarps generally began at the top of the slope and extended to between one-half of the embankment height and the full embankment height. The embankment soils exposed by the slide were observed to be firm to hard at a shallow depth (less than 1 ft in most instances) when probed with a thin steel rod (drain tile probe).

The sloughs observed on the northern ash pond (#1 through #6) and one of two slough areas on the southern ash pond (area #7) appeared to be mainly due to sliding at the interface between ash materials apparently added to the downstream embankment slope and the original cohesive soil embankment constructed in 1985. Water infiltration through the ash materials that did not infiltrate the cohesive soils appears to have reduced the friction between these materials and caused sloughing. The sloughed material appeared to be composed of partially hydrated flyash and was generally hard and brittle.

Slide area #8 was observed on the southern portion of the eastern embankment. It appeared to be a shallow failure about 50 ft long with a scarp about 8 in. deep. In general, the slide appeared to consist of only topsoil and organic material. Infiltration of water through the topsoil that was trapped between the topsoil and cohesive embankment probably provided the failure mechanism in this area. There were no observations made that would indicate why this area failed and other areas with similar surface condition and slope did not.

Until more favorable weather conditions exist, the areas of instability may continue to slough, sloughs may propagate into areas adjacent to existing sloughs, and new sloughs may develop.

Repair of these areas may be completed using local cohesive soils, or riprap materials similar to those used to repair other areas of sliding. The use of local cohesive soil for repair will probably be the more economic alternative if repairs are made, but will require more favorable weather conditions and soil moisture control as described below.

Repair of the embankment with local cohesive soil should consist of stripping the affected area of all sloughing soil, ash, and vegetative cover; placement of new compacted soil embankment; and establishment of vegetative cover on the repaired embankment. Repair of these areas with soil should not be started until weather conditions allow compaction of thin lifts (8 in. maximum compacted thickness) of soil to be placed and compacted to 95% of the maximum dry density obtained using ASTM Test Method D648 (Standard Compaction Test).

The new embankment materials should be constructed by benching into the existing embankment deep enough to remove all soft or wet soils encountered. The maximum vertical bench height should be limited to 2 ft. The average slope of the benched area within the existing embankment should be no steeper than 1.5H:1.0V during construction of repairs. In order to construct repairs and maintain stability of the existing embankment materials, it will probably be necessary to increase the width of the embankment toe and construct a slope flatter than the 1.5H:1.0 V and 2.0H:1.0V slopes that were originally constructed. It is recommended that slopes no steeper than 2.5H:1.0V be constructed for repairs with local cohesive soils since one area of instability in the 2.0H:1.0V existing slope was observed during the inspection. A typical soil repair section is shown on the attached sheet.

Repair of the embankment with riprap material should consist of stripping the affected area of all sloughing soil, ash, and vegetative cover and placement of riprap materials.

The riprap materials should be constructed by benching into the existing embankment deep enough to remove all soft or wet soils encountered. The average slope of the benched area within the existing embankment should be no steeper than 1.5H:1.0V during construction of repairs. The maximum vertical bench height should be limited to 2 ft. The riprap materials may be placed in a single slope configuration or benched. The riprap should be placed in lifts not exceeding 2 ft in height and tracked in with the equipment used for construction. The single slope should be no steeper than 2.5H:1.0V. For a benched slope, the average slope of the riprap materials should be no steeper than 2.5H:1.0V. The slope of the benches should match the slope of the adjacent embankment materials. A typical benched riprap slope is shown on the attached sheet.

The above repair recommendations should also be considered for areas of the pond embankment that have not experienced instability in order to prevent instability under similar wet weather conditions in the future. The ash materials that have been placed on the embankment slope appear to have created a mechanism for failure by trapping water between the ash and embankment soil. In addition, flattening the slope of the embankment where ash materials are not present should be considered since instability of the slope under extremely wet weather conditions has been experienced.

As discussed, an alternative to the above repair recommendations is to discontinue use of the pond for water detention. The risk of a breach in the embankment would be greatly reduced if water detention and storage were eliminated. This could be accomplished by grading the ash materials within the pond to drain to a low point (either the existing outfall structure, or a designed breach within the perimeter embankment). One requirement for this alternative would be that the ash be graded to be able to discharge runoff from the pond interior to the pond outlet with minimal water detention.

We have been pleased to provide the information within this letter. Feel free to call me at (217) 747-9437 if you have any questions.

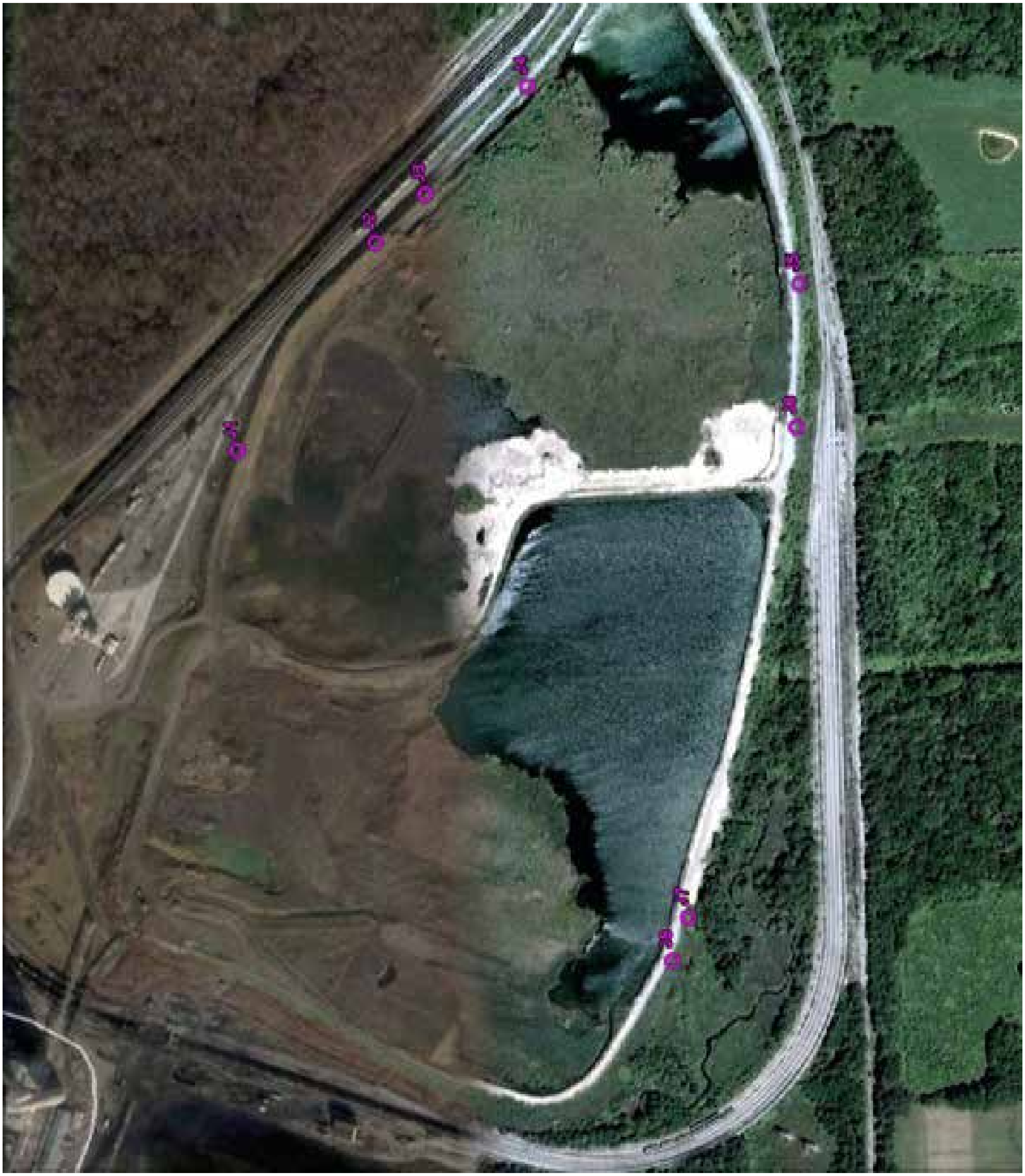
Sincerely,

HANSON PROFESSIONAL SERVICES INC.

James P. Knutelski, PE
Geotechnical Engineer

jpk

Enclosures



Slide Area #1

Slide Area #2

Slide Area #3

Slide Area #4

Slide Area #5

Slide Area #6

Slide Area #7

Slide Area #8

By: JPK Date: 4/27/11

Checked by: Date:

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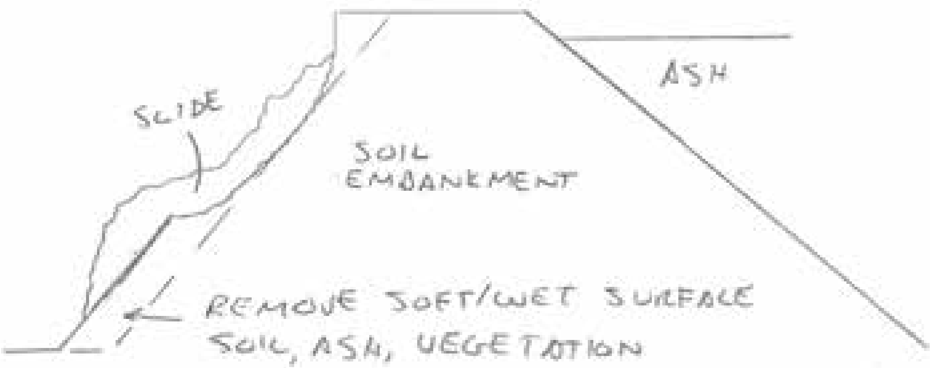
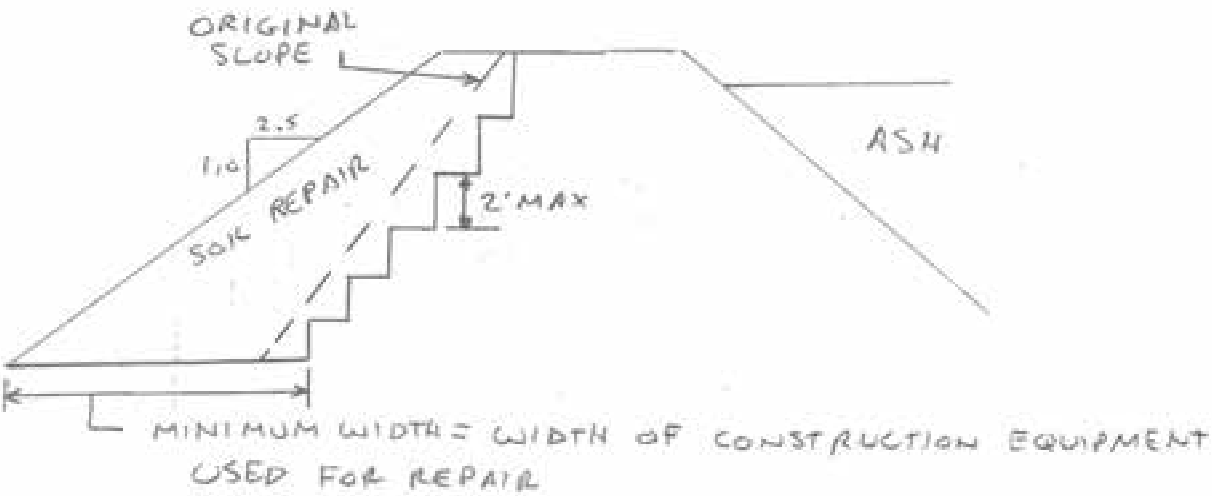
JOPPA ASH POND - SHALLOW FAILURE REPAIR

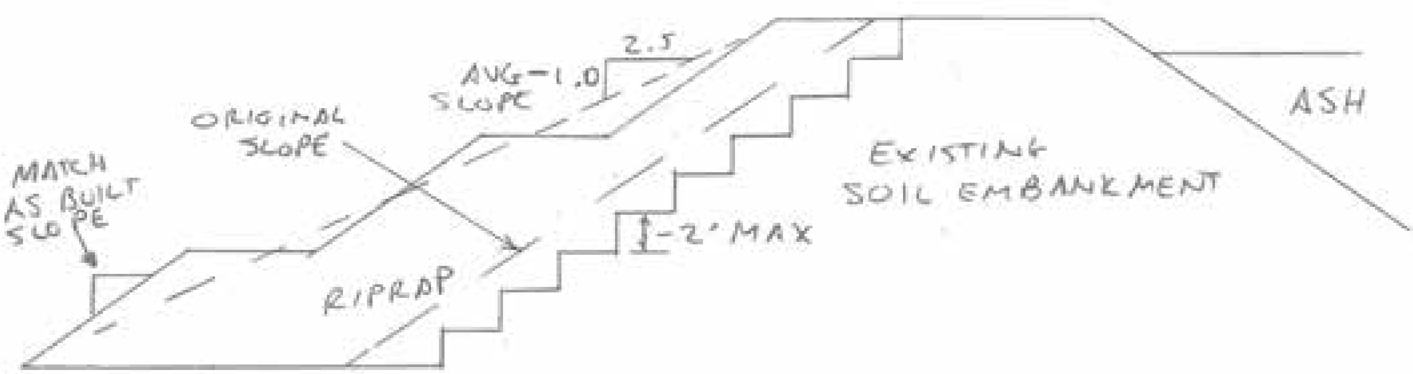
TYPICAL SHALLOW SLIDE



SOIL REPAIR



RIPRAP REPAIR



Appendix E: Photos of Slope Repairs

Figure E.1: Photo of stripping the affected area of all sloughing soil, ash, and vegetative cover.

Figure E.2: Photo of benching into the existing embankment.