HALEY & ALDRICH, INC.
6500 Rockside Road
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Cleveland, OH 44131
216.739.0555

MEMORANDUM

17 April 2018
File No. 129342-015

SUBJECT: History of Construction
Associated Electric Cooperative, Inc.
New Madrid Power Plant – Inactive Lined Pond
New Madrid, MO

Haley & Aldrich, Inc. (Haley & Aldrich) has assisted Associated Electric Cooperative, Inc. (AECI) with compiling the history of construction in accordance with §257.73(c)(1) for the existing coal combustion residuals (CCR) surface impoundment known as Inactive Lined Pond at the New Madrid Power Plant (NMPP). This document addresses the requirements of the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257 (CCR Rule), specifically §257.73(c)(1). Based on the USEPA's issued CCR Rule Partial Vacatur in 2016, the Inactive Lined Pond impoundment at the NMPP is subject to applicable requirements of the CCR Rule. To the extent feasible, AECI has provided documentation supporting the history of construction. Information on the history of construction of the Inactive Lined Pond is presented in the following sections.

§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:	Associated Electric Cooperative, Inc. 2814 South Golden Avenue P.O. Box 754 Springfield, Missouri 65807
Name of CCR Unit:	Inactive Lined Pond (inactive under the CCR Rule), also referred to as the Lined Pond and Ash Pond 2 in past reports

§257.73(c)(1)(ii): The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.

Latitude: 36°30'7"
Longitude: 89°33'36"
The general location of the facility is provided in Appendix A.

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

The Inactive Lined Pond was previously used for settling and wet storage of fly ash from the NMPP.

<u>§257.73(c)(1)(iv):</u> The name and size in acres of the watershed within which the CCR unit is located.

USGS Watershed Name: 08020204 – 08 Lower Mississippi Region – Little River Ditches
Watershed Acreage: 2,620 square miles
Unit-specific Watershed Area: 78 acres

The watershed area, which includes only the impoundment area itself, is based on the most recent site topography, provided by AECI. It should be noted that the drainage area was determined as part of the Inflow Flood Control System Plan required by §257.83 of the CCR Rule which is provided under separate cover.

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

Information that was readily available regarding the description of the physical and engineering properties of the foundation and abutment materials on which the Lined Pond was constructed was discussed on pages 5 and 6 of "Final Report, Round 7 Dam Assessment" by GZA GeoEnvironmental, Inc., dated 3 June 2011, from which an excerpt is provided as Appendix B, and also on pages 1-4 of "Stability Evaluation, Slag Pond 1 and Ash Pond 2" by Geotechnology, Inc., dated 22 June 2009[1], from which an excerpt is provided as Appendix C.

<u>§257.73(c)(1)(vi)</u>: 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.

Information that was readily available regarding the type, size, range, and physical engineering properties of the materials of each zone of the Inactive Lined Pond were discussed on pages 5 and 6 of "Final Report, Round 7 Dam Assessment" by GZA GeoEnvironmental, Inc., dated 3 June 2011, from which an excerpt is provided as Appendix B, and also on pages 1-4 of "Stability Evaluation, Slag Pond 1 and Ash Pond 2" by Geotechnology, Inc., dated 22 June 2009, from which an excerpt is provided as Appendix C.

[1] Note that AECI was only able to locate the draft version of this document.

Information on the method of site preparation and construction as-built documentation of the Lined Pond is not readily available.

The Lined Pond was constructed circa 1994.

<u>§257.73(c)(1)(vii)</u>: *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.*

As readily available, drawings including partial, but not all, information listed from above have been provided in Appendix D as relates to the design of the Lined Pond. The Lined Pond abuts Pond 003 and the history of construction of Pond 003 was previously developed under separate cover.

Drawings showing improvements made to the eastern embankment to repair surficial sloughing are provided in Appendix E.

The hydraulic parameters of the unit are being developed as part of the Inflow Flood Control System Plan required by §257.83 of the CCR Rule which is provided under separate cover. The expected maximum depth of CCR within the CCR surface impoundment is approximately 30 feet.

<u>§257.73(c)(1)(viii)</u>: *a description of the type, purpose, and location of existing instrumentation.*

The Lined Pond does not have existing instrumentation used in the monitoring of structural stability. Groundwater monitoring wells do exist in the eastern embankment (P-6), and the southern embankment (P-7 and P-8) and they are shown in Appendix F.

<u>§257.73(c)(1)(ix)</u>: *area-capacity curves for the CCR unit.*

Original design area-capacity curves for the Lined Pond are not readily available. It should be noted that updated area-capacity curves for the impoundment are being developed as part of the Inflow Flood Control System Plan required by §257.83 of the CCR Rule which will be provided under separate cover.

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

The Lined Pond does not have a fixed primary spillway or emergency spillway. In its original design, a pump station operated in the southeast corner of the unit. That station is no longer operational, and instead, discharges are managed by a manually operated pump in the southeast corner of the unit. The only form of inflow to the unit is direct precipitation.

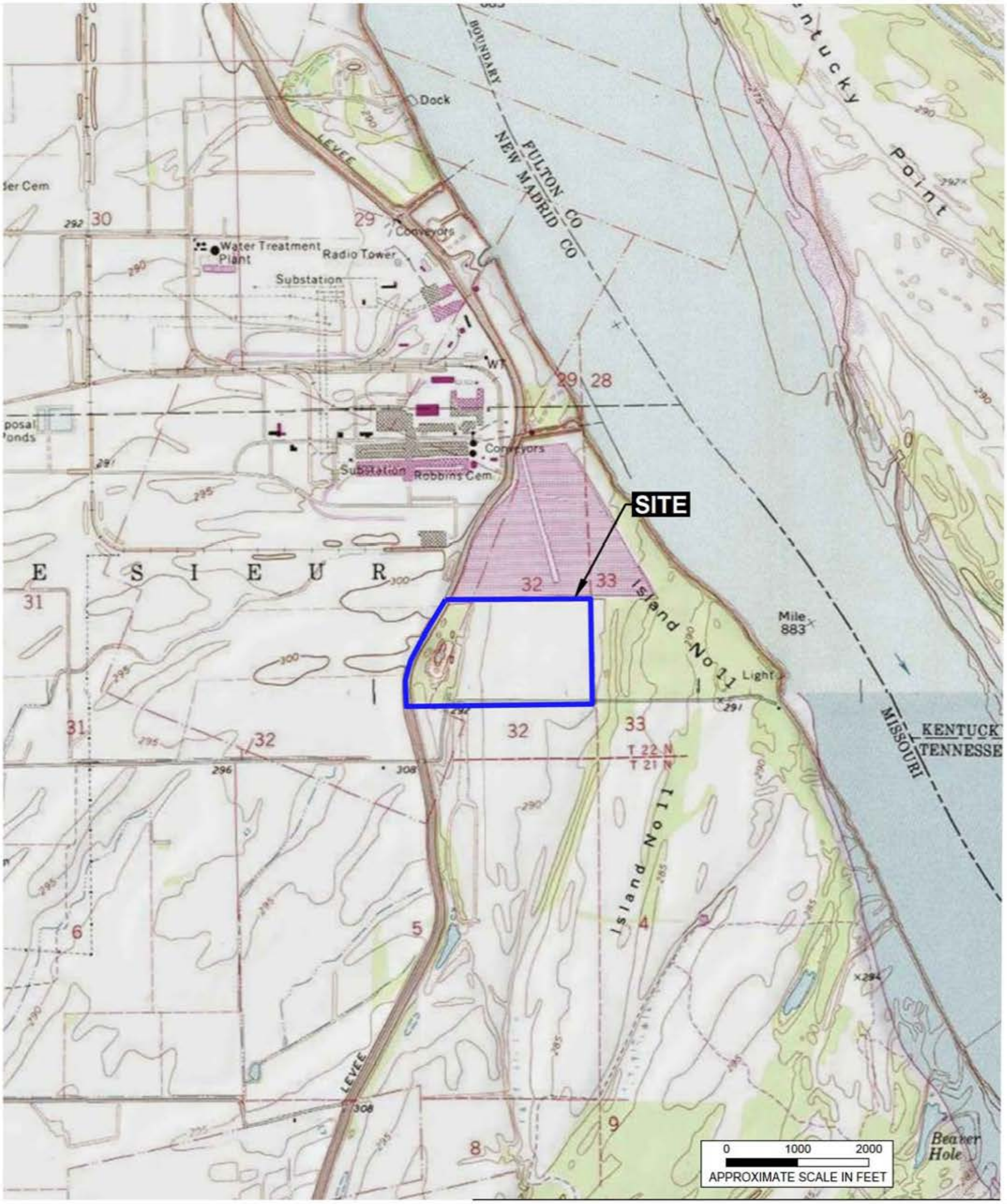
§257.73(c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

Information on the construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit are not readily available. See the drawings provided in Appendix D for construction design related information.

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

There are no records or knowledge of structural instability associated with the Lined Pond. Surficial sloughing was identified on the downstream side of the eastern embankment in the 2012. Repairs were made consistent with the drawings provided in the Appendix E. Similar surficial sloughing was identified in 2016 adjacent to areas previously prepared as described above. In 2017, repairs were made to the sloughing by regrading the slope and installing a bench with riprap at the water line of the Raw Water Pond.

APPENDIX A
Site Locus



MAP SOURCE: ESRI

SITE COORDINATES: 36°30'14"N, 89°33'36"W

HALEY ALDRICH

LINED POND
AECI, NEW MADRID POWER PLANT
MARSTON, MISSOURI

SITE LOCUS

SCALE: AS SHOWN
APRIL 2018

FIGURE 1

POSTOLOWSKI, KEVIN Printed: 4/9/2018 9:52 AM Layout: FIG 1 (2018-ARPIL)
Z:\CLE_COMMON\PROJECTS\129342_AECI-NMPP\CAD\LINED POND\FIGURES\129342_005_FIG-1_LOCUS.DWG

APPENDIX B

Excerpts from:

Final Report, Round 7 Dam Assessment, Associated Electric Cooperative, Inc.

New Madrid Power Plant, Ash Pond 1 & 2 and Slag Pond 1 & 2 Impoundments

By GZA GeoEnvironmental, Dated June 2011

FINAL REPORT
ROUND 7 DAM ASSESSMENT
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
ASH POND 1 & 2 AND SLAG POND 1 & 2 IMPOUNDMENTS
NEW MADRID COUNTY, MISSOURI

June 3, 2011

PREPARED FOR:

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

PREPARED BY:

GZA GeoEnvironmental, Inc.
19500 Victor Parkway, Suite 300
Livonia, MI 48152
GZA File No. 01.0170142.20

1.2 Description of Project

1.2.1 Location

The NMPP is located about three miles east of the city of Marston in New Madrid County, Missouri. The Site is accessible from the west via State Highway EE and from the north and south from Levee Road. The NMPP CCW impoundments are located near the power plant, which is located at latitude 36° 30' 56" North and longitude 89° 33' 47" West. A Site locus of the impoundments and surrounding area is shown in **Figure 1**. An aerial photograph of the impoundments and surrounding area is provided as **Figure 2**. The impoundments can be accessed by vehicles from earthen access roads from the NMPP.

1.2.2 Owner/Caretaker

The CCW impoundments are owned and operated by AECI.

	Dam Owner/Caretaker
Name	Associated Electric Cooperative, Inc. New Madrid Power Plant
Mailing Address	2814 S. Golden, P.O. Box 754
City, State, Zip	Springfield, Missouri 65801-0754
Contact	Duane Highley, P.E.
Title	Director, Power Production
E-Mail	duanehighley@aeci.org
Daytime Phone	(573) 643-2211
Emergency Phone	911 / (573) 379-0451 (Yard Superintendent Cell)

1.2.3 Purpose of the Impoundments

The NMPP is a two-unit coal-fired power plant, with a maximum generating capacity of approximately 1200 Megawatts. Unit 1 was constructed in 1972 while Unit 2 was constructed in 1977. Four earthen embankment CCW impoundments known as Ash Pond 1 (AP1) Impoundment, Slag Pond 1 (SP1) Impoundment, Ash Pond 2 (AP2) Impoundment, and Slag Pond 2 (SP2) Impoundment were constructed for the purpose of storing CCW waste and discharging plant wastewater.

The AP1 Impoundment and SP1 Impoundment were constructed in 1972 and function as sedimentation and storage basins for fly ash and boiler slag, respectively.[2] The SP2 Impoundment was constructed in 1984 and functions as a sedimentation and storage basin for boiler slag. The AP2 Impoundment was constructed in 1994 and functions as a sedimentation and storage basin for fly ash. The impoundments are located outside (on the river side) of the Mississippi River levee system. The top of embankment elevation of the AP1 Impoundment,

[2] Information regarding the materials received by each impoundment is based on the March 24, 2009 "Response to Request for Information Under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act," from AECI to EPA.

AP2 Impoundment and SP1 Impoundment embankments generally matches the elevation of the Mississippi River levees.

1.2.4 Description of the Ash Pond 1 Impoundment and Appurtenances

Based on information provided by the NMPP personnel, the AP1 Impoundment was designed by Burns and McDonnell of Kansas City, Missouri. No construction documentation was available but a design drawing was provided by AECI[3]. The following description of the AP1 Impoundment is based on: (a) the available design drawings; (b) the March 24, 2009 "Response to Request for Information Under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act" from AECI to the EPA (Response); (c) a slope stability analysis that was conducted for the impoundment embankments; (d) and information provided by NMPP personnel.

The AP1 Impoundment is located east of the NMPP and is roughly triangular in shape as shown in **Figure 3**. The eastern embankment of the AP1 Impoundment is shared with the SP1 Impoundment and the southern embankment is shared with the AP2 Impoundment. Most of the area of the AP1 Impoundment is filled with fly ash that has settled in-place or is stockpiled in the impoundment. Water and fly ash are discharged into the AP1 Impoundment via four pipelines located on the northern portion of the impoundment. The discharged water and ash flow through an approximately 7 foot deep channel in the stockpiled ash that is maintained through the removal of settled fly ash. The channel transports water through a channel between the embankment between the AP1 Impoundment and SP1 Impoundment and water then travels through the SP1 Impoundment. The ash that is removed from the channel is dewatered and stockpiled in the AP2 Impoundment as shown on **Figure 3**. The stockpiled ash is several feet above the embankment elevations in several areas.

The AP1 Impoundment consists of an earthfill embankment with a crest length of approximately 6,400 feet[4] and a general height (from the lowest toe elevation to the crest of embankments) of approximately 12 feet. The impoundment is unlined and the embankments were constructed from native silty clay. The impoundment has a surface area of approximately 31 acres at a water level elevation of 303 feet Mean Sea Level (MSL) and the stockpiled ash occupies approximately 80 percent of the available storage capacity[5]. A gravel access road is present on the southern embankment crest and an asphalt access road is present on the western embankment crest. The crest elevation of the impoundment is approximately 310 feet MSL.[6]

Based on the design drawings provided and discussions with NMPP personnel, it does not appear the embankment was constructed over wet ash, slag or other unsuitable materials.

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[3] Drawing provided by AECI titled: "Fly Ash Pond Improvement Plan View W/Contours". Drawing generated by AECI and dated 1989.

[4] The length of the embankments for the impoundments was estimated by GZA using Google Earth Software.

[5] The volume of ash provided for the impoundments was taken from the March 24, 2009 "Response to Request for Information Under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act" from AECI to EPA.

[6] Elevations of the AP1 and SP1 impoundments were estimated by GZA from topographic contours provided in AECI drawing titled: "Fly Ash Pond Improvement Plan View W/Contours" dated 1989.

The AP1 impoundment embankments were designed with 3 horizontal on 1 vertical (3H:1V) upstream and downstream slopes[7]. The western downstream slope was generally designed to be vegetated with grass. There is one groundwater monitoring well (P-5) located near the western embankment of the AP1 Impoundment.

1.2.5 Description of the Slag Pond 1 Impoundment and Appurtenances

Based on information provided by the NMPP personnel, the SP1 Impoundment was designed by Burns and McDonnell of Kansas City, Missouri. No construction documentation was available but a design drawing was provided by AECI[8]. The following description of the SP1 Impoundment is based on the available design drawing, the March 24, 2009 Response, a stability analysis that was conducted for the impoundment embankments, and information provided by NMPP personnel.

The SP1 Impoundment is located east of the NMPP and the AP1 Impoundment. The western, southern, and southeastern embankments of the SP1 Impoundment are shared with the AP1 Impoundment, the AP2 Impoundment and the Raw Water Pond, respectively as shown in **Figure 3**. Most of the area of the SP1 Impoundment is filled with fly ash that has settled and or has been stockpiled in the impoundment. Water and presumably ash enter the impoundment through a channel in the embankment between the AP1 Impoundment and SP1 Impoundment. The water flows through an approximately 7 foot deep channel in the ash delta and discharges to the Raw Water Pond through a channel in the southeastern embankment of the SP1 Impoundment. The stockpiled ash extends several feet above the embankment elevations in some areas.

The impoundment consists of an earthfill embankment with a crest length of approximately 6,700 feet and a general height (from the lowest toe elevation to the crest of impoundment) of approximately 20 feet. The impoundment is unlined and the embankments were constructed from native silty clays. The impoundment has a surface area of approximately 62 acres at a water level elevation of 303 feet MSL and the stockpiled ash occupies approximately 80 percent of the storage capacity. A gravel access road is present on the top of the southern and eastern portions of the impoundment. The crest elevation of the impoundment is approximately 307 feet to 310 feet MSL.

The SP1 Impoundment embankments were designed with 3H:1V upstream and downstream slopes without rip-rap or other protection against wave action erosion[9]. The downstream slope of the eastern embankment was generally designed to be vegetated with grass. There are three groundwater monitoring wells (P-1 through P-3) located along the eastern embankment of SP1 Impoundment.

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7 Slopes based on Geotechnology, Inc. report "Global Stability Evaluation, Slag Pond 1 and Ash Pond 2, AECI New Madrid Power Generating Facility, New Madrid County, Missouri", dated July 31, 2009.

8 Drawing provided by AECI titled: "Fly Ash Pond Improvement Plan View W/Contours". Drawing generated by AECI and dated 1989.

9 Slopes based on Geotechnology, Inc. report "Global Stability Evaluation, Slag Pond 1 And Ash Pond 2, Aeci New Madrid Power Generating Facility, New Madrid County, Missouri", dated July 31, 2009.

1.2.6 Description of the Ash Pond 2 Impoundment and Appurtenances

Based on information provided by the NMPP personnel, the AP2 Impoundment was designed by Burns and McDonnell of Kansas City, Missouri. No construction documentation was available for the impoundment but three design drawings prepared by Burns and McDonnell and SLT North America, Inc. were provided by AECI. The following description of the AP2 Impoundment is based on: (a) the available design drawings: (b) the March 24, 2009 Response; (c) a stability analysis that was conducted for the impoundment embankments; (d) and information provided by NMPP personnel.

The AP2 Impoundment is located southeast of the NMPP and south of the AP1 Impoundment and the SP2 Impoundment. The northern and eastern embankments of the AP2 Impoundment are shared with the AP1 Impoundment, and the Make Up Water (MUW) Pond, respectively as shown on **Figure 4**. Most of the western portion of the AP2 Impoundment is filled with fly ash that has been stockpiled in the impoundment. When the impoundment is active, ash is trucked to the impoundment from the power plant. Water from the MUW Pond is used to sluice the ash from the truck into the AP2 Impoundment. The water for sluicing is controlled in the Compressor Building located on the northern embankment of the AP2 Impoundment as shown on **Figure 4**. The stockpiled ash extends several feet above the embankment elevations in some areas.

The AP2 Impoundment does not currently receive ash during normal operating conditions. The ash that previously was trucked to the AP2 Impoundment, is now being trucked to the dry ash landfill recently commissioned southwest of the impoundments (see location on Figure 2). Storm water runoff from the landfill collects in an evaporation basin. If the water level in the evaporation basin approaches the maximum operating level approximately 2 feet below the top of embankment, water is pumped to the AP2 Impoundment via high-density polyethylene (HDPE) pipelines that run along the crest of the southern embankment and discharge in the southeast corner of the AP2 Impoundment.

Water that enters the AP2 Impoundment through sluicing operations or pumping from the landfill storm water pond evaporates. If the rate of inflow exceeds the rate of evaporation, three approximately 8-inch diameter pipelines present in the northeast portion of the AP2 Impoundment transfer water by gravity to the SP2 Impoundment.

The AP2 impoundment consists of an earthfill embankment with a crest length of approximately 7,800 feet and a general height (from the lowest toe elevation to the crest of impoundment) of approximately 20 feet. The impoundment is lined and the embankments were constructed from native silty clays. The liner consists of 60 MIL and 80 MIL Hyperflex© that was placed on a prepared subgrade. Ash in the impoundment lies directly on the liner surface. The impoundment has a surface area of approximately 78 acres at a water level elevation of 303 feet MSL and the stockpiled ash occupies approximately 99 percent of the available storage capacity. A gravel access road is present on the impoundment crest. The crest elevation of the impoundment is approximately 307 feet MSL.[10]

During high water events of the Mississippi River, pore pressures can build up under the liner present in the AP2 Impoundment. If left unmitigated, these pressures can lift the liner off

[10] Elevations of all impoundments are estimated from topographic contours provided in AECI drawing titled: "Fly Ash Pond Improvement Plan View W/Contours" dated 1989.

the embankment slopes. To maintain positive downward pressure, water can be pumped from the MUW Pond to the AP2 Impoundment via two 18-inch diameter pipelines located on the downstream slope of the eastern embankment. The transfer pumps are manually controlled in the Pump Control Building on the crest of the eastern embankment.

The AP2 Impoundment embankments were designed with 3H:1V upstream and downstream slopes without rip-rap or other protection against wave action erosion[11]. The downstream slope of the western and southern embankments was generally designed to be vegetated with grass. There are three groundwater monitoring wells (P-6 through P-8) located along the eastern and southern embankments of the AP2 Impoundment.

1.2.7 Description of the Slag Pond 2 Impoundment and Appurtenances

Based on information provided by the NMPP personnel, the SP2 Impoundment was designed by Burns and McDonnell of Kansas City, Missouri. No construction documentation was available for the impoundment but a survey drawing from December of 2005 was provided by AECI. The following description of the SP2 Impoundment is based on the available survey drawing, the March 24, 2009 Response, and information provided by NMPP personnel.

The SP2 Impoundment is located east of the NMPP and north of the AP1 Impoundment and the SP1 Impoundment as shown on **Figure 2**. Most of the northern portion of the SP2 Impoundment is filled with fly ash that has settled in-place or has been stockpiled in the impoundment. The northern portion of the impoundment is used as a processing area for recovered ash. Water and fly ash are discharged into the SP2 Impoundment via four pipelines located on the northern portion of the impoundment. The discharged water and ash flow through an approximately 3 foot deep channel into an ash delta that is maintained by removal of settled fly ash. Clarified water from the SP2 Impoundment is discharged to the Mississippi River through a decant structure located near the southeast portion of the impoundment. The pond water elevation is maintained by stop logs in the decant structure. The ash that is removed from the channel is dewatered and stockpiled in the SP2 Impoundment as shown on **Figure 3** until it is recycled or transported to the dry ash landfill.

The SP2 Impoundment consists of an earthfill embankment with a crest length of approximately 3,000 feet and a general height (from the lowest toe elevation to the crest of the impoundment) of approximately 20 feet. The impoundment is unlined and the embankments were constructed from native silty clays. The impoundment has a surface area of approximately 4 acres at a water level elevation of 299 feet MSL and the stockpiled ash occupies approximately 18 percent of the storage capacity. A gravel access road is present on the crest of the impoundment. The crest elevation of the impoundment is approximately 302 feet MSL which appears to be below the elevation of the Mississippi River levee system.[12] Based on information provided by NMPP, the impoundment has not experienced damage from flooding of the Mississippi River.

The SP2 Impoundment embankments appeared to be designed with 4 horizontal on 1 vertical (4H:1V) upstream slopes and 2.5 horizontal on 1 vertical (2.5H:1V) downstream

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[11] Slopes based on Geotechnology, Inc. report "Global Stability Evaluation, Slag Pond 1 And Ash Pond 2, AECI New Madrid Power Generating Facility, New Madrid County, Missouri", dated July 31, 2009

[12] Elevations of all impoundments are estimated from topographic contours provided in AECI drawing titled: "Fly Ash Pond Improvement Plan View W/Contours", dated 1989.

APPENDIX C
Excerpt from:
Stability Evaluation, Slag Pond 1 and Ash Pond 2
AECI New Madrid Power Generating Facility
By Geotechnology, Inc., dated June 2009

STABILITY EVALUATION
SLAG POND 1 AND ASH POND 2
AECI NEW MADRID POWER GENERATING FACILITY
NEW MADRID COUNTY, MISSOURI

DRAFT

Prepared for:

ASSOCIATE ELECTRIC COOPERATIVE, INC.
Springfield, Missouri

Prepared by:

GEOTECHNOLOGY, INC.
St. Louis, Missouri

Geotechnology Project No. 1011304.91IG

June 22, 2009

STABILITY EVALUATION
SLAG POND 1 AND ASH POND 2
AECI NEW MADRID POWER GENERATING FACILITY
NEW MADRID COUNTY, MISSOURI

SECTION I - PROJECT DATA

AUTHORIZATION

The services documented in this report were provided in accordance with the terms, conditions and scope of services described in Geotechnology's February 19, 2009 proposal numbered P15245.00.91IG. The project was authorized by your signed acceptance of the proposal.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to provide AECI with the information necessary to make decisions regarding repairs/improvements to the ash/slag pond embankments. Also, our scope included a study of potential flow of the slag/flyash during an embankment breach. Briefly, services consisted of site reconnaissance, drilling five borings, observing the excavation of ten test pits, installing eight piezometers, laboratory testing, engineering analyses and preparation of this report. Important information prepared by The Association of Engineering Firms Practicing in the Geosciences (ASFE) for studies of the type is included in Appendix A for your review.

Our scope of service originally included performing a geotechnical boring, installing a piezometer (i.e. P-5), and performing a slope stability evaluation of the embankment between the two raw water ponds. At the request of a representative of AECI, a stability evaluation of this area was not performed because a structural failure at this location would not result in the movement of ash material outside of the impoundment area. AECI also determined that placing Piezometer P-5 adjacent to the mainline levee road would provide a better understanding of groundwater movement beneath the site.

PROJECT AND SITE DESCRIPTION

We understand that the waste materials from the power generating process at the AECI New Madrid Power Plant are stored in the slag/ash ponds located southeast of the plant. The site location and general topography of the area as per U.S.G.S. map of the vicinity are shown on Plate 1. The slag/ash ponds are in the floodplain of the Mississippi River and east (outside) of the river levee. The storage ponds are contained by approximately 15-foot high embankments as shown on Plate 2. Based on the plans provided, each embankment consists of 1V:3H (Vertical:Horizontal) slopes, and a 10- to 15-foot wide crest at approximately El 308[1]. Raw water ponds are present to the

[1] All elevations herein refer to the mean sea level (msl) datum in feet.

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southeast of Slag Pond 1 and east of Ash Pond 2. The Slag Pond and Ash Pond 1 were constructed in the 1970's, and Ash Pond 2 in the early 1990's. The slopes are generally grass covered. An exception is the area east of Slag Pond 1, which is moderately wooded.

SECTION II - FIELD EXPLORATION AND LABORATORY TESTING

FIELD EXPLORATION

The field exploration consisted of drilling five borings and excavating ten test pits, designated as Borings P-2, 3, 4, 6, 7 and Test Pits TP-1 through -10, respectively, at approximately the locations shown on Plate 2. The borings were located in the field by Geotechnology by measuring distances from existing site features. The boring and test pit locations were surveyed by S.H. Smith & Company, and the location coordinates and elevations were provided to Geotechnology.

The borings were drilled to predetermined depths of 55 to 85 feet using an all-terrain CME 550 rotary drill rig equipped with hollow stem augers. All borings were extended using rotary wash techniques below the depths indicated on the boring logs. Standard Penetration Tests (SPT's) were performed using an automatic hammer. Split-spoon samples and relatively undisturbed Shelby tube samples were obtained at the depths indicated on the boring logs presented in Appendix B. A bulk soil sample was obtained from the auger cuttings generated at Boring P-4 and at a nearby slab stockpile. An explanation of the terms and symbols used on the boring logs is provided in Appendix B.

The test pits were excavated with a Caterpillar 324L trackhoe to depths of 5.5 to 16 feet. Grab samples of excavated materials were collected from the trackhoe bucket.

An engineer from Geotechnology provided technical direction during field exploration, observed drilling and sampling, observed excavation of the test pits, assisted in obtaining samples and prepared descriptive logs of the material encountered. The boring logs represent conditions observed at the time of exploration, and have been edited to incorporate results of the laboratory tests as appropriate.

Unless noted on the logs, the lines designating the changes between various strata represent approximate boundaries. The transition between materials may be gradual or may occur between recovered samples. The stratification given on the logs, or described herein, is for use by Geotechnology in its analyses and should not be used as the basis of design or construction cost estimates without realizing that there can be variation from that shown or described.

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The logs and related information depict subsurface conditions only at the specific locations and times where sampling was conducted. The passage of time may result in changes in conditions, interpreted to exist, at or between the locations where sampling was conducted.

PIEZOMETERS

Open-standpipe piezometers were installed in all borings to permit subsequent measurement of the groundwater levels. The piezometers consist of 2-inch diameter PVC pipe with a 10-foot long screen placed at the bottom of the borehole. The piezometers were backfilled with sand to a depth of 43 feet and sealed with bentonite pellets to a depth of 39 feet; the remainder of the piezometer was grouted with bentonite slurry and capped with concrete. Above-ground protective casings were installed for the piezometers. Exceptions are Piezometers P-7 and -8 where flush mount protective casings were installed. Details of typical piezometer installations at the borings are presented in Appendix D.

LABORATORY TESTING

Laboratory testing was performed to estimate pertinent engineering and index properties of the soil. Moisture contents were determined for cohesive soil samples, and Atterberg limits tests were accomplished on selected samples. Unconfined compression tests were performed on selected Shelby tube samples. A consolidated-undrained triaxial compression test was performed on a representative embankment fill sample. Grain size analyses and passing #200 sieve tests were performed on representative cohesionless samples. Modified Proctor (ASTM D 1557) tests were performed on a representative embankment fill sample and a representative sample of a nearby stockpile of slag. Laboratory test results are presented in Appendices B and C.

SECTION III - SUBSURFACE CONDITIONS

STRATIGRAPHY

Embankment. The overburden in borings drilled along the embankments consists of man-placed fill underlain by alluvial material transported and deposited by the Mississippi River. The fill is approximately 15 to 23 feet thick and is generally comprised of silty clay, occasionally mixed with sand and clay. Representative samples in the fill had unit dry unit weights of 88 to 107 pounds per cubic foot (pcf). Moisture content percentages ranged from the mid-teens to the upper twenties. SPT N-values in the embankment fill varied from 4 to 18 blows per foot (bpf).

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The soil encountered beneath the fill consists of alluvial deposits of silty clay, silt and sand. An exception is Boring P-4 where the cohesive stratum is not present. The thickness of the cohesive soil varies between 9 and 24 feet. Sand occurs below the cohesive soil and beneath the fill in Boring P-4, and extends to the 55- to 85-foot depths of exploration. The consistency of the cohesive soil generally varies from soft to very stiff. The density of the granular soil varies from loose to dense, but is mostly medium dense. Auger refusal material was not encountered in the borings.

Slag Pond 1 (Test Pits TP-1 through -4). The surface stratum in test pits excavated in the slag pond area consists of 3 to 10 feet of black slag. An exception is Test Pit TP-1 where 4 feet of coal dust, debris and fly ash is present above the black slag. Below the slag, an alluvial deposit of silt is present to the 6- to 15-foot depths of exploration (refer to photographs in Appendix E). Moisture contents of the slab material varied from approximately 18 to 30 percent. The moisture content of the silt was greater than 40 percent, and indicates partially saturated to saturated conditions.

Ash Pond 1 (Test Pits TP-5 through -7). Approximately 7 to 13 feet of fly ash is present in the test pits excavated in Ash Pond 1. Silt was observed below the fly ash in Test Pits TP-5 and TP-7 at depths of 7 feet and 12 feet, respectively. Test Pit TP-6 was terminated in the fly ash. The moisture contents of two fly ash samples were 47 and 132 percent, which is indicative of the moisture retention characteristics of the material.

Ash Pond 2 (Test Pits TP-8 through -10). The test pits in Ash Pond 2 were excavated to depths of approximately 13 to 16 feet, terminated in fly ash, and not extended further in order to not penetrate the HPDE liner below the fly ash. The moisture contents of three fly ash samples were 75, 76 and 111 percent, which is indicative of the moisture retention characteristics of the material

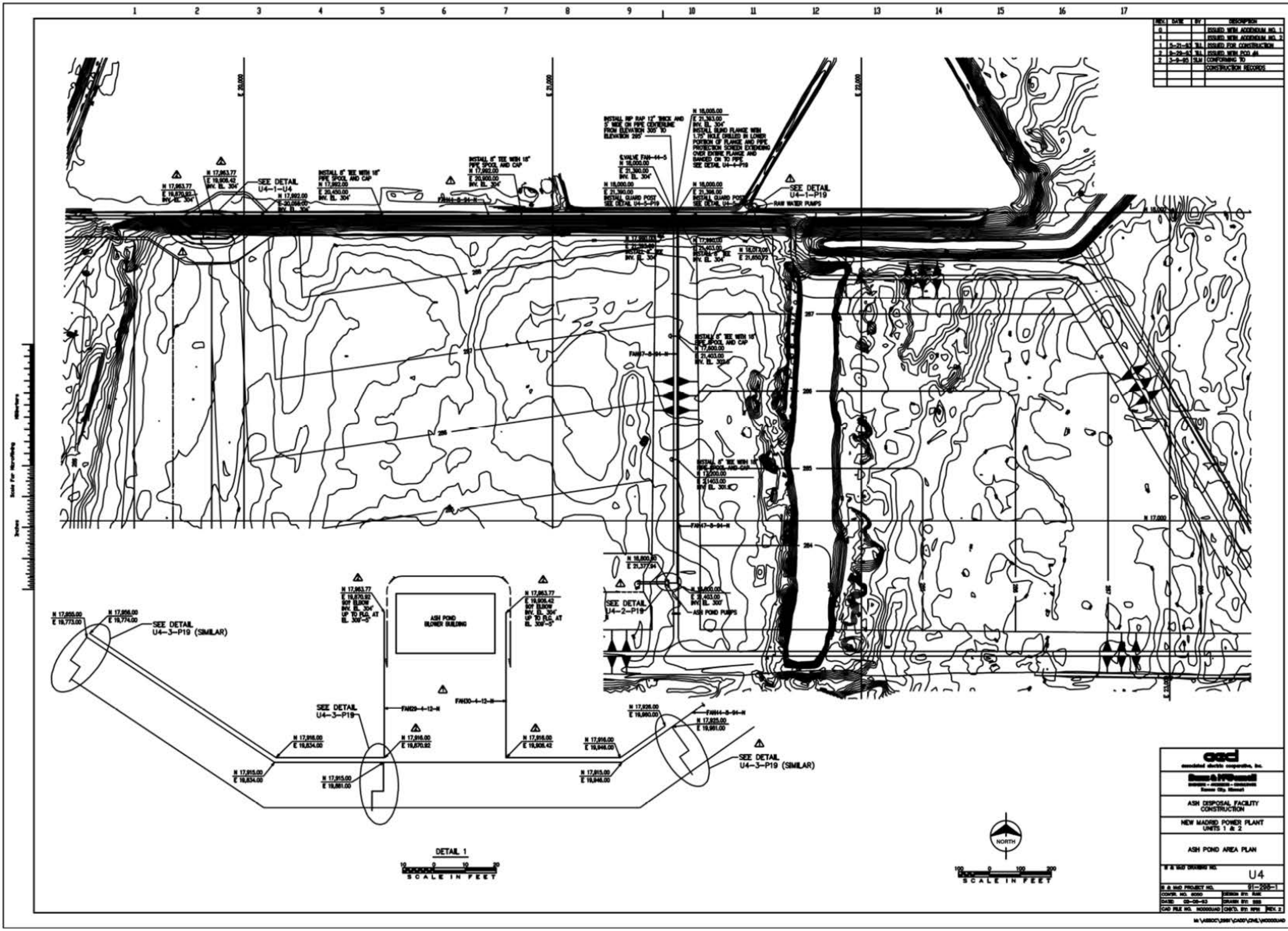
Water perched within the fly ash was observed at a depth of eleven feet in Test Pit TP-10. Perched water was not observed in Test Pits TP-8 and TP-9.

DRAFT

GROUNDWATER

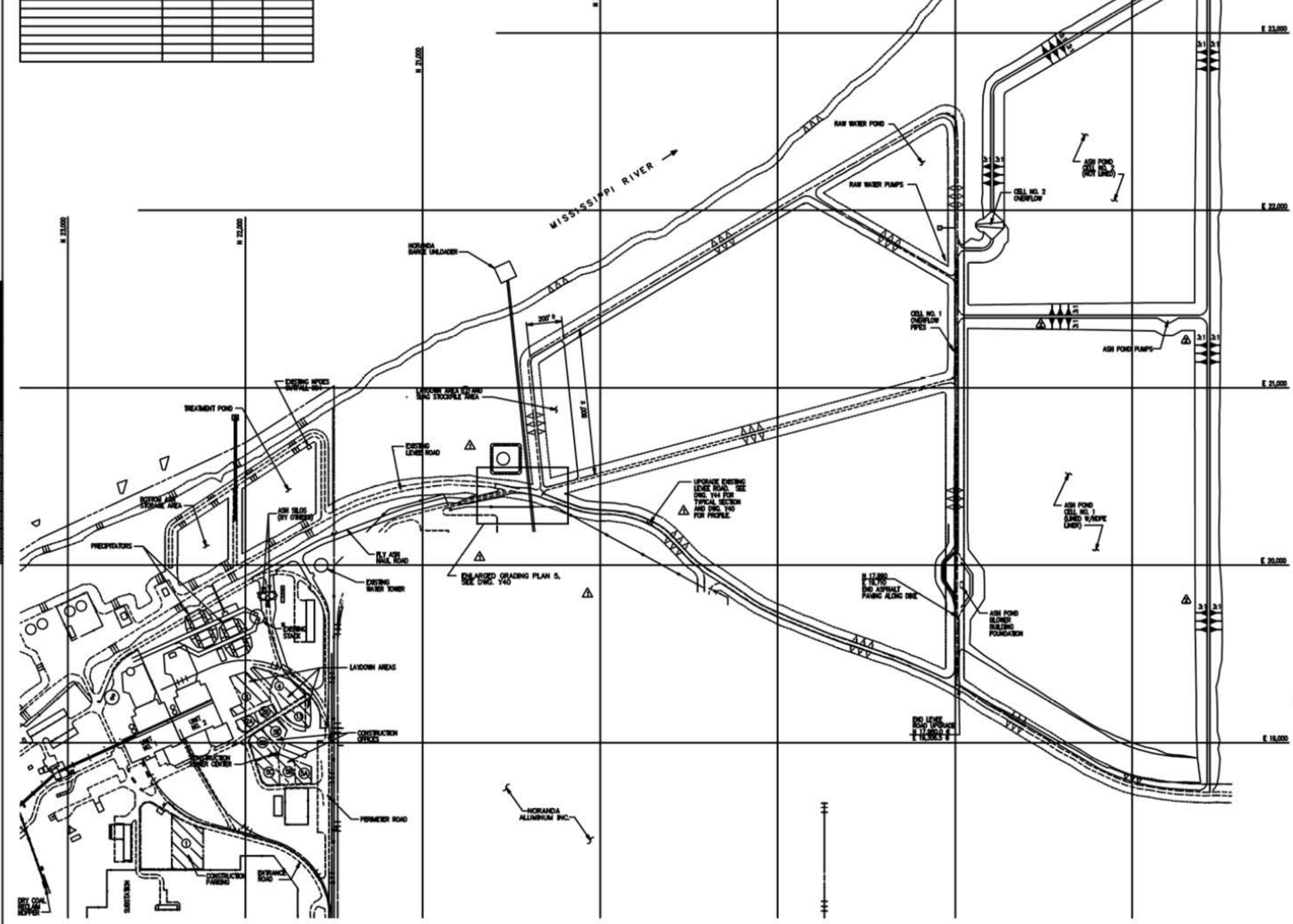
Borings and Piezometers. Groundwater levels in the borings could not be recorded at the time of the subsurface exploration due to the rotary wash technique used in drilling the borings. Rotary wash drilling techniques include the introduction of water into the borehole which masks the presence of groundwater. Groundwater levels shown on the boring logs may not have stabilized before backfilling, which is typical in less permeable cohesive soil. Consequently, the indicated/lack of observed groundwater levels may not represent present or future levels. Groundwater levels may vary significantly over time due to the effects of seasonal variation in

APPENDIX D
Misc. Available Drawings


REV. DATE BY DESCRIPTION
0 ISSUED WITH ADDENDUM NO. 1
1 ISSUED WITH ADDENDUM NO. 2
1 ISSUED FOR CONSTRUCTION
2 ISSUED WITH PCO #4
2 3-9-95 SLM CONFORMING TO CONSTRUCTION RECORDS
INSTALL RIP RAP 12" THICK AND 5' WIDE ON PIPE CENTERLINE FROM ELEVATION 300' TO ELEVATION 285'
SEE DETAIL U4-1-U4
SEE DETAIL U4-1-P19
RAW WATER PUMPS
INSTALL GUARD POST SEE DETAIL U4-5-P19
SEE DETAIL U4-2-P19
ASH POND PUMPS
ASH POND BLOWER BUILDING
SEE DETAIL U4-3-P19 (SIMILAR)
SEE DETAIL U4-3-P19
DETAIL 1
SCALE IN FEET
NORTH
associated electric cooperative, inc.
ASH DISPOSAL FACILITY CONSTRUCTION
NEW MADRID POWER PLANT UNITS 1 & 2
ASH POND AREA PLAN
U4
REV. 2

CONSTRUCTION OFFICE, PARKING, & LAYDOWN AREAS ALLOCATION TABLE			
CONTRACT	OFFICE AREA	LAYDOWN AREA	PARKING AREA
6040 GENERAL CONSTRUCTION	5D	3	1
6050 ASH DISPOSAL FACILITY	5B	12	1
6070 POWER WIRING	5E	2A	1
6090 CEM SYSTEMS	5A	2B	1

REV.	DATE	BY	DESCRIPTION
0	3-10-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO.2
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	8-18-93	JRL	REVISED POND SLOPES
	8-18-93	TLL	ISSUED WITH PCO-2
2	8-18-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS



200 0 200 400
SCALE IN FEET

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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

LAYDOWN AREAS LAYOUT PLAN

B & McD DRAWING NO.	Y38
B & McD PROJECT NO.	91-295-1
CONTR. NO. 6050	DESIGN BY: LARSON
DATE: 5-29-92	DRAWN BY: LANGHAMMER
CAD FILE NO. N0000Y38G	CHK'D. BY: TLL REV. 2

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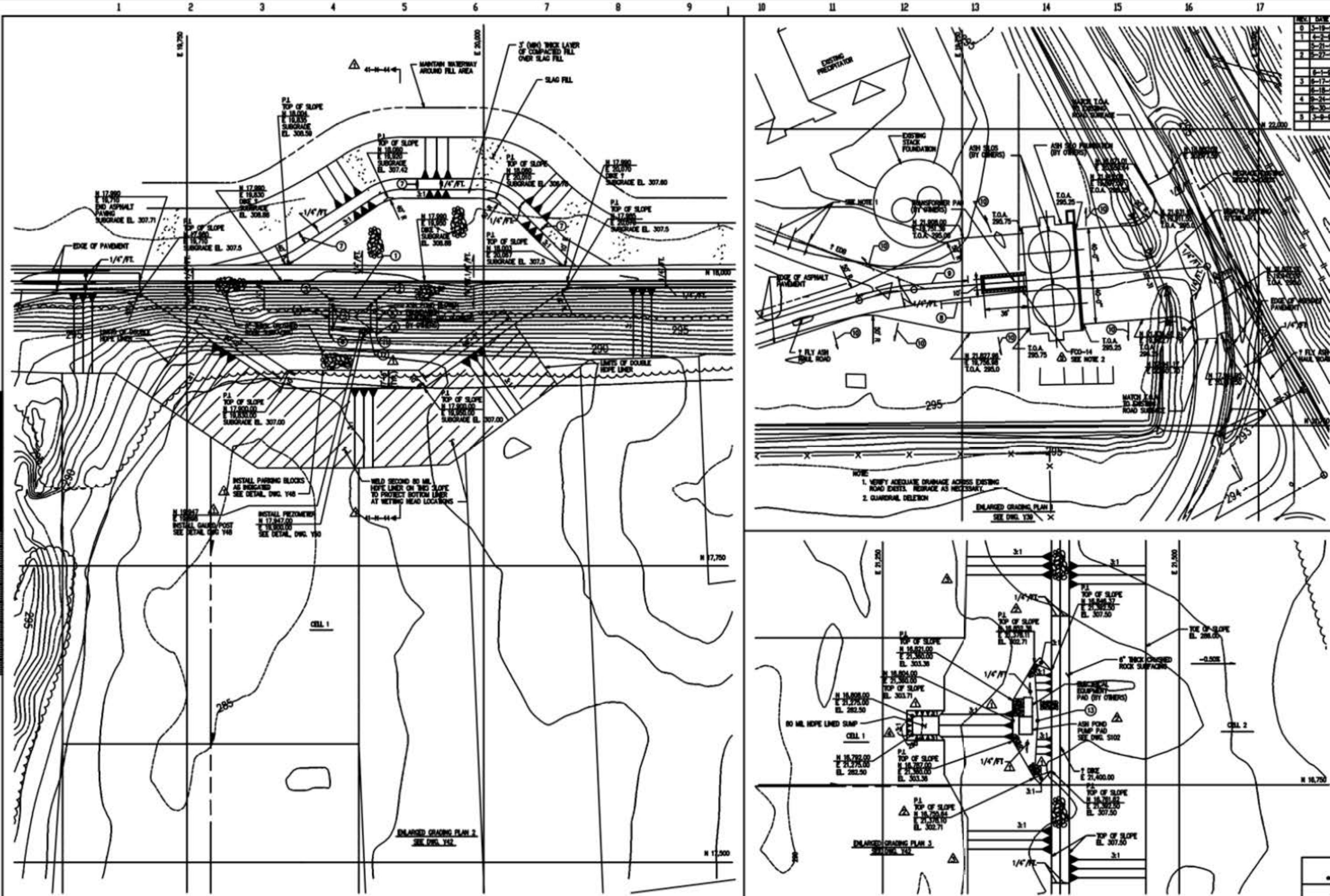

REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-2-93	TLL	REVISED PER ADDENDUM NO. 1
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	5-27-93	JCL	REVISED ASH POND PUMP
			PAD LOCATION AND GRADING
	6-1-93	TLL	ISSUED WITH PCO-1
3	6-17-93	JCL	REVISED POND SLOPES
	6-18-93	TLL	ISSUED WITH PCO-2
4	9-24-93	DLM	ADDED SUMP
	9-30-93	TLL	ISSUED WITH PCO-4
5	3-9-95	SLM	CONFORMING TO
			CONSTRUCTION RECORDS

① N 17,975
E 19,890
SWALE HIGH POINT
SUBGRADE EL. 308.2

② P.I. SWALE
N 17,975
E 19,910

③ P.I. SWALE
N 17,975
E 19,870

④ FL SWALE
S=0.5%

⑤ SUBGRADE EL. 308.5

⑥ CONTINUE SWALE AT
0.5% SLOPE UNTIL IT
DAYLIGHTS EL. 307.95

⑦ 10' BENCH BETWEEN
TOE OF COMPACTED FILL
AND SHOULDER OF SLAG FILL

⑧ STA. 16+20
BEGIN 25' TANS. TO
1/4"/FT. CROSSSLOPE

⑨ STA. 16+20
BEGIN 100' TRANS.
BETWEEN 80' ROADWAY
AND TYPICAL SECTION
FLY ASH HAUL ROAD

⑩ SLOPE CRUSHED ROCK SURFACING
FROM T.O.A. AT 5% UNTIL IT MATCHES
EXISTING CRUSHED ROCK SURFACING

⑪ BUILDING CORNER
N 17,950.00
E 19,905.00

⑫ N 19,947
E 19,902
INSTALL GUARD POST
SEE DETAIL DWG Y48

⑬ TOP OF SLOPE
N 16,804.00
E 21,381.00
EL. 303.71

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CONSTRUCTION

NEW MADRID POWER PLANT
UNITS 1 & 2

ENLARGED GRADING PLANS

B & McD DRAWING NO. Y41

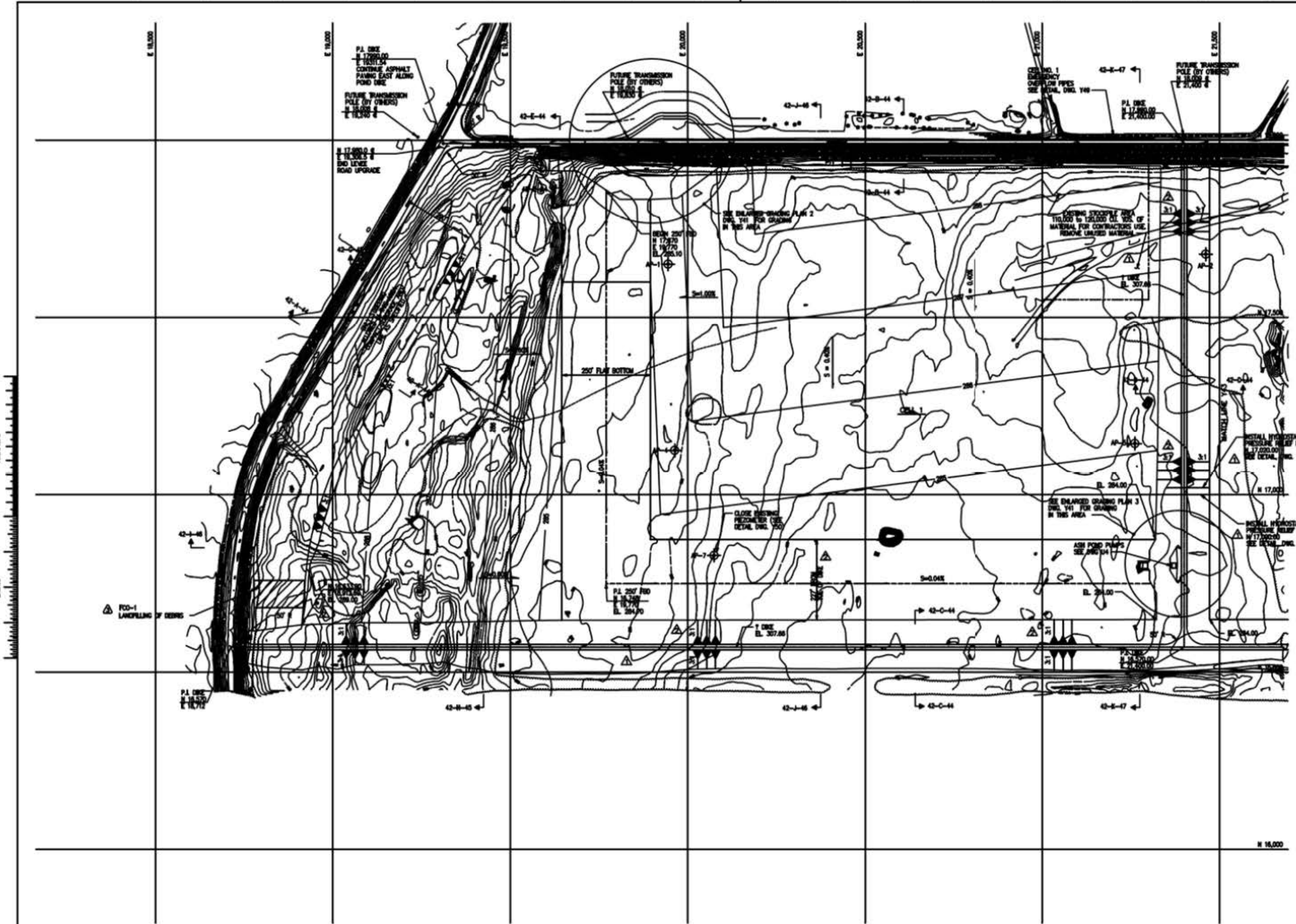
B & McD PROJECT NO. 91-295-1

CONTR. NO. 8050 | DESIGN BY: DKS

DATE 1-24-93 | DRAWN BY: LANGHAMMER

CAD FILE NO. | CHK'D. BY: TLL | REV. 5

M:\ASSOC\29591\CADD\CIVIL\



REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 2
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	8-2-93	JRL	REVISED PER PCO-1
2	8-17-93	JRL	REVISED POND SLOPES
	8-18-93	TLL	ISSUED WITH PCO-2
3	3-9-95	SLM	CONFORMING TO
			CONSTRUCTION RECORDS

NORTH

100 0 100 200
SCALE IN FEET

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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT
UNITS 1 & 2

ASH POND
GRADING PLAN
CELL NO. 1

B & McD DRAWING NO.
Y42

B & McD PROJECT NO.	91-298-1		
CONTR. NO.	6050	DESIGN BY:	[illegible]
DATE:	9-18-92	DRAWN BY:	LANGHAMMER
CAD FILE NO.	NOOOOY5K	CHK'D. BY:	REV. 3

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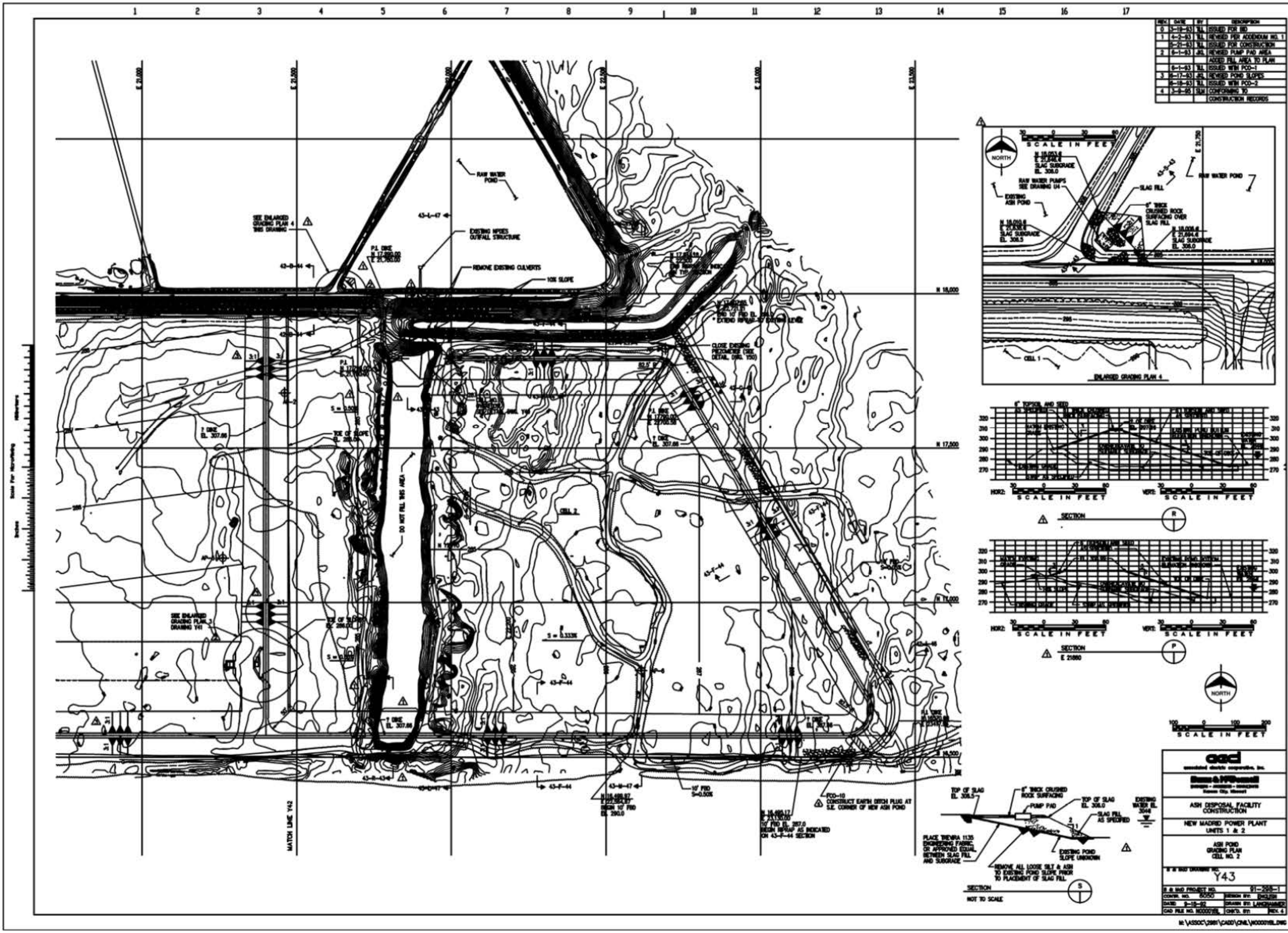
REV. DATE BY DESCRIPTION
0 3-10-93 TLL ISSUED FOR BID
1 4-2-93 TLL REVISED PER ADDENDUM NO. 1
5-21-93 TLL ISSUED FOR CONSTRUCTION
2 6-1-93 JRL REVISED PUMP PAD AREA
ADDED FILL AREA TO PLAN
6-1-93 TLL ISSUED WITH PCO-1
3 6-17-93 JRL REVISED POND SLOPES
6-18-93 TLL ISSUED WITH PCO-2
4 3-9-95 SLM CONFORMING TO
CONSTRUCTION RECORDS
RAW WATER POND
EXISTING NPDES OUTFALL STRUCTURE
REMOVE EXISTING CULVERTS
10% SLOPE
SEE ENLARGED GRADING PLAN 4 THIS DRAWING
CLOSE EXISTING
DO NOT FILL THIS AREA
CELL 2
SEE ENLARGED GRADING PLAN 3 DRAWING Y41
MATCH LINE Y42
10' FBD S=0.50%
CONSTRUCT EARTH DITCH PLUG AT S.E. CORNER OF NEW ASH POND
ENLARGED GRADING PLAN 4
SCALE IN FEET
NORTH
SECTION R
SECTION P
E 21850
TOP OF SLAG EL. 308.5
6" THICK CRUSHED ROCK SURFACING
PUMP PAD
TOP OF SLAG EL. 308.0
SLAG FILL AS SPECIFIED
EXISTING WATER EL. 304.6
PLACE TREVIRA 1135 ENGINEERING FABRIC, OR APPROVED EQUAL, BETWEEN SLAG FILL AND SUBGRADE
EXISTING POND SLOPE UNKNOWN
REMOVE ALL LOOSE SILT & ASH TO EXISTING POND SLOPE PRIOR TO PLACEMENT OF SLAG FILL
SECTION S
NOT TO SCALE
aeci
associated electric cooperative, inc.
ASH DISPOSAL FACILITY CONSTRUCTION
NEW MADRID POWER PLANT UNITS 1 & 2
ASH POND GRADING PLAN CELL NO. 2
Y43
B & McD PROJECT NO. 91-295-1
CONTR. NO. 6050
DESIGN BY: ENGLISH
DATE 9-10-92
DRAWN BY: LANGHAMMER
CAD FILE NO. NOOOOYEL
CHK'D. BY:
REV. 4
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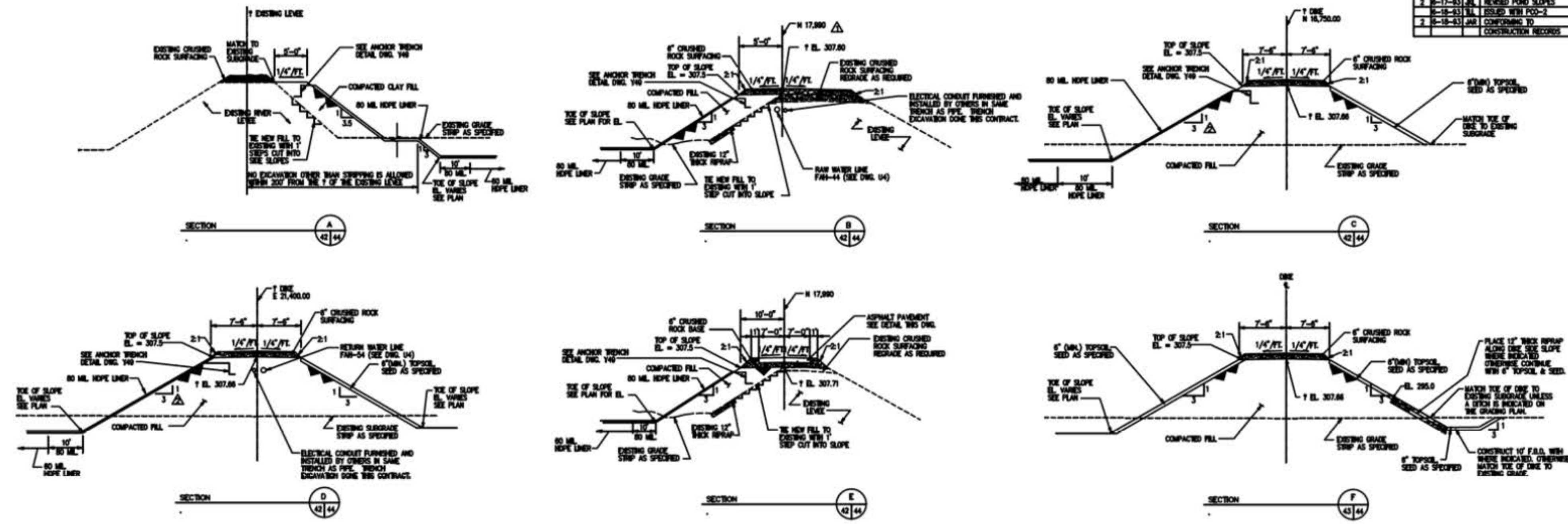
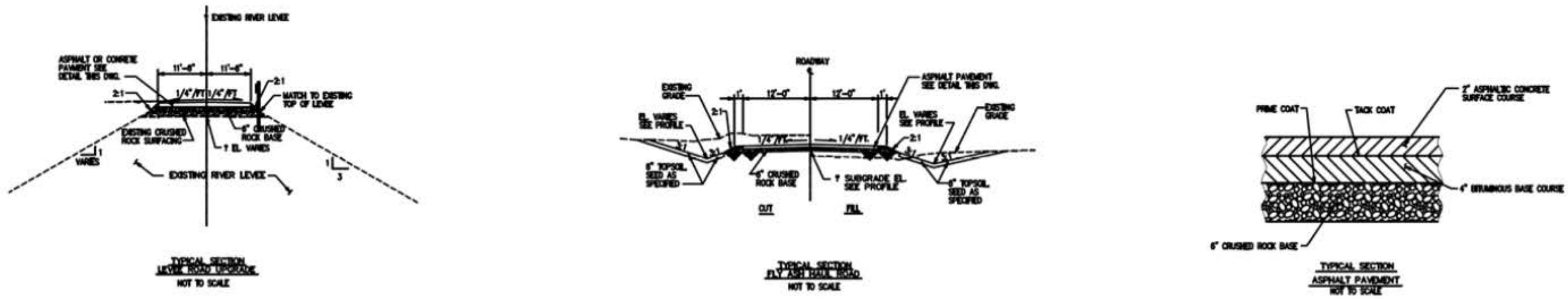
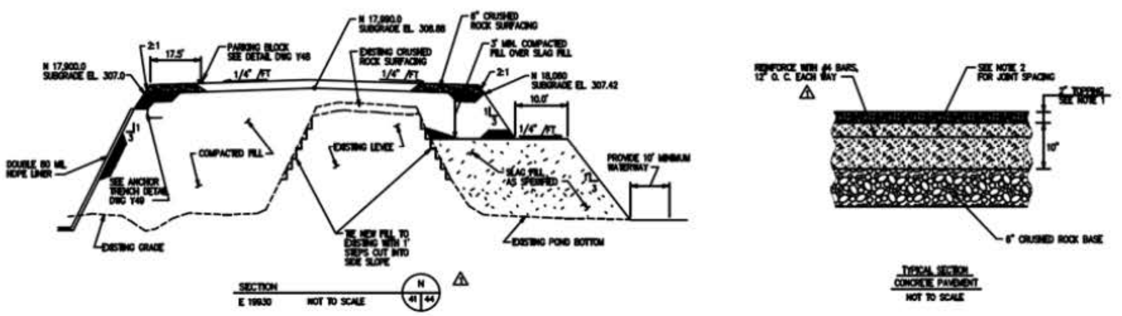
REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 2
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	6-17-93	JDL	REVISED POND SLOPES
	8-18-93	TLL	ISSUED WITH PCO-2
2	8-18-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS







NOTES:

1. PROVIDE HEAVY DUTY CONCRETE TOPPING OVER CONCRETE PAVEMENT.
   - I CONCRETE MATERIALS:
     - A. PORTLAND CEMENT, TYPE I
     - B. POTABLE WATER
     - C. COARSE AGGREGATE: SELECT TRAP ROCK, UNIFORMLY GRADED FROM 1" MAX. SIZE TO 95% RETAINED ON A NO. 8 SIEVE. MAX. WEIGHT LOSS OF 20% IN 500 REVOLUTIONS PER ASTM C-131.
     - D. FINE AGGREGATE: SAND IN ACCORDANCE WITH ASTM C-33
     - E. ADMIXTURE: WATER REDUCER CONFORMING TO ASTM C494 TYPE A
   - II CONCRETE MIXTURE:
     - A. CEMENT CONTENT: MINIMUM OF 8 SACKS/CY.
     - B. WATER/ CEMENT RATIO: MAXIMUM OF 0.45 BY WEIGHT
     - C. SLUMP: 2I" MAXIMUM
2. PLACE LONGITUDINAL JOINTS ALONG ROAD 1. PLACE TRANVERSE JOINTS EVERY 14'.

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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

TYPICAL SECTIONS AND DETAILS

B & McD DRAWING NO. Y44

B & McD PROJECT NO.	91-295-1		
CONTR. NO.	80550	DESIGN BY:	ENGLISH
DATE:	1-25-93	DRAWN BY:	LANGHAMMER
CAD FILE NO.	NOOO0Y0M	CHK'D. BY:	REV. 2

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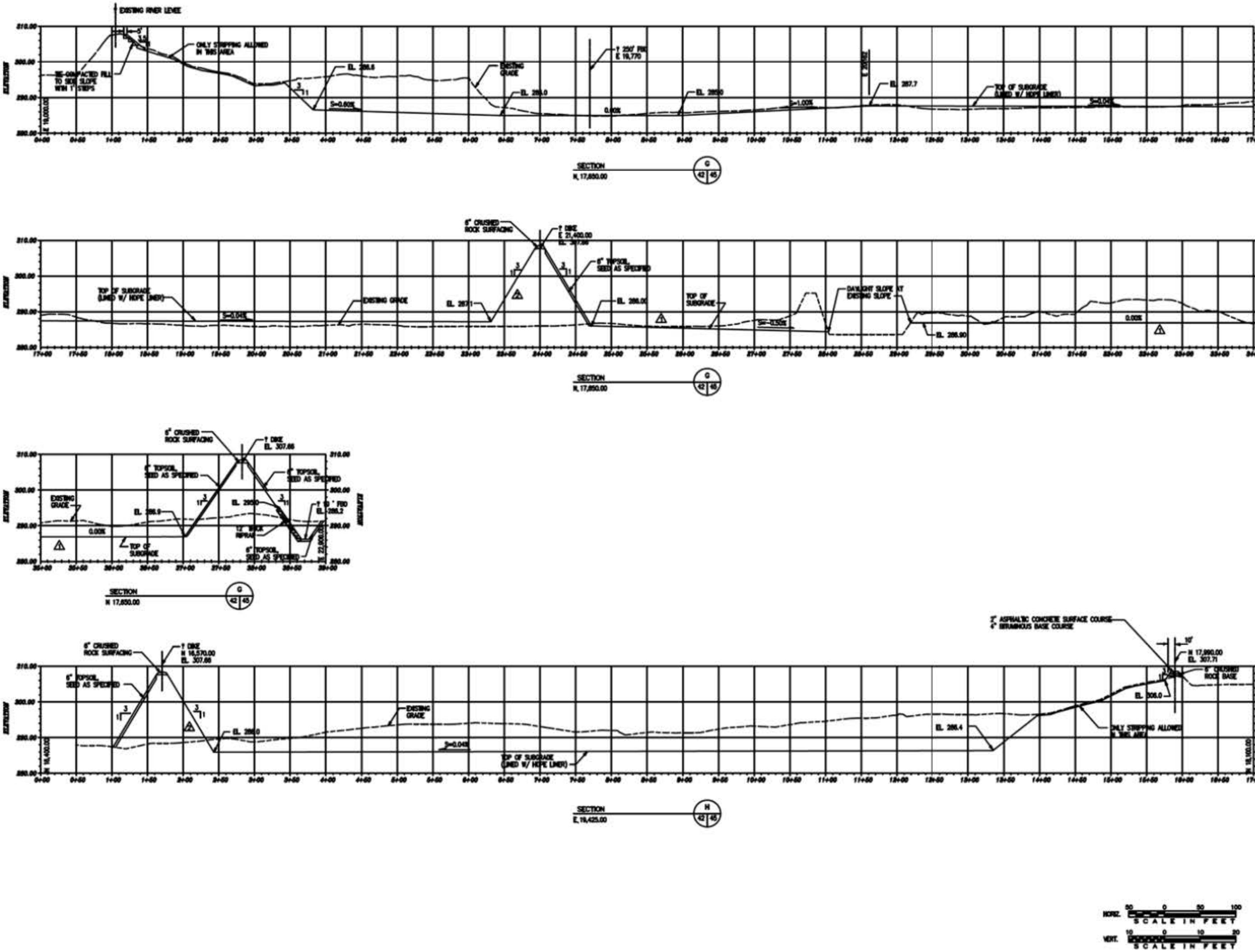

REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	6-17-93	JRL	REVISED POND SLOPES
	6-18-93	TLL	ISSUED WITH PCO-2
2	6-16-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS

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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

GRADING SECTIONS 1

B & McD DRAWING NO. Y45

B & McD PROJECT NO. 91-295-1	
CONTR. NO. 60050	DESIGN BY: ENGLISH
DATE: 9-30-92	DRAWN BY: LANGHAMMER
CAD FILE NO. N0000Y45N	CHK'D. BY: REV. 2

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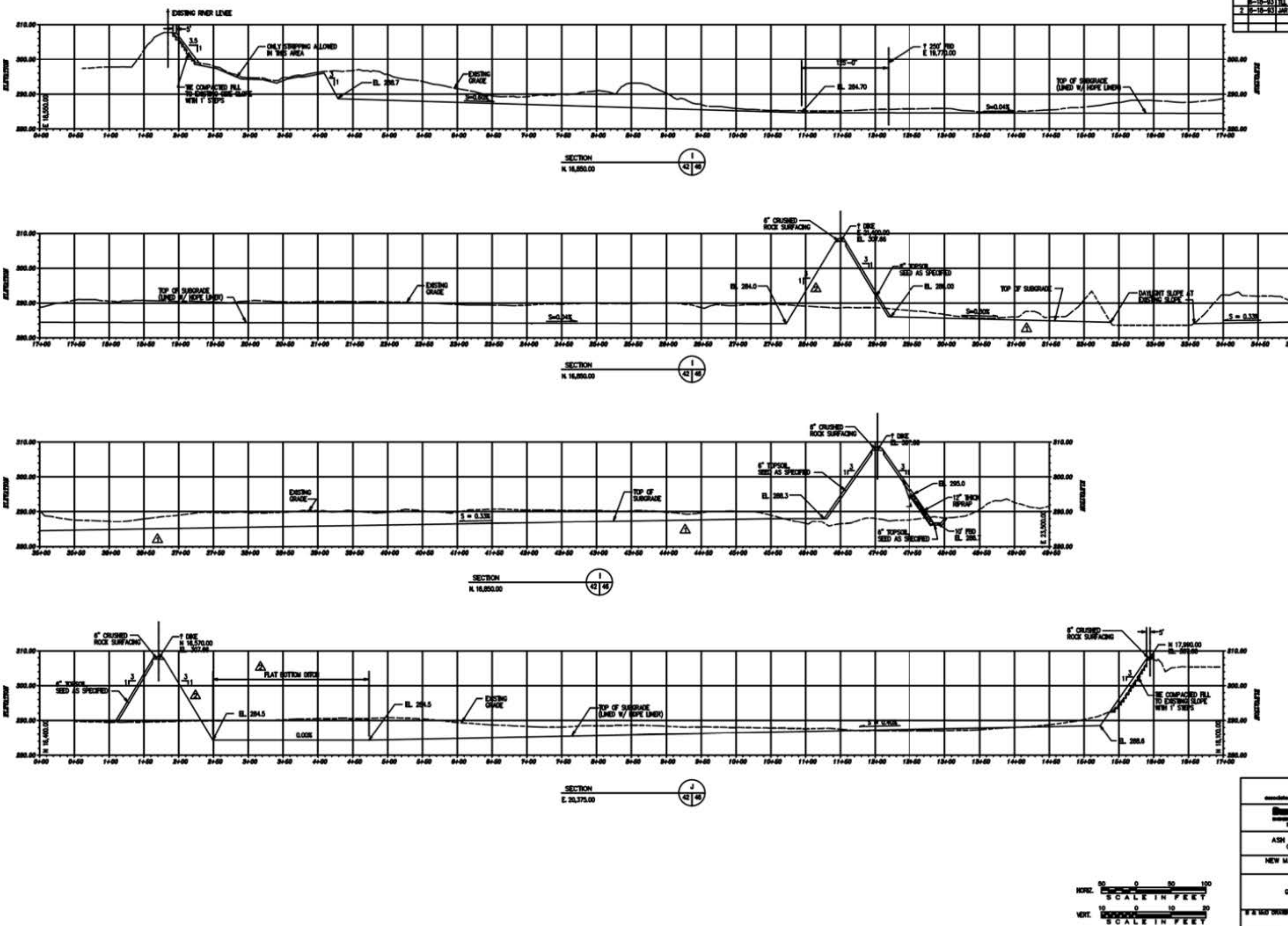
REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	8-17-93	JRL	REVISED POND SLOPES
	8-18-93	TLL	ISSUED WITH PCO-2
2	9-16-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS



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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

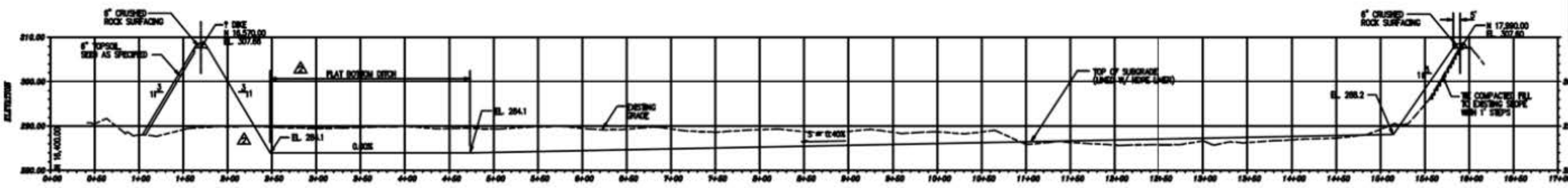
GRADING SECTIONS 2

B & McD DRAWING NO. Y46

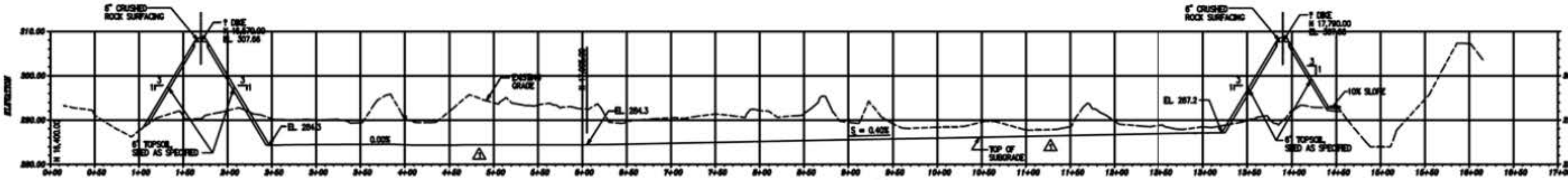
B & McD PROJECT NO.	91-295-1		
CONTR. NO.	8050	DESIGN BY:	ENGLISH
DATE:	9-30-92	DRAWN BY:	LANGHAMMER
CAD FILE NO.	N0000Y60	CHK'D. BY:	REV. 2

M:\ASSOC\2981\CADD\CIVIL\N0000Y60.DWG

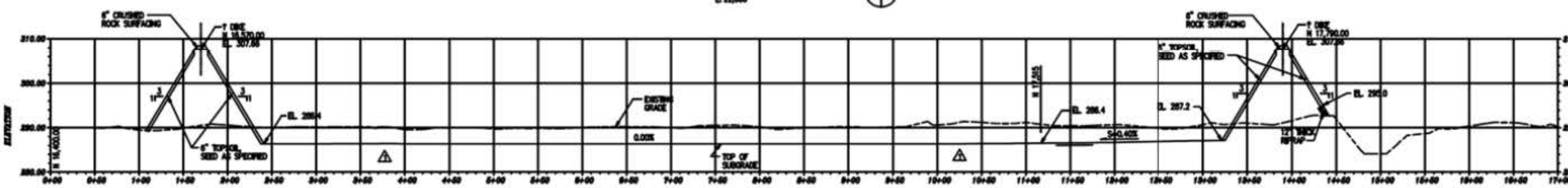
REV.	DATE	BY	DESCRIPTION
0	3-19-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	8-17-93	JRL	REVISED POND SLOPES
	8-18-93	TLL	ISSUED WITH PCO-2
2	8-18-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS



SECTION K
E. 21,275
42 | 47



SECTION L
E. 22,000
43 | 47



SECTION M
E. 22,815.00
43 | 47

HORIZ. 50 0 50 100 SCALE IN FEET

VERT. 10 0 10 20 SCALE IN FEET

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ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

GRADING SECTIONS 3

B & McD DRAWING NO. Y47

B & McD PROJECT NO. 91-295-1	
CONTR. NO. 80050	DESIGN BY: ENGLISH
DATE: 9-30-92	DRAWN BY: LANGHAMMER
CAD FILE NO. N00001SP	CHK'D. BY: REV. 2

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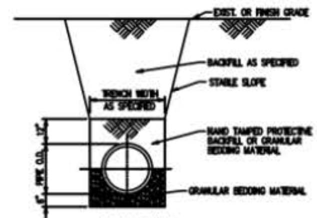
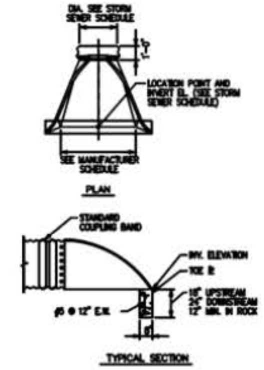
REV.	DATE	BY	DESCRIPTION
0	5-19-93	TLL	ISSUED FOR BID
1	4-8-93	KVC	REVISED PER ADDENDUM NO. 2
	8-21-93	TLL	ISSUED FOR CONSTRUCTION
1	8-21-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS

STORM SEWER SCHEDULE

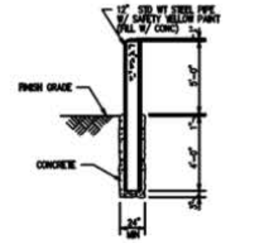
LINE NO.	LENGTH FT.	INVERT ELEV.		INVERT LOCATION		SLOPE FT./FT.	CMP		RCP		END SECT.	REMARKS
		UPPER	LOWER	UPPER	LOWER		SIZE	GAGE	DIA.	CLASS		
SS-30	94	291.5	291.2	N 21,802.1 E 19,310.7	N 21,812.0 E 19,217.0	0.0032	30"	14			2	STA. 22+076 FLY ASH HAUL ROAD
SS-31	103	292.5	292.2	N 21,828.5 E 19,893.4	N 21,831.2 E 19,825.1	0.0029	18"	16			2	STA. 14+654 FLY ASH HAUL ROAD
SS-32	30	293.5	293.3	N 21,828.5 E 19,956.6	N 21,813.5 E 19,930.6	0.0067	18"	16			2	CULVERT LOCATED UNDER ACCESS RAMP AT FLY ASH HAUL ROAD STA. 30+53
SS-33	40	292.6	292.4	N 21,780.1 E 20,037.8	N 21,780.7 E 20,002.9	0.0050	28"X20" PIPE ARCH	14			2	STA. 12+85 FLY ASH HAUL ROAD
SS-34	41	294.0	293.7	N 21,288.0 E 20,256.8	N 21,273.9 E 20,219.0	0.0073	18"	16 △			2	STA. 7+50 FLY ASH HAUL ROAD



PIPE TRENCH
NOT TO SCALE

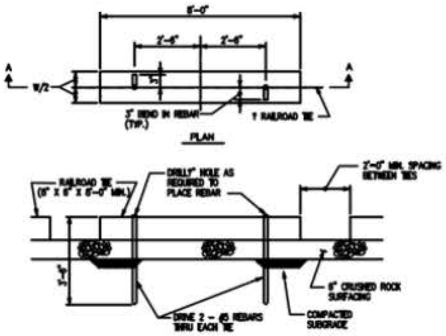


C.M.P. END SECTION
NOT TO SCALE

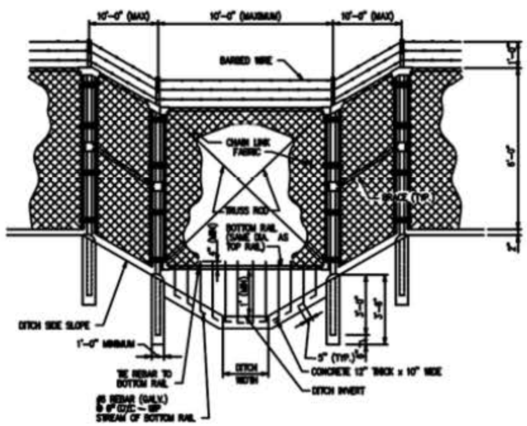


GUARD POST
NOT TO SCALE

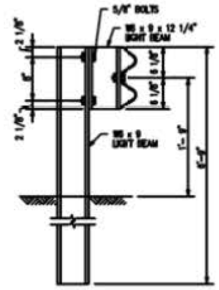
NOTE:
1. PREPARE SURFACE IN FIELD BY SSPC-SP11 QUALITY AND 1.0 MIL. MIN. PROFILE DEPTH. FIRST COAT IS TO BE AUXYD PRIMER AT MIN. 40% SOLIDS BY VOLUME, APPLIED AT 2 MILS DRY. SECOND AND THIRD COATS ARE TO BE AUXYD GLOSS ENAMEL MIN. 40% SOLIDS BY VOLUME. EACH COAT APPLIED AT 1.5 MILS DRY. TOTAL COATING 5 MIL. MIN. DRY FILM.

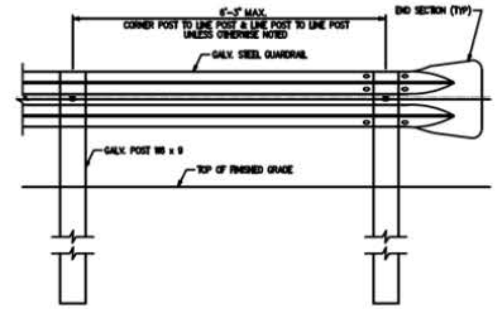


PARKING BLOCK DETAILS
NOT TO SCALE

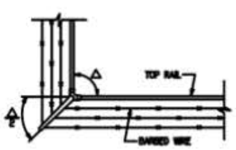


FENCE DITCH CROSSING DETAIL
NOT TO SCALE

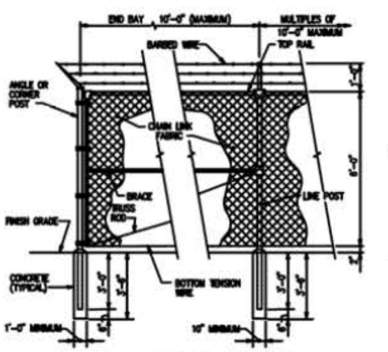




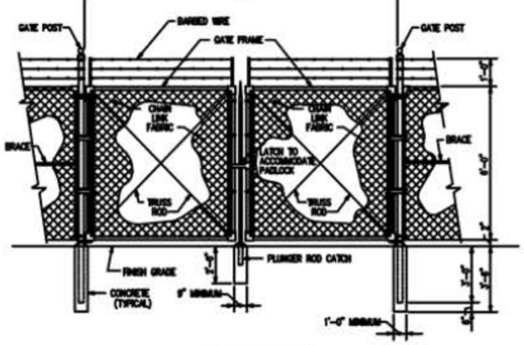
LINE POST GUARDRAIL DETAIL
NOT TO SCALE



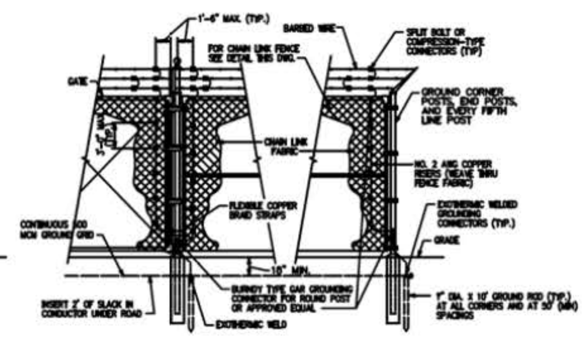
FENCE CORNER PLAN
NOT TO SCALE



CHAIN LINK FENCE DETAILS
NOT TO SCALE



DOUBLE SWING GATE
NOT TO SCALE



CHAIN LINK FENCE AND GATE GROUNDING DETAIL
NOT TO SCALE

NOTE: (GROUNDING)
1. ALL NEW FENCING AND GATES SHALL BE GROUNDED.

aeci
associated electric cooperative, inc.

Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ASH DISPOSAL FACILITY CONSTRUCTION

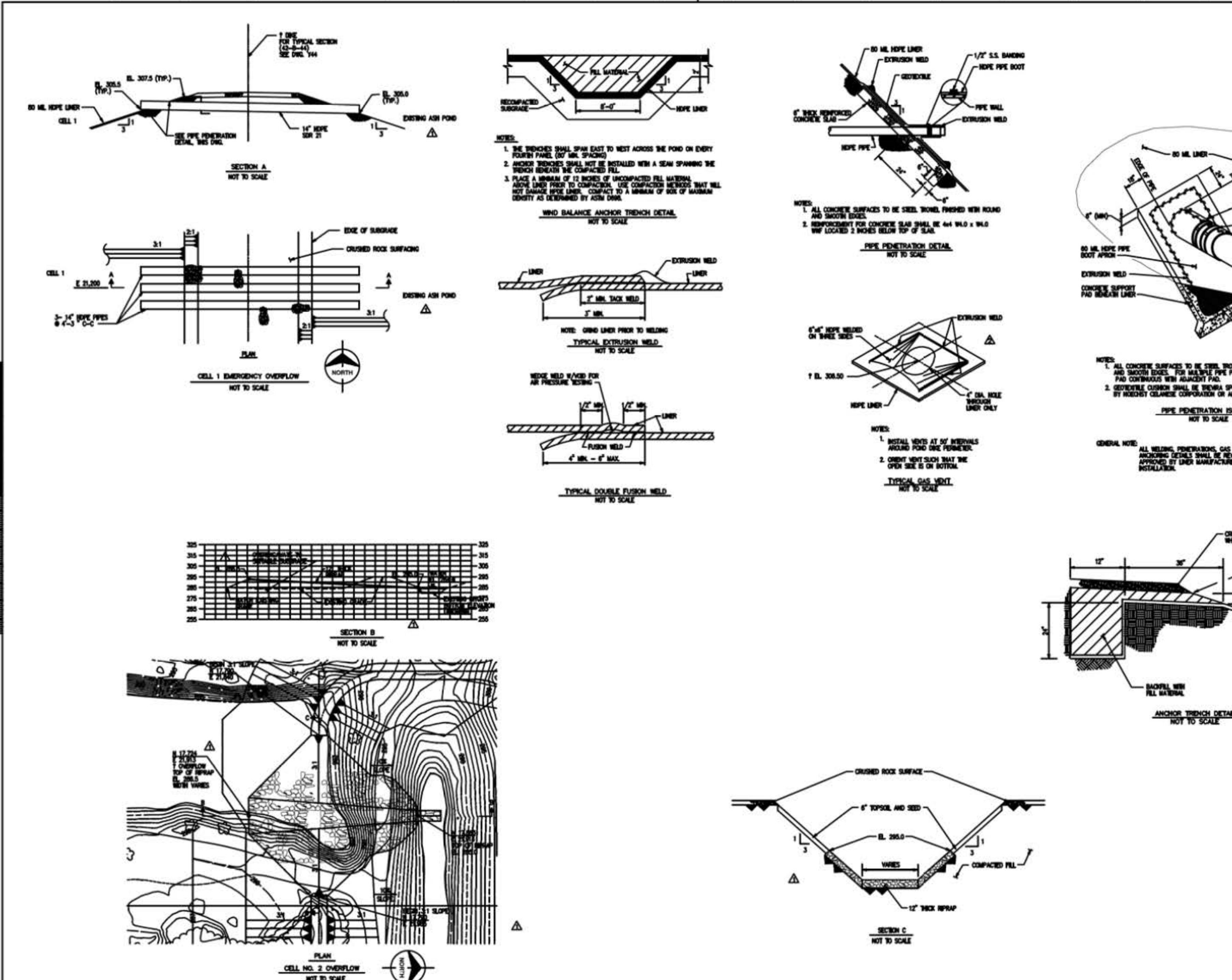
NEW MADRID POWER PLANT UNITS 1 & 2

MISCELLANEOUS DETAILS

B & McD DRAWING NO. Y48

B & McD PROJECT NO.	91-295-1		
CONTR. NO.	60550	DESIGN BY:	ENGLISH
DATE:	2-8-93	DRAWN BY:	LANGHAMMER
CAD FILE NO.	NO0001BG	CHK'D. BY:	REV. 1

M:\ASSOC\2981\CADD\CIVIL\NO0001BG.DWG



REV.	DATE	BY	DESCRIPTION
0	3-10-93	TLL	ISSUED FOR BID
1	4-2-93	TLL	REVISED PER ADDENDUM NO. 1
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 2
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
2	6-16-93	JAS	REVISED VENT ELEV.
	6-16-93	TLL	ISSUED WITH PCO-2
2	6-16-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS

aeci
associated electric cooperative, inc.

Burns & McDonnell
Kansas City, Missouri

ASH DISPOSAL FACILITY CONSTRUCTION

NEW MADRID POWER PLANT UNITS 1 & 2

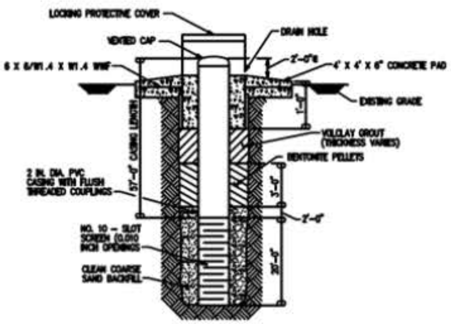
MISCELLANEOUS DETAILS

B & McD DRAWING NO. Y49

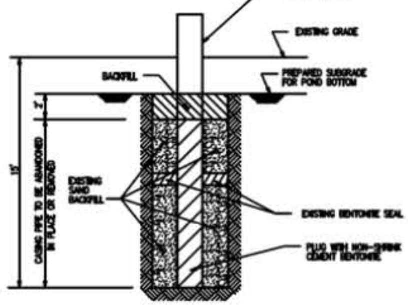
B & McD PROJECT NO.	91-295-1		
CONTR. NO.	60050	DESIGN BY:	ENGLISH
DATE:	2-8-93	DRAWN BY:	LANGHAMMER
CAD FILE NO.	N00001Y49R	CHK'D. BY:	REV. 2

M:\ASSOC\2981\CADD\CIVIL\N00001Y49R.DWG

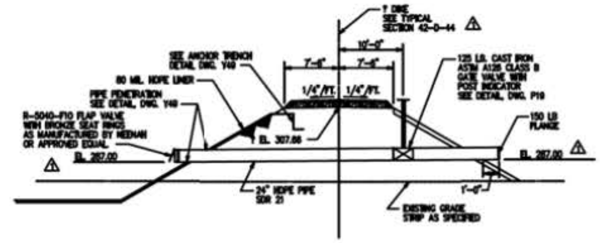
REV.	DATE	BY	DESCRIPTION
0	3-10-93	TLL	ISSUED FOR BID
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 1
1	4-27-93	KVC	REVISED PER ADDENDUM NO. 2
	5-21-93	TLL	ISSUED FOR CONSTRUCTION
1	5-21-93	JAR	CONFORMING TO
			CONSTRUCTION RECORDS



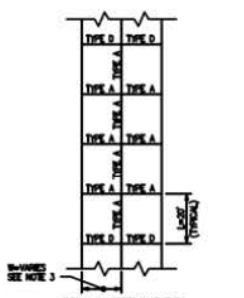
PIEZOMETER DETAIL
NOT TO SCALE



TYPICAL WELL CLOSURE PLAN
NOT TO SCALE

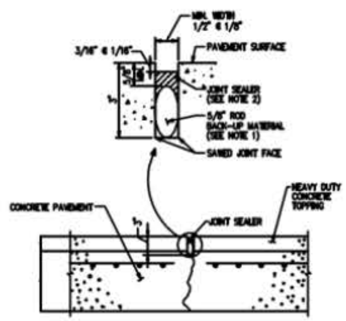


HYDROSTATIC PRESSURE RELIEF PIPE
NOT TO SCALE



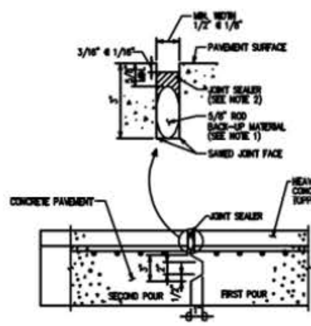
TYPICAL CONCRETE PAVEMENT JOINT LAYOUT
NOT TO SCALE

NOTES:
1. PLACE TYPE D EXPANSION JOINTS WHERE INDICATED AND AT ALL LOCATIONS WHERE NEW CONCRETE PAVEMENT IS ADJACENT TO EXISTING PIPE CROSSING STRUCTURES.
2. TYPE B CONSTRUCTION JOINTS SHALL BE USED WHERE PAVING OPERATIONS ARE DELAYED OR STOPPED AND SHALL BE LOCATED AT A PLANNED CONTRACTION JOINT.
3. MINIMUM SLAB DIMENSION SHALL BE W=16'-0" AND MAXIMUM SLAB DIMENSION SHALL BE W=23'-0".



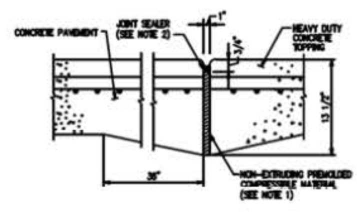
TYPE A – CONTROL
NOT TO SCALE

NOTES:
1. INSTALL BACK-UP MATERIAL CONFORMING TO ASTM D1751. FILLER SHALL EXTEND FOR THE FULL WIDTH AND INDICATED DEPTH OF JOINT.
2. JOINT SEALER SHALL BE HOT-POUR ELASTIC TYPE CONFORMING TO ASTM D1190.



TYPE B – CONSTRUCTION JOINT
NOT TO SCALE

NOTES:
1. INSTALL BACK-UP MATERIAL CONFORMING TO ASTM D1751. FILLER SHALL EXTEND FOR THE FULL WIDTH AND INDICATED DEPTH OF JOINT.
2. JOINT SEALER SHALL BE HOT-POUR ELASTIC TYPE CONFORMING TO ASTM D1190.



TYPE D – EXPANSION JOINT
NOT TO SCALE

NOTES:
1. INSTALL BACK-UP MATERIAL CONFORMING TO ASTM D1751. FILLER SHALL EXTEND FOR THE FULL WIDTH AND INDICATED DEPTH OF JOINT.
2. JOINT SEALER SHALL BE HOT-POUR ELASTIC TYPE CONFORMING TO ASTM D1190.

associated electric cooperative, inc.

ASH DISPOSAL FACILITY CONSTRUCTION

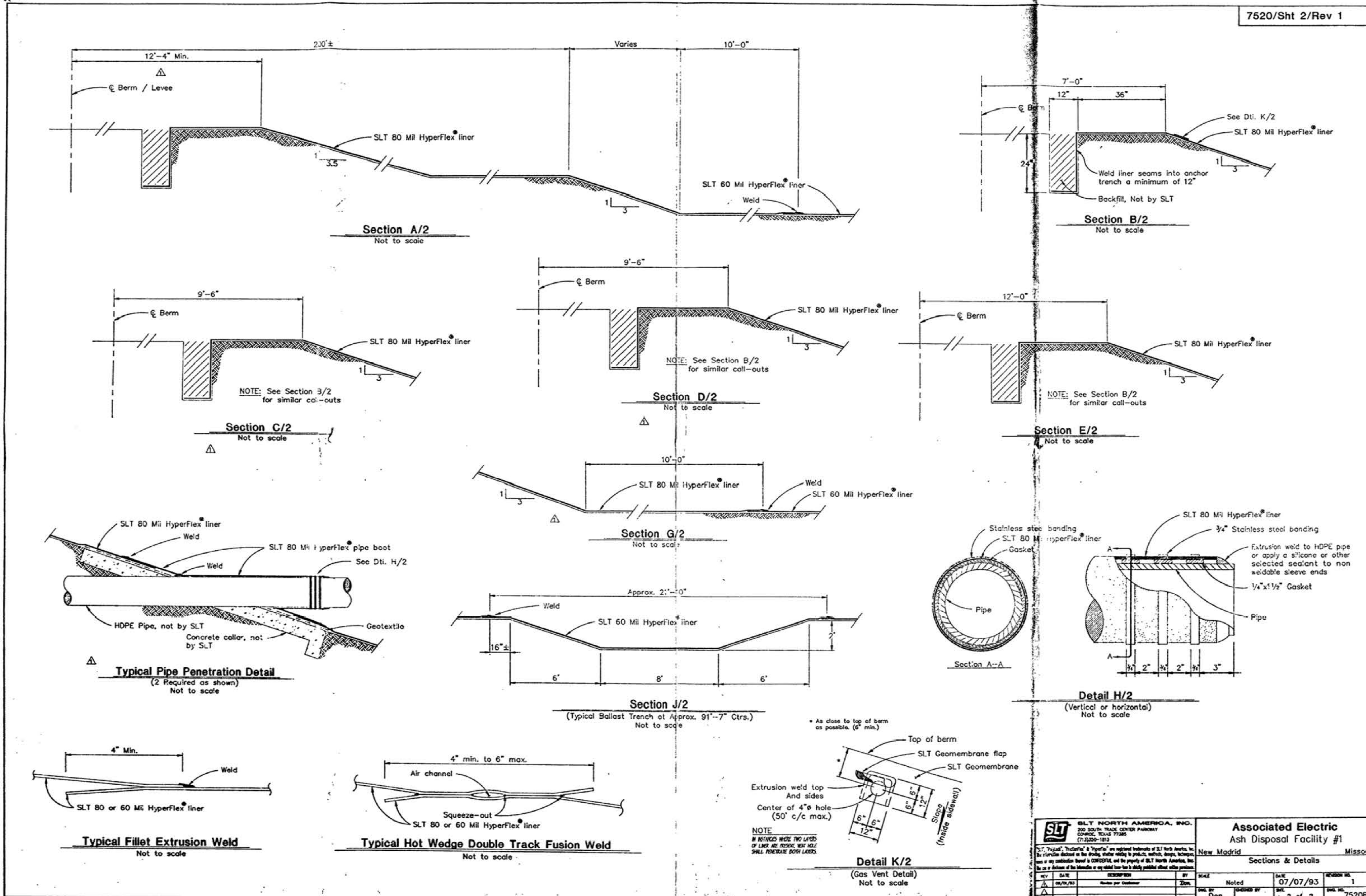
NEW MADRID POWER PLANT UNITS 1 & 2

MISCELLANEOUS DETAILS

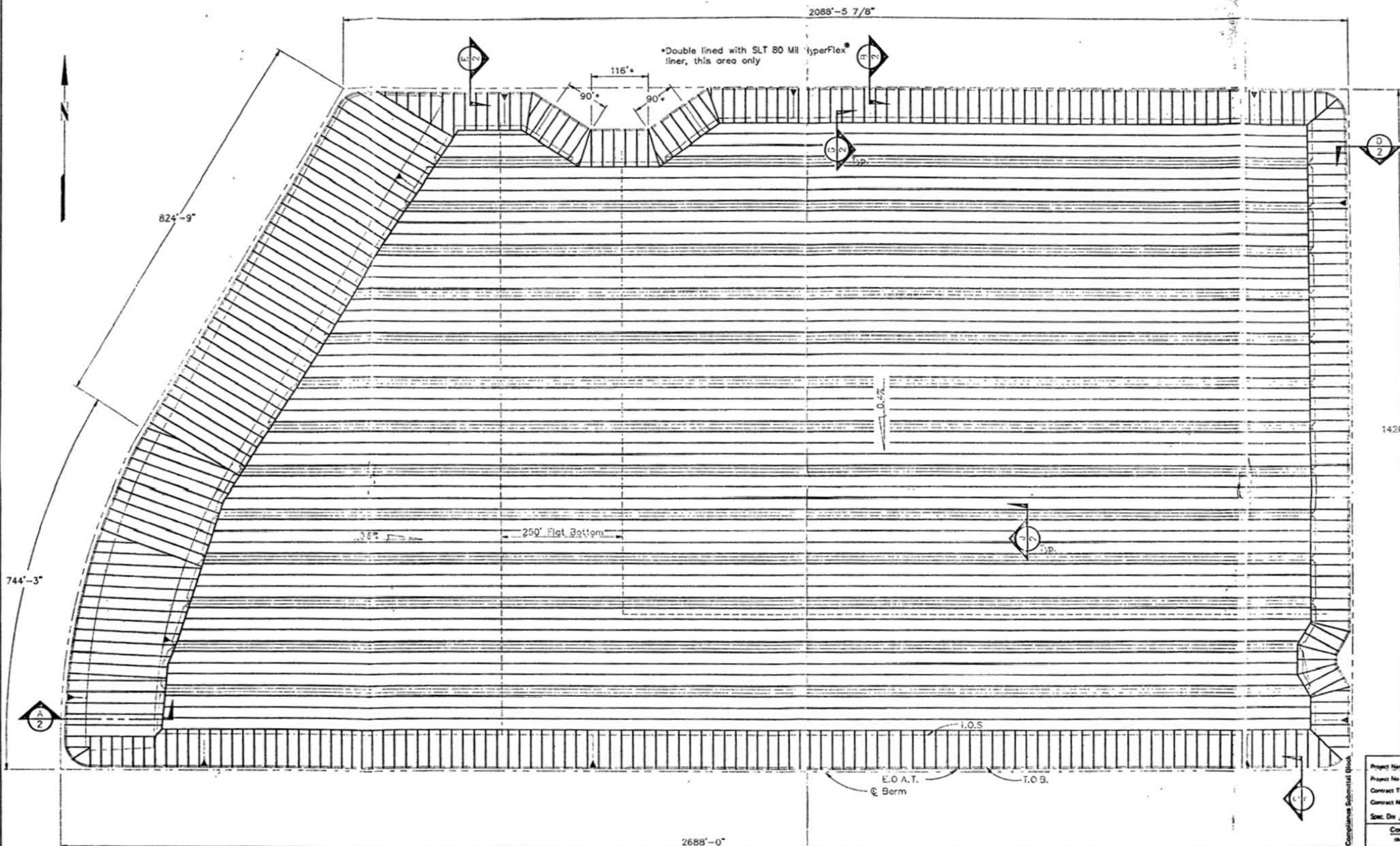
B & McD DRAWING NO. Y50

B & McD PROJECT NO.	91-295-1		
CONTR. NO.	80050	DESIGN BY:	ENGLISH
DATE:	3-10-93	DRAWN BY:	FROST
CAD FILE NO.	N0000165	CHK'D. BY:	REV. 1

M:\ASSOC\2981\CADD\CIVIL\N0000165.DWG


7520/Sht 2/Rev 1
200'±
12'-4" Min.
Varies
10'-0"
℄ Berm / Levee
SLT 80 Mil HyperFlex® liner
1
3.5
SLT 60 Mil HyperFlex® liner
Weld
1
3
Section A/2
Not to scale
7'-0"
12"
36"
℄ Berm
See Dtl. K/2
SLT 80 Mil HyperFlex® liner
24"
1
3
Weld liner seams into anchor trench a minimum of 12"
Backfill, Not by SLT
Section B/2
Not to scale
9'-6"
℄ Berm
SLT 80 Mil HyperFlex® liner
NOTE: See Section B/2 for similar call-outs
Section C/2
Not to scale
9'-6"
℄ Berm
SLT 80 Mil HyperFlex® liner
NOTE: See Section B/2 for similar call-outs
Section D/2
Not to scale
12'-0"
℄ Berm
SLT 80 Mil HyperFlex® liner
NOTE: See Section B/2 for similar call-outs
Section E/2
Not to scale
10'-0"
SLT 80 Mil HyperFlex® liner
Weld
SLT 60 Mil HyperFlex® liner
Section G/2
Not to scale
SLT 80 Mil HyperFlex® liner
Weld
SLT 80 Mil HyperFlex® pipe boot
Weld
See Dtl. H/2
HDPE Pipe, not by SLT
Concrete collar, not by SLT
Geotextile
Typical Pipe Penetration Detail
(2 Required as shown)
Not to scale
Approx. 21'-0"
Weld
SLT 60 Mil HyperFlex® liner
16"±
2'
6'
8'
6'
Section J/2
(Typical Ballast Trench at Approx. 91'-7" Ctrs.)
Not to scale
Stainless steel banding
SLT 80 Mil HyperFlex® liner
Gasket
Pipe
Section A-A
SLT 80 Mil HyperFlex® liner
3/4" Stainless steel banding
Extrusion weld to HDPE pipe or apply a silicone or other selected sealant to non weldable sleeve ends
1/4"x1 1/2" Gasket
Pipe
A
A
3/4" 2" 3/4" 2" 3/4" 3"
Detail H/2
(Vertical or horizontal)
Not to scale
4" Min.
Weld
SLT 80 or 60 Mil HyperFlex® liner
Typical Fillet Extrusion Weld
Not to scale
4" min. to 6" max.
Air channel
Squeeze-out
SLT 80 or 60 Mil HyperFlex® liner
Typical Hot Wedge Double Track Fusion Weld
Not to scale
* As close to top of berm as possible. (6" min.)
Top of berm
SLT Geomembrane flap
SLT Geomembrane
Extrusion weld top And sides
Center of 4"ø hole (50' c/c max.)
6"
6"
12"
6"
6"
12"
Slope (Inside sidewall)
NOTE
IN INSTANCES WHERE TWO LAYERS OF LINER ARE PRESENT, VENT HOLE SHALL PENETRATE BOTH LAYERS.
Detail K/2
(Gas Vent Detail)
Not to scale
SLT NORTH AMERICA, INC.
200 SOUTH TRADE CENTER PARKWAY
CONROE, TEXAS 77385
(713)350-1813
Associated Electric
Ash Disposal Facility #1
New Madrid
Missouri
Sections & Details
SCALE Noted
DATE 07/07/93
REVISION NO. 1
DWG. BY Don
CHECKED BY
SHT. 2 of 2
DWG. NO. 7520B
REV
DATE
DESCRIPTION
BY
Revise per Customer

37



Plan View

Scale 1" = 100'

NOTE: PANEL LAYOUT SHOWN IN PLAN VIEWS ARE CONCEPTUAL ONLY AND ARE SUBJECT TO CHANGES PRIOR TO OR DURING INSTALLATION AT THE DISCRETION OF THE SLT SITE MANAGER WITH APPROVAL OF THE ENGINEER

THINK SAFETY FIRST

LEGEND

- WELDED SEAMS
- T.O.B. – TOP OF BERM
- T.O.S. – TOE OF SLOPE
- E.O.A.T. – EDGE OF ANCHOR TRENCH
- DETAIL OR SECTION DRAWING NUMBER
- DIRECTION OF SLOPE
- 80 MIL LINER
- 60 MIL LINER

GENERAL NOTES

1.) ALL EARTHWORK BY BLOOMSDALE.
2.) ALL PIPEWORK BY BLOOMSDALE.
3.) ALL CONCRETE WORK BY BLOOMSDALE.
   A. ALL CONCRETE CORNERS IN CONTACT WITH LINER SHALL BE CHAMFERED TO A MINIMUM OF 1" SQUARE
   B. ALL CONCRETE SHALL BE STEEL TROWEL FINISHED
4.) EXCAVATION AND BACKFILL OF ANCHOR TRENCH BY BLOOMSDALE. ALL ANCHOR TRENCH BACKFILL TO BE COMPACTED BY BLOOMSDALE.
5.) LINER LAYOUT SHOWN MAY VARY TO ACCOMMODATE FIELD CONDITIONS. (TO BE DETERMINED BY SLT SITE MANAGER WITH APPROVAL OF ENGINEER.)
6.) GAS VENTING BY SLT PER DETAIL K/2.
7.) ALL DESIGN CHANGES TO BE REVIEWED BY SLT BEFORE INITIATING CONSTRUCTION.
8.) FINAL AREA TO BE DETERMINED PER SLT FIELD MEASUREMENTS AND SHALL INCLUDE THE LINER INSTALLED IN THE ANCHOR TRENCH.

REVISED COPY

Compliance Submittal Block

Project Name: ASSOC
Project No.: 91-298-1
Contract Title: Ash Disposal Facility Const.
Contract No.: 6050
Spec. Div: 2776 Art No:

Contractor's Approval (See Contract Documents)
Contractor: Bloomsdale Excavating
Approved By: DH
Date: 9/13/93
(Do not send drawing to Engineer without Contractor's prior Approval.)

B&McD Record Stamp

B&McD Action (See Contract Documents)
Co.
Date Received
Initials & Date
A | E
B | F
C | ⓒ TLL 2-7-95
D

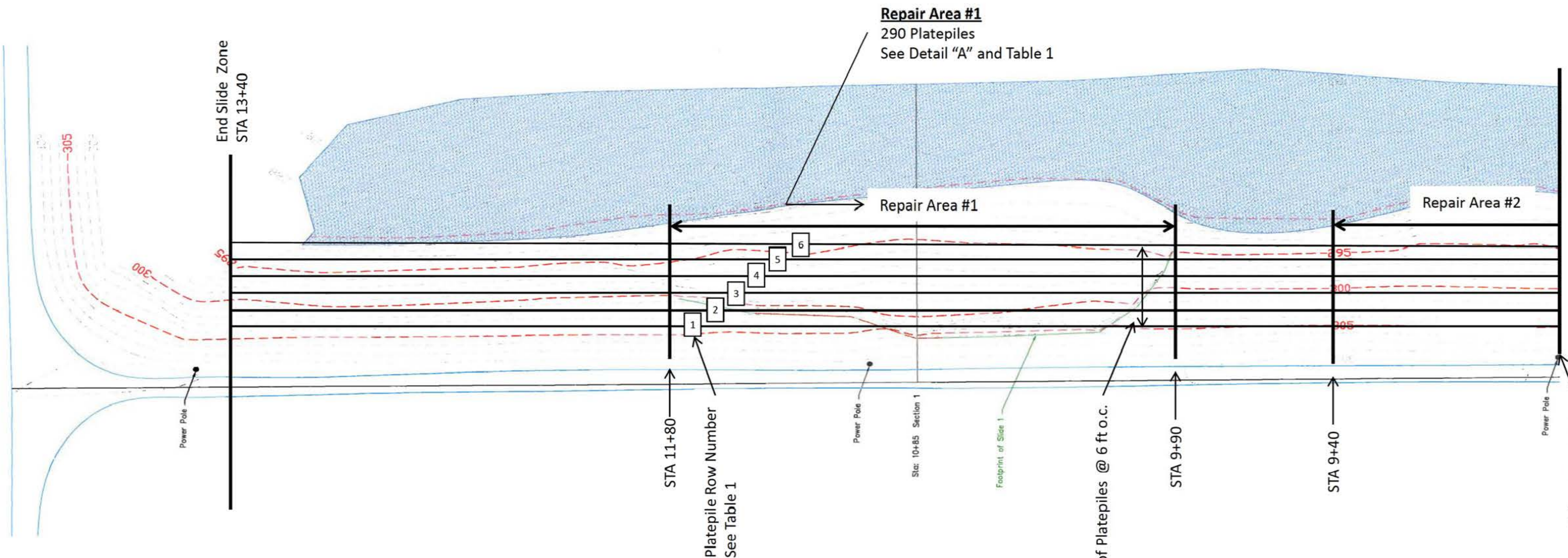
SLT NORTH AMERICA, INC.
700 SOUTH TRADE CENTER PARKWAY
CONROE, TEXAS 77385

Associated Electric
Ash Disposal Facility #1
New ... Misso...
Plan View

SCALE	DATE	REVISION NO.
Noted	07/07/93	1
DWG BY: Don	SHT: 1 of 2	DWG NO: 752...

Revise per Customer — Dm

APPENDIX E
Raw Water Pond Slope Repair
By Slope Reinforcement Technology, LLC, 2012



Detail "A" - Platepile Array and Dimensions

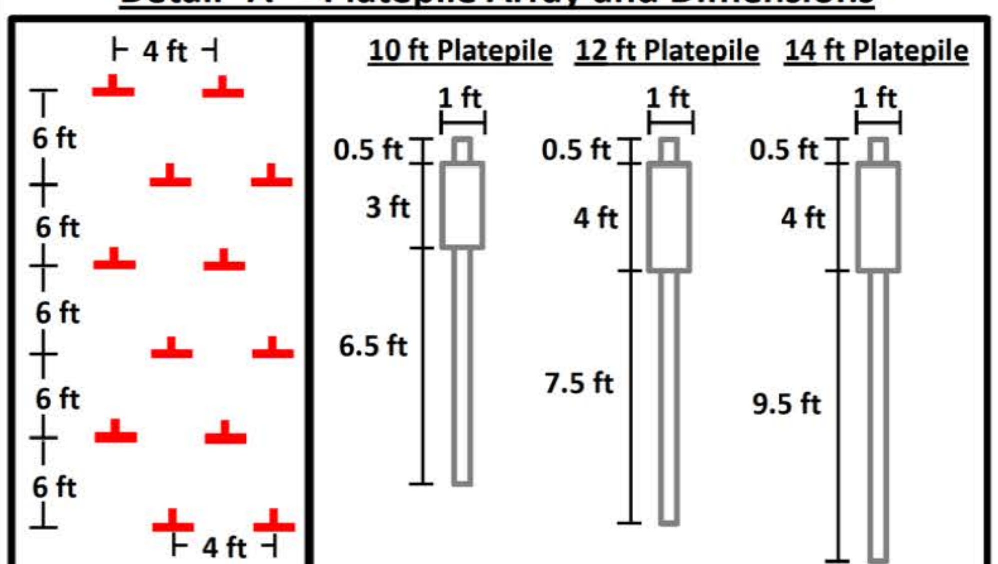
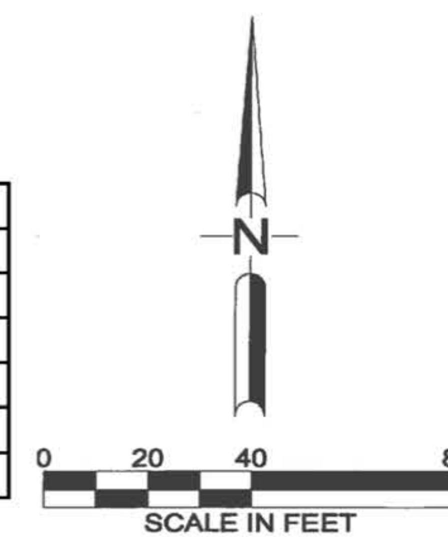


Table 1 - Summary of Platepile Sizes

Row No.*	Length, ft.	L - Size, In.	Thickness, in.	Plate Size, In.	Plate Thickness, In.
1	10	3 " x 3"	0.375	12 x 36	0.25
2	12	3 " x 3"	0.375	12 x 48	0.25
3	14	3 " x 3"	0.375	12 x 48	0.25
4	14	3 " x 3"	0.375	12 x 48	0.25
5	14	3 " x 3"	0.375	12 x 48	0.25
6	12	3 " x 3"	0.375	12 x 48	0.25

*Row numbers begin at top of slope



SRT
SLOPE REINFORCEMENT TECHNOLOGY, LLC

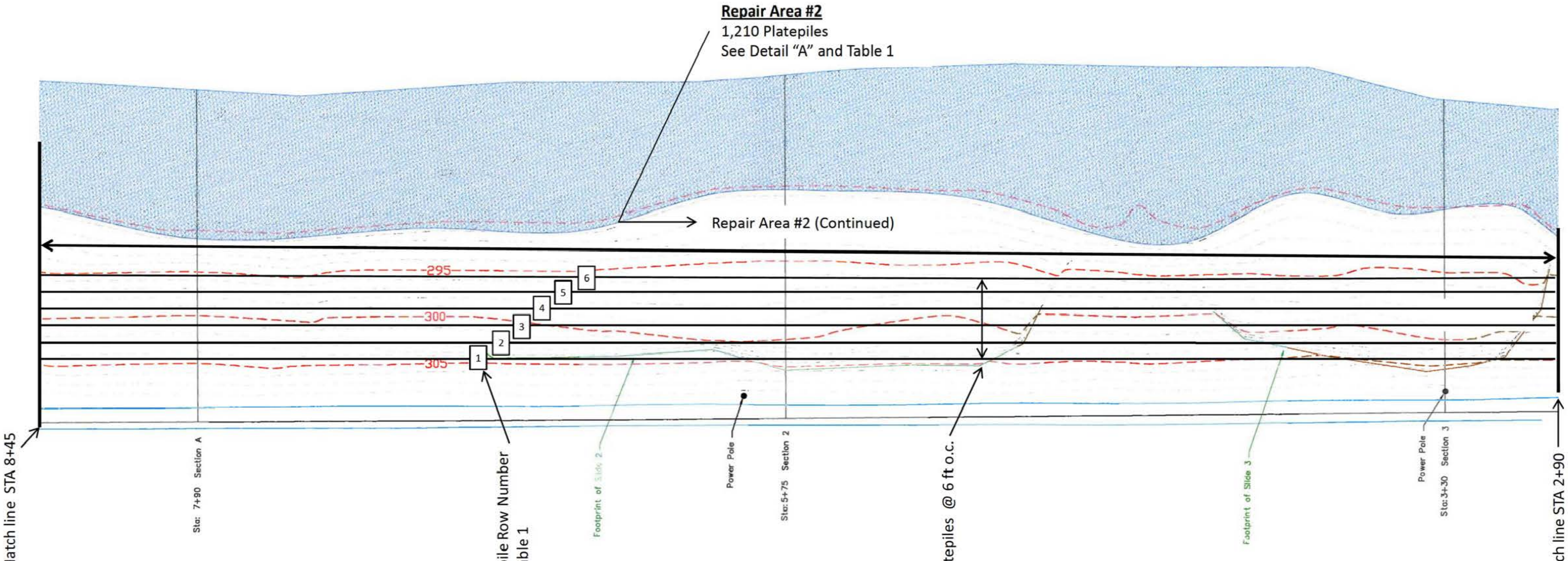
Raw Water Pond Slope Repair
AECI New Madrid, MO

Drawn By: Kevin Kane

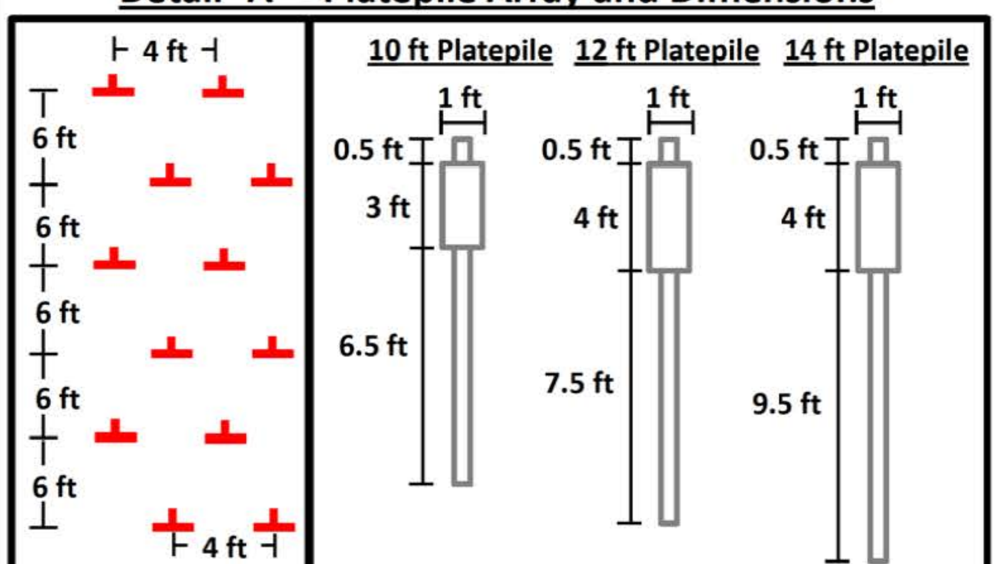
Reviewed By: Richard Short

Date: January 27th, 2012

Plate: 1



Detail "A" - Platepile Array and Dimensions



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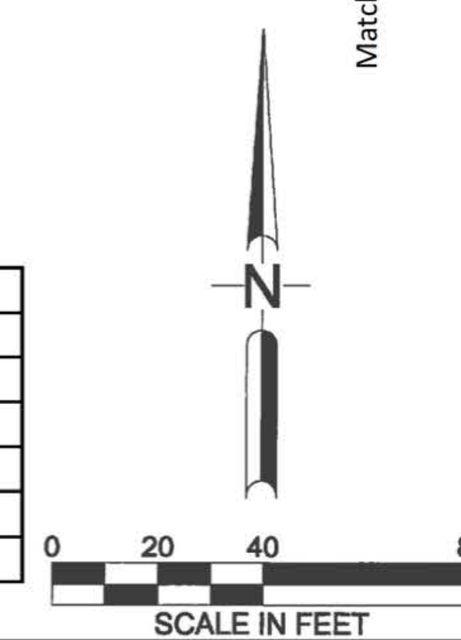
6	12	3 " x 3"	0.375	12 x 48	0.25

*Row numbers begin at top of slope



SRT
SLOPE REINFORCEMENT TECHNOLOGY, LLC

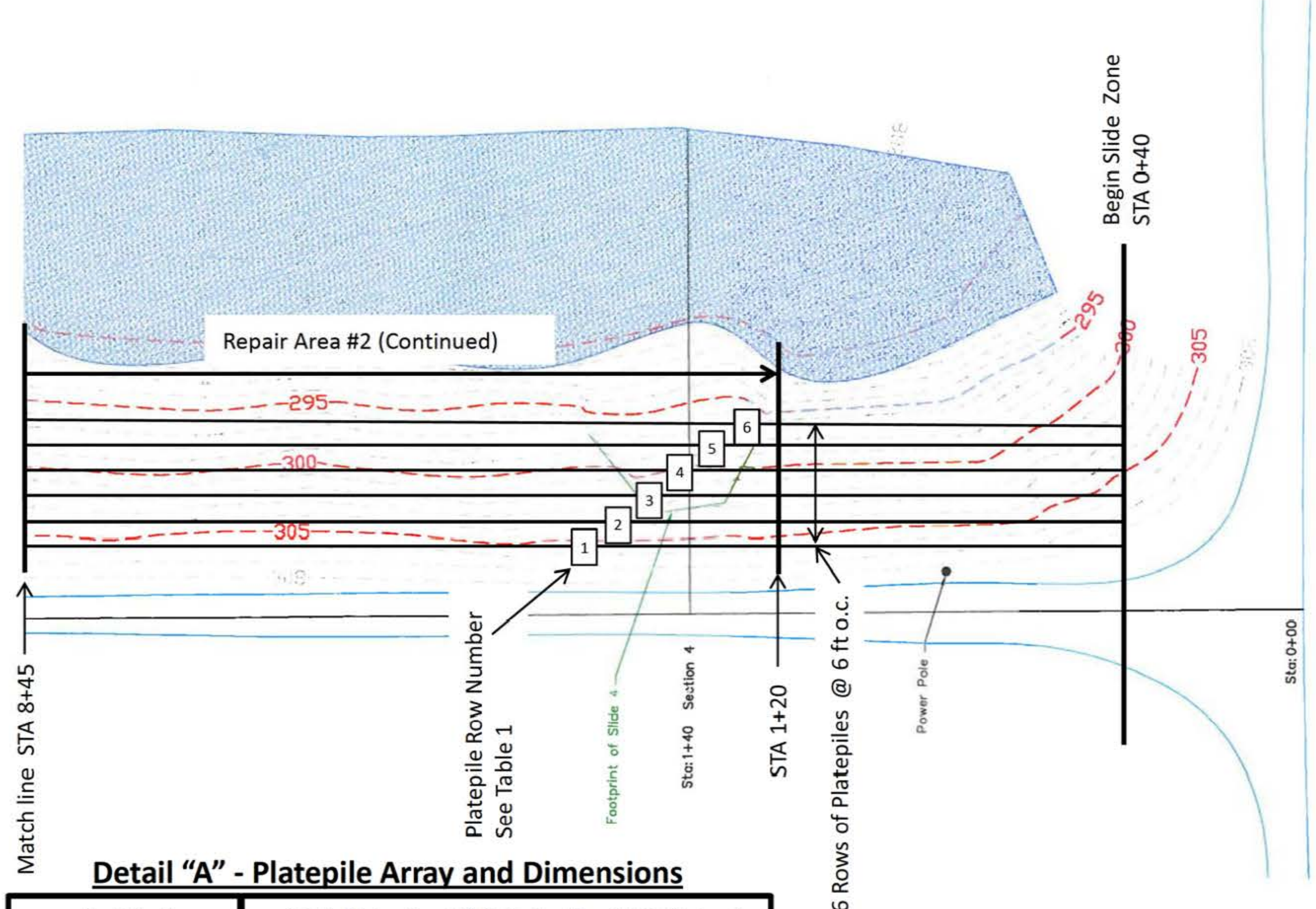
Raw Water Pond Slope Repair
AECI New Madrid, MO

Drawn By: Kevin Kane

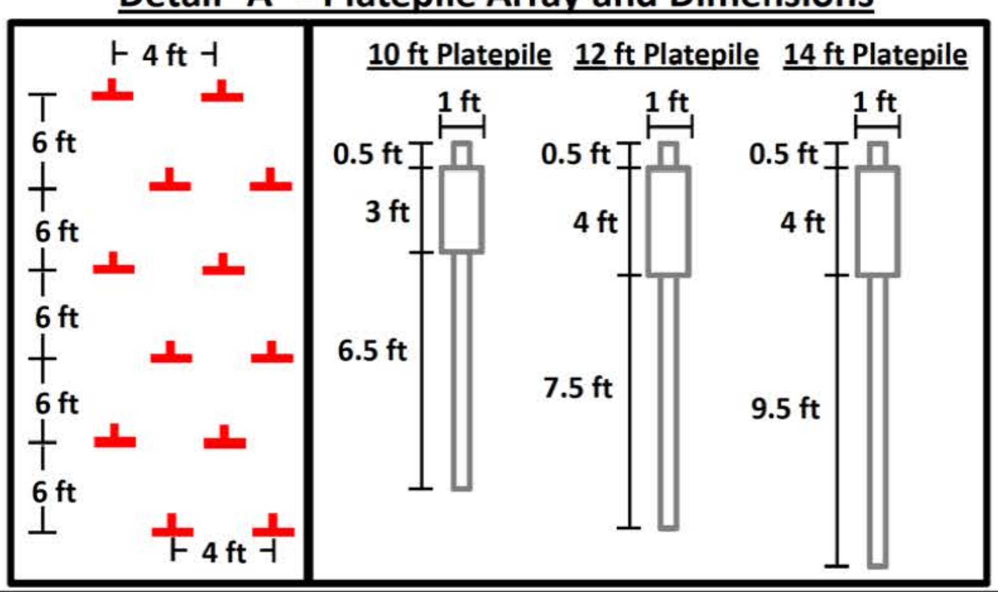
Reviewed By: Richard Short

Date: January 27th, 2012

Plate: 2



Detail "A" - Platepile Array and Dimensions



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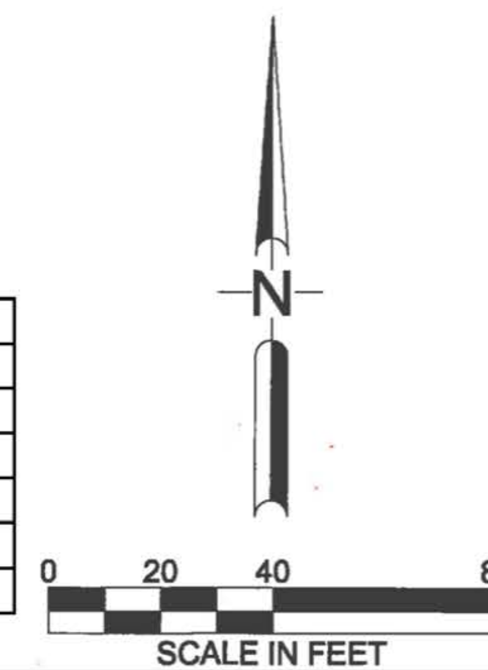
4	14	3 " x 3"	0.375	12 x 48	0.25
5	14	3 " x 3"	0.375	12 x 48	0.25
6	12	3 " x 3"	0.375	12 x 48	0.25

*Row numbers begin at top of slope



SRT
SLOPE REINFORCEMENT TECHNOLOGY, LLC

Raw Water Pond Slope Repair
AECI New Madrid, MO

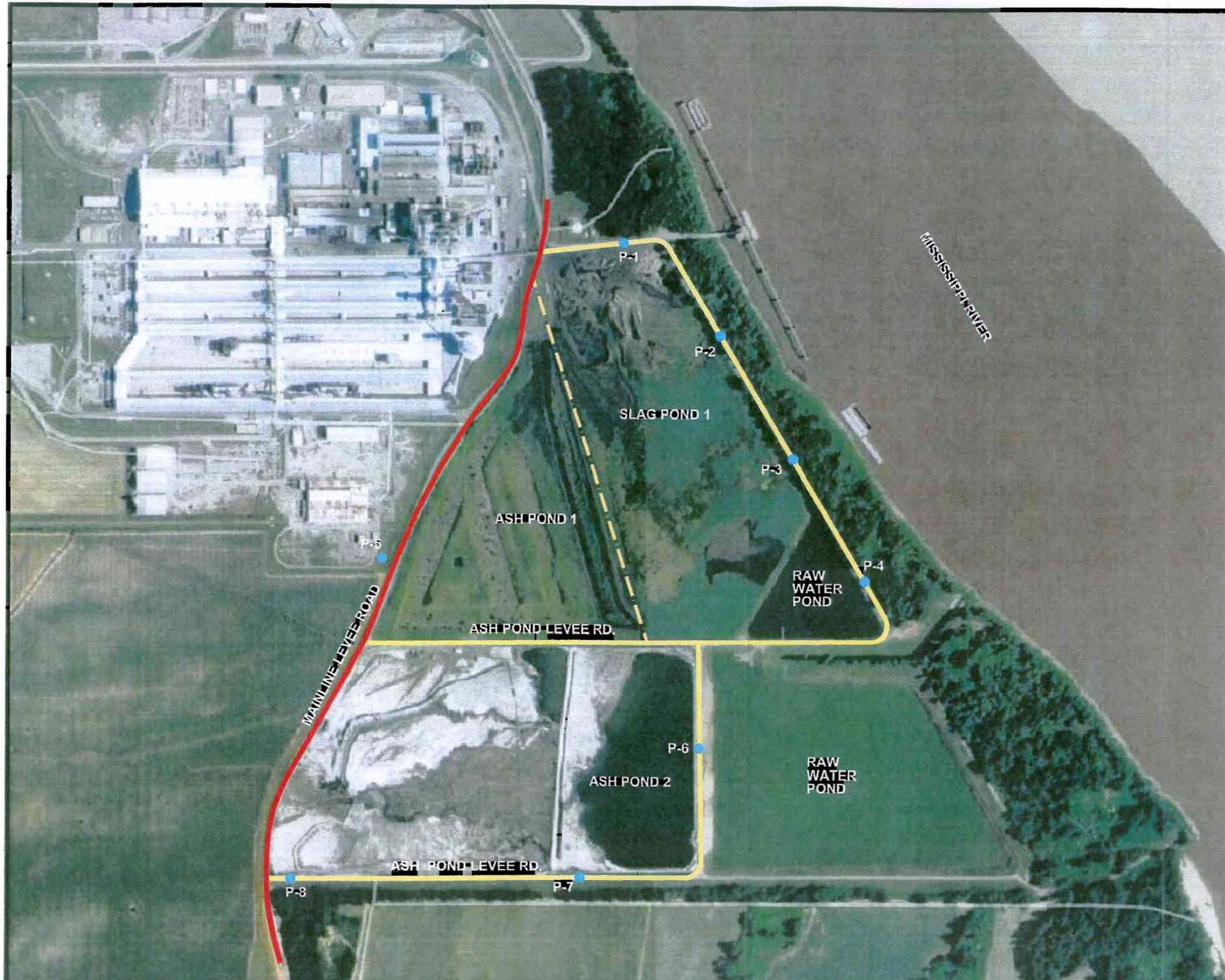
Drawn By: Kevin Kane

Date: January 27th, 2012

Reviewed By: Richard Short

Plate: 3

APPENDIX F
Excerpt from:
Slag Pond 1 and Ash Pond 2 Piezometers
AECI New Madrid Power Generating Facility
Dated July 31, 2009



NOTES:

1. Plan adapted from an aerial photograph courtesy of Google Earth.
2. Piezometers were located in the field by Geotechnology and subsequently surveyed by the project surveyor.

LEGEND:

● Piezometer Location

N

0 500 1000

APPROXIMATE SCALE IN FEET

Drawn By: SLC	Ck'd By: Su	App'vd By: MHM
Date: 04-23-09	Date: 7/30/09	Date: 7/30/09

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

AECI New Madrid
Slag Pond and Ash Pond Piezometers
New Madrid County, Missouri

AERIAL PHOTOGRAPH OF SITE AND PIEZOMETER LOCATIONS

Project Number 1011304.91IG	PLATE 2