ALLIANT ENERGY
Interstate Power and Light Company
Sutherland Generating Station

CCR SURFACE IMPOUNDMENT

HISTORY OF CONSTRUCTION

Report Issued: March 05, 2018
Revision 0

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

EXECUTIVE SUMMARY

This History of Construction (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual (CCR) from Electric Utilities (40 CFR Parts 257 and 261), also known as the CCR Rule.

This Report documents the construction history of each CCR unit at the Sutherland Generating Station in Marshalltown, Iowa in accordance with §257.73(c) and §257.100(a) of the CCR Rule. For purposes of this Report, the term "CCR unit" only refers to existing and inactive CCR surface impoundments.

Primarily, this Report is focused on providing history of construction information for each CCR surface impoundment to the extent feasible, provided that such information is reasonably and readily available.

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1 INTRODUCTION

The owner/operator of the CCR units must provide a history of construction for the inactive CCR surface impoundments at the Sutherland Generating Station (SGS) in Marshalltown, Iowa in accordance with §257.73(c)(1) and §257.100(a) of the CCR Rule. Hard Hat Services, on behalf of Interstate Power and Light Company, has provided history of construction information for the CCR surface impoundments to the extent feasible, provided that such information is reasonably and readily available.

1.1 CCR Rule Applicability

The CCR Rule requires that an owner/operator of a CCR unit must provide a history of construction for CCR surface impoundments with a height of 5 feet or more and a storage volume of 20 acre-feet or more; or for CCR surface impoundments with a height of 20 feet or more (§257.73(b)(1), §257.73(b)(2), and §257.100(a)).

1.2 History of Construction Applicability

SGS has four inactive CCR surface impoundments, of which only one meets the CCR Rule applicability within Section 1.1. The CCR surface impoundments are identified as follows:

- SGS North Primary Pond
- SGS South Primary Pond
- SGS Main Pond
- SGS Polishing Pond

Only the SGS Main Pond meets the requirements of §257.73(b)(1) and/or §257.73(b)(2) and is subject to the periodic safety factor assessment requirements of §257.73(e) and §257.100(a) of the CCR Rule. The SGS North Primary Pond, SGS South Primary Pond, and SGS Polishing Pond do not have an embankment height of 5 feet or more, and do not have a storage volume of 20 acre-feet or more. Thus, these CCR surface impoundments are not subject to the periodic safety factor assessment requirements.

2 FACILITY DESCRIPTION

The following sub-sections provide a general facility description.

2.1 Name and Address - §257.73(c)(1)(i) and §257.100(a)

Included below is the name and address of the owner/operator of the CCR units, name of each CCR unit, and state identification number for the CCR Units (if one has been assigned by the state).

Owner/Operator Name and Address:

Interstate Power and Light Company (*an Alliant Energy Company*)
Sutherland Generating Station
3001 East Main Street
Marshalltown, IA 50158

The names of the inactive CCR Units located at SGS are identified as follows:

- SGS North Primary Pond
- SGS South Primary Pond
- SGS Main Pond
- SGS Polishing Pond

The state identification number that has been assigned to the CCR Units at SGS, by the Iowa Department of Natural Resources (DNR), is 64-UDP-02-15.

2.2 General Facility History

SGS is located east of the City of Marshalltown and approximately one-half mile west of the Iowa River in Marshall County. Figure 1 provides both a topographic map and an aerial photograph of the SGS facility location, with the approximate property boundary of the facility identified.

SGS, originally owned/operated by the Iowa Electric Light and Power Company, initiated facility operations in 1954. At the time of initial facility operations SGS was a fossil–fueled electric generating station that consisted of two steam electric generating units (Unit 1 and Unit 2). The initial steam electric generating units at SGS both had a

nameplate rating of 37.5 Megawatts (MW) each. At the time of initial operations both Unit 1 and Unit 2 burned coal as the primary fuel source. The coal was transported to and received by the facility via rail car. A third steam electric generating unit (Unit 3) was commissioned in 1961. Unit 3 had a nameplate rating of 96 MW and also burned coal as the primary fuel source.

The burning of coal produced a by-product of CCR. The CCR at SGS was categorized into two types, bottom ash and fly ash. Boilers 1 and 2 were pulverized coal dry-bottom boilers. Boiler 3 was a cyclone wet-bottom boiler with a water-filled slag tank under the boiler which quenched the molten ash. Ash and slag that collected in the bottom of the boilers was periodically sluiced with water from the generating plant to a surface impoundment. At the time of initial facility operations, the fly ash that was produced from Unit 1 and Unit 2 was not recovered as it would get carried from the boiler furnace as part of the flue gas. Unit 3 consisted of a mechanical cyclone separator that collected fly ash. The fly ash was sluiced with water from the generating plant to a surface impoundment. The original CCR surface impoundment at SGS is presumed to have been constructed at the same time as the generating plant. The CCR surface impoundment, which is located to the east of the generating plant, was initially identified within historical drawings as an Ash Disposal Pond, as well as an Ash Pit. The original configuration is presumed to have consisted of one large CCR surface impoundment. Historical drawings that identify the layout and location of the original CCR surface impoundment are provided in Appendix A.

When the facility was operating, the bottom ash produced from generating Units 1 and 2, as well as bottom ash (slag) produced from generating Unit 3 was sluiced to the western portion of the CCR surface impoundment. In addition to sluiced bottom ash and slag, other influent flows that discharged into the CCR surface impoundment consisted of cooling tower blow down water, air compressor cooling water, boiler blow down water, storm water runoff from the coal pile storage area, and other low-volume waste water streams from the generating plant via a ground-floor sump pump. There is no known

readily available information regarding the original hydraulic structures associated with the original CCR surface impoundment.

At some point after construction of the generating plant, the facility was retrofitted with electrostatic precipitators. From review of historical photographs and discussions with facility personnel, it is estimated that the electrostatic precipitators were constructed around 1975. With the construction of the electrostatic precipitators, fly ash produced from the generating units would be electrostatically precipitated and collected. The precipitator fly ash that was collected was conveyed dry and stored in a fly ash storage silo prior to being transported off-site to an ash landfill. In 1994 the off-site ash landfill was closed. At that time, the precipitator fly ash was transported to an on-site temporary storage area prior to being transported off-site for beneficial reuse. If the dry conveying system malfunctioned, an emergency by-pass system would utilize water to sluice the precipitator fly ash from the generating plant to the CCR surface impoundment.

Additional discussions on the historical construction, operations, and modifications of the CCR surface impoundments at SGS is provided in further detail throughout Section 3.

From 1954 to 1991 the owner/operator of SGS was the Iowa Electric Light and Power Company. In 1991, the Iowa Southern Utilities Company merged with Iowa Electric Light and Power Company to create IES Industries. In 1998, a three-way merger was completed between IES Industries, Interstate Power Company, and Wisconsin Power and Light Company forming Interstate Energy Corporation. In 1999, Interstate Energy Corporation changed its name to Alliant Energy Corporation.

The configuration of the original CCR surface impoundment has evolved over time as provided in further detail in Section 3.1.5. As SGS exists today, the configuration consists of four CCR surface impoundments. The CCR surface impoundments are identified as the SGS North Primary Pond, SGS South Primary Pond, SGS Main Pond, and SGS

Polishing Pond. The four CCR surface impoundments remain within the footprint of the original CCR surface impoundment.

At the end of 2012, SGS ceased using coal and modified facility operations to use natural gas as the primary fuel source. At that time, the CCR surface impoundments became inactive as CCR was no longer produced. From 2012 through 2017 the inactive CCR surface impoundments remained the primary receivers of cooling tower blow down water, air compressor cooling water, boiler blow down water, storm water runoff from the former coal pile storage area, and other low-volume waste water streams from the generating plant via a ground-floor sump pump. As of June 30, 2017, SGS ceased natural gas generation and retired. With SGS ceasing generating operations the inactive CCR surface impoundments no longer receive process flows. Presently, the inactive CCR surface impoundments only receive influent flows during rainfall events, including surface water runoff from the former coal pile storage area that is pumped into the SGS North Primary Pond by the lift pumps.

The inactive CCR surface impoundments at SGS are anticipated to be closed in 2019.

3 HISTORY OF CONSTRUCTION - §257.73(c)(1) and §257.100(a)

This Report documents the history of construction information for the inactive CCR surface impoundment to the extent feasible, provided that such information is reasonably and readily available. The following activities were completed to reasonably collect and assemble the readily available history of construction information:

- Historical aerial photography review;
- Historical topography review; and
- Electronic design drawing, specification, and report review.

3.1 SGS Main Pond

The following subsections are intended to meet the requirements of the CCR Rule §257.73(c)(1) and §257.100(a) for the SGS Main Pond.

3.1.1 CCR Unit Location - §257.73(c)(1)(ii) and §257.100(a)

The SGS Main Pond is located east of the generating plant on the eastern portion of the site. The location of the SGS Main Pond, in reference to the surrounding topography, is identified on both a USGS 7 ½ minute topographic quadrangle map and aerial photograph on Figure 1. Figure 2 identifies the configuration of the SGS Main Pond, as well as provides the location of the SGS Main Pond in relation to the other CCR surface impoundments at SGS.

3.1.2 Statement of Purpose - §257.73(c)(1)(iii) and §257.100(a)

The SGS Main Pond is an inactive CCR surface impoundment that receives influent flows from the SGS North Primary Pond and SGS South Primary Pond. Process flows into the SGS North Primary Pond and SGS South Primary Pond ceased at the time of the generating plant retirement in June 2017. Presently, the only influent flows occur during rainfall events and includes surface water runoff from the former coal pile storage area that is pumped into the SGS North Primary Pond by the lift pumps. The SGS North Primary Pond is designed to discharge into the northwest corner of the SGS Main Pond

while the overflow pipe from the SGS South Primary Pond is designed to discharge into the west end of the SGS Main Pond.

The water within the SGS Main Pond is designed to flow around a series of intermediate finger berms prior to discharging into the southern end of the SGS Polishing Pond, which is located north of the SGS Main Pond. The water in the SGS Main Pond is designed to discharge into the SGS Polishing Pond via a precast concrete mixing channel located in the northeast corner of the SGS Main Pond.

The water within the SGS Polishing Pond is designed to discharge through the facilities National Pollutant Discharge Elimination System (NPDES) Outfall 001 which consists of a Parshall flume and flow metering equipment. The water within the SGS Polishing Pond is designed to discharge into a small discharge pond. The water in the discharge pond would then drain through a corrugated metal pipe into a treatment swale located north of the discharge pond. The water in the treatment swale would then flow west for several hundred yards between the rail road tracks located north of the generating plant. At the end of the treatment swale, an underground culvert directed the stream under the rail road tracks towards the north and into Unnamed Creek parallel to the county road, eventually draining towards the east into the Iowa River.

Water is no longer regularly discharged from the SGS Main Pond. Additionally, as the facility ceased operations, it is anticipated that future water levels within the inactive CCR surface impoundments will continue to be minimal. The SGS Main Pond, along with the other inactive CCR surface impoundments at SGS, are anticipated to be closed in 2019.

3.1.3 Physical Layout Information - §257.73(c)(1)(iv) and §257.100(a)

As identified in an Inflow Flood Control Plan[1] prepared for SGS in accordance with §257.82 and §257.100(a) of the CCR Rule, the SGS Main Pond has a watershed of

[1] Inflow Flood Control Plan, Sutherland Generating Station, 2018, Hard Hat Services

approximately 26.5 acres. Approximately 20 acres of the watershed drainage area includes the generating plant structures, the former coal pile storage area, and land adjacent to the inactive CCR surface impoundments. Approximately 6.5 acres of the watershed drainage area consists of open water associated with the inactive CCR surface impoundments.

As discussed in an Annual Inspection Report[2] prepared for SGS in accordance with §257.83 and §257.100(a) of the CCR Rule, the SGS Main Pond is incised along the west side of the CCR unit. The north side of the SGS Main Pond, along the western portion, is also incised. The eastern portion of the north side of the SGS Main Pond consists of an embankment that separates the SGS Main Pond from the SGS Polishing Pond. The south and east embankments of the SGS Main Pond have an elevation of approximately 865.3 feet at the lowest point of the embankments and a height of approximately 10 feet from the crest to the toe of the downstream slopes of the embankments. The maximum interior storage depth of the SGS Main Pond is approximately 11.8 feet. The total volume of impounded CCR and water within the SGS Main Pond is approximately 34,000 cubic yards.

3.1.4 Foundation and Abutment Properties - §257.73(c)(1)(v) and §257.100(a)

As identified in a Safety Factor Assessment[3] prepared for SGS in accordance with §257.73(e) and §257.100(a) of the CCR Rule, SGS is located in the alluvial outwash formations of the Iowa River. The general soil stratigraphy in Iowa is windblown Loess on the surface with glacial till below the loess. In some locations the loess is eroded away and in river valleys the till is also totally or partially eroded and overlain by alluvial soils. The Marshall County Soil Survey indicates that black clay (Zook clay) is some of the finest textured soils derived from alluvial deposition and is found in the lower parts of bottom

[2] Annual Inspection Report, Sutherland Generating Station, 2017, Hard Hat Services
[3] Safety Factor Assessment, Sutherland Generating Station, 2018, Hard Hat Services

lands below alluvial benches that divide the bottomland of river valleys from the loess deposits.

Soil borings and cone penetrometer test (CPT) borings were installed in the vicinity of the CCR surface impoundments in 2006 (Appendix E). Deep soil borings were installed west and south of the CCR surface impoundments in 2007 (Appendix E). Additional soil borings and CPT borings were installed southwest of the CCR surface impoundments in 2008 (Appendix F).

The generalized soil conditions at the embankments is compacted Zook clay from the top elevation at 865 feet to elevation 857-855 feet (assuming some topsoil was stripped prior to compacting the embankments), undisturbed Zook clay to elevation 850 feet and loose to medium dense alluvial sand below that elevation. The Zook clay prior to construction of the embankments was approximately 8-feet thick and was exposed to desiccation and bottom drainage after deposition. In addition to the natural drainage and desiccation, the undisturbed Zook clay below the embankments has been surcharge loaded by as much as 8-feet of compacted embankment for over 50 years further consolidating the clay under the embankment. Pocket penetrometer results from the 2006 borings (Appendix E) indicate that the underlying Zook clay is over consolidated. Zook clay at the toe of the embankment slopes is assumed to be normally consolidated since the area is normally saturated and is not expected to show significant desiccation.

3.1.5 Historical Construction and Use - §257.73(c)(1)(vi) and §257.100(a)

The SGS Main Pond (located within the footprint of the original Ash Disposal Pond as identified in historical drawings) was constructed in 1954 in an area located east of the generating plant. Historical drawings that identify the original layout of the CCR surface impoundment are provided in Appendix A.

There are no known reasonably and readily available documents that detail the method of site preparation and construction of each zone of the SGS Main Pond. In-situ soil properties of the CCR surface impoundment were identified in a Safety Factor

Assessment[4] prepared for SGS in accordance with §257.73(e) and §257.100(a) of the CCR Rule. As discussed in the Safety Factor Assessment, soil borings and CPT borings were installed in the vicinity of the CCR surface impoundment along the south and east embankments in 2006 (Appendix E). The borings indicated that the embankments were constructed of Zook clay.

Historical use of the CCR surface impoundments consisted of being the primary receiver of CCR. The bottom ash produced from generating Units 1 and 2, as well as bottom ash (slag) produced from generating Unit 3 was sluiced to the western portion of the CCR surface impoundment. In addition to sluiced CCR, other influent flows that discharged into the CCR surface impoundment consisted of cooling tower blow down water, air compressor cooling water, boiler blow down water, storm water runoff from the coal pile storage area, and other low-volume waste water streams from the generating plant via a ground-floor sump pump.

At some point after construction of the generating plant, the facility was retrofitted with electrostatic precipitators. From review of historical photographs and discussions with facility personnel, it is estimated that the electrostatic precipitators were constructed around 1975. With the construction of the electrostatic precipitators, fly ash produced from the generating units would be electrostatically precipitated and collected. The precipitator fly ash that was collected was conveyed dry and stored in a fly ash storage silo prior to being transported off-site to an ash landfill. In 1994 the off-site ash landfill was closed. At that time, the precipitator fly ash was transported to an on-site temporary storage area prior to being transported off-site for beneficial reuse. If the dry conveying system malfunctioned, an emergency by-pass system would utilize water to sluice the precipitator fly ash from the generating plant to the CCR surface impoundment.

Historical aerial photographs taken between 1965 and 1983 confirm the configuration of the large CCR surface impoundment generally went unchanged during that time period

[4] Safety Factor Assessment, Sutherland Generating Station, 2018, Hard Hat Services

(Appendix B). The only visual changes during that time, as observed from the historical aerial photographs, was the interior of the pond filling up with what is presumed to be CCR.

A historical aerial photograph taken in 1994 identified the first significant reconfiguration of the CCR surface impoundment (Appendix B). At that time, the northwestern portion of the CCR surface impoundment was observed to have been filled in with what is presumed to be CCR. Additionally, the historical aerial photograph showed the addition of a primary settling pond that appeared to be constructed within the western portion of the original footprint of the CCR surface impoundment. The primary settling pond became the primary receiver of sluiced CCR, as well as process flows and storm water flows. The secondary settling pond, located east of the primary settling pond, was divided by an intermediate finger berm. Soil borings and CPT borings installed along the intermediate finger berm in 2006 indicated the berm was constructed completely out of bottom ash (Appendix E). From the historical aerial photograph, it appears the primary settling pond discharged into the northwest corner of the secondary settling pond. The water in the secondary settling pond would then flow to the southwest corner of the CCR surface impoundment and around the intermediate finger berm where it would then flow to the northeast corner of the secondary settling pond. The water would then flow through a hydraulic structure into a small discharge pond. There is no known readily available information regarding the hydraulic structures associated with the primary settling pond, secondary settling pond, or discharge pond at the time the historical aerial photograph was taken.

A historical aerial photograph taken in 2005 (Appendix B), as well as a Settling Pond Survey drawing prepared by Hard Hat Services in 2005 (Appendix G), showed that at some point in time since the 1994 historical aerial photograph was taken that the primary settling pond had been separated into a north primary settling pond and a south primary settling pond. The Settling Pond Survey drawing also identified a hydraulic structure located in the northeast corner of the secondary settling pond. The hydraulic structure

consisted of a flow metering flume. The water in the secondary settling pond would flow through the metering flume prior to discharging into a small discharge pond.

The CCR surface impoundments were last modified in 2006 as identified in design drawings prepared by Hard Hat Services (Appendix G), as well as historical aerial photographs during that same year (Appendix B). The configuration of the north primary settling pond (presently identified as the SGS North Primary Pond) and south primary settling pond (presently identified as the SGS South Primary Pond) generally remained the same. Modifications included the reconfiguration of the secondary settling pond (presently identified as the SGS Main Pond) with the construction of additional intermediate finger berms, as well as the construction of a polishing pond (presently identified as the SGS Polishing Pond) located northeast of the secondary settling pond. The water within the SGS North Primary Pond and SGS South Primary Pond discharged to the east into the northwest corner of the reconfigured SGS Main Pond. The water within the SGS Main Pond was designed to flow around the series of intermediate finger berms prior to discharging to the north through a precast concrete mixing channel into the SGS Polishing Pond. The water within the SGS Polishing Pond discharged through the facilities NPDES Outfall 001, which consisted of a Parshall flume and flow metering equipment, and into the small discharge pond. The water would then drain through a corrugated metal pipe into a grassy ditch located north of the discharge pond. The water in the grassy ditch would then flow west for several hundred yards between the rail road tracks located north of the generating plant. At the end of the grassy ditch, an underground culvert directed the stream under the rail road tracks towards the north and into an unnamed drainage ditch parallel to the county road, eventually draining towards the east into the Iowa River.

At the end of 2012, SGS ceased using coal and modified facility operations to use natural gas as the primary fuel source. At that time, the CCR surface impoundments became inactive as CCR was no longer produced. From 2013 through 2017 the inactive CCR surface impoundments remained the primary receivers of cooling tower blow down

water, air compressor cooling water, boiler blow down water, storm water runoff from the former coal pile storage area, and other low-volume waste water streams from the generating plant via a ground-floor sump pump. As of June 30, 2017, SGS ceased natural gas generation and retired. With SGS ceasing generating operations the inactive CCR surface impoundments no longer received process flows. Presently, the inactive CCR surface impoundments only receive influent flows during rainfall events, including surface water runoff from the former coal pile storage area that is pumped into the SGS North Primary Pond by the lift pumps. The inactive CCR surface impoundments at SGS are anticipated to be closed in 2019.

The following list provides a general overview of the known modifications and operations associated with the SGS Main Pond since initial facility operations:

- The original CCR surface impoundment, identified in historical drawings as an Ash Disposal Pond or an Ash Pit, was reconfigured into two separate CCR surface impoundments at some point prior to 1994. The reconfigured CCR surface impoundments were identified as a primary settling pond and a secondary settling pond. At some point in time prior to 2005 the primary settling pond was reconfigured into two separate CCR surface impoundments. The reconfigured CCR surface impoundments were identified as a north primary settling pond and a south primary settling pond. In 2006, the secondary settling pond was reconfigured into two separate CCR surface impoundments. The reconfigured CCR surface impoundments were identified as a secondary settling pond and a polishing pond. At some point in time since 2006 the CCR surface impoundments were reidentified as the SGS North Primary Pond, SGS South Primary Pond, SGS Main Pond, and SGS Polishing Pond.

- The discharge associated with the CCR surface impoundments pre-dates the NPDES program established in 1972. The discharge was listed with the State of Iowa NPDES Permit as NPDES Outfall 001.

- In June 1991 SGS modified coal burning operations by switching from Iowa coal to Powder River Basin coal.

- Maintenance dredging of CCR from the SGS North Primary Pond and SGS South Primary Pond occurred on a regular basis prior to 2012. During dredging operations valves could be turned to redirect the process waters to the CCR surface impoundment that was not being dredged. The dredged CCR was temporarily stored north of the SGS North Primary Pond where it was allowed to dewater. The material would then be moved with an end-loader to a temporary on-site storage pile. The CCR was then transported off-site for beneficial reuse or landfilling. Maintenance dredging of CCR from the SGS Main Pond occurred less frequently as the majority of CCR was collected in the SGS North Primary Pond and SGS South Primary Pond. There is no known readily available information detailing maintenance dredging operations or frequency associated with the SGS Main Pond.

- In 2006, the current configuration of the SGS Main Pond and SGS Polishing Pond were constructed (Appendix G). The existing intermediate finger berm located within the SGS Main Pond was stabilized by removing bottom ash material to approximately 1 foot above the normal water elevation within the SGS Main Pond. The berm was then compacted, followed by placement of geogrid and compacted AgPave (hydrated fly ash) along the berm crest. In addition to repairing the existing intermediate finger berm, new intermediate finger berms were constructed out of quarry shot rock and compacted AgPave. The new intermediate finger berms allowed access to the entire surface impoundment for maintenance dredging, as well as increased the detention time to enhance settling of suspended solids. A precast concrete mixing channel was installed in the the northwest corner of the SGS Main Pond. The installation of the mixing channel was completed in order to allow for chemical addition to settle out suspended

solids and reduce algae. Lastly, the hydraulic structure located in the northeast corner of the small discharge pond was modified by adding a section of corrugated metal pipe to the top of the existing structure to create an underflow discharge.

Historical aerial photographs (See Appendix B) and historical topographic maps (See Appendix C) identify the topographic changes to the SGS Main Pond that have occurred since the time of initial facility operations.

3.1.6 Structures, Appurtenances, and Operations- §257.73(c)(1)(vii) and §257.100(a)

Detailed dimensional drawings of the SGS Main Pond that were reasonably and readily available are identified below. The detailed dimensional drawings were obtained from various designs, plans, and reports that were assembled during the historical information review.

- Historical Site Drawings (1959, 1961) – Drawings provide the general layout and location of the original CCR surface impoundment around the time of initial plant operations (Appendix A).

- Area Plan (1957 - with revisions through 1996) – Drawing provides the general layout and location of the CCR surface impoundment around the time of initial plant operations. Drawing also identifies various modifications to the generating plant between 1957 and 1996 (Appendix G).

- Settling Pond Survey (2005) – Drawing prepared by Hard Hat Services identifies existing conditions of the north primary settling pond, south primary settling pond, secondary settling pond, and discharge pond at the time the topographic survey was completed in 2005. Drawing identifies topographic contours of the area, as well as locations of existing hydraulic structures (Appendix G).

- Geotechnical and Sediment Sample Test Locations (2006) – Drawing prepared by Hard Hat Services provides locations of historical soil borings and CPT borings

that were completed at SGS in the vicinity of the CCR surface impoundments. (Appendix E).

- Phase 1 Polishing Pond Design and Phase 2 Settling Pond Reconfiguration (2006) – Design drawings prepared by Hard Hat Services identify proposed modifications to the configuration of the CCR surface impoundments, including the reconfiguration of the SGS Main Pond with the stabilization of the existing intermediate finger berm, addition of new intermediate finger berms, addition of a precast concrete mixing channel hydraulic structure between the SGS Main Pond and SGS Polishing Pond, and modification of the existing hydraulic structure associated with the small discharge pond (Appendix G).

- Deep Borings and Well Boring Locations (2007, 1994) – Drawing prepared by Aether DBS provides locations of historical deep soil borings completed by Black and Veatch in 2007 (Appendix E) and location of a groundwater well with boring log information completed by Layne-Western Company, Inc. in 1994 (Appendix D).

- Embankment Cross Sections (2012) – Drawings prepared by Aether DBS provide cross-sections of the existing conditions of the south and east embankments of the SGS Main Pond and east embankment of the SGS Polishing Pond at the time the survey was completed in 2012 (Appendix G).

- Topographic Survey (2016) - Drawing prepared by DLZ identifies existing conditions of the CCR surface impoundments at the time the survey was completed in 2016. Drawing identifies topographic contours of the area, as well as locations of existing hydraulic structures (Appendix G).

3.1.7 Instrumentation - §257.73(c)(1)(viii) and §257.100(a)

The SGS Main Pond does not have existing instrumentation that supports the operation of the CCR unit. Review of readily available historical documents from 2005 identified a

flow metering flume that was used to support the operation of what was then identified as the secondary settling pond. The instrumentation is presumed to be the same existing flume and metering instrumentation presently associated with the SGS Polishing Pond, which is the downstream receiver of the SGS Main Pond. The metering instrumentation consists of an ultrasonic level indicator mounted over a Parshall flume hydraulic structure in the northeast corner of the SGS Polishing Pond. The ultrasonic level indicator collects flow data in accordance with the requirements of the facility's NPDES permit for NPDES Outfall 001.

3.1.8 Area-Capacity Curve - §257.73(c)(1)(ix) and §257.100(a)

An area-capacity curve identifies the relationship between the surface area of the CCR surface impoundment and an elevation, which corresponds to an available storage capacity. After review of readily available historical documents, there is no readily available information regarding area-capacity curves for the SGS Main Pond.

3.1.9 Spillway and Diversion Features - §257.73(c)(1)(x) and §257.100(a)

The SGS Main Pond is equipped with one hydraulic structure, which is located in the northeast corner of the SGS Main Pond. The hydraulic structure consists of a precast concrete mixing channel, which is designed to allow water from the SGS Main Pond to flow into the SGS Polishing Pond. The mixing channel, which is approximately 15 feet long and 2 feet wide at the inlet and outlet, was installed to allow for chemical addition to settle out suspended solids and for algae control. The water in the SGS Polishing Pond is designed to flow through a Parshall flume prior to discharging into a small discharge pond. The water in the discharge pond is designed to flow under a section of corrugated metal pipe prior to overflowing into a 24-inch diameter concrete manhole and through a corrugated metal pipe into a treatment swale located north of the discharge pond. The water in the treatment swale would then flow west for several hundred yards between the rail road tracks located north of the generating plant. At the end of the treatment swale, an underground culvert directed the stream under the rail road tracks towards the

north and into Unnamed Creek parallel to the county road, eventually draining towards the east into the Iowa River.

The hydraulic structures are constructed of non-erodible material and designed to carry sustained flows. Additional information regarding the hydraulic capacity of the hydraulic structure associated with the SGS Main Pond is provided in the Inflow Flood Control Plan[5].

3.1.10 Construction Specifications, Surveillance, Maintenance, and Repair - §257.73(c)(1)(xi) and §257.100(a)

SGS implements a Site-Specific Inspection and Maintenance (I&M) Plan[6], in accordance with an Alliant Energy I&M Plan[7]. The Site-Specific I&M Plan has been implemented at SGS to identify the factors which may affect the long-term stability of the CCR surface impoundment. The Site-Specific I&M Plan identifies existing operation and maintenance activities, and identifies the inspection, monitoring, maintenance, and recordkeeping requirements as outlined in the Alliant Energy I&M Plan to maintain the integrity of the CCR surface impoundment.

Visual inspections of the SGS Main Pond are completed in accordance with §257.83 and §257.100(a) of the CCR Rule. At intervals not exceeding seven days, the SGS Main Pond is visually inspected for any appearances of structural weakness or other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR surface impoundment. At intervals not exceeding thirty days, instrumentation serving the SGS Main Pond is visually inspected to confirm proper working condition. In addition to the seven-day and thirty-day inspections, SGS conducts event-related inspections which may include inspections following storm events, seismic events, major maintenance activities, as well as other unusual events. Annual inspections are conducted by a qualified PE who is familiar with the requirements of the CCR Rule, the

[5] Inflow Flood Control Plan, Sutherland Generating Station, 2018, Hard Hat Environmental Services
[6] Inspection and Maintenance (I&M) Plan, Sutherland Generating Station, May 2017, Version 3.0-Revision 0.0
[7] Inspection and Maintenance (I&M) Plan, Alliant Energy, February 2017, Version 3.0-Revision 0.0

Alliant Energy I&M Plan, the SGS Site-Specific I&M Plan, and other facility specific information pertaining to the CCR surface impoundment.

Maintenance activities that are completed at SGS may include routine maintenance, event-related maintenance, and long-term maintenance. Routine maintenance activities may include management of vegetation (or other forms of slope protection), tree and sapling removal, reseeding of disturbed vegetated areas, removal of debris from collection and diversion channels, and repair of eroded areas. Event-related maintenance activities may include maintenance after unusual events such as heavy rainfall, periods of very high winds, or seismic activity. Maintenance may include repair of eroded areas or removal of damaged vegetation. Long-term maintenance activities are identified as part of the ongoing inspection program, through the annual inspections, or through other engineering evaluations and may include larger remediation activities.

3.1.11 Structural Instability Records - §257.73(c)(1)(xii) and §257.100(a)

After review of readily available historical documents there are no known records of structural instability associated with the SGS Main Pond that were identified.

4 CHANGES TO THE HISTORY OF CONSTRUCTION

If there is a significant change to any information compiled within the Report, the owner or operator of the CCR unit must update the relevant information and place into the facility's operating record as required by §257.105(f)(9) and §257.100(a).

FIGURES

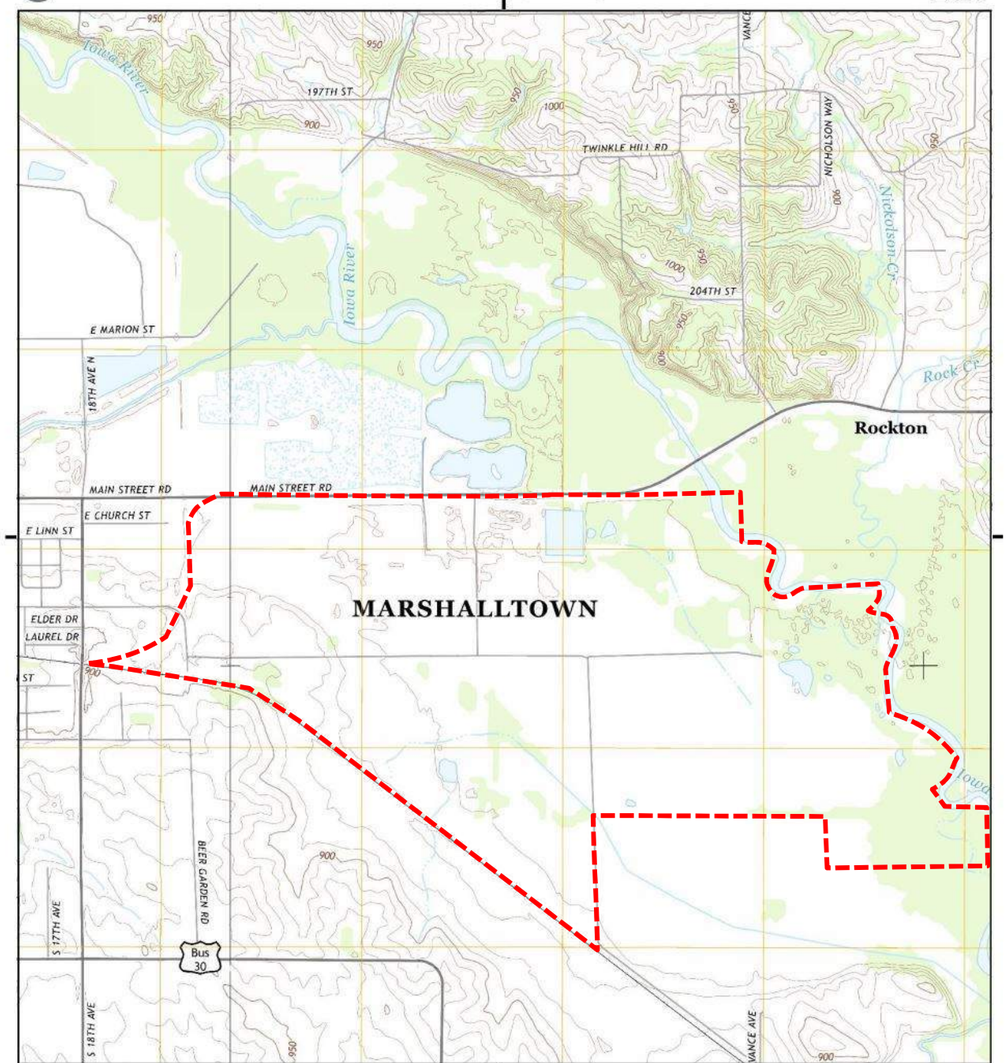
Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction

EDR

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Le Grand, 2013, 7.5-minute
W, Marshalltown, 2013, 7.5-minute

SITE NAME: Sutherland Generating Station
ADDRESS: 3001 East Main Street Road
Marshalltown, IA 50158
CLIENT: Environmental Site Assessors

N

5087055 - 1 page 4

Historical Aerial Photo

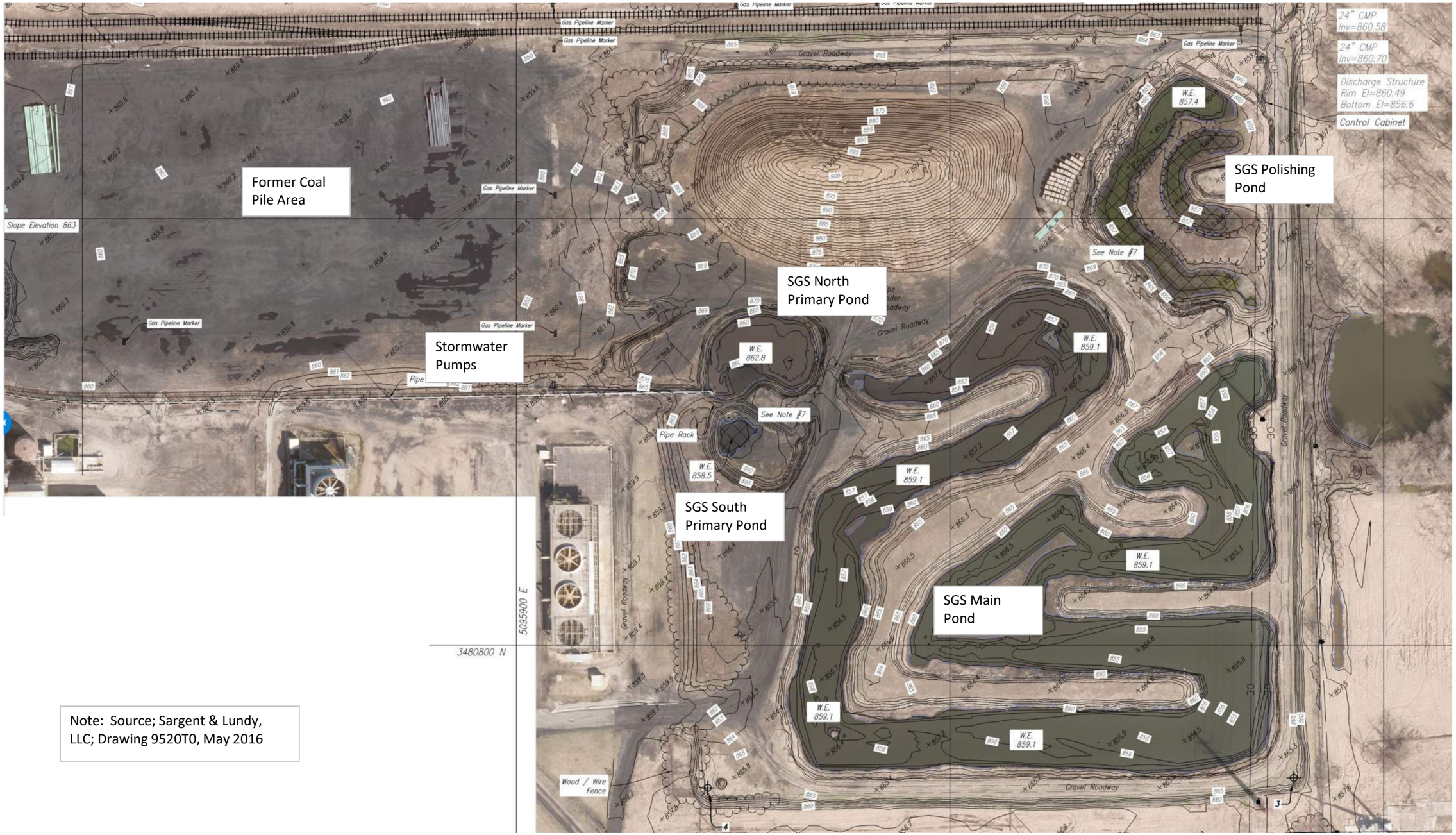
Approximate Property Boundary

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

Site Location
Sutherland Generating Station
Interstate Power and Light Company

Drawing
Figure 1

Date
1/22/2018



Note: Source; Sargent & Lundy, LLC; Drawing 9520T0, May 2016

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CCR Impoundments
Sutherland Generating Station
Interstate Power and Light Company

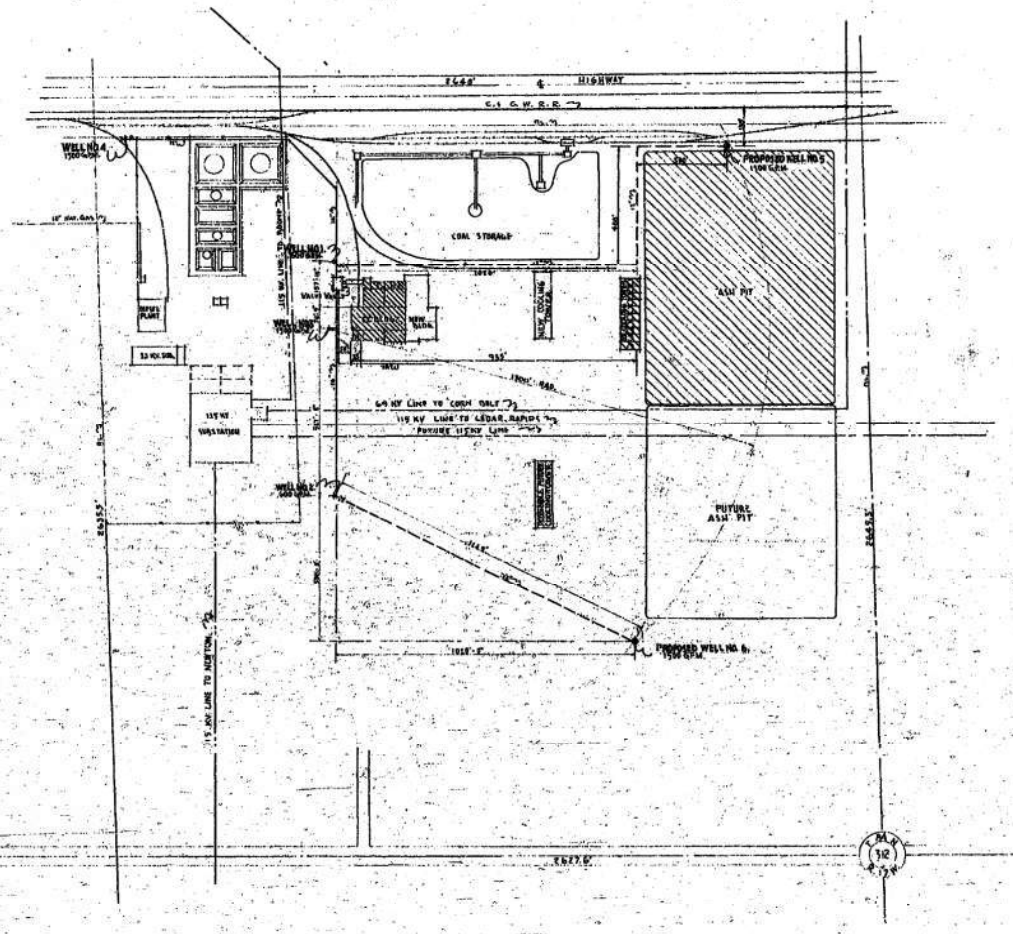
Drawing
Figure 2

Date
12/18/2017

APPENDIX A – Historical Site Drawings – 1959, 1961

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction

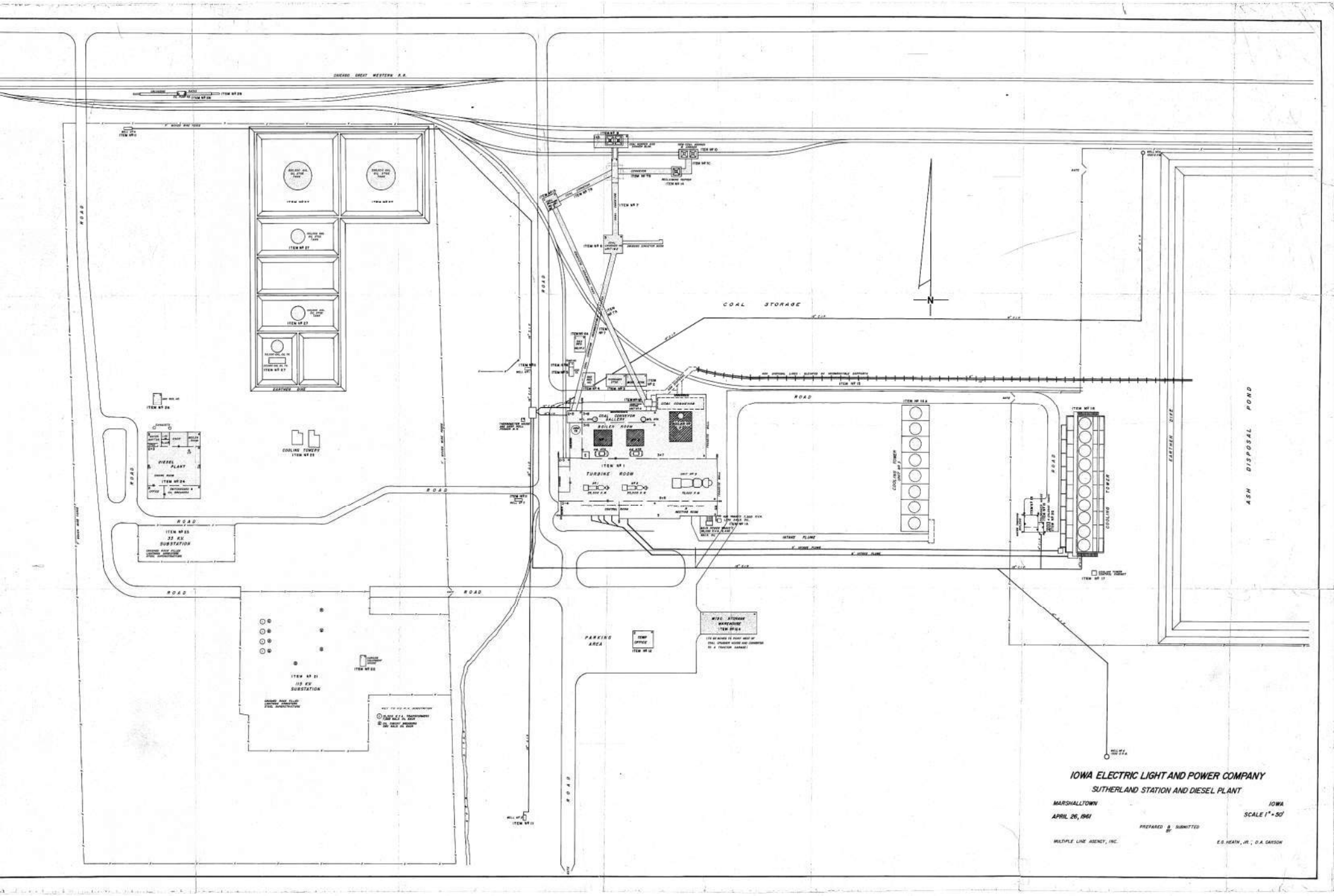


IOWA ELECTRIC LIGHT & POWER CO

MARSHALLTOWN PLANT
WELL LOCATION PLAT

HOWARD R. GREEN CO., ENGINEERS
CEDAR RAPIDS, IOWA

DRAWN: MH 5/15/59
CHECKED: L.E. DWG. #
JOB NO.: 1-20660-0-D-W0510


CHICAGO GREAT WESTERN R.R.
ROAD
COAL STORAGE
N
ASH DISPOSAL POND
EARTHEN DIKE
ITEM NP 1
TURBINE ROOM
BOILER ROOM
COAL CONVEYOR GALLERY
ITEM NP 2
COAL CONVEYOR
ITEM NP 3
ITEM NP 4
ITEM NP 5
ITEM NP 6
ITEM NP 7
ITEM NP 8
ITEM NP 9
ITEM NP 10
ITEM NP 10 A
ITEM NP 11
ITEM NP 12
TEMP OFFICE
ITEM NP 13
ITEM NP 14
ITEM NP 15
ITEM NP 16
ITEM NP 17
ITEM NP 18
ITEM NP 19
ITEM NP 20
ITEM NP 21
ITEM NP 22
ITEM NP 23
ITEM NP 24
ITEM NP 25
ITEM NP 26
ITEM NP 27
ITEM NP 28
ITEM NP 29
ITEM NP 30
ITEM NP 31
ITEM NP 32
ITEM NP 33
ITEM NP 34
ITEM NP 35
ITEM NP 36
ITEM NP 37
ITEM NP 38
ITEM NP 39
ITEM NP 40
ITEM NP 41
ITEM NP 42
ITEM NP 43
ITEM NP 44
DIESEL PLANT
COOLING TOWERS
ITEM NP 22
33 KV. SUBSTATION
110 KV. SUBSTATION
PARKING AREA
MISC. STORAGE WAREHOUSE
COOLING TOWER
INTAKE FLUME
IOWA ELECTRIC LIGHT AND POWER COMPANY
SUTHERLAND STATION AND DIESEL PLANT
MARSHALLTOWN
IOWA
APRIL 26, 1961
SCALE 1" = 50'
PREPARED & SUBMITTED BY
MULTIPLE LINE AGENCY, INC.
E.S. HEATH, JR.; O.A. CARSON

APPENDIX B – EDR Historical Aerial Photograph Package

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction

Sutherland Generating Station

3001 East Main Street Road

Marshalltown, IA 50158

Inquiry Number: 5087055.2

October 26, 2017

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

10/26/17

Site Name:

Sutherland Generating Station
3001 East Main Street Road
Marshalltown, IA 50158
EDR Inquiry # 5087055.2

Client Name:

Environmental Site Assessors
932 North Wright Street, Suite 160
Naperville, IL 60563
Contact: Mark W Loerop

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2011	1"=500'	Flight Year: 2011	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2008	1"=500'	Flight Year: 2008	USDA/NAIP
2007	1"=500'	Flight Year: 2007	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1994	1"=500'	Acquisition Date: April 23, 1994	USGS/DOQQ
1983	1"=500'	Flight Date: January 01, 1983	NHAP
1971	1"=500'	Flight Date: January 01, 1971	USDA
1965	1"=500'	Flight Date: January 01, 1965	USDA
1952	1"=500'	Flight Date: January 01, 1952	USDA
1939	1"=500'	Flight Date: June 01, 1939	USGS

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.


INQUIRY #: 5087055.2
YEAR: 2011
= 500'
N
EDR


INQUIRY #: 5087055.2
YEAR: 2010
= 500'
N
EDR

INQUIRY #: 5087055.2

YEAR: 2009

= 500'

N

EDR


INQUIRY #: 5087055.2
YEAR: 2008
= 500'
N
EDR

INQUIRY #: 5087055.2

YEAR: 2007

= 500'

N

EDR


INQUIRY #: 5087055.2
YEAR: 2006
= 500'
N
EDR

INQUIRY #: 5087055.2

YEAR: 2005

= 500'

N

EDR

INQUIRY #: 5087055.2

YEAR: 1994

= 500'

N

EDR


INQUIRY #: 5087055.2
YEAR: 1983
= 500'
N
EDR
Subject boundary not shown because it e


INQUIRY #: 5087055.2
YEAR: 1971
= 500'
N
EDR
Subject boundary not shown because it e


INQUIRY #: 5087055.2
YEAR: 1965
= 500'
N
EDR
Subject boundary not shown because it e


INQUIRY #: 5087055.2
YEAR: 1952
= 500'
N
EDR
Subject boundary not shown because it e

INQUIRY #: 5087055.2

YEAR: 1939

= 500'

N

EDR

APPENDIX C – EDR Historical Topographic Map Report

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction

Sutherland Generating Station
3001 East Main Street Road
Marshalltown, IA 50158

Inquiry Number: 5087055.1
October 25, 2017

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

10/25/17

Site Name:

Sutherland Generating Station
3001 East Main Street Road
Marshalltown, IA 50158
EDR Inquiry # 5087055.1

Client Name:

Environmental Site Assessors
932 North Wright Street, Suite 160
Naperville, IL 60563
Contact: Mark W Loerop

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Environmental Site Assessors were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# 154.018.016
Project: SGS CCR Compliance

Coordinates:

Latitude:	42.047866 42° 2' 52" North
Longitude:	-92.856558 -92° 51' 24" West
UTM Zone:	Zone 15 North
UTM X Meters:	511870.62
UTM Y Meters:	4655100.71
Elevation:	859.00' above sea level

Maps Provided:

2013
1978, 1980
1960

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2013 Source Sheets

Marshalltown
2013
7.5-minute, 24000

Le Grand
2013
7.5-minute, 24000

1978, 1980 Source Sheets

Le Grand
1978
7.5-minute, 24000
Aerial Photo Revised 1958

Marshalltown
1980
7.5-minute, 24000
Aerial Photo Revised 1978

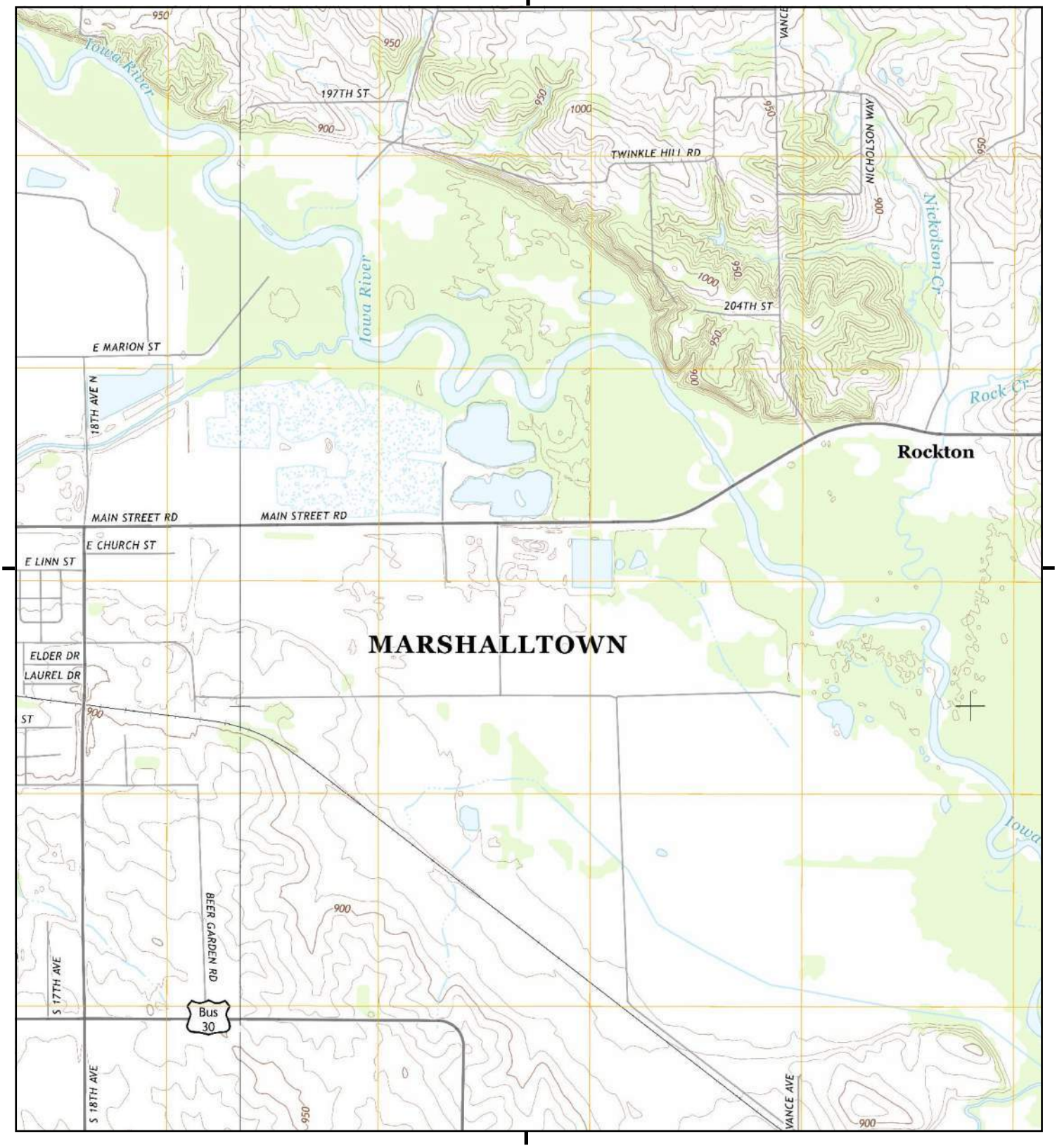
1960 Source Sheets

Marshalltown
1960
7.5-minute, 24000
Aerial Photo Revised 1958

Le Grand
1960
7.5-minute, 24000
Aerial Photo Revised 1958

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

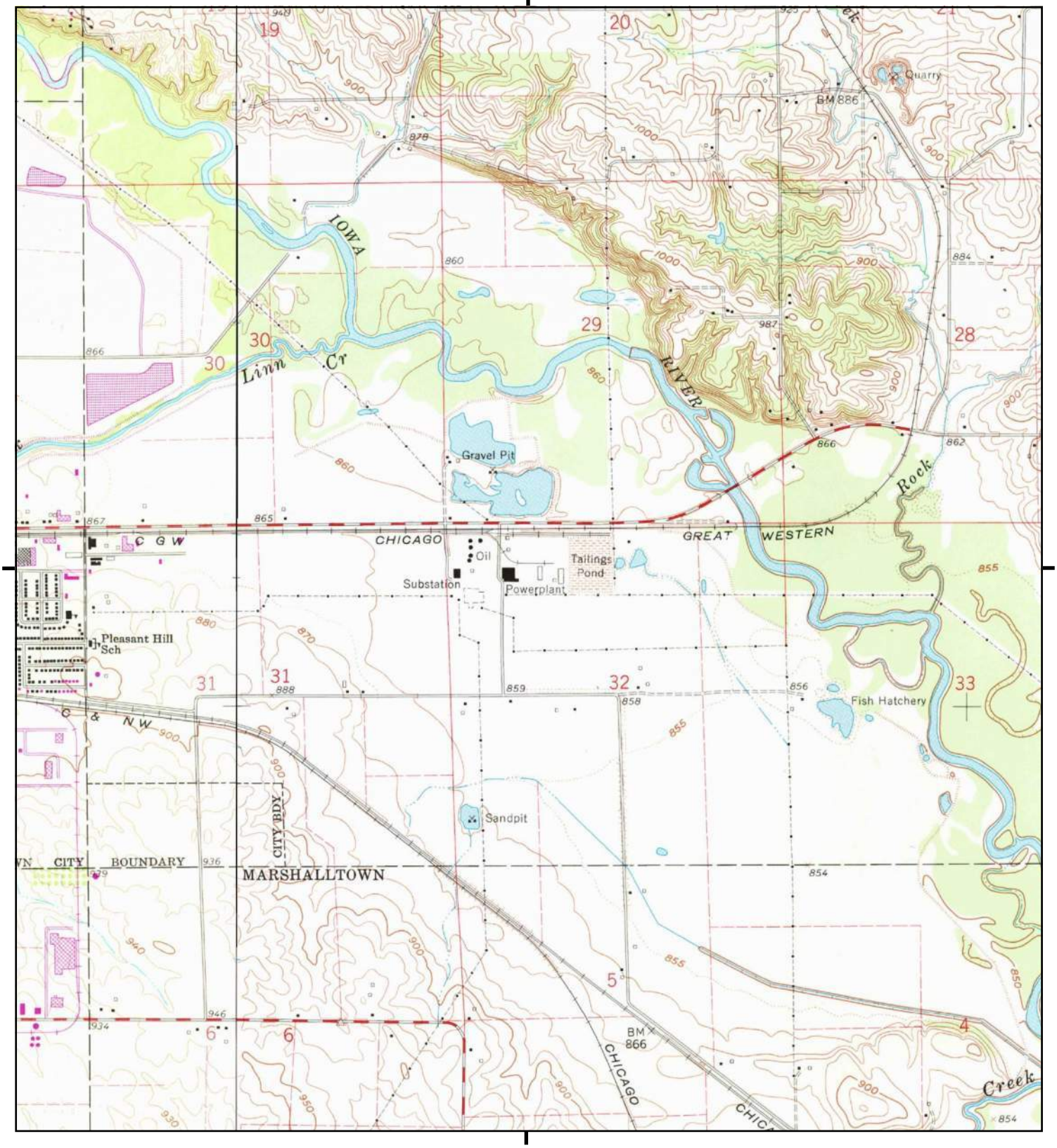
TP, Le Grand, 2013, 7.5-minute
W, Marshalltown, 2013, 7.5-minute

SITE NAME: Sutherland Generating Station
ADDRESS: 3001 East Main Street Road
Marshalltown, IA 50158
CLIENT: Environmental Site Assessors

N

Historical Topo Map

1978, 1980



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

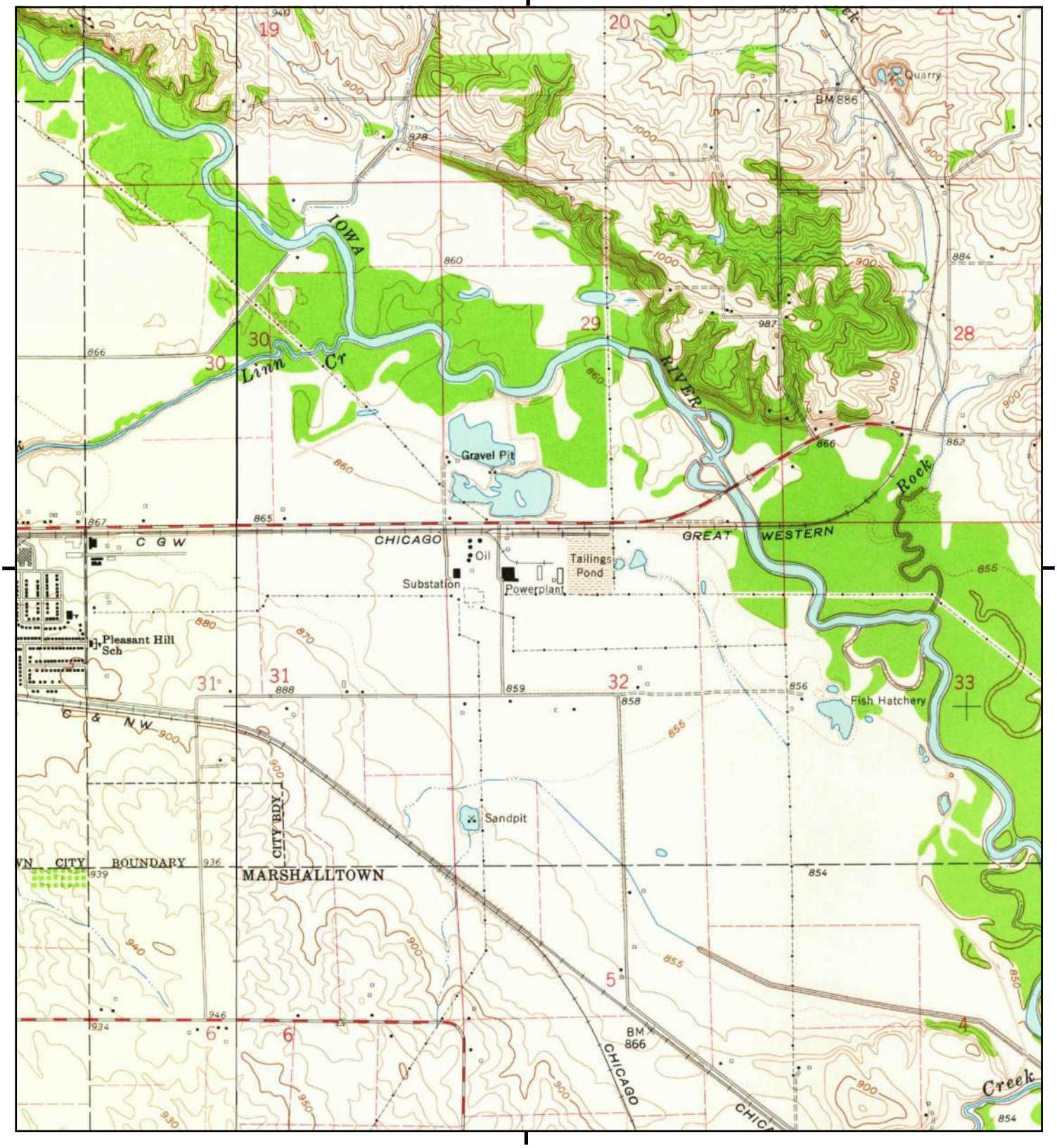
TP, Le Grand, 1978, 7.5-minute
W, Marshalltown, 1980, 7.5-minute

SITE NAME: Sutherland Generating Station
ADDRESS: 3001 East Main Street Road
Marshalltown, IA 50158
CLIENT: Environmental Site Assessors

N

Historical Topo Map

1960



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Le Grand, 1960, 7.5-minute
W, Marshalltown, 1960, 7.5-minute

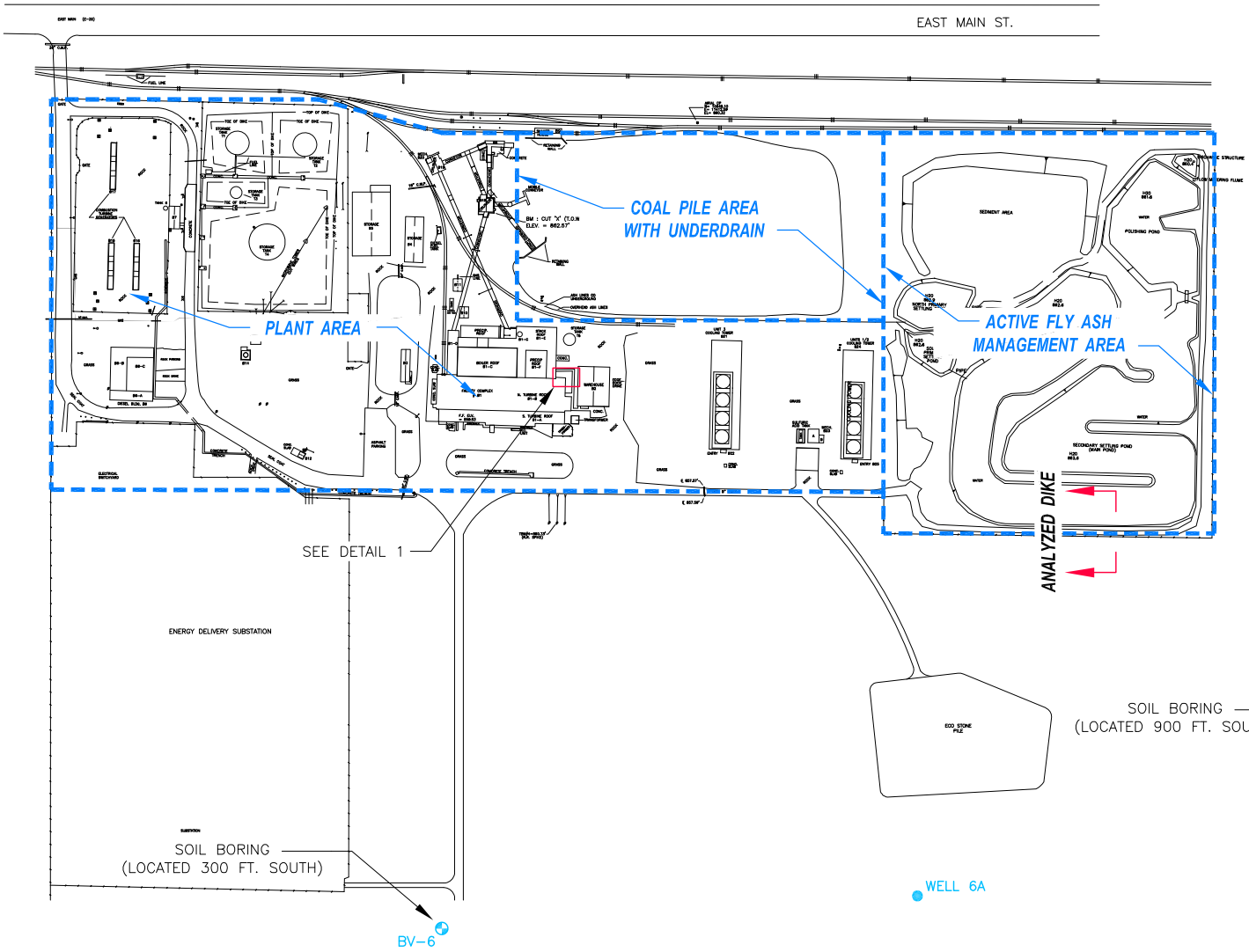
SITE NAME: Sutherland Generating Station
ADDRESS: 3001 East Main Street Road
Marshalltown, IA 50158
CLIENT: Environmental Site Assessors

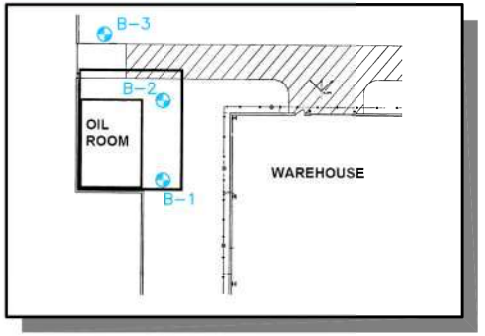
N

APPENDIX D – IDNR Well Record – 1994

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction





DETAIL 1

NOT TO SCALE

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

aetherdbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	12-29-2010
DRAWN BY:	MM
CHKD. BY:	TCW
APPROVED:	12-29-2010

CLIENT / LOCATION

ALLIANT ENERGY
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION

SITE PLAN

JOB 154

SHT. 1

DWG. SITE PLAN

Attachment G

Well Record
Well Number 6A, Permit No. 3090

Source:
Iowa Department of Natural Resources, Geological Survey Bureau

Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall Iowa City, Ia. 52242-1319 PH (319) 335-1575

WELL RECORD

Permit No. 3090

Site Identification

Property Owner IES UTILITIES Well Number 6A

Address E. MAIN ST ROAD, MARSHALLTOWN

Tenant

Well Depth 252 ft Date Completed 5 / 18 / 94

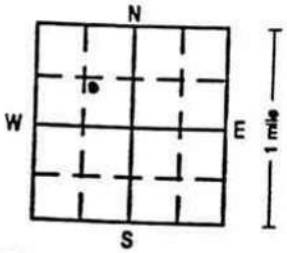
Location

County MARSHALL

____ mi. N/S and ____ mi. E/W of intersection of ____ and ____

NW 1/4 of the SE 1/4 of the NW 1/4 of Sec 32 TWP 84N RNG 17 E/W

Show exact location of well in section grid with a dot (•).



Sketch map of well location on property

☐ upland ☐ hillside ☒ valley Elevation (if known) ____

Formation log

From	To	Color	Hardness	Formation description
0	8	BLACK		FILL MATL
8	11	BLACK		TOP SOIL
11	18	GRAY		CLAY
18	22	GRAY		SAND / GRAVEL
22	44	BROWN		SAND/GRAVEL/COBBLES
44	46	GRAY		SANDY CLAY
46	58	BROWN		SAND/GRAVEL/COBBLES
58	127	GRAY		CLAY W/COBBLES
127	132	GRAY		SANDY CLAY
132	140	GRAY		SAND, GRAVEL
140	152	GRAY		CLAY WITH SAND
152	168	GRAY		SAND GRAVEL
168	173	GRAY		CLAY, COBBLES
173	185	GRAY		SAND
185	192	GRAY		FINE SAND
192	241	GRAY		SANDY CLAY
241	252	GRAY		SAND, GRAVEL
252		GRAY		LIMESTONE

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

Well use

☐ Domestic ☐ Municipal ☒ Industrial
☐ Livestock ☐ Public Supply ☐ Monitoring
☐ Test Well ☐ Irrigation ☐ Other ____ (explain)

Drill method

☒ rotary ☐ auger ☐ cable other ____

Hole size

60 inch from 0 ft to 63 ft
54 inch from 63 ft to 252 ft

hole size continued
___ inch from ___ ft to ___ ft
___ inch from ___ ft to ___ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / no) Pitless adaptor (yes / no)

Size (ID/OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
54" ID	STEEL	0	63	63
30" ID	STEEL/19	+2	152	154
"	" "	167	172	5
"	" "	182	240	58

Perforated or slotted casing? (yes / no)

Perforated / slotted from ____ ft to ____ ft
Perforated / slotted from ____ ft to ____ ft

Casing grouted? (yes / no)

Type	Depth Top	Depth Bottom	Amount
CEMENT	0	63	11 YD³ OUTSIDE
CEMENT	0	20	12 YD³

Well screen? (yes / no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
30"	.075	152	167	15	SST
30"	.075	172	182	10	SST
30"	.075	240	250	10	SST

Bottom capped (yes / no) with STAINLESS PLATE
Seals / Packers (yes / no) kind ____ depth ____ ft
Gravel packed (yes / no) from 120 ft to 252 ft
type NORTH. 3 amount 106 TONS

Well developed? (yes / no)

Explain AIR DEVELOPED, SURGED, BAILED, PUMPED

Pump installed? (yes / no)

Date 06 / 01 / 94
Installer's name PAUL RENTSCHLER
Type of pump VERTICAL TURB. Depth to intake 150 ft
Pump diameter 12" BOWL Rated capacity 1,000 GPM

Water Information

Aquifer: ☒ sand/gravel ☐ limestone ☐ sandstone
Main water-supply zone from 120 ft to 252 ft
Final water level (static water level) 37 ft (below / above) GL
Pumping water level 73.9 ft below GL; ☐ tape ☐ airline ☒ E-line
At yield of 1313 GPM; ☒ orifice ☐ volumetric ☐ estimate Date 5-18-94

Water quality test? (yes / no)

Date tested 5 / 18 / 94
Tested by UNIV. OF IOWA LAB
Test results ____

Contractor

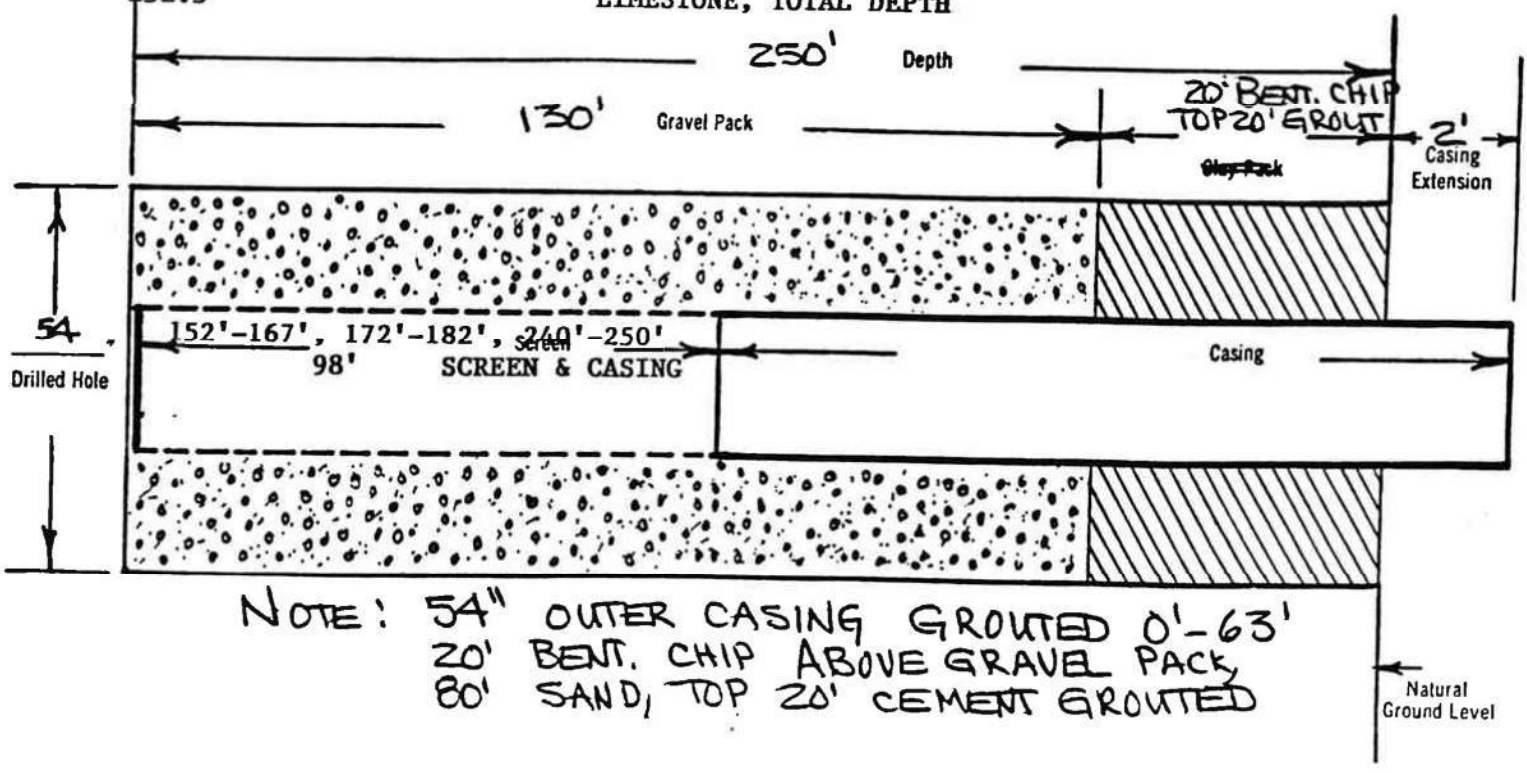
LAYNE-WESTERN
Address 25450 HWY 275, VALLEY, NE 68064
Driller D. DEAVER Certification no. 40259

white copy - Iowa DNR, Geological Survey Bureau blue copy - Well Contractor pink copy - Customer yellow copy - County Health Officer

CONTRACT IES UTILITIES, INC. Well No. 6

Log of well from ground level:

Feet		Feet	Formation
0	to	8	FILL MATERIAL
8	to	11	TOP SOIL
11	to	18	GRAY CLAY
18	to	22	GRAY SAND AND GRAVEL
22	to	44	BROWN SAND AND GRAVEL WITH COBBLES
44	to	46	SANDY GRAY CLAY
46	to	58	BROWN SAND AND GRAVEL WITH COBBLES
58	to	127	GRAY CLAY WITH COBBLES
127	to	132	SANDY GRAY CLAY - SMALL GRAVEL
132	to	140	SAND WITH SMALL GRAVEL
140	to	152	SANDY GRAY CLAY
152	to	168	GRAY SAND AND GRAVEL
168	to	173	GRAY CLAY WITH COBBLES
173	to	185	GRAY SAND
185	to	192	FINE GRAY SAND
192	to	241	SANDY GRAY CLAY WITH COBBLES
241	to	252.5	SAND AND GRAVEL
252.5			LIMESTONE, TOTAL DEPTH

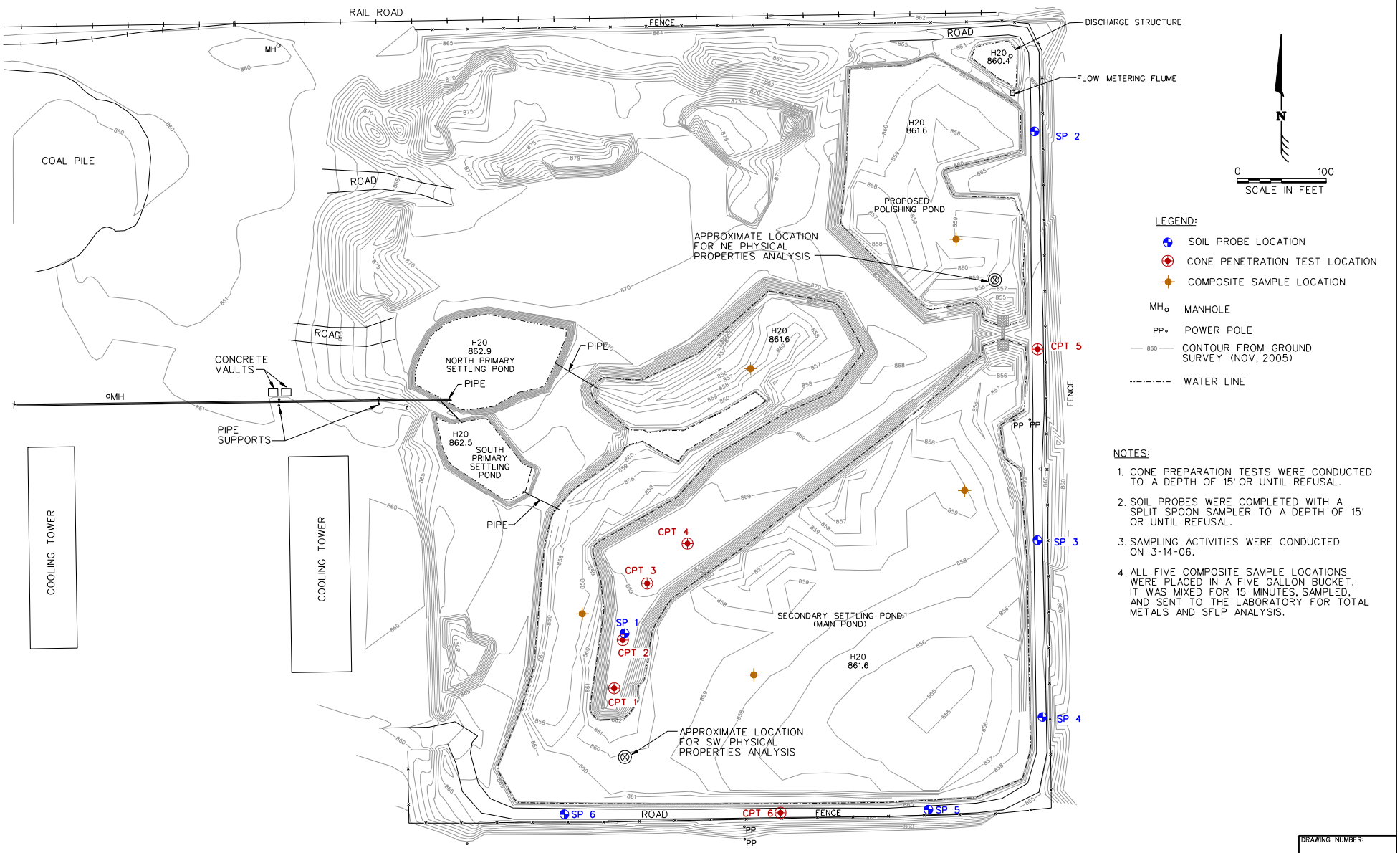


NOTE: 54" OUTER CASING GROUTED 0'-63'
20' BENT. CHIP ABOVE GRAVEL PACK
80' SAND, TOP 20' CEMENT GROUTED

APPENDIX E – Soil Borings and CPT Borings- 2006, 2007

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction



LEGEND:

- SOIL PROBE LOCATION
- CONE PENETRATION TEST LOCATION
- COMPOSITE SAMPLE LOCATION
- MH — MANHOLE
- PP — POWER POLE
- 860 — CONTOUR FROM GROUND SURVEY (NOV, 2005)
- WATER LINE

NOTES:

1. CONE PREPARATION TESTS WERE CONDUCTED TO A DEPTH OF 15' OR UNTIL REFUSAL.
2. SOIL PROBES WERE COMPLETED WITH A SPLIT SPOON SAMPLER TO A DEPTH OF 15' OR UNTIL REFUSAL.
3. SAMPLING ACTIVITIES WERE CONDUCTED ON 3-14-06.
4. ALL FIVE COMPOSITE SAMPLE LOCATIONS WERE PLACED IN A FIVE GALLON BUCKET. IT WAS MIXED FOR 15 MINUTES, SAMPLED, AND SENT TO THE LABORATORY FOR TOTAL METALS AND SFLP ANALYSIS.

$FILEABBREV$

$DATE$

REV	DATE	BY	DESCRIPTION

SCALE: 0 50 100 SCALE IN FEET
DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES TM
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: GEOTECHNICAL AND SEDIMENT SAMPLE TEST LOCATIONS

FIGURE 1

DRAWING NUMBER:

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Energy

BORING NO.: *SP1*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	GP 1	5'/5'		0		0		ASH; black to dark gray; well graded; fine to coarse grained; moist to wet.
						-5		
	GP 2	2'/5'						
						-10		
	GP 3	5'/5'						
						-15		SILT; black to dark gray; non-plastic; wet.
	GP4	5'/5'		1.25		-20		CLAY; olive green mottled w/ yellowish brown; low plasticity; moist; trace sand and gravel.
						-25		Bottom of boring @ 20.0'. Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Energy

BORING NO.: *SP2*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
	GP 1	5'/5'		0 2.75 3.5 4.0 2.5 2.0		0 -5		CLAY; brown;; low to high plasticity; moist; trace sand and gravel.
	GP 2	2'/5'		2.5 1.5 1.5		-10		
	GP 3	5'/5'		1.75 1.5 1.5		-15 -20		Bottom of boring @ 15.0'. Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

PROJECT: Alliant Energy

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SP3*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
	GP 1	5'/5'		0 4.5 4.5 2.5		0 -5		CLAY; yellowish brown to black; non-plastic to low plasticity; moist; trace ash, sand and gravel. SAND; yellow; poorly graded; medium grained; moist. CLAY; olive; low plasticity; moist; some sand.
	GP 2	2'/5'		2.0 1.5 1.5 1.25 1.5 2.0		-10		@ 8' grades some organic matter @11' organic matter grades out
	GP 3	5'/5'		2.25 2.25 2.0		-15		@ 13' grades olive Bottom of boring @ 15.0'. Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Energy

BORING NO.: *SP4*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
	GP 1	5'/5'		0 3.0 4.0 4.5 1.25 1.25 2.0		0 -5		CLAY; yellowish brown to black; non-plastic to low plasticity; moist; trace ash, sand and gravel. CLAY; olive; low plasticity; moist; some sand.
	GP 2	2'/5'		2.0 1.5		-10		@ 8' grades some organic matter @11' organic matter grades out
	GP 3	5'/5'		1.5 1.5 1.0 1.0		-15		@ 13' grades olive Bottom of boring @ 15.0'. Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Energy

BORING NO.: *SP5*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
	GP 1	5'/5'		0 >4.5 >4.5 >4.5		0		CLAY; brown; low plasticity; moist; trace sand and gravel.
				1.5 1.75		-5		CLAY & ASH; black; non-plastic to low plasticity; moist.
	GP 2	2'/5'		1.25 1.25 2.0		-10		CLAY; olive; low plasticity; moist; trace sand and gravel. @ 9' grades black @11' grades olive
	GP 3	5'/5'		1.25 1.5 1.5 1.5		-15		Bottom of boring @ 15.0'. Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.
						-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat

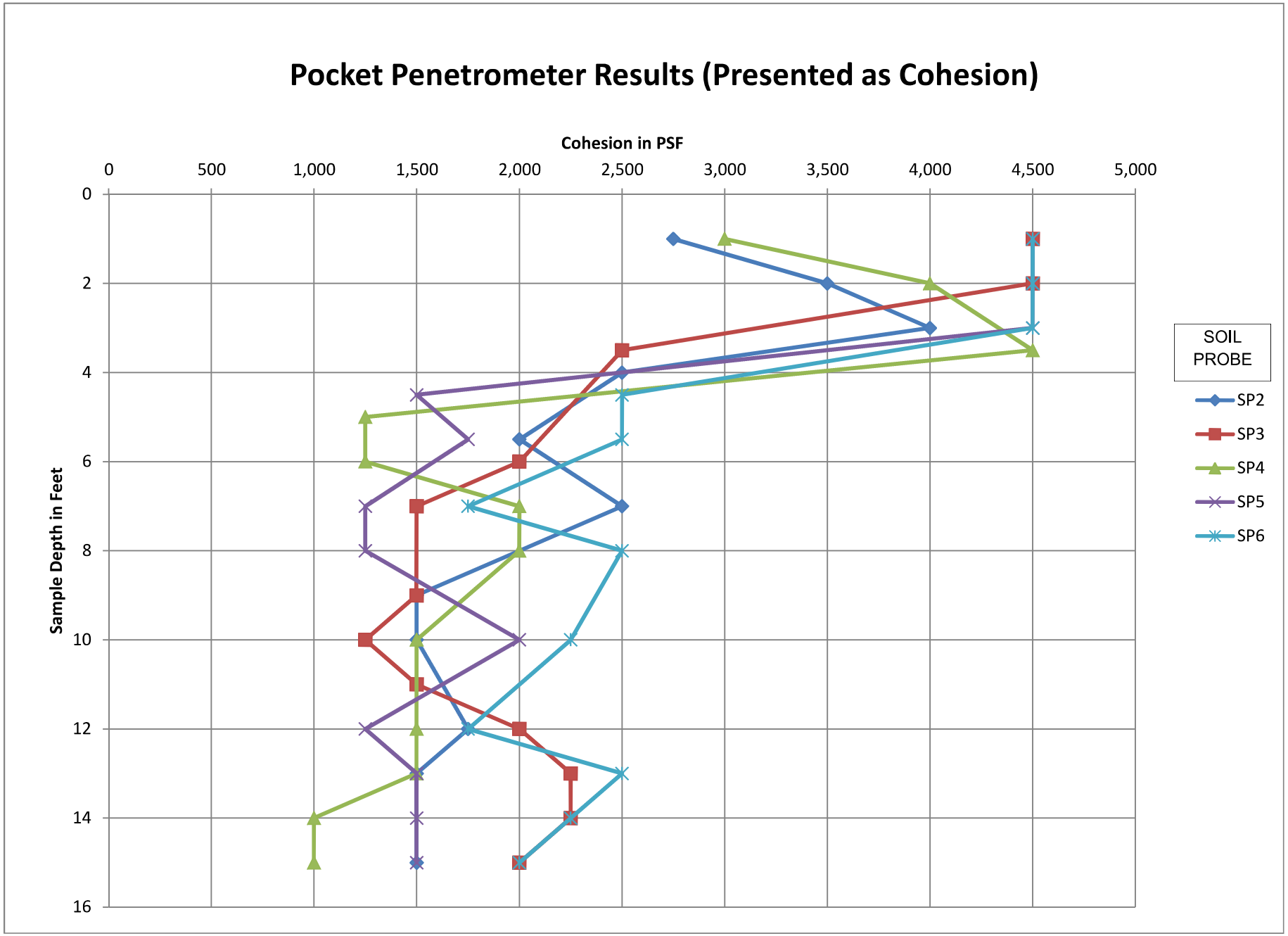
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Energy

BORING NO.: *SP6*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *3-14-06*
DATE FINISHED: *3-14-06*
GROUND SURFACE ELEVATION: *NOT MEASURED*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER READINGS	POCKET PENETROMETER HISTOGRAM	DEPTH IN FEET	PROFILE	DESCRIPTION
				0		0		CLAY; brown; low plasticity; moist; trace sand and gravel.
				> 4.5				
				> 4.5				
	GP 1	5'/5'		> 4.5				
				2.5		-5		
				2.5				
				1.75				
	GP 2	2'/5'		2.5				@ 9' grades some organic material
				2.25		-10		
								@11' organic material grades out
				1.75				
	GP 3	5'/5'		2.5				
				2.25				
				2.0		-15		Bottom of boring @ 15.0'.
								Boring advanced W/ Geoprobe Model 6610 using 60" Macrocore sampling system.
						-20		

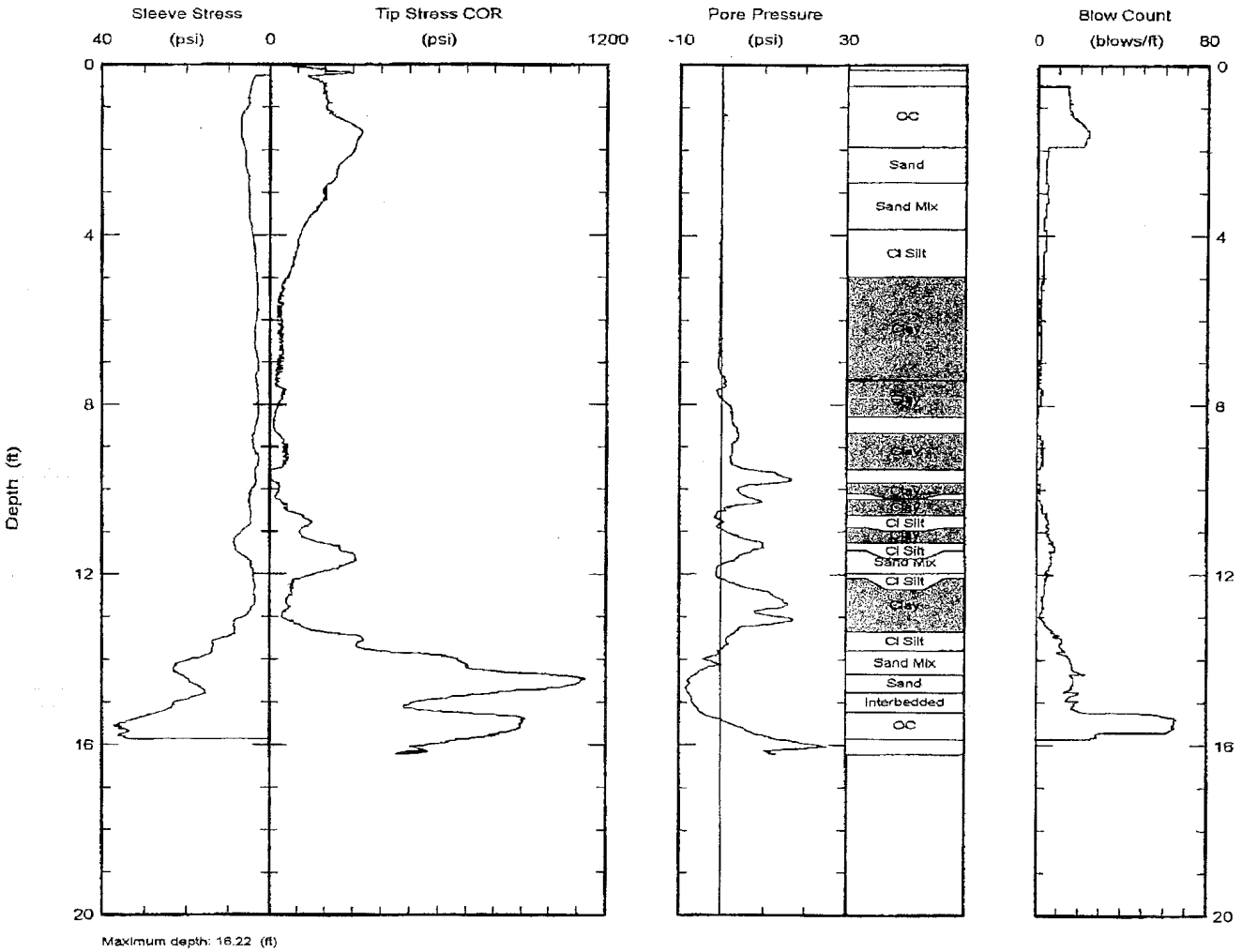

Pocket Penetrometer Results (Presented as Cohesion)
Cohesion in PSF
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
Sample Depth in Feet
0
2
4
6
8
10
12
14
16
SOIL PROBE
SP2
SP3
SP4
SP5
SP6

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

Date: 14/Mar/2006
Test ID: mshtn1
Project: MarshtIn

Client: Hard Hat
Site: ashpond



Maximum depth: 16.22 (ft)

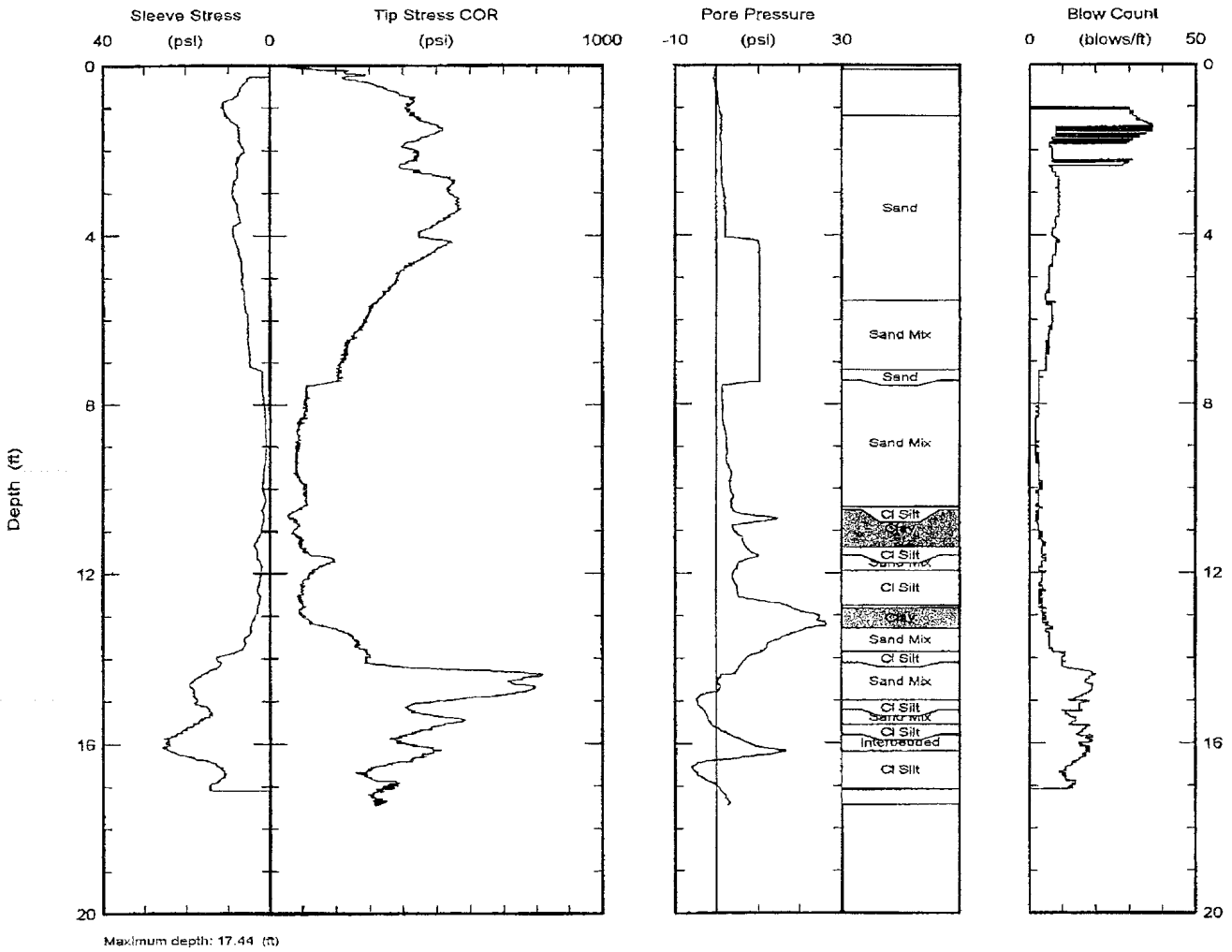
Test ID: mshtn1
File: A14M0601C.ECP

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

Date: 14/Mar/2006
Test ID: cpt2
Project: Marshtln

Client: Hard Hat
Site: ashpond



Maximum depth: 17.44 (ft)

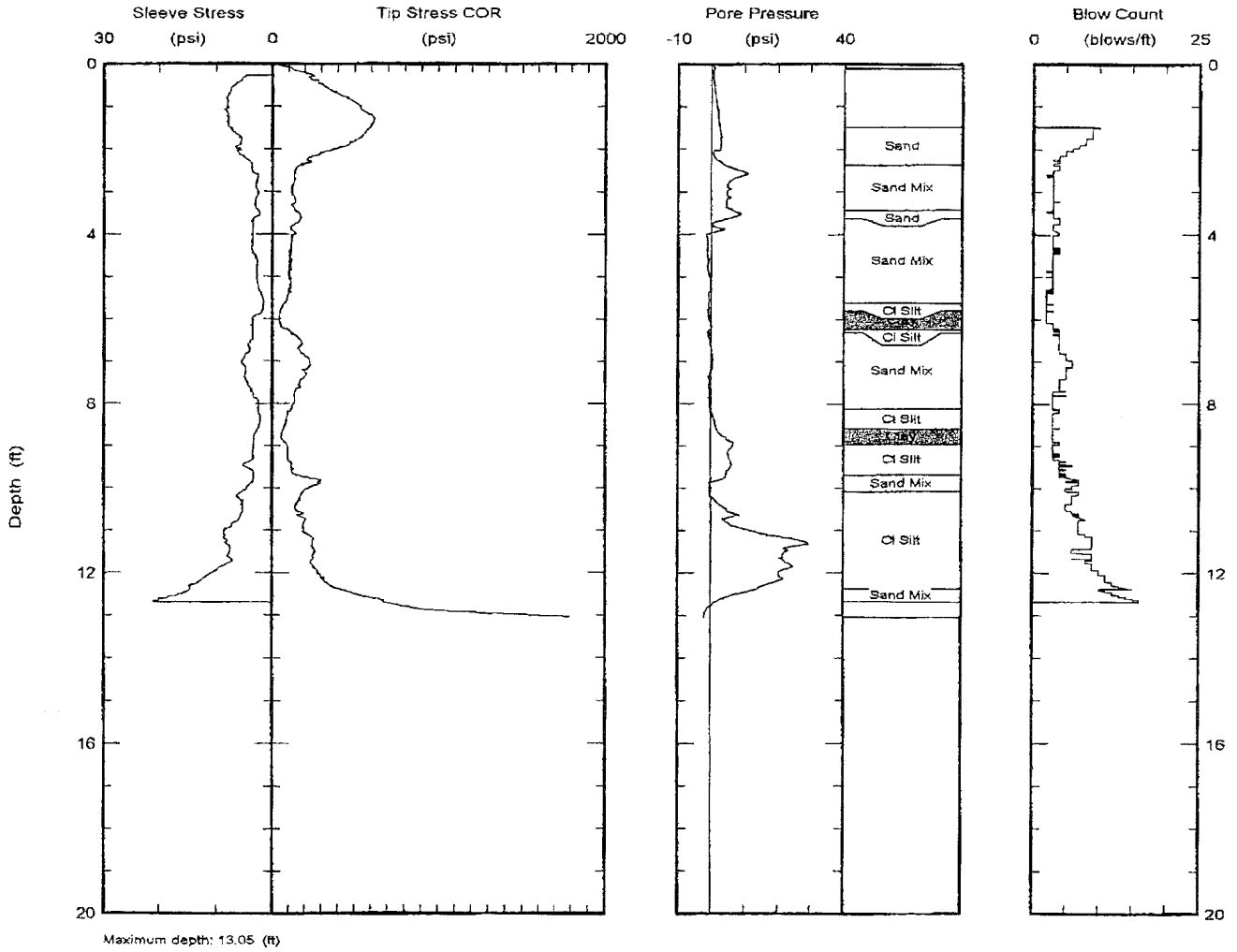
Test ID: cpt2
File: A14M0602C.ECP

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

Date: 14/Mar/2006
Test ID: cpt3
Project: Marshtln

Client: Hard Hat
Site: ashpond



Maximum depth: 13.05 (ft)

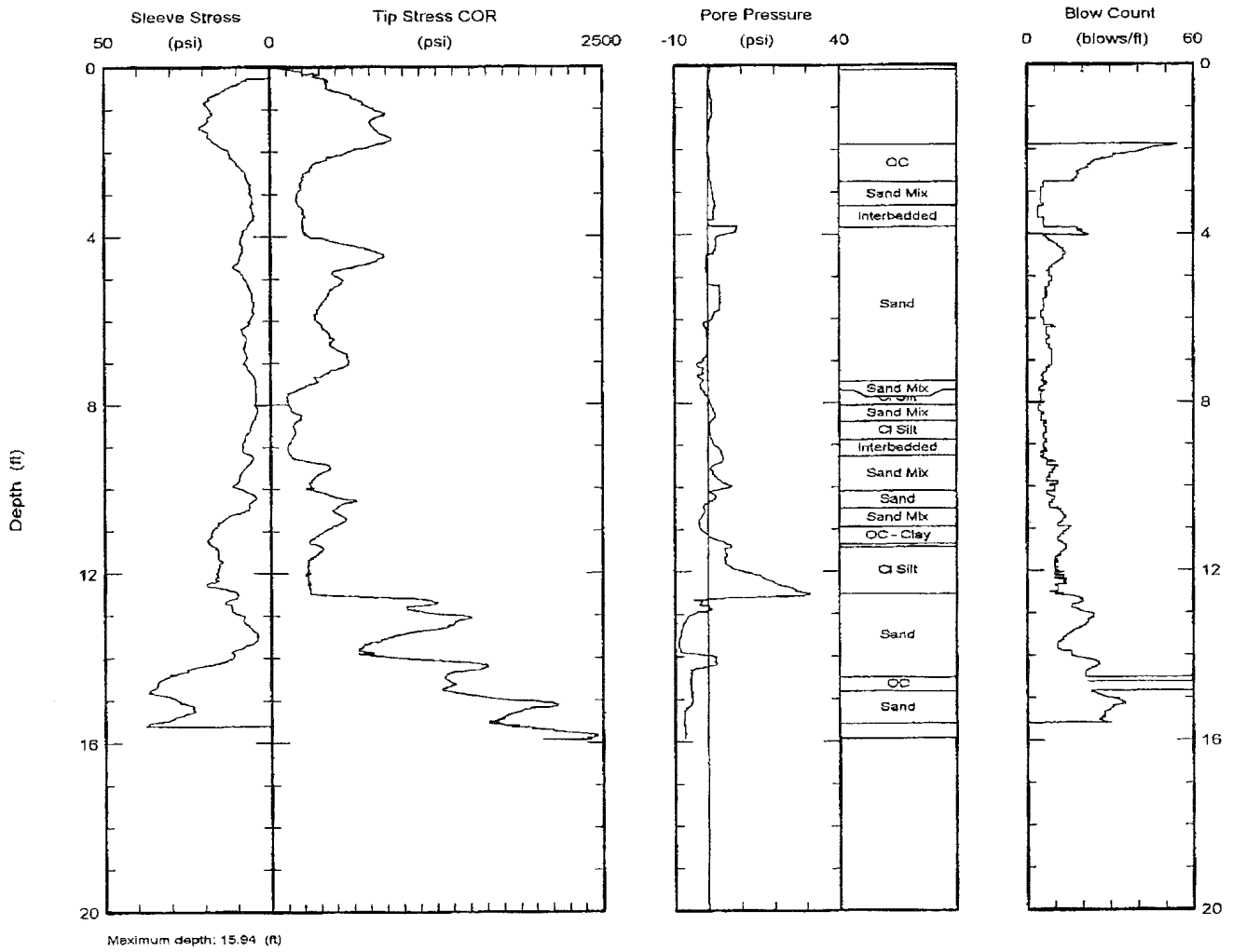
Test ID: cpt3
File: A14M0603C.ECP

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

Date: 14/Mar/2006
Test ID: CPT4
Project: Marshtin

Client: Hard Hat
Site: ashpond



Maximum depth: 15.94 (ft)

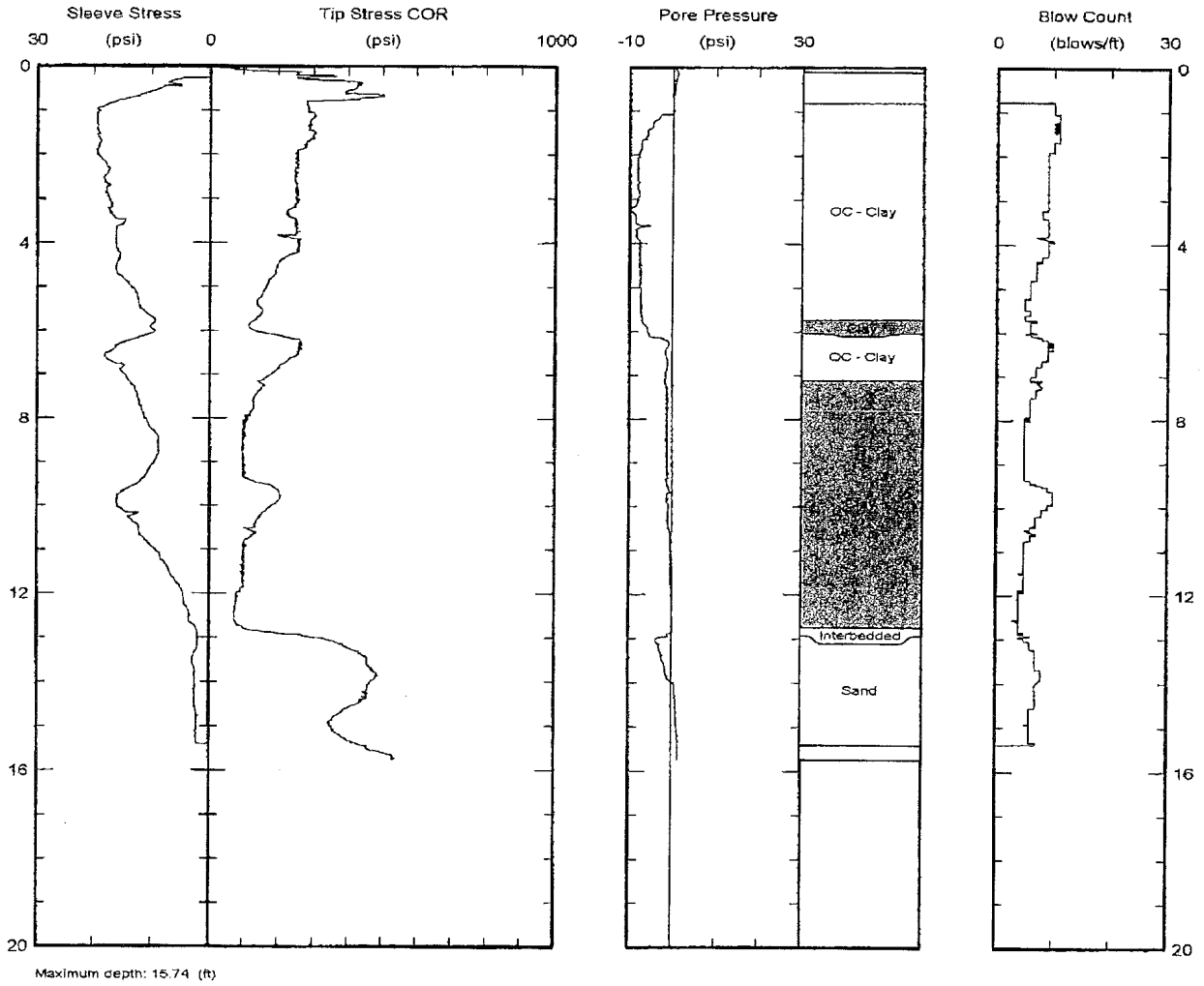
Test ID: CPT4
File: A14M0604C.ECP

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

Date: 14/Mar/2006
Test ID: cpt5
Project: Marshtln

Client: Hard Hat
Site: ashpond



Maximum depth: 15.74 (ft)

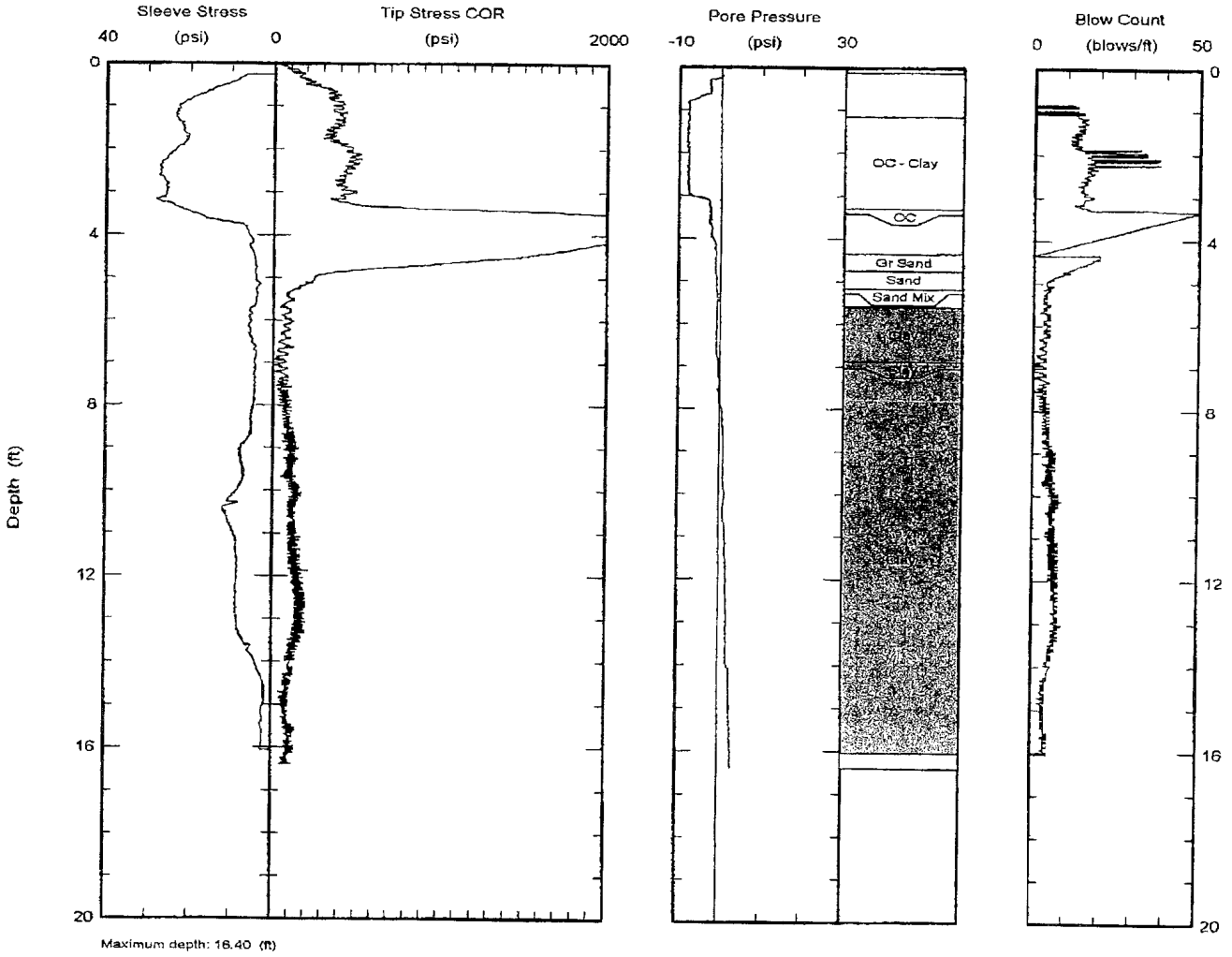
Test ID: cpt5
File: A14M0605C.ECP

CABENO Environmental Field Services
Crest Hill, IL 60435
815-372-1702
Email: jneil14@attbi.com

Northing:
Easting:
Elevation:

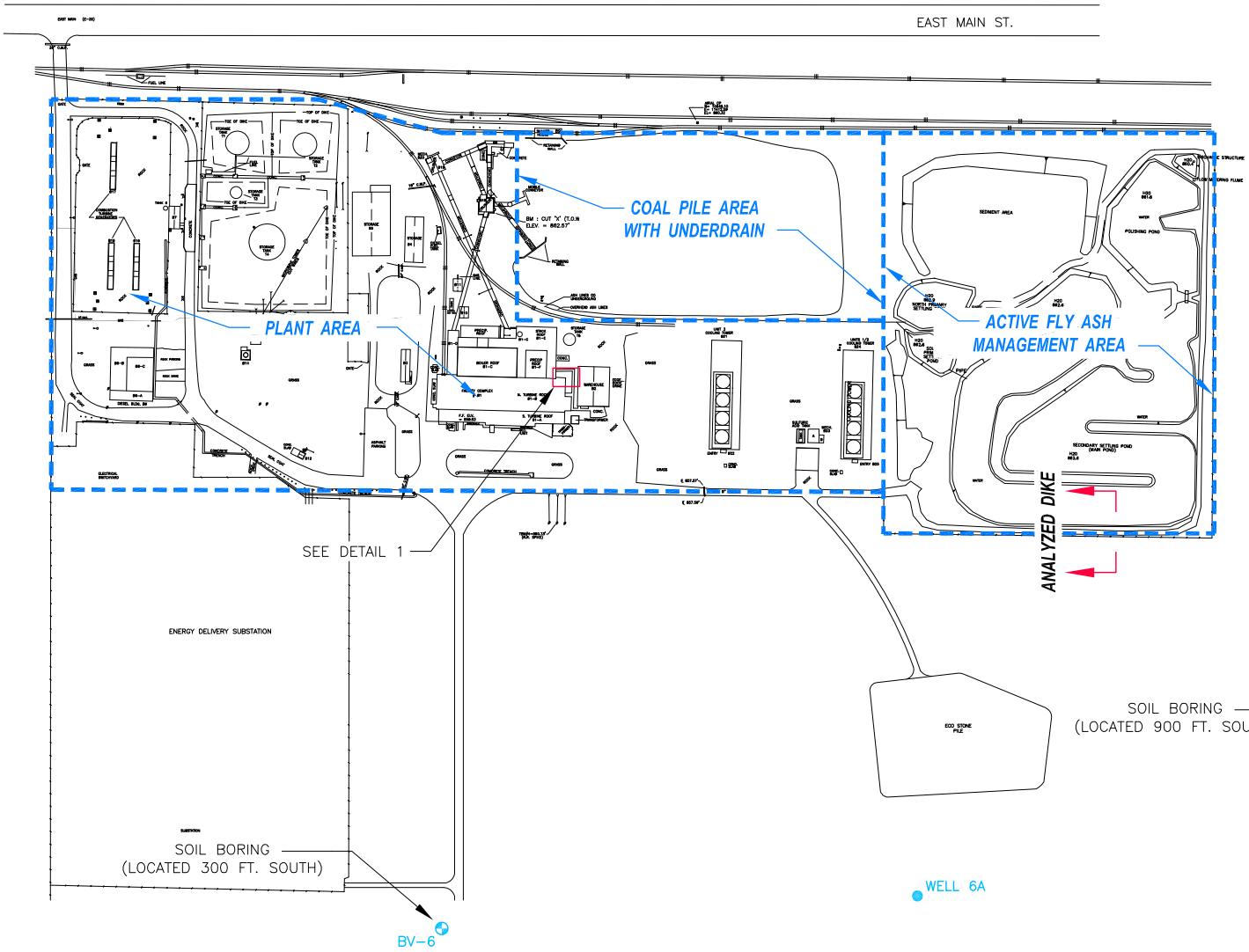
Date: 14/Mar/2006
Test ID: cpt6
Project: Marshtln

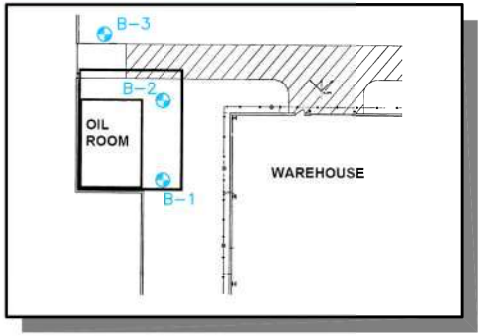
Client: Hard Hat
Site: ashpond



Maximum depth: 18.40 (ft)

Test ID: cpt6
File: A14M0606C.ECP





DETAIL 1

NOT TO SCALE

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

aetherdbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	12-29-2010
DRAWN BY:	MM
CHKD. BY:	TCW
APPROVED:	12-29-2010

CLIENT / LOCATION

ALLIANT ENERGY
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION

SITE PLAN

JOB 154

SHT. 1

DWG. SITE PLAN

Attachment E

Selected Deep Soil Borings
Sutherland Generating Station

Source:
Preliminary Subsurface Investigation
Black & Veatch, May 14, 2007

BLACK & VEATCH

BORING LOG

BORING NO. BV-6

SHEET 1 OF 3

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479395.0'	E 5095039.0'	856.6 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Flat, grassy marsh, standing water, offset 28' south	State Plane	04/13/07	04/14/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB & SE	V. Bhadriraju VB	E. Meyer EM

SOIL SAMPLING							ROCK CORING											
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														0		856		Silty CLAY; dark gray; moist; low plasticity; (TOPSOIL)	Boring advanced w/4-1/4" ID hollow stem auger. SPT performed w/ automatic hammer.
TW	1	-	-	-	-	1.6								2		854		1.5 CLAY; yellow-brown; moist; high plasticity	
TW	2	-	-	-	-	1.5								4		852		grading gray w/some brown mottling	
														6		850	▽		Water encountered @ 6' during drilling.
SPT	3	3	3	5	8	1.5								8		848		7.0 SAND; brownish-yellow; loose; wet; medium to coarse grained; well graded; rounded	
SPT	4	3	5	7	12	0.7								10		846		grading medium dense	
SPT	5	5	7	8	15	0								12		844			Below 11.5' continued w/ 2-15/16" tricone roller bit using bentonite mud as drilling fluid.
SPT	6	6	4	4	8	0								14		842		grading loose	
														16		840			
														18		838			
SPT	7	9	7	7	14	0								20		836		grading medium dense	
														22		834			
SPT	8	5	4	3	7	0.7								24		832		grading loose	
														26		830			
														28		828			
SPT	9	9	10	15	25	0.8								30		826		grading medium dense; medium to fine grained; rounded to subrounded; w/rounded cobbles	Driller reports cobbles.

5/11/2007 1:04 PM IP&L - Sutherland Station

BLACK & VEATCH

BORING LOG

BORING NO. BV-6

SHEET 2 OF 3

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479395.0' E 5095039.0'	856.6 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Flat, grassy marsh, standing water, offset 28' south	State Plane	04/13/07	04/14/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB for SE	V. Bhadriraju VB	E. Meyer

SOIL SAMPLING							ROCK CORING									
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
SPT	10	8	11	11	22	0.5								32		824		grading fine to coarse grained; fine to coarse, angular gravel	
														34		822			
														36		820		36.7' to 37.3' gravel lense	Gravel lense based on drilling resistance.
SPT	11	6	6	5	11	0.8								38		818			
														40		816			
														42		814			
														44		812		44.0	
SPT	12	3	6	7	13	0.8												Silty SAND; dark gray; medium dense; wet; fine grained; poorly graded	
														46		810			
														48		808		49.0	
SPT	13	6	13	12	25	1.4								50		806		SILT; dark gray; very stiff; moist; low plasticity; w/trace sand (Glacial Till)	
														52		804			
TW	14	-	-	-	-	0								54		802			TW 14 recovered w/split spoon. PP = 1.5 tsf
														56		800			
														58		798			
TW	16	-	-	-	-	0								60		796			
														62		794			

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BLACK & VEATCH

BORING LOG

BORING NO. BV-6

SHEET 3 OF 3

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479395.0'	E 5095039.0'	856.6 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Flat, grassy marsh, standing water, offset 28' south	State Plane	04/13/07	04/14/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB for SE	V. Bhadriraju VB	E. Meyer

SOIL SAMPLING							ROCK CORING									
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	18	6	8	8	16	1.4								64	792		PP = 1.5 to 2.0 tsf
														66	790		
														68	788		
TW	18A	-	-	-	-	0								70	786	grading stiff	TW 18A recovered w/split spoon. PP = 1.75 tsf
														72	784		
SPT	19	7	9	10	19	1.4								74	782	grading very stiff	PP = 2.25 tsf
														76	780		
TW	20	-	-	-	-	1.0								78	778		PP = 3.0 tsf
SPT	21	8	9	9	18	1.0								80	776		PP = 2.5 tsf
														82	774		Bottom of boring @ 80.5'. Water level not recorded. Boring backfilled w/ cement bentonite grout on 04/14/07.
														84	772		
														86	770		
														88	768		
														90	766		
														92	764		
														94			

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BLACK & VEATCH

BORING LOG

BORING NO. BV-7

SHEET 1 OF 3

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479095.0'	E 5097105.0'	855.9 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Agricultural field off access road	State Plane	04/11/07	04/12/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB SG	V. Bhadriraju VB	E. Meyer EM

SOIL SAMPLING							ROCK CORING										
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														0				Silty CLAY; dark gray; moist; low plasticity (TOPSOIL)	Boring advanced w/4-1/2" ID hollow stem auger. SPT performed w/ automatic hammer.
TW	1	-	-	-	-	1.5								2		854			
														1.5				Silty CLAY; dark gray; moist; low plasticity	
TW	2	-	-	-	-	1.5								4		852			
														4.0				CLAY; gray-brown; mottled; moist; high plasticity	Below 4' continued w/ 2-15/16" tricone roller bit using bentonite mud as drilling fluid.
TW	3	-	-	-	-	1.5								6		850			
														8		848			
														8.0				SAND; yellow-brown; loose; wet; fine to medium grained; well graded; w/rounded to subrounded gravel	
SPT	4	2	3	3	6	1.0								10		846			
SPT	5	5	4	5	9	0.8								12		844			
SPT	6	6	7	7	14	0.6								14		842		grading medium dense	
														16		840			
														18		838			
SPT	7	5	4	2	6	0.8								20		836		grading loose	
														22		834			
SPT	8	3	4	4	8	1.4								24		832		grading w/cobbles	Driller reports cobbles @ 23.4'.
														26		830			
														28		828			
SPT	9	8	10	10	20	1.3								30		826		grading medium dense; cobbles grade out	

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BLACK & VEATCH

BORING LOG

BORING NO. BV-7

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479095.0' E 5097105.0'	855.9 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Agricultural field off access road	State Plane	04/11/07	04/12/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB for SE	V. Bhadriraju VB	E. Meyer

SOIL SAMPLING							ROCK CORING										
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														32		824			
																		33.0	
																		Clayey SILT; dark gray; stiff; moist; low plasticity	
SPT	10	4	4	5	9	2.0								34		822			PP = 1.0 tsf
														36		820			
																		37.5	
														38		818		Gravelly SAND; gray; medium dense; wet; medium to coarse grained; poorly graded; angular	
SPT	11	17	4	7	11	0								40		816			
														42		814			
														44		812		grading dense	
SPT	12	37	31	16	47	1.8								46		810			
																		46.5	
																		Clayey SILT; dark gray; very stiff; moist; low plasticity; w/trace angular sand; (Glacial Till)	
														48		808			PP = 4.5 tsf
SPT	13	9	12	13	25	1.7								50		806			
														52		804			
														54		802		grading hard	PP = 4.5 tsf
SPT	14	8	16	17	33	1.4								56		800			
														58		798			
																		grading very stiff	PP = 2.5 tsf
SPT	15	13	14	13	27	1.0								60		796			Below 60' continued w/ 4-1/4" ID hollow stem auger.
														62		794			

BLACK & VEATCH

BORING LOG

BORING NO. BV-7

CLIENT	PROJECT	PROJECT NO.
Interstate Power & Light	Sutherland Station	145491

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 3479095.0'	E 5097105.0'	855.9 ft (MSL)	80.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Agricultural field off access road	State Plane	04/11/07	04/12/07

LOGGED BY	CHECKED BY	APPROVED BY
R. S. Edwards VB for SE	V. Bhadriraju VB	E. Meyer EM

SOIL SAMPLING							ROCK CORING										
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
SPT	16	8	13	14	27	1.2								64		792			PP = 3.75 tsf
														66		790			
														68		788			
SPT	17	8	12	13	25	1.2								70		786			PP = 4.0 tsf
														72		784			
SPT	18	9	13	12	25	2.0								74		782			PP = 3.0 tsf
														76		780			
														78		778			
SPT	19	9	11	12	23	2.0								80		776			PP = 3.0 tsf
														82		774			Bottom of boring @ 80.5'. Water level not recorded. Boring backfilled w/ cement bentonite grout on 04/12/07.
														84		772			
														86		770			
														88		768			
														90		766			
														92		764			
														94		762			

Attachment F

Deep Soil Borings
Sutherland Generating Station

Source:
Subsurface Exploration, Sutherland Air Heater Building
TEAM Services, December 3, 2007

LOG OF BORING NO. 1

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Approx. Surface Elev.: 859.3 ft.									
	Fill -- SAND, with gravel and coal debris, very dark gray		SP	1	AS			8.4		
	2.0 857.3				HS					
	3.0 Fine SAND 856.3									
	Lean CLAY, trace sand and ferrous staining, dark grayish brown and yellowish brown, medium stiff		CL	2	SS	12"	3	28.2		1500*
		5			HS					
	8.0 ▽ 851.3									
	Silty fine to medium SAND, yellowish brown, very loose		SP	3	SS	10"	1	17.2		
		10			HS					
	12.0 847.3									
	Silty fine to coarse SAND, trace gravel, dark grayish brown, very loose		SP	4	SS	1"	1	13.2		
		15			HS					
			SP	5	SS	1"	1			
		20			HS					
			SP	6	SS	0"	1			
		25			HS					
	27.0 832.3									
	Fine to coarse SAND, trace gravel and silt, light brownish gray, medium dense		SP	7	SS	14"	12	11.2		
		30			HS					
			SP	8	SS	11"	16	13.5		
		35								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 8'	WD	▼
WL			
WL			

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	Rig 112	FOREMAN	MG
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 1

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Fine to coarse SAND, trace gravel and silt, light brownish gray, medium dense				HS					
	38.0 821.3		SP	9	SS	17"	14	15.0		
	Silty fine to coarse SAND, trace gravel and ferrous staining, olive gray, medium dense	40			HS					
			SP	10	SS	18"	19	14.1		
	46.0 813.3	45			HS					
	Sandy lean CLAY, trace gravel, very dark gray, very stiff		CL	11	SS	18"	19	10.7		7500*
	48.0 811.3									
	Bottom of Boring									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 8'	WD	▼
WL			
WL			

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	Rig 112	FOREMAN	MG
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 2

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE. %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Approx. Surface Elev.: 859.7 ft.									
	Fill -- Lean CLAY, trace sand, gravel, and organic matter, very dark brown		CL	1	AS			19.1		
	2.0 857.7				HS					
	Lean CLAY, trace sand and ferrous staining, dark gray, stiff		CL	2	SS	12"	5	22.4		2500*
		5			HS					
	8.0 851.7									
	Silty fine to medium SAND, yellowish brown, loose ▽		SP	3	SS	16"	5	17.7		
		10			HS					
	12.0 847.7									
	Silty fine to coarse SAND, trace gravel, light yellowish brown, loose		SP	4	SS	13"	4	14.5		
		15			HS					
	17.0 842.7									
	Silty fine to coarse SAND, trace gravel and ferrous staining, light olive brown, medium dense		SP	5	SS	12"	13	6.4		
		20			HS					
	-- color change to gray @ 22'		SP	6	SS	14"	10	12.6		
		25			HS					
	-- becomes loose @ 28'		SP	7	SS	10"	7	11.8		
		30			HS					
	-- color change to grayish brown, becomes medium dense @ 32'		SP	8	SS	8"	20	10.1		
		35								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 9'	WD	▽
WL			
WL			

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	Rig 112	FOREMAN	MG
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 2

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Silty fine to coarse SAND, trace gravel and ferrous staining, grayish brown, medium dense				HS					
			SP	9	SS	10"	15	10.7		
		40			HS					
	43.0 816.7									
	Sandy lean CLAY, trace gravel, very dark gray, very stiff		CL	10	SS	16"	13	12.4		
		45			HS					
			CL	11	SS	8"	20	12.7		
		50			HS					
			CL	12	SS	18"	20	10.9		
		55			HS					
			CL	13	SS	18"	16	11.8		
		60			HS					
			CL	14	SS	18"	19	12.5		
		65			HS					
			CL	15	SS	18"	21	12.4		
		70								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 9'	WD	▼
WL			
WL			

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	Rig 112	FOREMAN	MG
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 2

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE. %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
					HS					
			CL	16	SS	18"	21	12.3		
		75			HS					
	-- becomes hard @ 77'									
			CL	17	SS	18"	29	12.3		
	80.0 779.7	80								
	Bottom of Boring									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 9'	WD	▼
WL			
WL			

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	Rig 112	FOREMAN	MG
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 3

OWNER

ARCHITECT/ENGINEER

SITE
Marshalltown, Iowa

PROJECT
Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Approx. Surface Elev.: 859.9 ft.									
	Fill -- Lean CLAY, with sand, trace gravel, organic matter, and coal debris, very dark brown	0	CL	1	AS			5.6		
	3.0 856.9				HS					
	Lean CLAY, trace sand and ferrous staining, dark gray and olive brown, medium stiff	5	CL	2	SS	13"	6	24.4		1500*
					HS					
	8.5 851.4									
	Silty fine to medium SAND, dark yellowish brown, very loose ▽	10	SP	3	SS	10"	3	18.1		
					HS					
	12.0 847.9									
	Silty fine to coarse SAND, trace gravel, light yellowish brown, medium dense	15	SP	4	SS	11"	11	16.4		
					HS					
		20	SP	5	SS	9"	16	18.2		
					HS					
	-- color change to gray @ 23'	25	SP	6	SS	8"	19	13.7		
					HS					
	-- color change to grayish brown @ 28'	30	SP	7	SS	12"	16	9.9		
					HS					
	-- becomes dense @ 33'	35	SP	8	SS	10"	35	16.0		

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS		
WL	▽ 10'	WD ▼
WL		
WL		

TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	ATV	FOREMAN	DC
APPROVED	RED	JOB #	1-2125

LOG OF BORING NO. 3

OWNER	ARCHITECT/ENGINEER
SITE: Marshalltown, Iowa	PROJECT: Sutherland Air Heater Building

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	Silty fine to coarse SAND, trace gravel, grayish brown, dense				HS					
	40.0 819.9	40	SP	9	SS	9"	37	15.6		
	40.5 819.4 Sandy lean CLAY, trace gravel, very dark gray, very stiff									
	Bottom of Boring									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ 10'	WD	▼
WL			
WL			

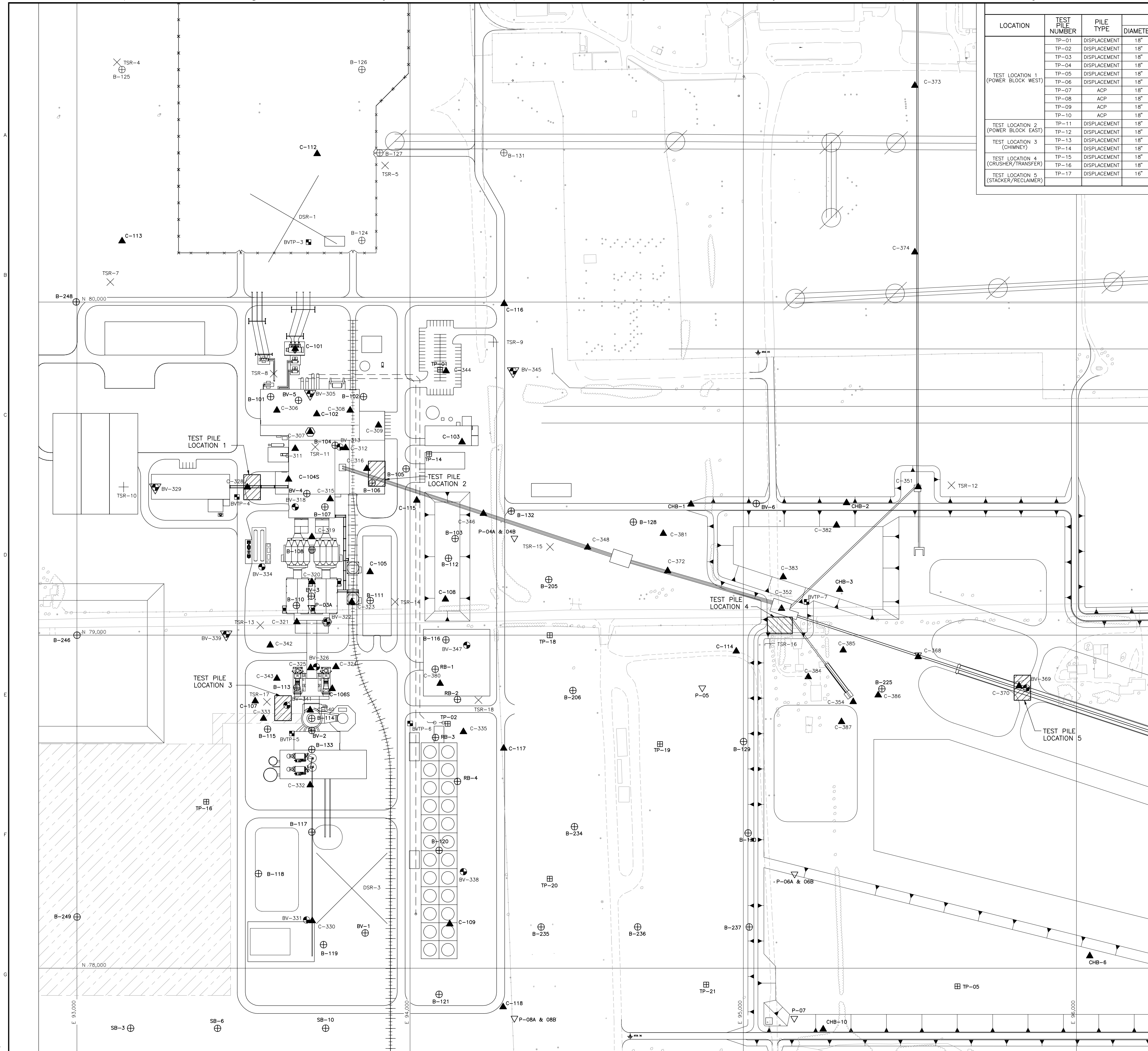
TEAM Services, Inc.

BORING STARTED	11-13-07		
BORING COMPLETED	11-13-07		
RIG	ATV	FOREMAN	DC
APPROVED	RED	JOB #	1-2125

APPENDIX F – Soil Borings and CPT Borings - 2008

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction



TEST PILE DATA

LOCATION	TEST PILE NUMBER	PILE TYPE	DIAMETER	ALLOWABLE CAPACITIES (TONS) COMPRESSIVE	UPLIFT	LATERAL	NOTES
TEST LOCATION 1 (POWER BLOCK WEST)	TP-01	DISPLACEMENT	18"	100		6	
	TP-02	DISPLACEMENT	18"		50		
	TP-03	DISPLACEMENT	18"	150			
	TP-04	DISPLACEMENT	18"		75		
	TP-05	DISPLACEMENT	18"	150			5' INTO GLACIAL TILL
	TP-06	DISPLACEMENT	18"		75		5' INTO GLACIAL TILL
	TP-07	ACP	18"	100			65' LONG
	TP-08	ACP	18"		50		65' LONG
	TP-09	ACP	18"	150			78' LONG
	TP-10	ACP	18"		75		78' LONG
TEST LOCATION 2 (POWER BLOCK EAST)	TP-11	DISPLACEMENT	18"	60			
	TP-12	DISPLACEMENT	18"		20		
TEST LOCATION 3 (CHIMNEY)	TP-13	DISPLACEMENT	18"	100		6	
	TP-14	DISPLACEMENT	18"		50		
TEST LOCATION 4 (CRUSHER/TRANSFER)	TP-15	DISPLACEMENT	18"	100		6	
	TP-16	DISPLACEMENT	18"		50		
TEST LOCATION 5 (STACKER/RECLAIMER)	TP-17	DISPLACEMENT	16"	40		5	

NOTES

1. SEE DWG 161197-DS-0002 FOR GENERAL NOTES AND 2008 BORING DETAILS.
2. SEE DWG 161197-DS-0004 FOR PREVIOUS BORING DETAILS.

LEGEND

- B-1 — PREVIOUS BORING
- C-1 — PREVIOUS CONE PENETROMETER SOUNDING LOCATION
- TP-1 — PREVIOUS TEST PIT
- P-1 — PREVIOUS PIEZOMETER
- BV-1 — PREVIOUS B&V BORING
- BV-1 — B&V BORING
- C-01 — CONE PENETROMETER SOUNDING LOCATION
- BVTP-2 — TEST PIT
- BV-1 C-01 — BV BORING + CONE PENETROMETER SOUNDING LOCATION
- C-307 — CONE PENETROMETER SOUNDING LOCATION W/PS-SUSPENSION LOGGING
- BV-6 — B&V BORING W/PS-SUSPENSION LOGGING
- CONE PENETROMETER SOUNDING (W/PIEZOMETER) LOCATION
- BORING (W/PIEZOMETER) LOCATION
- RESISTIVITY TEST (TSR OR DSR)

NOT TO BE USED FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
A	17/DEC/08	ISSUED FOR REVIEW	WG	JAL		MEH	

100' 50' 0 100' 200'
1"=100'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

SIGNED ____________
DATE ________ REG NO. ________

KBV SUTHERLAND
POWER CONSTRUCTORS

ENGINEER JAL | DRAWN WG
CHECKED | DATE

INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION UNIT 4

B&V TEST PILE LOCATIONS

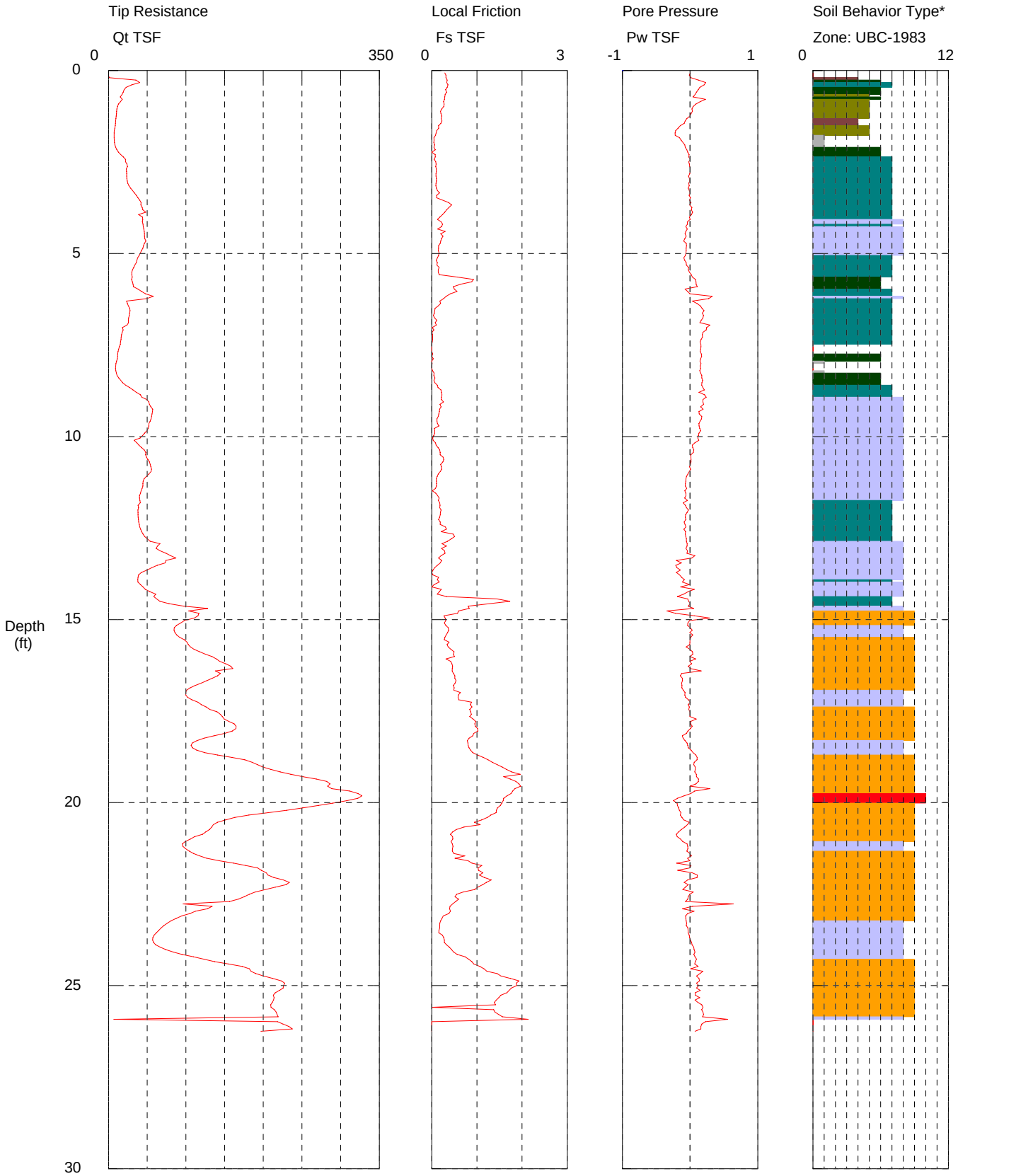
PROJECT DRAWING NUMBER 161197-DS-0027 REV A
CLIENT DWG NO 1-2060-4-

ACAD 16.1s (LMS Tech)
GRAD7739 A1APL37 E.1 10-1 12/17/08 09:34:08

TERRACON

Operator: GF
Sounding: C-333
Cone Used: DSA1092

CPT Date/Time: 12/12/2008 8:42:50 AM
Location: Sutherland Unit 4
Job Number: 08085080



Maximum Depth = 26.25 feet

Depth Increment = 0.066 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

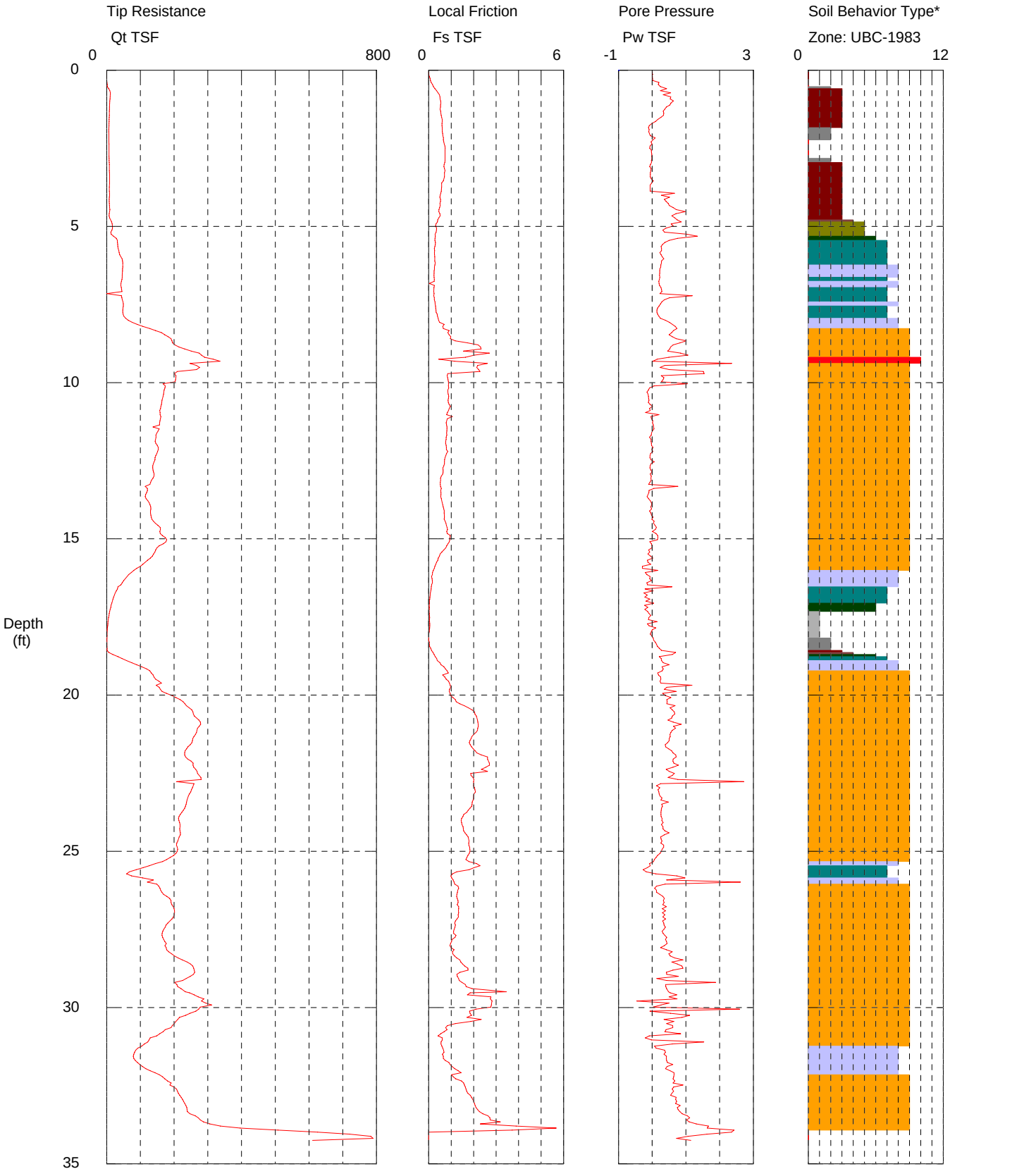
Elevation 860.70

*Soil behavior type and SPT based on data from UBC-1983

TERRACON

Operator: GF
Sounding: C-328
Cone Used: DSA1092

CPT Date/Time: 12/10/2008 2:32:46 PM
Location: Sutherland Unit 4
Job Number: 08085080



Maximum Depth = 34.25 feet

Depth Increment = 0.066 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

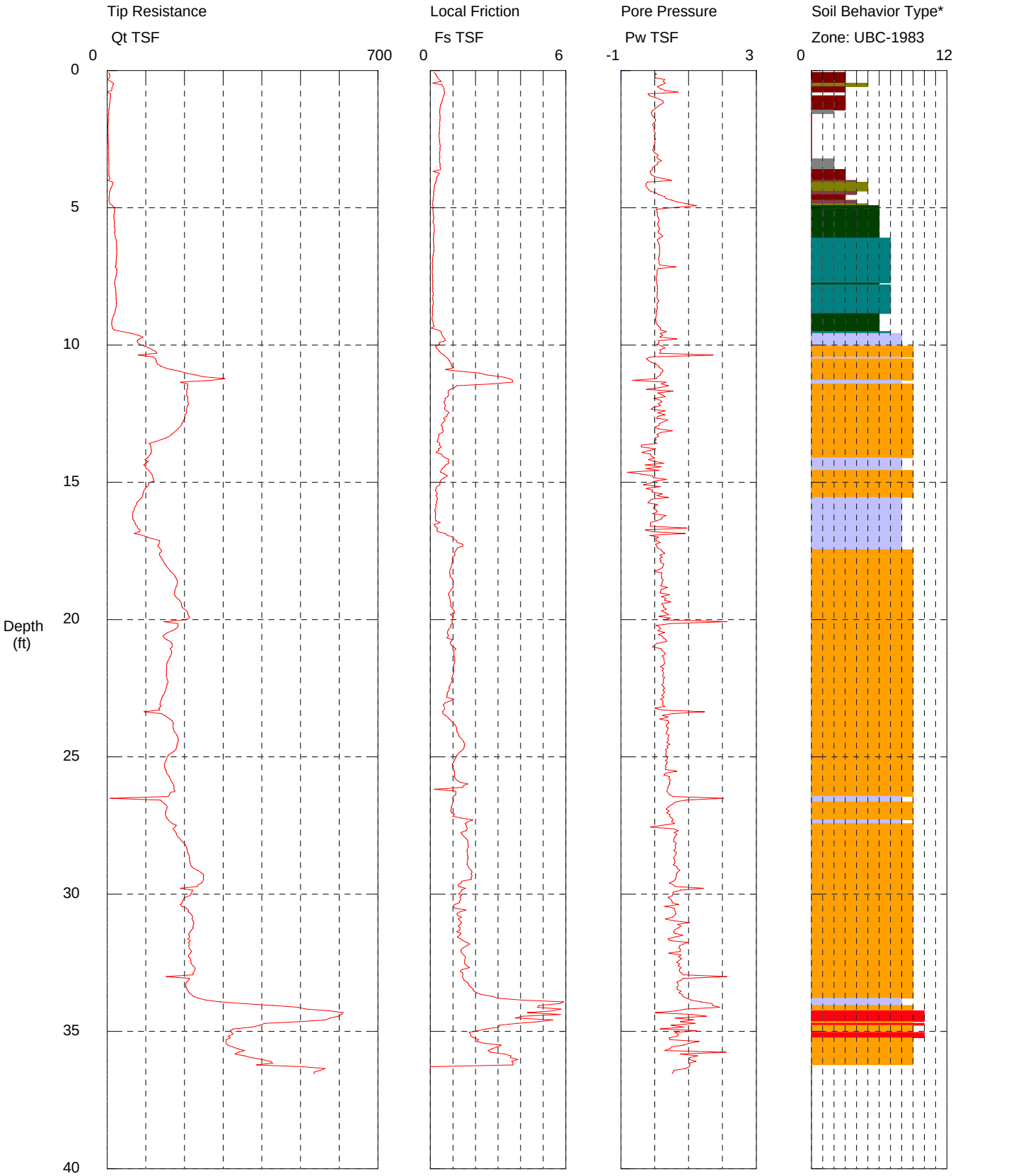
Elevation 860.20

*Soil behavior type and SPT based on data from UBC-1983

TERRACON

Operator: GF
Sounding: C-316
Cone Used: DSA1092

CPT Date/Time: 12/11/2008 1:08:59 PM
Location: Sutherland Unit 4
Job Number: 08085080



Maximum Depth = 36.55 feet

Depth Increment = 0.066 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

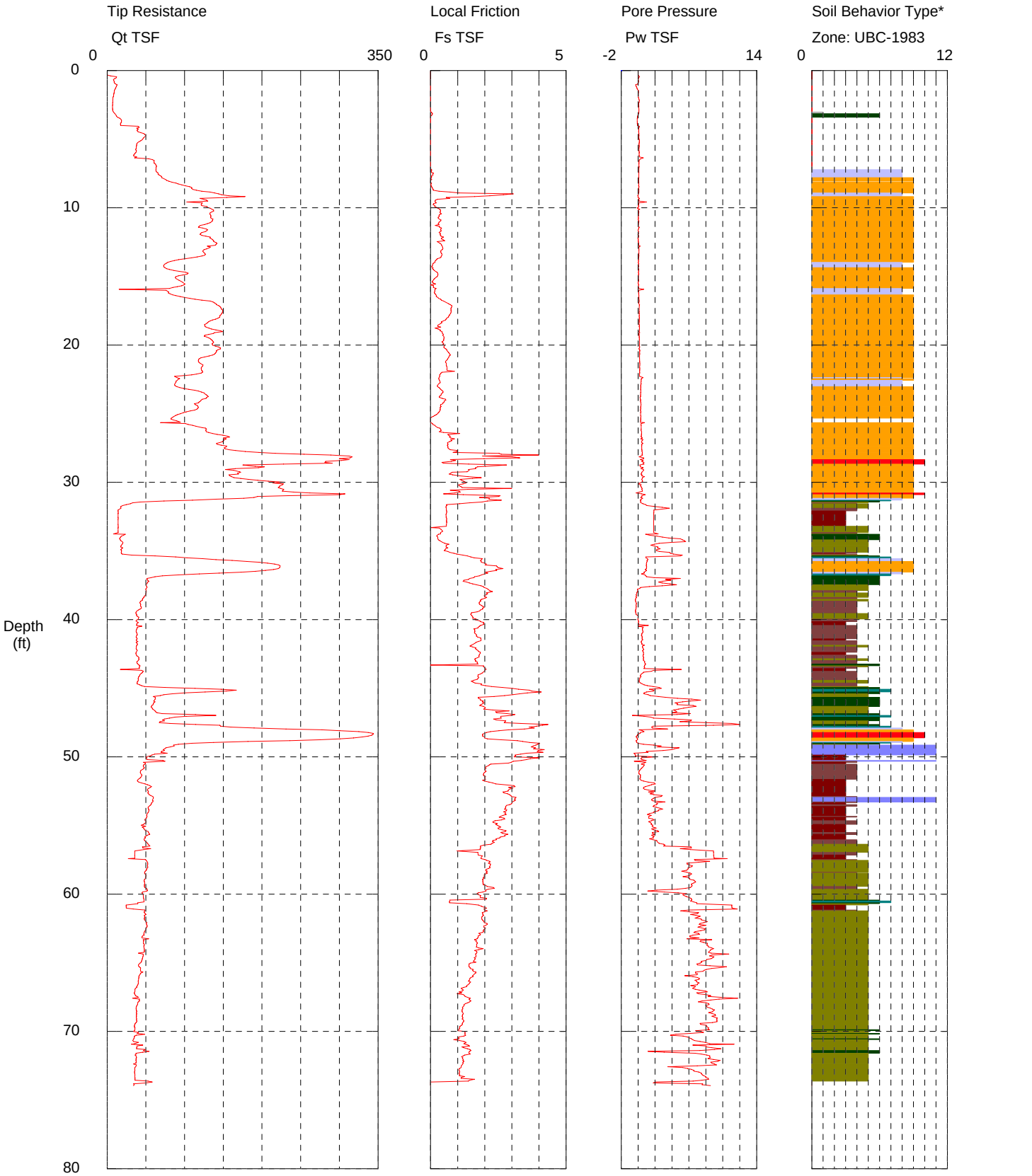
Elevation 859.70

*Soil behavior type and SPT based on data from UBC-1983

TERRACON

Operator: GF
Sounding: C-370
Cone Used: DSA1092

CPT Date/Time: 12/5/2008 7:53:41 AM
Location: Sutherland Unit 4
Job Number: 08085080



Maximum Depth = 73.95 feet

Depth Increment = 0.066 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Elevation 856.50

*Soil behavior type and SPT based on data from UBC-1983

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-341
SHEET 1 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78790.0 E 93630.0	859.9 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
Flat level, Agricultural field	12/04/2008	12/04/2008

LOGGED BY	CHECKED BY	APPROVED BY
T. Bonnie		

SAMPLING							CORING										
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														0					
SPT	01	2	3	3	6	0.5								2		858		CLAY; dark brown; firm; dry; high plasticity; w/ trace sand (0.0–1.5) SAND; yellowish brown; loose; moist; fine sand to medium sand grained; well graded; subangular; w/ trace clay (1.5–3.5)	Advanced w/4 1/4" ID; 8" OD hollow stem auger w/center plug. SPT performed w/auto hammer. Samples 1 & 2 were frozen during logging
SPT	02	4	5	2	7	0.3								4		856		CLAY; dark brown; firm; moist; high plasticity; w/ trace sand (3.5–4.0) SAND; yellowish brown; loose; moist; fine sand to coarse sand grained; well graded; subangular; w/ trace silt (4.0–6.0)	
SPT	03	3	1	2	3	1.2								6		854		SAND; pale brown; very loose; moist; fine sand grained; well graded; subrounded SAND; fine sand to coarse sand grained grading w/ trace fine gravel	
SPT	04	3	3	3	6	0.9								8		852			
SPT	05	4	3	2	5	0.0								10		850			Advanced w/2 15/16" tricone roller bit using bentonite mud as drilling fluid. No recovery for SPT-05
SPT	06	3	3	5	8	0.8								12		848			
														14		846			
														16		844			
														18		842			
														20		840		SAND; fine sand grained	
														22		838			
SPT	07	7	9	8	17	0.9								24		836		SAND; light brown; medium dense; fine sand grained; well graded; subrounded; w/ trace fine gravel, trace coarse sand (23.5–29.0)	
														26		834			
														28		832			
SPT	08	5	6	9	15	0.9								30				SAND; pale brown; medium dense; fine sand to medium sand grained; well graded; subrounded; w/	SPT-08 Sample is split @ 29' A=FINE SAND B=FINE TO MEDIUM

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-341
SHEET 2 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78790.0 E 93630.0	859.9 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
Flat level, Agricultural field	12/04/2008	12/04/2008

LOGGED BY	CHECKED BY	APPROVED BY
T. Bonnie		

SAMPLING							CORING									
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														30				trace fine gravel	SAND
														32		828			
																		33.5	Driller reported cobble @ 33'
SPT	09	2	2	2	4	1.5								34		826		Clayey SILT; gray; soft; non plastic; w/ trace sand	
														36		824			
														38		822			Driller reported cobble @ 38'
SPT	10	8	7	5	12	0.8								40		820		SAND; brown; medium dense; fine sand to coarse sand grained; well graded; angular; w/ trace fine gravel	
														42		818			
																		43.0	
																		CLAY; dark gray; very stiff; high plasticity; w/ some fine sand	Change based on driller's observation
SPT	11	6	10	10	20	1.2								44		816		44.2	SPT-12 Sample is split @ 44.2' A=CLAY B=SAND
														46		814		SAND; orangeish brown; medium dense; fine sand grained; well graded; w/ trace gravel	
														48		812			
																		48.5	
SPT	12	4	5	8	13	1.2								50		810		CLAY; gray; stiff; high plasticity; w/ trace sand, trace fine gravel	
																		50.5	
														52		808		SAND; grayish brown; medium dense; coarse sand grained; well graded; subangular; w/ trace chert	Change based on driller's observation
																		53.7	
SPT	13	4	5	9	14	1.3								54		806		CLAY; gray; stiff; high plasticity; w/ trace sand, trace fine gravel	
														56		804			
														58		802			
TW	14		-	-	-	2.0								60					

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-341
SHEET 3 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78790.0 E 93630.0	859.9 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
Flat level, Agricultural field	12/04/2008	12/04/2008

LOGGED BY	CHECKED BY	APPROVED BY
T. Bonnie		

SAMPLING							CORING										
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
SPT	15	5	6	9	15	1.4								60					
														62		798			
														64		796			
														66		794			
														68		792			
TW	16		-	-	-	1.8								70		790			
														72		788			
SPT	17	5	6	9	15	1.3								74		786			
														76		784			Bottom of boring at 75.0'. Backfilled with Backfilled w/High solids bentonite grout on 12/04/08. Water level not recorded.
														78		782			
														80		780			
														82		778			
														84		776			
														86		774			
														88		772			
														90					

BV ENERGY - BV_ENERGY.GDT - 12/17/08 11:10
\\KACI-NS-02\ENERGY_GIS\COAL\SUTHERLAND\SUTHERLAND.GPJ

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-369
SHEET 1 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78815.0 E 95915.0	856.7 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
	12/02/2008	12/02/2008

LOGGED BY	CHECKED BY	APPROVED BY
J. Deeken		

SAMPLING							CORING									
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														0		856		Sandy PEAT; black; moist; high plasticity; w/ with roots	0.0
																			0.4
																		Silty CLAY; dark black; soft; moist; high plasticity	
														2		854			2.0
																		SAND; dark gray; loose; wet; fine sand to medium sand grained; well graded; subangular; w/ trace fine to medium gravel	
TW	1		-	-	-	1.3								4		852			
SPT	2	2	2	3	5	1.2								6		850			
SPT	3	3	3	4	7	0.9								8		848		grading dark brown	
SPT	4	5	6	5	11	0.3								10		846			
SPT	5	4	4	6	10	0.5								12		844			
SPT	6	4	4	5	9	0.8								14		842			
														16		840		grading w/ trace silt	
SPT	7	5	4	4	8	0.9								18		838			
														20		836			
														22		834			
														24		832			
														26		830			
														28		828			
SPT	8	13	9	9	18	1.3								30					30.0

BV ENERGY - BV_ENERGY.GDT - 12/17/08 11:10
\\KACI-NS-02\ENERGY_GIS\COAL\SUTHERLAND\SUTHERLAND.GPJ

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-369
SHEET 2 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78815.0 E 95915.0	856.7 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
	12/02/2008	12/02/2008

LOGGED BY	CHECKED BY	APPROVED BY
J. Deeken		

SAMPLING							CORING						
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD
SPT	9	7	4	4	8	1.0							
TW	10		-	-	-	0.0							
SPT	11	8	12	15	27	0.2							
TW	12		-	-	-	1.2							
SPT	13	10	11	13	24	1.5							
SPT	14	8	13	19	32	1.5							

DEPTH (FEET) / SAMPLE TYPE / ELEVATION (FEET) / GRAPHIC LOG

30 826
32 824
34 822
36 820
38 818
40 816
42 814
44 812
46 810
48 808
50 806
52 804
54 802
56 800
58 798
60

CLASSIFICATION OF MATERIALS

Clayey SILT; dark gray; firm; moist; low plasticity

grading w/ some gravel, trace sand

grading w/ trace gravel

REMARKS

BV ENERGY - BV_ENERGY.GDT - 12/17/08 11:10
\\KACI-NS-02\ENERGY_GIS\COAL\SUTHERLAND\SUTHERLAND.GPJ

BLACK & VEATCH

PRELIMINARY
BORING LOG

BORING NO. BV-369
SHEET 3 OF 3

CLIENT	PROJECT	PROJECT NO.
Alliant Energy	Sutherland Generating Station Unit 4	161197

PROJECT LOCATION	COORDINATES (Plant Grid)	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Marshalltown, Iowa	N 78815.0 E 95915.0	856.7 ft (NAVD 88)	75.0 ft

SURFACE CONDITIONS	START DATE	END DATE
	12/02/2008	12/02/2008

LOGGED BY	CHECKED BY	APPROVED BY
J. Deeken		

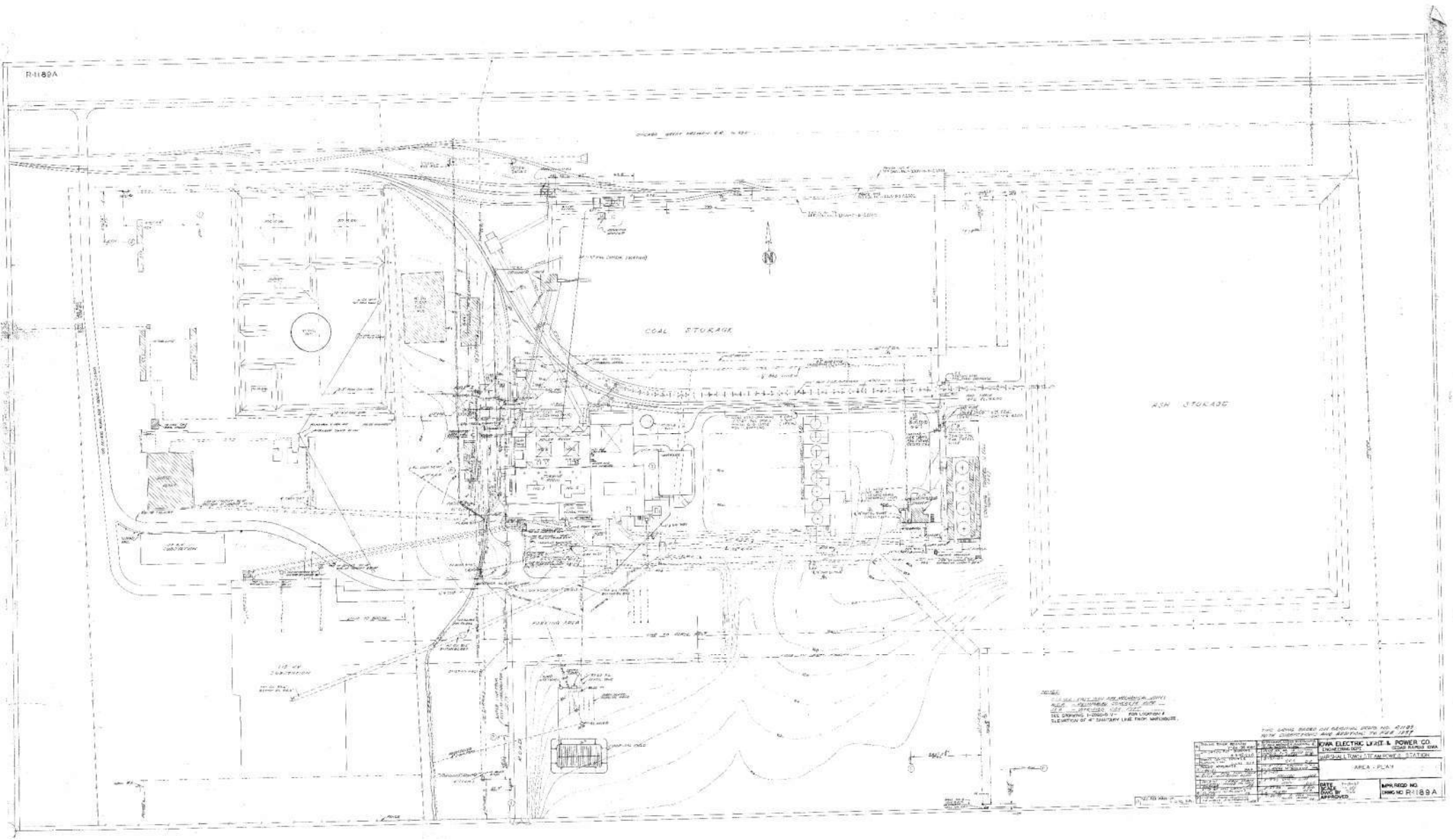
SAMPLING							CORING									
SAMPLE TYPE	SAMPLE NUMBER	1ST 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD	DEPTH (FEET)	SAMPLE TYPE	ELEVATION (FEET)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
														60		796			
																		61.0 Sandy SILT; dark gray; hard; wet; non plastic	
														62		794			
SPT	15	13	20	17	37	1.5								64		792			
																		66.0 SILT; dark gray; stiff; moist; high plasticity	
														66		790			
														68		788			
SPT	16	7	10	15	25	1.5								70		786			
														72		784			
														74		782			
TW	17		-	-	-	1.5													
														76		780			
														78		778			
														80		776			
														82		774			
														84		772			
														86		770			
														88		768			
														90					

BV ENERGY - BV_ENERGY.GDT - 12/17/08 11:10
\\KACI-NS-02\ENERGY_GIS\COAL\SUTHERLAND\SUTHERLAND.GPJ

APPENDIX G – SGS CCR Surface Impoundment Drawings

Alliant Energy
Interstate Power and Light Company
Sutherland Generating Station
Marshalltown, Iowa

History of Construction


R-1189A
COAL STORAGE
ASH STORAGE
PARKING AREA
SUBSTATION
SUBSTATION
N
THIS DRAWING BASED ON ORIGINAL DRWG NO. R-1189
WITH CORRECTIONS AND ADDITIONS TO AUG 1997
IOWA ELECTRIC LIGHT & POWER CO.
ENGINEERING DEPT. CEDAR RAPIDS, IOWA
MARTINSVILLE STEAM POWER STATION
AREA - PLAN
DRWG NO R-1189A

RAIL ROAD

FENCE

DISCHARGE POND

ROAD

H20
860.4

FLOW METERING FLUME

H20
861.6

COAL PILE

ROAD

ROAD

CONCRETE
VAULTS

PIPE

PIPE

PIPE
SUPPORTS

H20
862.9

NORTH PRIMARY
SETTLING POND

H20
861.6

SOUTH
PRIMARY
SETTLING
POND

H20
862.5

PIPE

SECONDARY SETTLING POND

H20
861.6

WEST COOLING TOWER

EAST COOLING TOWER

ROAD

FENCE

PP

PP

PP

MH

MH

N

0 100
SCALE IN FEET

LEGEND:

- MH — MANHOLE
- PP — POWER POLE
- 857.8 — SURVEY POINT ELEVATION
- 860 — CONTOUR FROM GROUND SURVEY (NOV, 2005)
- WATER LINE

NOTE:
SURVEY CONDUCTED BY
CLAPSADDLE - GARBER ASSOCIATES, INC.
NOVEMBER 1 2005

12/13/2005 ...\sps.dgn

REV	DATE	BY	DESCRIPTION

SCALE: 0 50 100
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

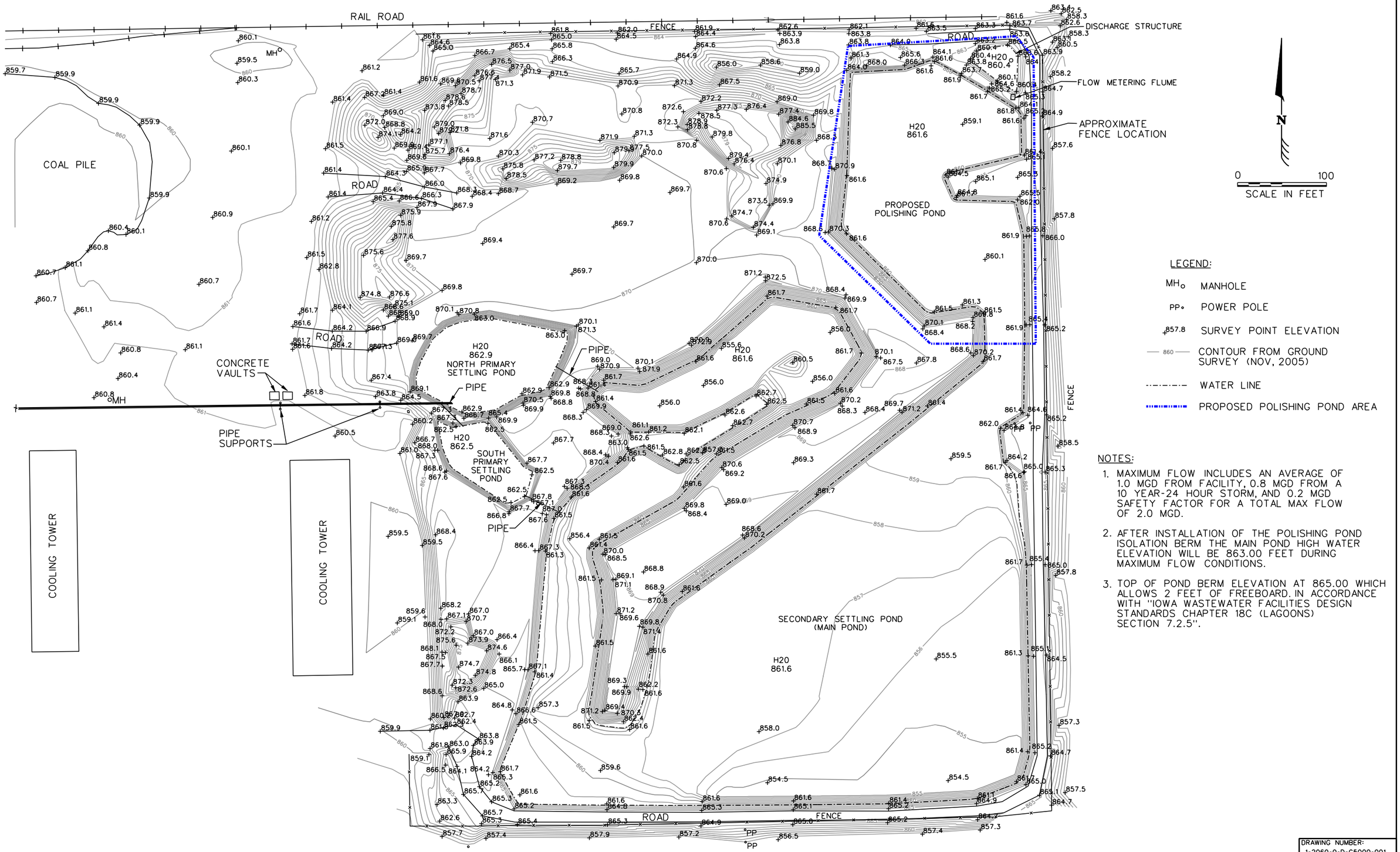
HARD HAT SERVICES, INC.™
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

CLIENT: ALLIANT ENERGY
SOUTHERLAND GENERATING STATION

TITLE: SETTLING POND SURVEY

FIGURE 1



LEGEND:

- MH_o MANHOLE
- PP∘ POWER POLE
- 857.8 SURVEY POINT ELEVATION
- 860 CONTOUR FROM GROUND SURVEY (NOV, 2005)
- WATER LINE
- PROPOSED POLISHING POND AREA

NOTES:

1. MAXIMUM FLOW INCLUDES AN AVERAGE OF 1.0 MGD FROM FACILITY, 0.8 MGD FROM A 10 YEAR-24 HOUR STORM, AND 0.2 MGD SAFETY FACTOR FOR A TOTAL MAX FLOW OF 2.0 MGD.
2. AFTER INSTALLATION OF THE POLISHING POND ISOLATION BERM THE MAIN POND HIGH WATER ELEVATION WILL BE 863.00 FEET DURING MAXIMUM FLOW CONDITIONS.
3. TOP OF POND BERM ELEVATION AT 865.00 WHICH ALLOWS 2 FEET OF FREEBOARD. IN ACCORDANCE WITH "IOWA WASTEWATER FACILITIES DESIGN STANDARDS CHAPTER 18C (LAGOONS) SECTION 7.2.5".

REV	DATE	BY	DESCRIPTION

SCALE: 0 50 100 SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES TM
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

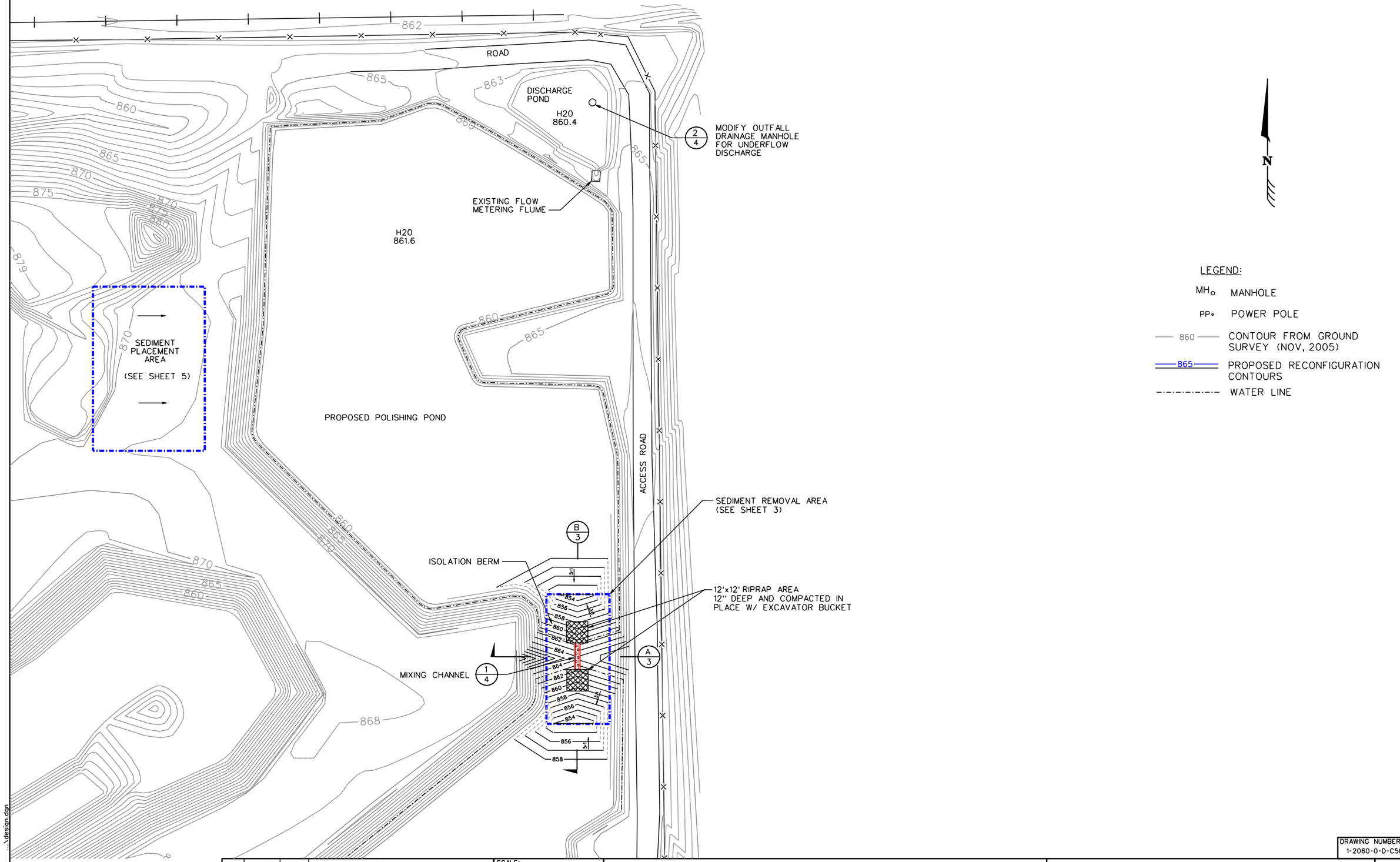
CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 1 - POLISHING POND DESIGN
GENERAL POND LAYOUT EXISTING CONDITIONS

SHEET 1

DRAWING NUMBER: 1-2060-0-D-C5000-001

2/23/2006 ...\existing.dgn



...\design.dgn

2/23/2006

REV	DATE	BY	DESCRIPTION

SCALE: 0 25 50
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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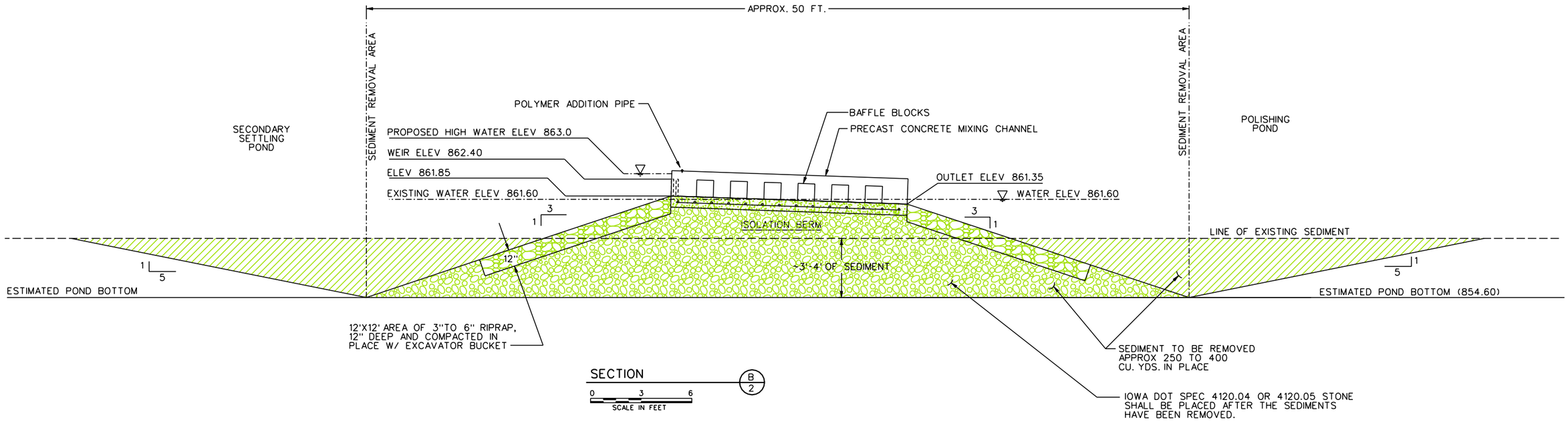
Naperville, IL 60563
(630) 637-9470

DRAWING NUMBER: 1-2060-0-D-C5000-002

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 1 - POLISHING POND DESIGN
PLAN VIEW

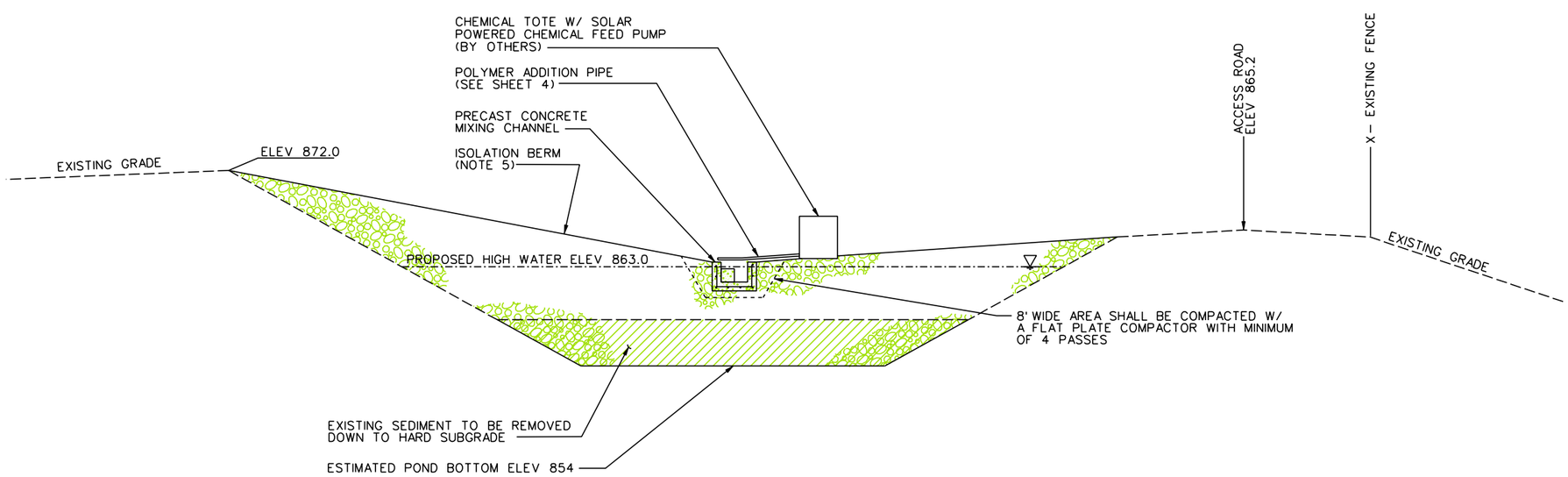
SHEET 2



SECTION B/2

0 3 6

SCALE IN FEET



SECTION A/2

0 5 10

SCALE IN FEET

NOTES:

1. THE CONTRACTOR SHOULD MAINTAIN THE MAIN POND WATER ELEVATION AT 861.00 DURING CONSTRUCTION OF THE POLISHING POND CONSTRUCTION.
2. SEDIMENT SHALL BE REMOVED UNTIL HARD BOTTOM OR UNDISTURBED MATERIAL IS OBSERVED. SEDIMENT REMOVAL WILL BE APPROVED BY CLIENT.
3. CONTRACTOR SHALL PROVIDE GRADATION FOR PROPOSED STONE FOR APPROVAL BY THE CLIENT BEFORE IT IS BROUGHT ON SITE.
4. AFTER STONE IS PLACED ABOVE THE WATERLINE, IT SHALL BE COMPACTED WITH A VIBRATORY ROLLER OR COMPACTOR PLATE IN 6-INCH COMPACTED LIFTS AT NO LESS THAN 4 PASSES.
5. ISOLATION BERM TO BE CONSTRUCTED WITH IDOT SPEC 4120.04 OR 4120.05 GRANULAR STONE W/ FINES, EXCEPT FOR RIPRAP AT THE CHANNEL INLET AND OUTLET
6. APPROXIMATE QUANTITY OF IOWA DOT SPEC 4120.04 OR 4120.05 IS 470 CU YDS AND 11 CU YDS OF 3" TO 6" RIPRAP.

DRAWING NUMBER: 1-2060-0-D-C5000-003

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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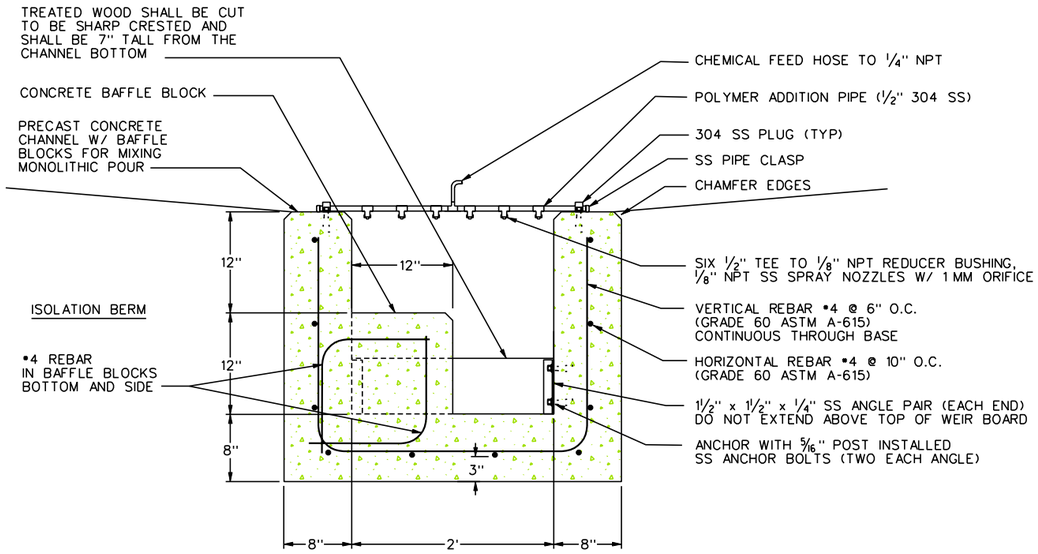
Engineering, Construction and Management Solutions
940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 1 - POLISHING POND DESIGN
ISOLATION BERM SECTIONS

SHEET 3

2/23/2006 ...\SECTIONS.dgn



SECTION A/4

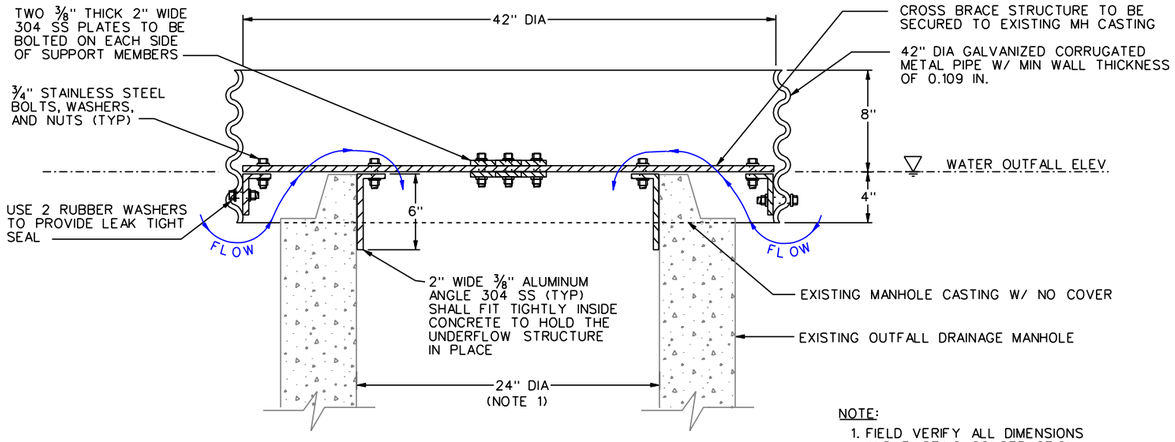
1" = 1'-6"

0 0.75 1.5

SCALE IN FEET

NOTE:

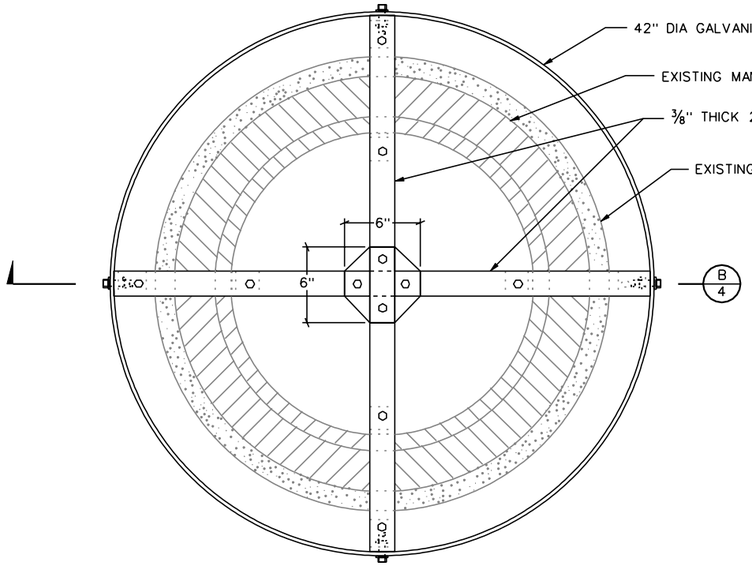
1. PRECAST CONCRETE COMPRESSIVE STRENGTH SHALL BE MONOLITHIC POUR. TYPE III HIGH-EARLY CONCRETE (4,000 PSI AT 7 DAYS; 6,000 PSI AT 28 DAYS). WITH 5% AIR ENTRAINMENT AND BRUSHED FINISH. CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH ACI 301-99 AND ACI 318-02. CHANNEL WALLS AND BAFFLE BLOCKS SHALL HAVE CHAMFERED EDGES.
2. THE LIFTING ANGLE FOR THE STRAPS SHALL BE GREATER THAN 45 DEGREES FROM HORIZONTAL.



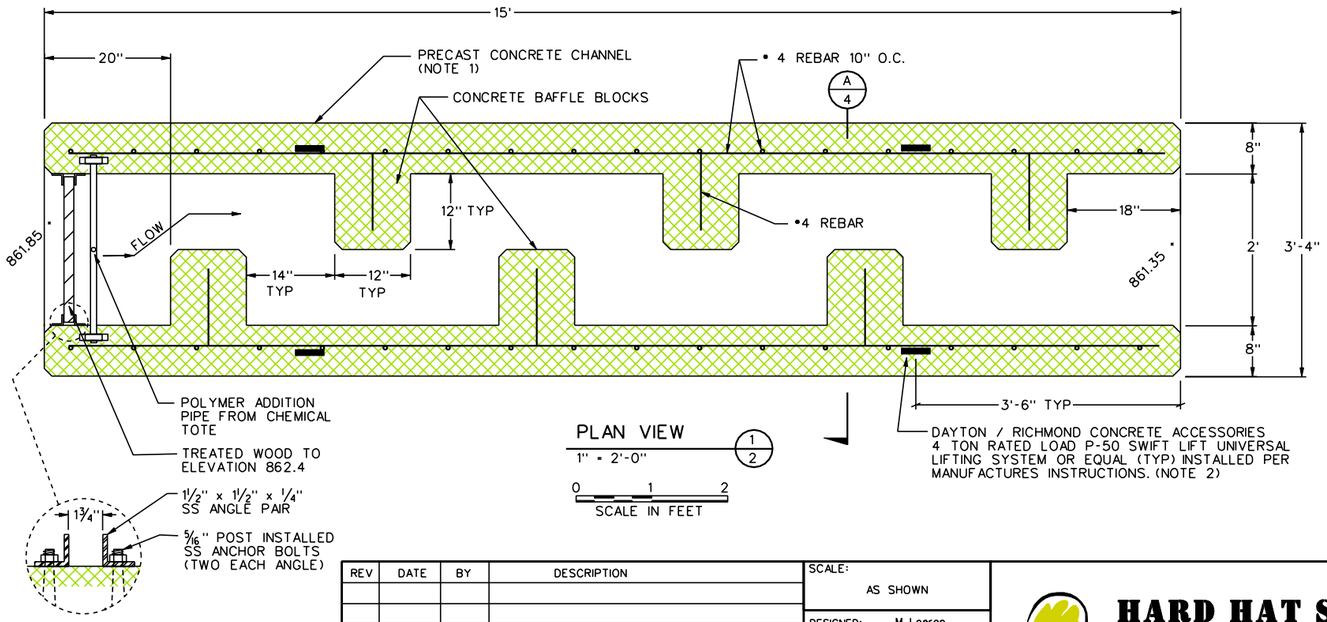
SECTION B/4

NOTE:

1. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONSTRUCTION OF DRAINAGE MANHOLE.



PLAN VIEW



PLAN VIEW 1/2

1" = 2'-0"

0 1 2

SCALE IN FEET

OUTFALL DRAINAGE MANHOLE MODIFICATIONS FOR UNDERFLOW DISCHARGE 2/2

1" = 1'-0"

0 0.5 1

SCALE IN FEET

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES TM
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

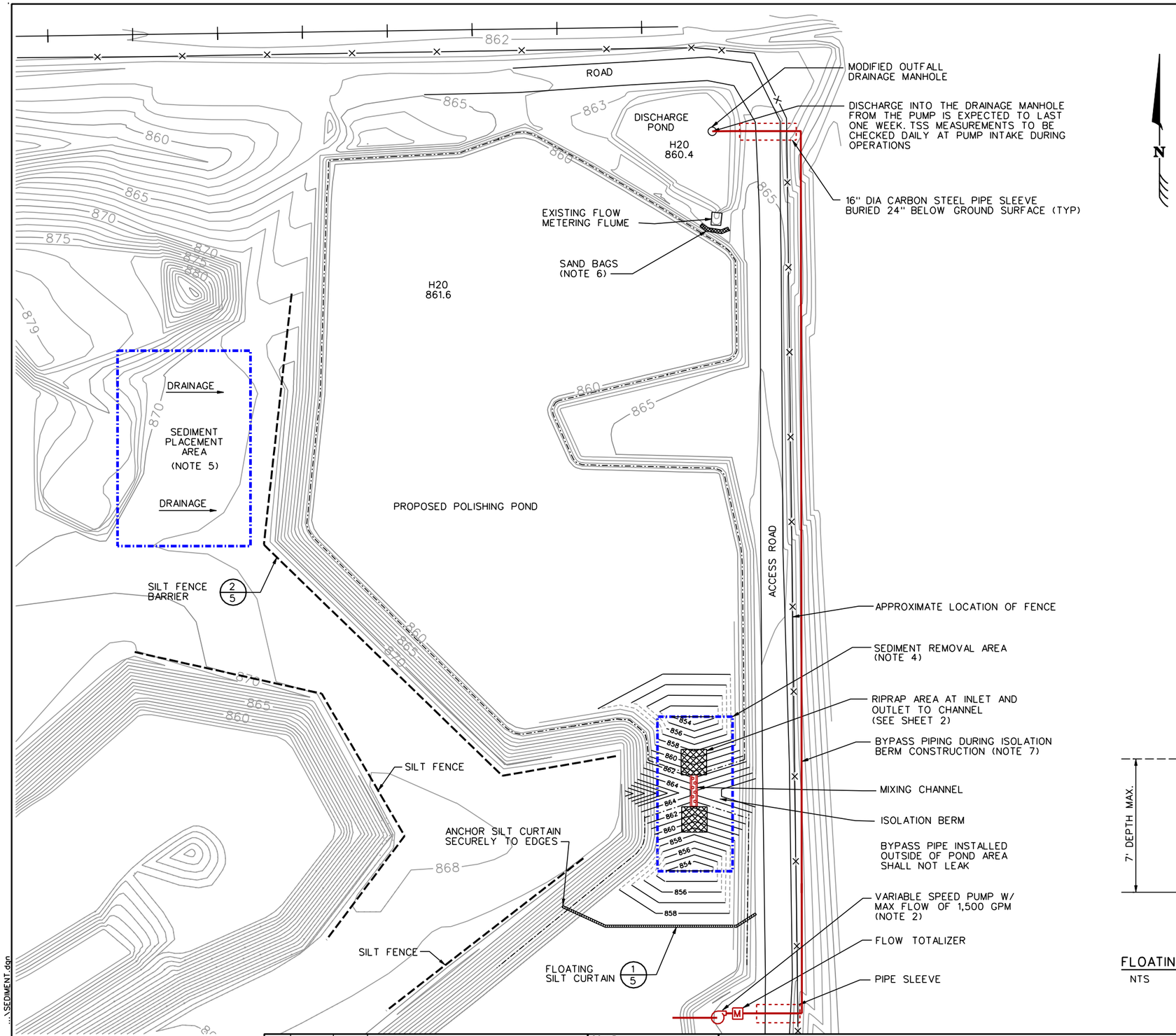
CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 1 - POLISHING POND DESIGN DETAILS

SHEET 4

DRAWING NUMBER: 1-2060-0-D-C5000-004

2/23/2006 ...\DETAILS.dgn

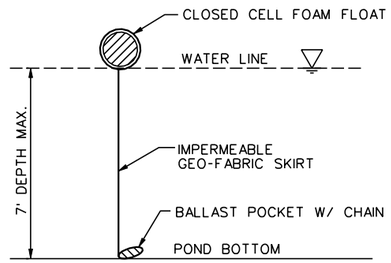


LEGEND:

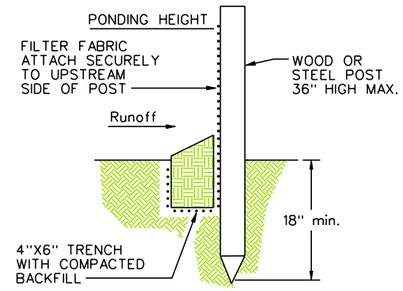
MH_o	MANHOLE
PP∘	POWER POLE
860	CONTOUR FROM GROUND SURVEY (NOV, 2005)
865	PROPOSED RECONFIGURATION CONTOURS
	WATER LINE

NOTES:

1. BYPASS PIPING SHOWN IN SCHEMATIC AND NOT TO SCALE.
2. PUMP MUST BE GAS POWERED AND THE STORAGE TANK MUST BE A DOUBLE WALLED.
3. SUCTION PIPE SHALL BE FLOATED ATOP WATER SURFACE TO AVOID DISTURBANCE OF SEDIMENTS.
4. 3'-5' OF SEDIMENTS SHALL BE REMOVED FROM THE SEDIMENT REMOVAL AREA AND PLACED IN THE SEDIMENT CONSTRUCTION OF THE ISOLATION BERM.
5. SEDIMENT PLACEMENT AREA SHALL BE GRADED TO DRAIN TOWARD THE PROPOSED POLISHING POND. SILT FENCE SHALL BE PLACED ALONG THE POLISHING POND TO FILTER SURFACE DRAINAGE.
6. TEMPORARY SAND BAGS TO BE PLACED BEFORE FLUME DURING PUMPING OPERATIONS AND SHALL NOT BE REMOVED UNTIL PUMPING IS COMPLETED AND TSS IN THE POLISHING POND DROPS BELOW 30 PPM.
7. BYPASS PIPE INSTALLED OUTSIDE OF POND AREA SHALL NOT LEAK.



FLOATING SILT CURTAIN 1/5
NTS



SILT FENCE BARRIER 2/5
NTS

...\SEDIMENT.dgn
3/1/2006

REV	DATE	BY	DESCRIPTION

SCALE: 0 25 50
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES TM
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

DRAWING NUMBER: 1-2060-0-D-C5000-005

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 1 - POLISHING POND DESIGN
SEDIMENT CONTROL

SHEET 5

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the state of Iowa.

(signature) (date)

Printed or typed name: _____

License number: _____

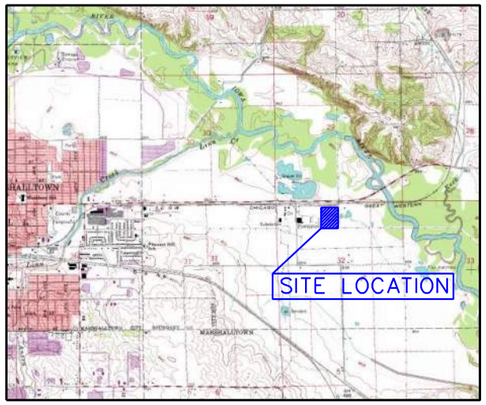
My license renewal date is December 31, _____

Pages or sheets covered by this seal: _____

INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION
3001 E. MAIN ST, MARSHALLTOWN, IOWA

PHASE 2
SETTLING POND RECONFIGURATION

(APRIL, 2006)



SHEET INDEX

5/5/2006 ...\COVER.dgn

DRAWING NUMBER: 1-2060-0-D-C5001-000

REV	DATE	BY	DESCRIPTION

SCALE: NONE

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: COVER SHEET

SHEET: –

RAIL ROAD

FENCE

DISCHARGE STRUCTURE

ROAD

H20
860.4

FLOW METERING FLUME

MH

EXISTING BOTTOM ASH PILE
TO BE RELOCATED
(SEE SHEET 11)

COAL PILE

H20
861.6

BENCHMARK
CUT "X" IN CONCRETE
N 3,481,438.90
E 5,096,754.54
Elev. 863.12

POLISHING POND

FENCE TO BE RELOCATED
PRIOR TO CONSTRUCTION
(BY OTHERS)

ROAD

ROAD

SEE PHASE 1
POLISHING POND DESIGN

H20
862.9
NORTH PRIMARY
SETTLING POND

PIPE

H20
862.6

CONCRETE
VAULTS

PIPE

MH

PIPE
SUPPORTS

H20
862.6
SOUTH
PRIMARY
SETTLING
POND

PP PP

COOLING TOWER

COOLING TOWER

PIPE

SECONDARY SETTLING POND
(MAIN POND)

H20
862.6

BENCHMARK
CUT "X" IN CONCRETE
N 3,480,792.02
E 5,096,013.78
Elev. 860.43

ROAD

PP
PP

FENCE

N

LEGEND:

- MH — MANHOLE
- PP — POWER POLE
- 860 — EXISTING TOPO AND TOP OF SEDIMENT SURVEY (NOV, 2005 & FEB, 2006)
- WATER LINE

DRAWING NUMBER:
1-2060-0-D-C5001-001

REV	DATE	BY	DESCRIPTION

SCALE:
0 50 100
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES TM
Engineering, Construction and Management Solutions

940 E. Diehl Rd, Suite 150
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(630) 637-9470

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 2
EXISTING CONDITIONS

SHEET 1

4/17/2006 ...\existing.dgn

LEGEND:

- MH ○ MANHOLE
- PP ○ POWER POLE
- 860 HARD POND BOTTOM ELEVATION (SURVEY NOV, 2005 & FEB, 2006)
- WATER LINE
- BOTTOM ASH REMOVAL AREA (13,650 CU YDS)
- 2.5 APPROXIMATE SEDIMENT DEPTH BASED ON FEB, 2006 SURVEY (38,000 CU YDS)

BOTTOM ASH REMOVAL
SOUTH BOUNDARY COORDINATES

PNT	NORTHING	EASTING
①	N 3,481,130	E 5,096,593
②	N 3,481,117	E 5,096,592
③	N 3,481,073	E 5,096,573
④	N 3,481,053	E 5,096,556
⑤	N 3,480,974	E 5,096,453
⑥	N 3,480,943	E 5,096,403
⑦	N 3,480,939	E 5,096,387
⑧	N 3,480,938	E 5,096,357
⑨	N 3,480,929	E 5,096,333
⑩	N 3,480,915	E 5,096,325
⑪	N 3,480,854	E 5,096,312

NOTES:

1. MATERIAL SHALL BE REMOVED DOWN TO A STABLE SUBGRADE APPROVED BY IP&L AND RECONSTRUCTED PER DETAIL "A" ON SHEET 10.
2. MATERIAL SHALL BE REMOVED DOWN TO ORIGINAL POND BOTTOM BELOW SEDIMENTS AND SHALL BE APPROVED BY IP&L. SIDESLOPES SHALL BE 2:1.
3. EXISTING FLOW DIVERSION BERM SHALL REMOVED TO DESIGN ELEVATION AND BE COMPACTED BY FOUR PASSES EACH DIRECTION WITH A VIBRATORY SMOOTH DRUM ROLLER.
4. SOME SEDIMENT WILL BE TRAPPED DURING PLACEMENT OF THE 6-24 INCH ROCK. (SEE DETAIL "A", SHEET 10)
5. QUANTITIES OF MATERIALS ARE LOCATED ON SHEET 12.
6. APPROXIMATE SEDIMENT THICKNESS IS BASED ON REFUSAL OF A HAND PUSHED 1-INCH PROBE ROD.

DRAWING NUMBER: 1-2060-0-D-C5001-002

REV	DATE	BY	DESCRIPTION

SCALE: 0 50 100 — SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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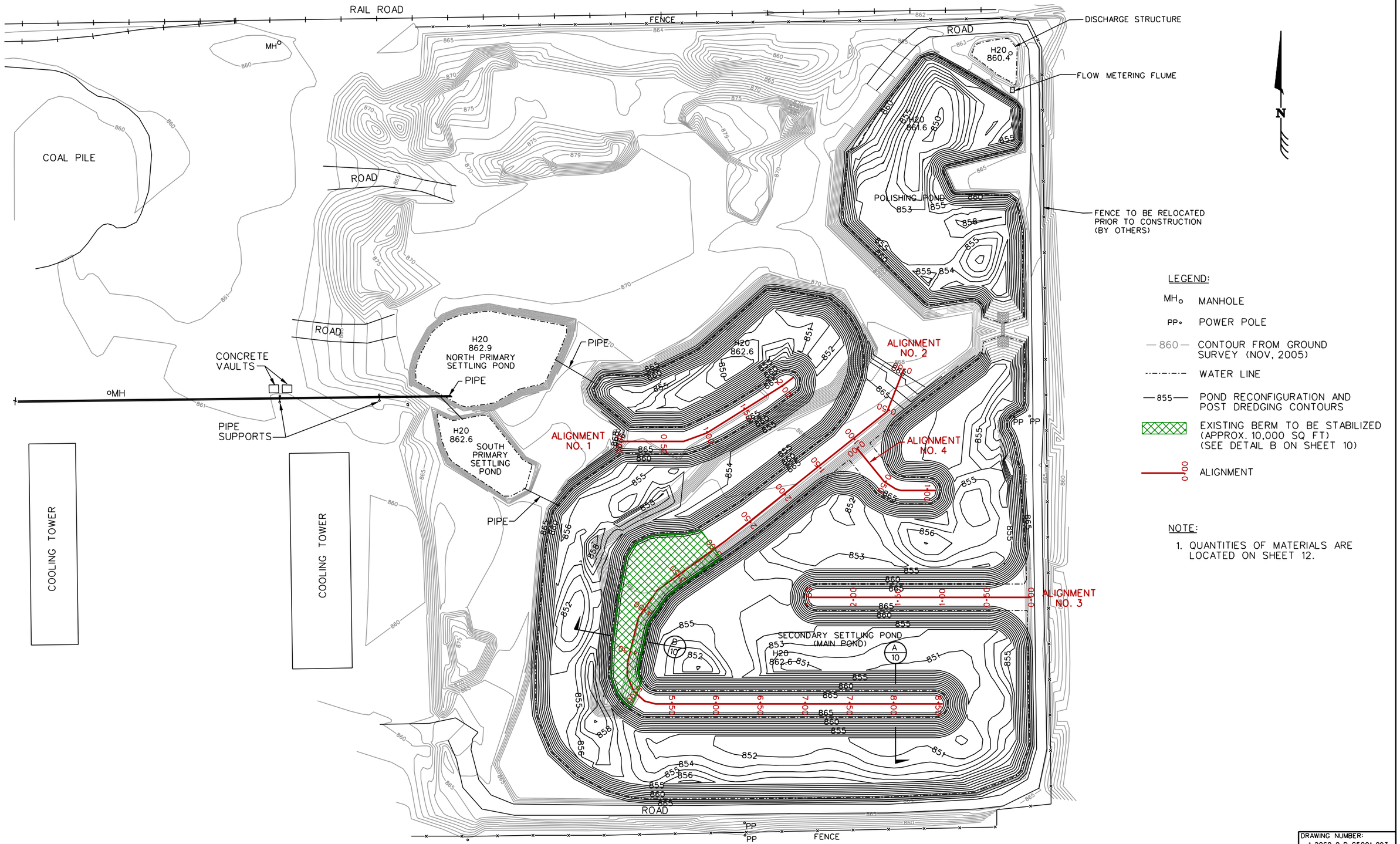
CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 2 - HARD POND BOTTOM ELEVATION AND SEDIMENT THICKNESS

SHEET 2

4/19/2006 ...\sediment-depth.dgn



LEGEND:

- MH — MANHOLE
- PP — POWER POLE
- 860 — CONTOUR FROM GROUND SURVEY (NOV, 2005)
- WATER LINE
- 855 — POND RECONFIGURATION AND POST DREDGING CONTOURS
- EXISTING BERM TO BE STABILIZED (APPROX. 10,000 SQ FT) (SEE DETAIL B ON SHEET 10)
- 0+00 — ALIGNMENT

NOTE:

1. QUANTITIES OF MATERIALS ARE LOCATED ON SHEET 12.

4/19/2006 ...\reconfiguration.dgn

REV	DATE	BY	DESCRIPTION

SCALE: 0 50 100 SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
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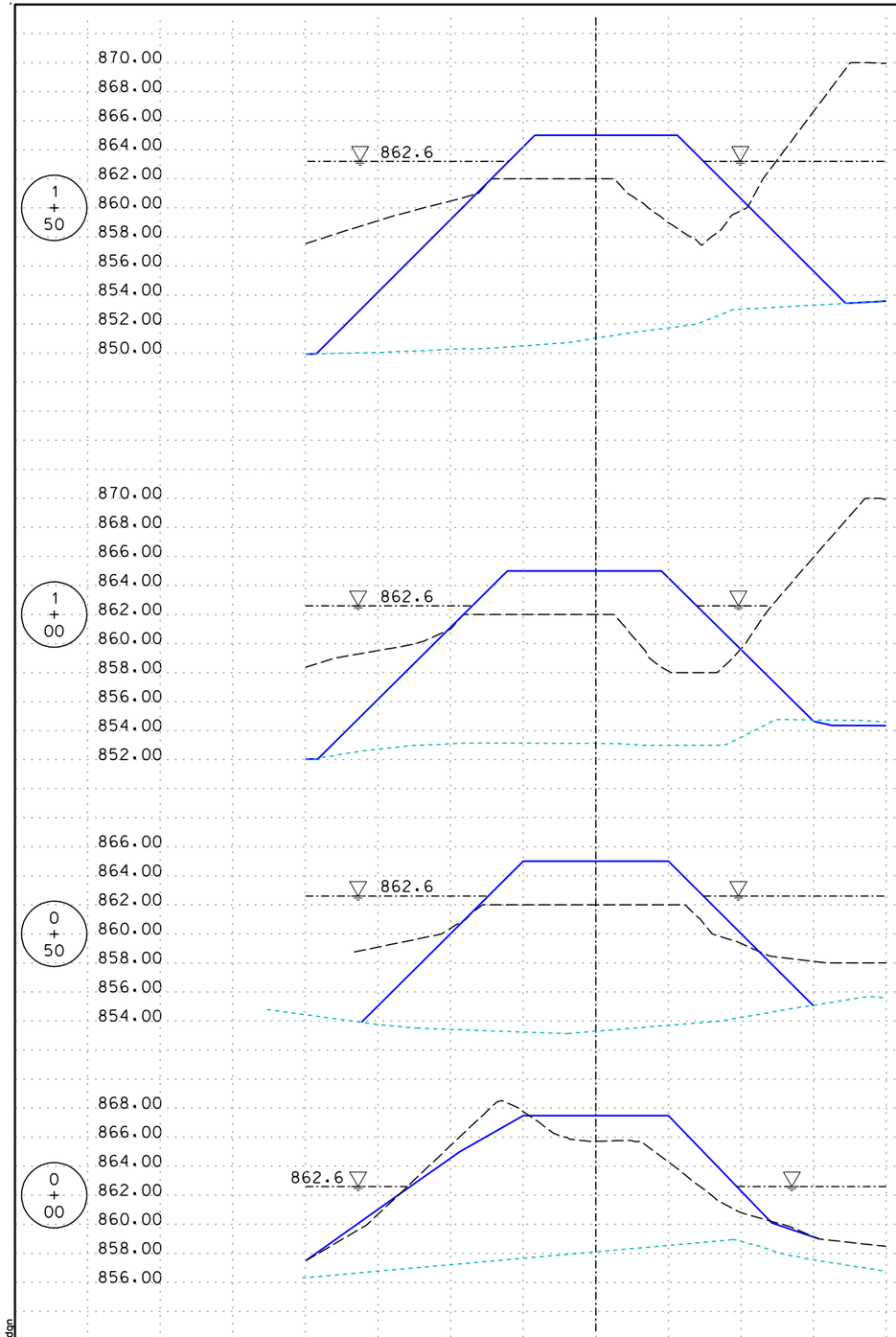
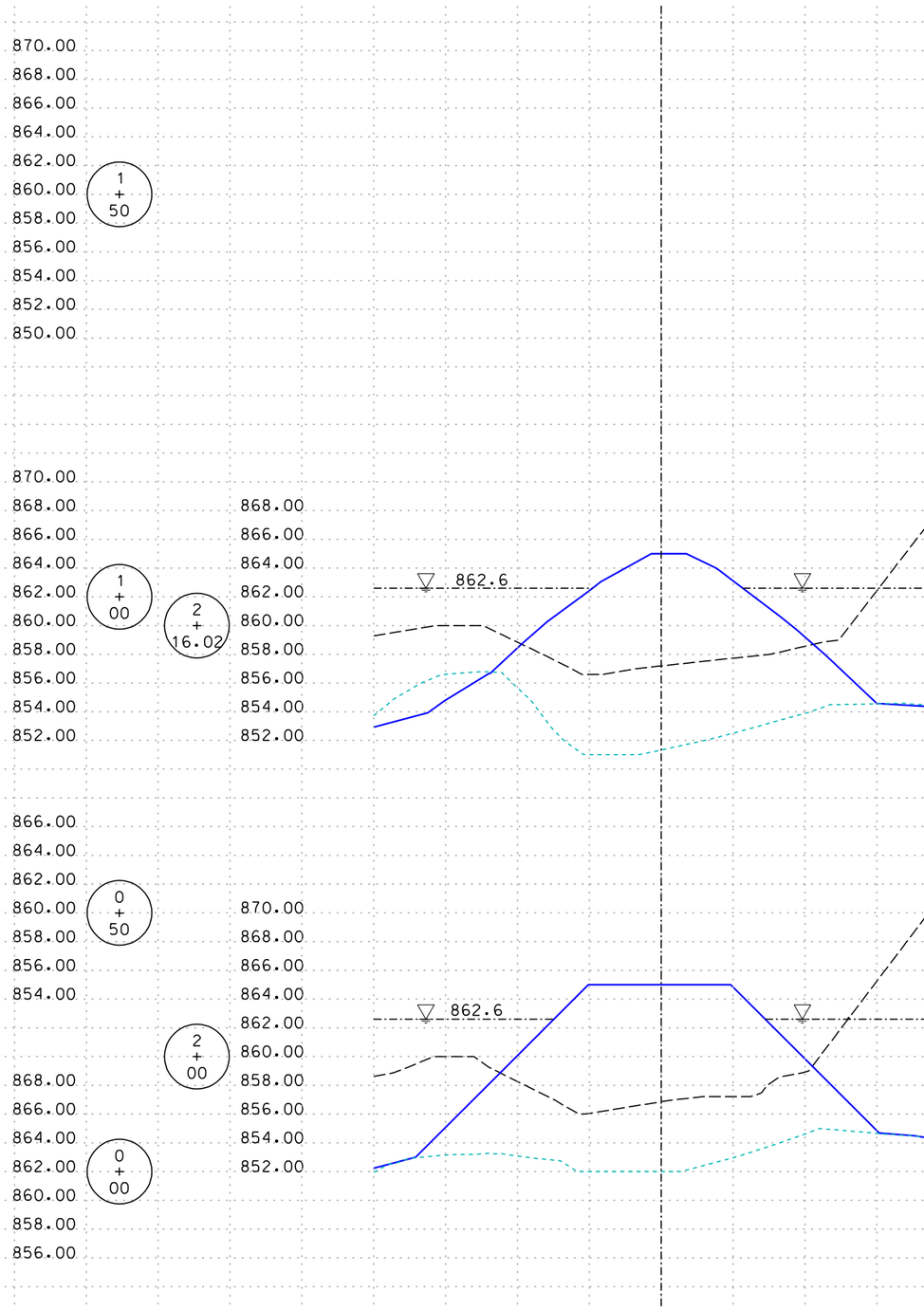
SUTHERLAND GENERATING STATION

TITLE: PHASE 2
SETTLING POND RECONFIGURATION

SHEET 3

DRAWING NUMBER: 1-2060-0-D-C5001-003





NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:

- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE EXCAVATION DEPTH (ORIGINAL POND BOTTOM)

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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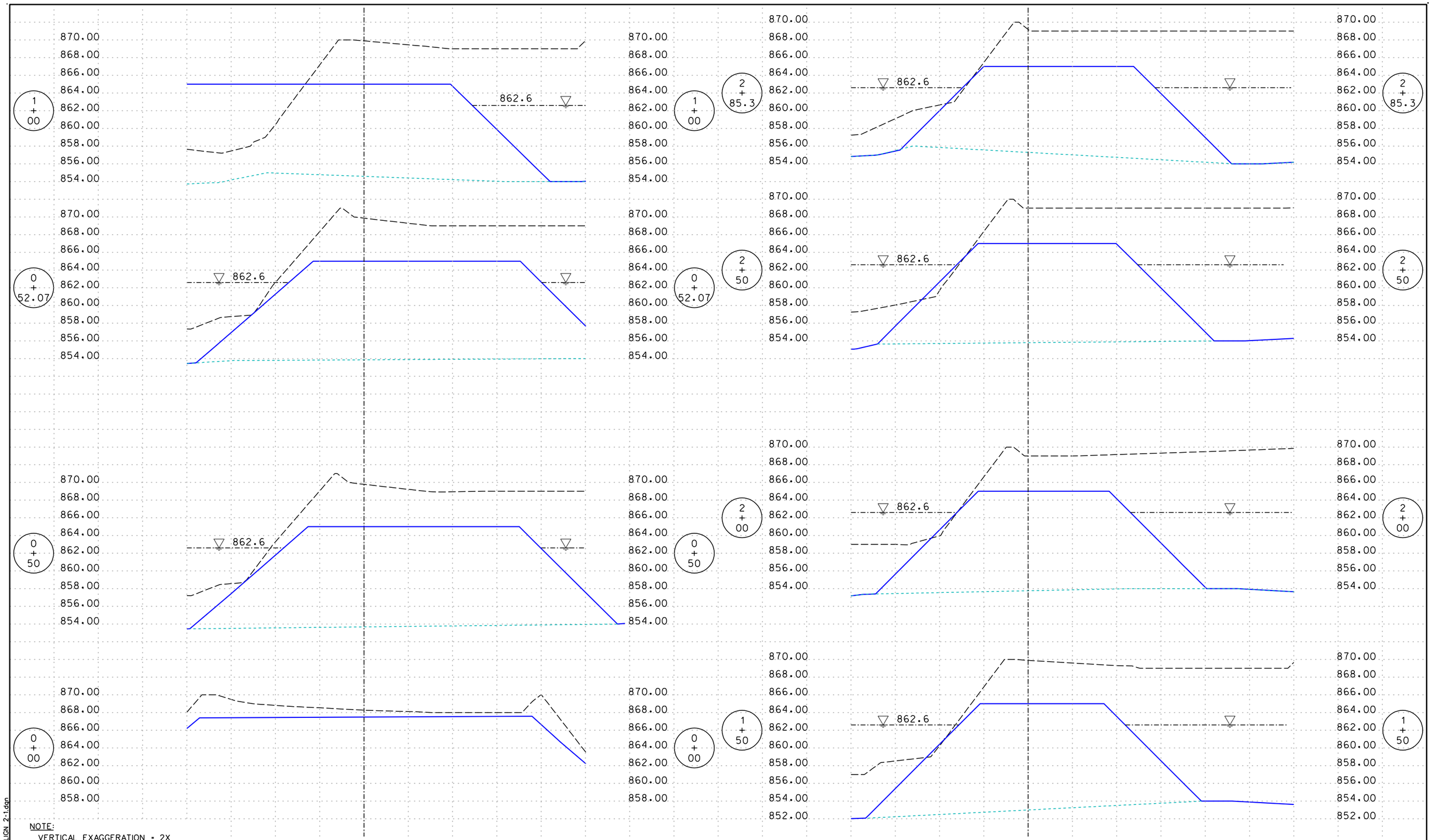
SUTHERLAND GENERATING STATION

TITLE: ALIGNMENT 1
CROSS SECTIONS

DRAWING NUMBER: 1-2060-0-D-C5001-004

SHEET 4

...\ALIGN 1.dgn
4/17/2006



NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:
- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE ORIGINAL POND BOTTOM

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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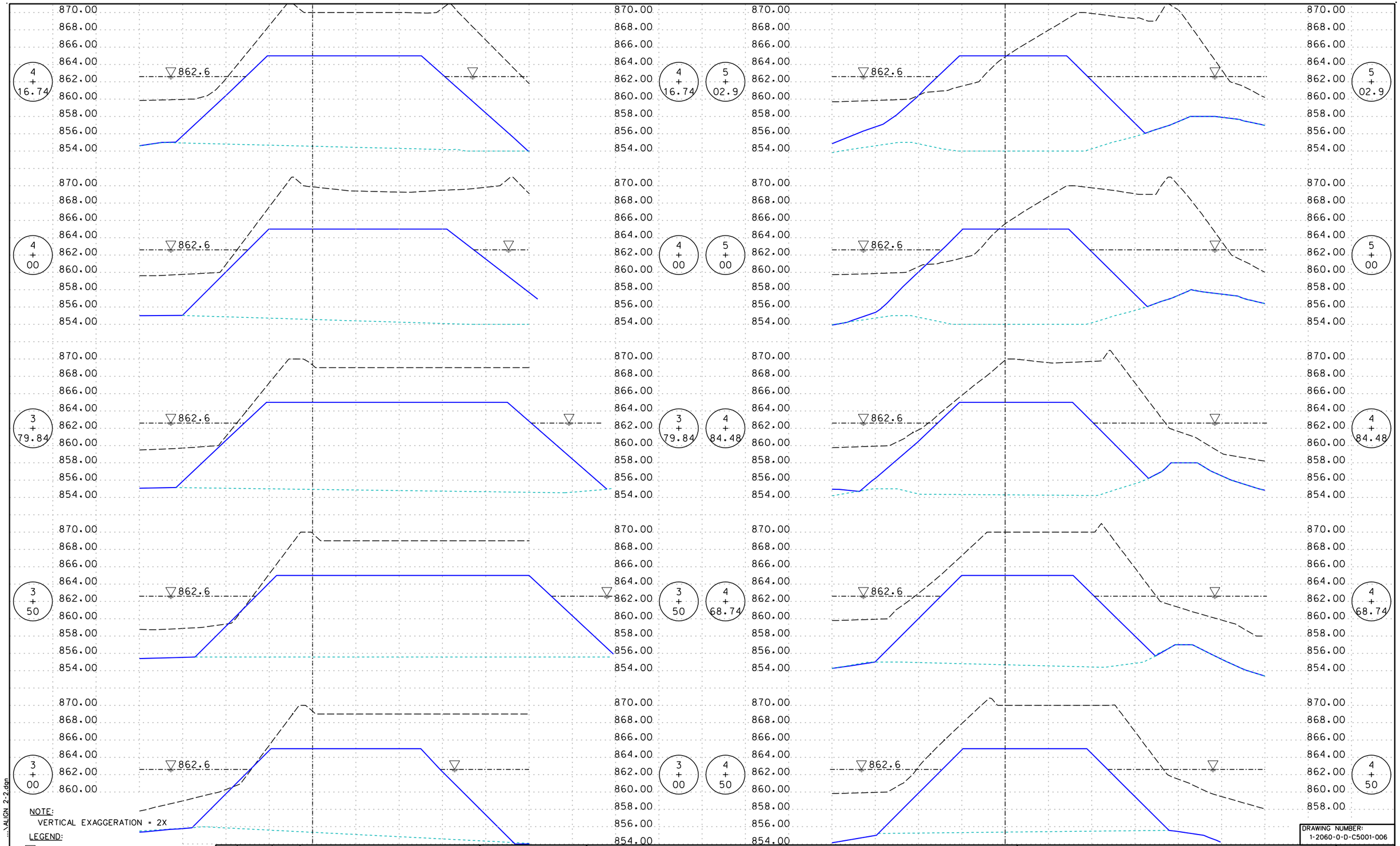
SUTHERLAND GENERATING STATION

TITLE: ALIGNMENT 2
CROSS SECTIONS (1 OF 3)

DRAWING NUMBER: 1-2060-0-0-C5001-005

SHEET 5

..\ALIGN 2-1.dgn
4/17/2006



NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:
- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE ORIGINAL POND BOTTOM

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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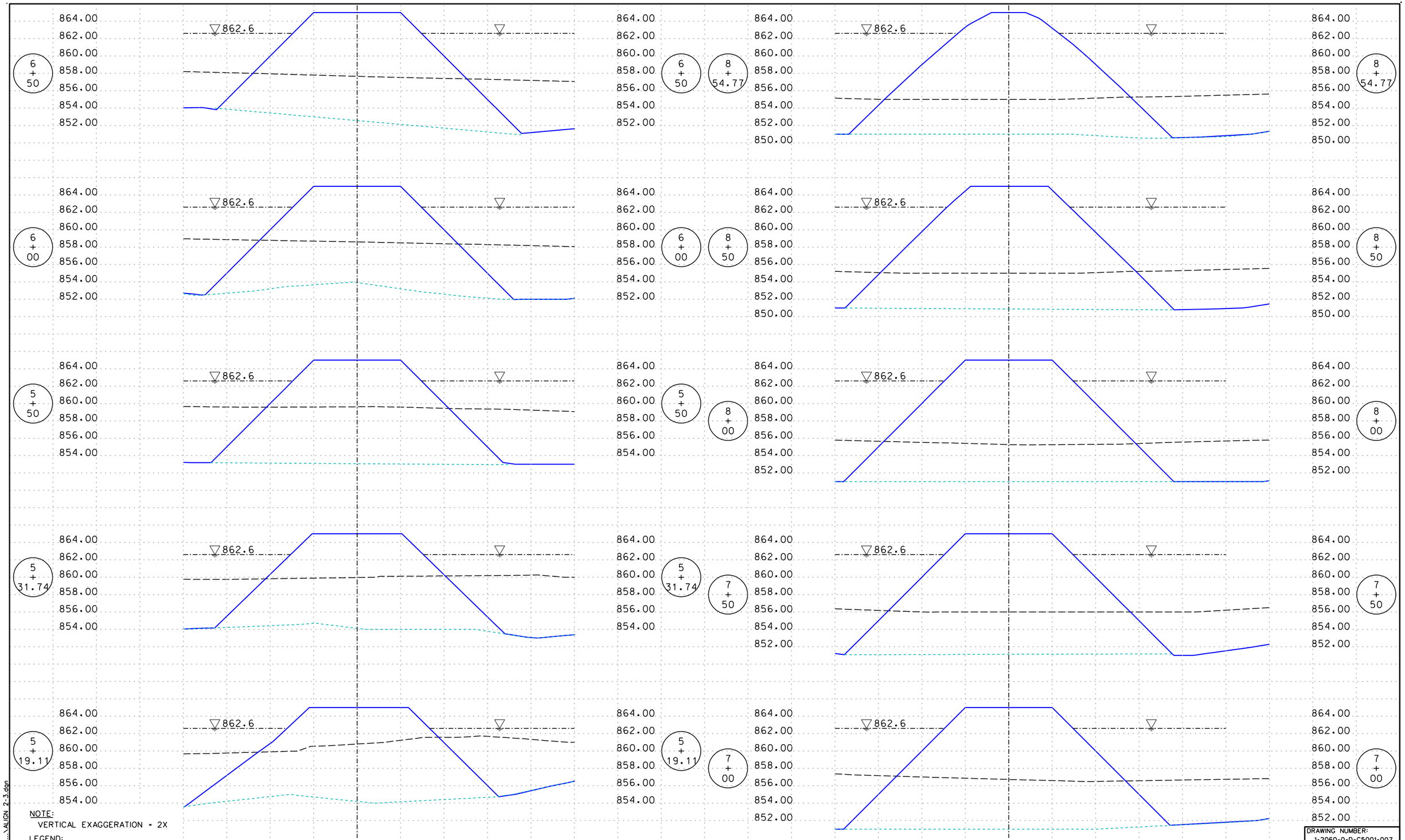
SUTHERLAND GENERATING STATION

TITLE: ALIGNMENT 2
CROSS SECTIONS (2 OF 3)

SHEET 6

DRAWING NUMBER:
1-2060-0-0-C5001-006

4/17/2006 ...\ALIGN 2-2.dgn



NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:
- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE ORIGINAL POND BOTTOM

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
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CHECKED: T. Blair

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SUTHERLAND GENERATING STATION

TITLE: ALIGNMENT 2
CROSS SECTIONS (3 OF 3)

SHEET 7

DRAWING NUMBER:
1-2060-0-D-C5001-007

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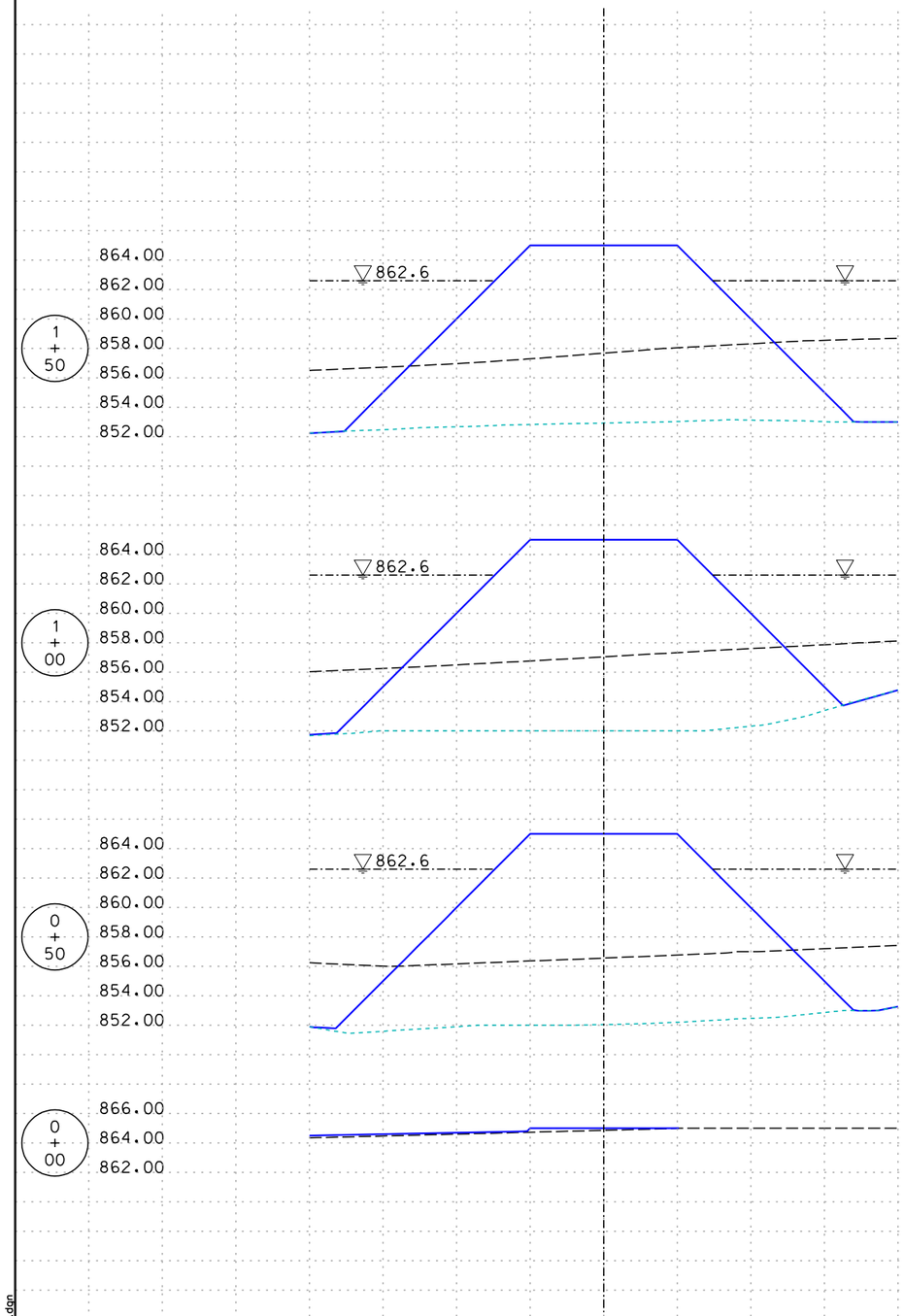
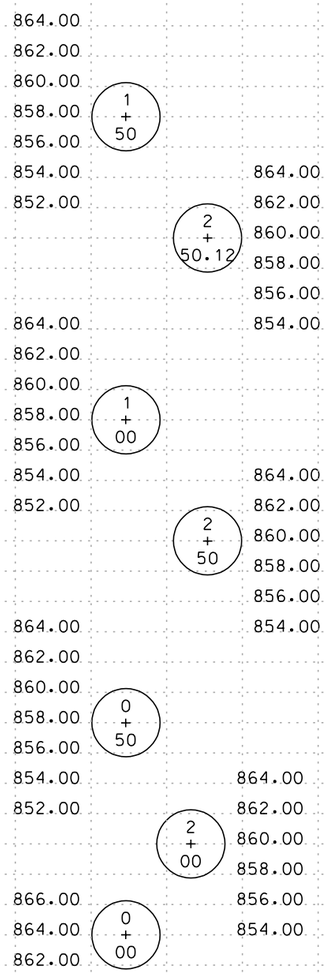
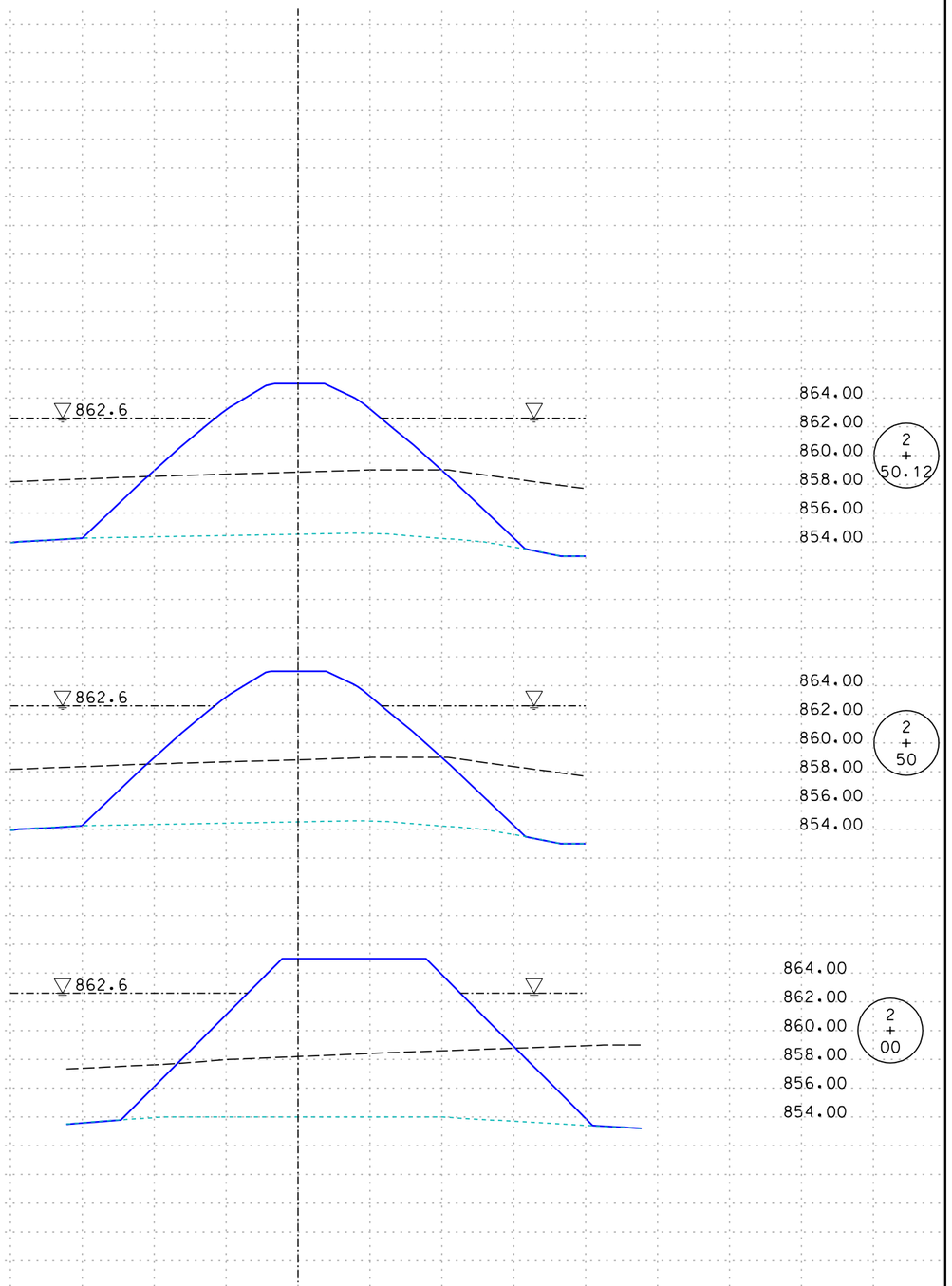
4/17/2006







NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:
- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE ORIGINAL POND BOTTOM

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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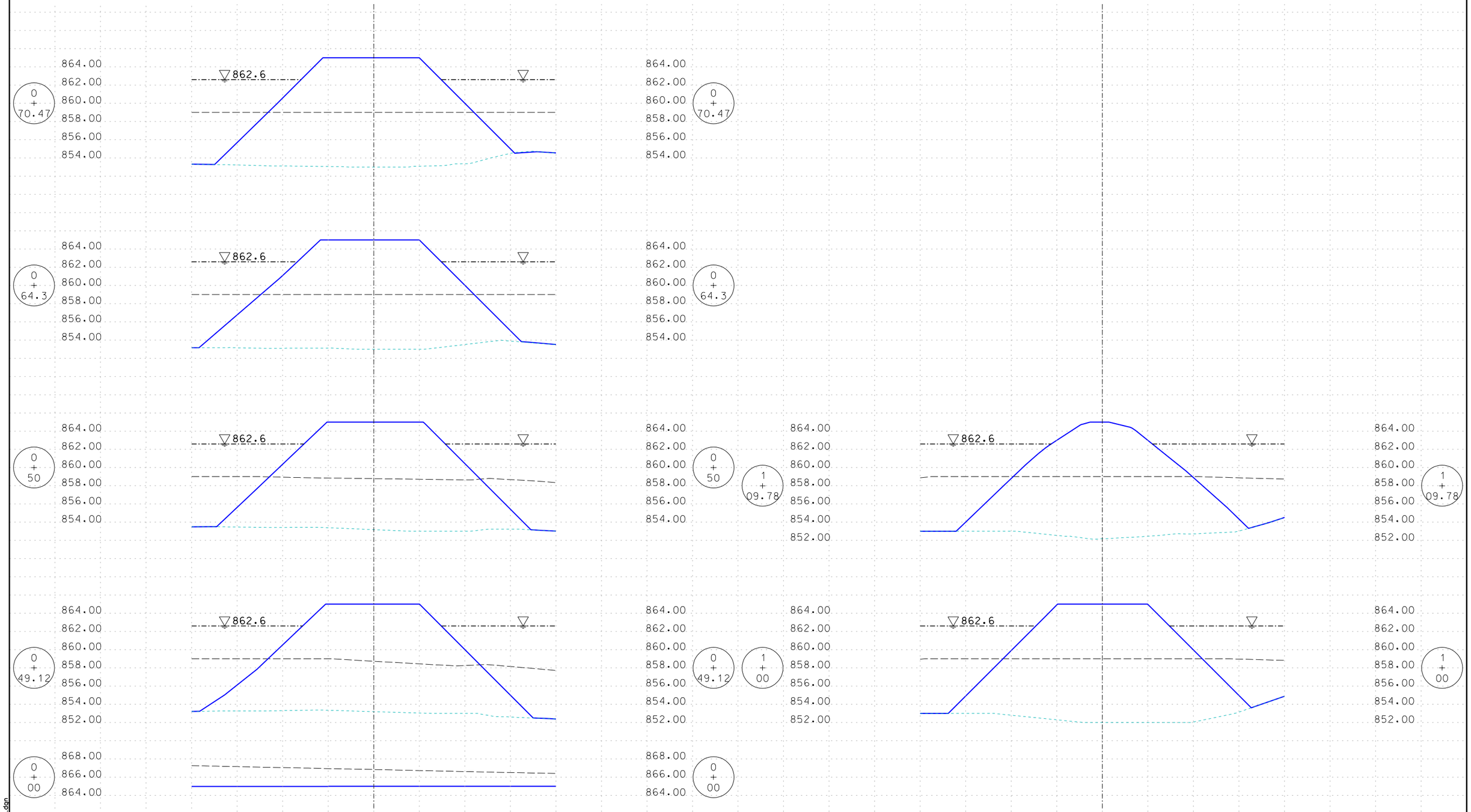
TITLE: ALIGNMENT 3
CROSS SECTIONS

DRAWING NUMBER: 1-2060-0-D-C5001-008

SHEET 8

4/17/2006 ...\ALIGN 3.dgn



NOTE:
VERTICAL EXAGGERATION = 2X

LEGEND:
- NORMAL WATER LEVEL
- EXISTING GRADE (TOP OF SEDIMENT)
- PROPOSED GRADE
- APPROXIMATE ORIGINAL POND BOTTOM

REV	DATE	BY	DESCRIPTION

SCALE: HORIZONTAL
0 10 20
SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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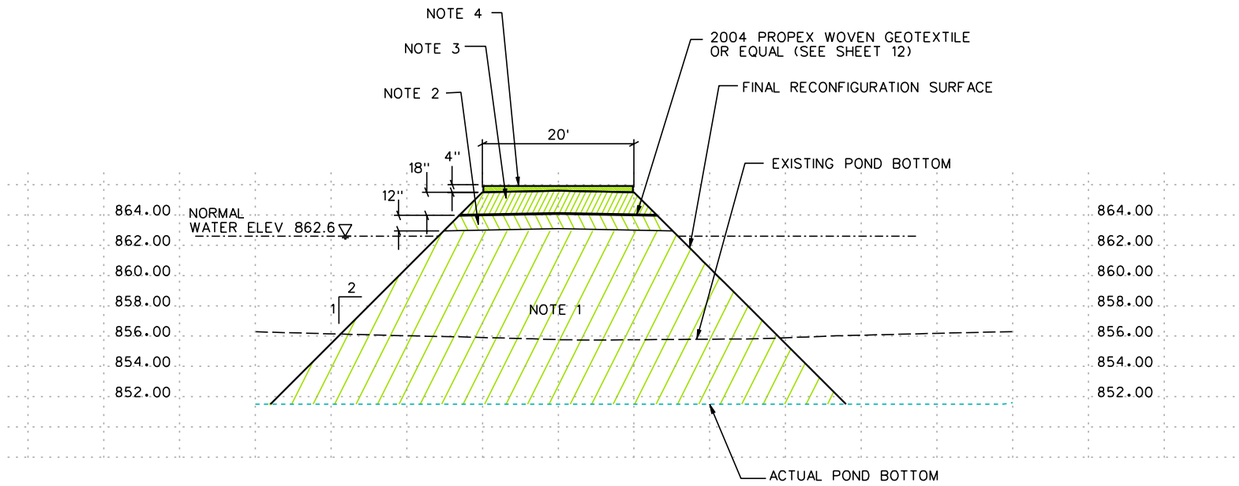
CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: ALIGNMENT 4
CROSS SECTIONS

DRAWING NUMBER:
1-2060-0-D-C5001-009

SHEET
9

...\ALIGN 4.dgn
4/17/2006



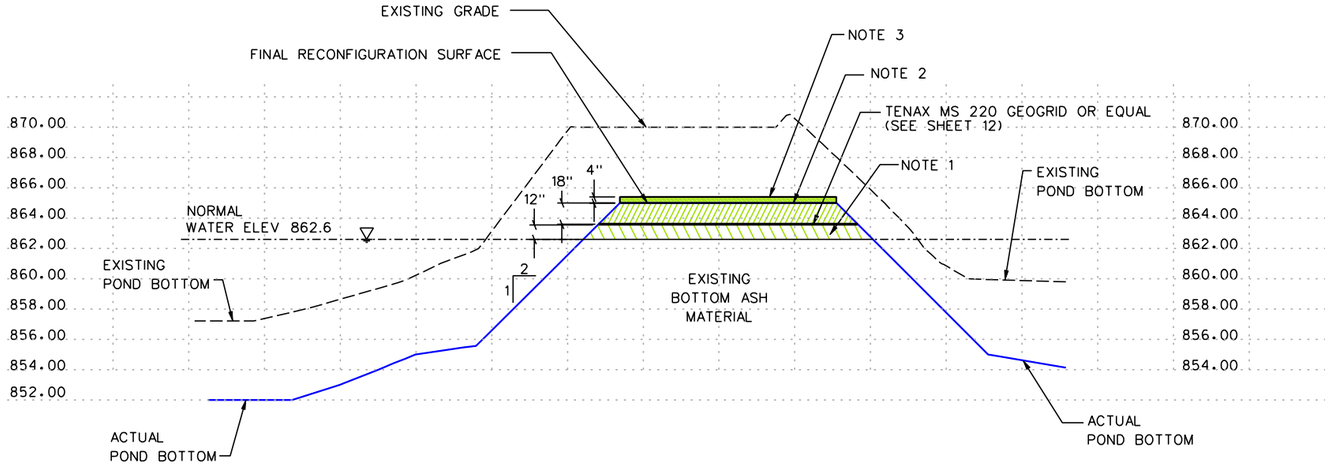
TYPICAL NEW BERM CONSTRUCTION (A/3)

NTS

(SEE NOTE 5)

NOTES:

1. QUARRY SHOT ROCK OR SIZED RECYCLED CONCRETE TO BE 6 TO 24 INCHES IN DIAMETER, PLACED TO ELEVATION 863. MATERIAL TO BE FREE FROM REBAR AND REINFORCEMENT WIRE SHALL NOT STICK OUT MORE THAN 2 INCHES. UP TO 20% OF MATERIAL BY WEIGHT FINER THAN 6" SHALL BE ACCEPTABLE.
2. 12" COMPACTED LIFT OF QUARRY SHOT ROCK OR SIZED RECYCLED CONCRETE TO BE 1½" TO 6 INCHES IN DIAMETER, MATERIAL TO BE FREE FROM REBAR AND REINFORCEMENT WIRE SHALL NOT STICK OUT MORE THAN 2 INCHES. UP TO 20% OF MATERIAL BY WEIGHT FINER THAN 1½" SHALL BE ACCEPTABLE. MATERIAL SHALL BE COMPACTED WITH A SMOOTH DRUM VIBRATING ROLLER WITH FOUR PASSES EACH DIRECTION.
3. 18" THICK LAYER OF AGPAVE, PLACED IN 9 INCH COMPACTED LIFTS. EACH LIFT SHALL BE PLACED AT +/- 2% OF THE OPTIMAL MOISTURE CONTENT AND COMPACTED TO 95% OR WELL GRADED 1½" AND SMALLER SIZED RECYCLED CONCRETE (SEE STANDARD PROCTOR ON SHEET 12)
4. 4" COMPACTED LIFT OF WELL GRADED 1½" AND SMALLER SIZED RECYCLED CONCRETE OR IOWA DOT SPEC 4120.04, 4120.05 SHALL BE NECESSARY IF AGPAVE IS USED.
5. DETAIL "A" APPLIES TO ALIGNMENT 1, ALIGNMENT 2 (STATION 5+00 TO 8+55), ALIGNMENT 3, ALIGNMENT 4.
6. QUANTITIES OF MATERIALS ARE LOCATED ON SHEET 12.



TYPICAL EXISTING BERM RECONSTRUCTION (B/3)

NTS

(SEE NOTE 3)

NOTES:

1. REMOVE BOTTOM ASH TO 12 INCHES ABOVE WATER LINE AND COMPACT WITH A SMOOTH DRUM ROLLER WITH FOUR PASSES EACH DIRECTION.
2. 18" THICK LAYER OF AGPAVE, PLACED IN 9 INCH COMPACTED LIFTS. EACH LIFT SHALL BE PLACED AT +/- 2% OF THE OPTIMAL MOISTURE CONTENT AND COMPACTED TO 95% OR WELL GRADED 1½" AND SMALLER SIZED RECYCLED CONCRETE (SEE STANDARD PROCTOR ON SHEET 12)
3. 4" COMPACTED LIFT OF WELL GRADED 1½" AND SMALLER SIZED RECYCLED CONCRETE OR IOWA DOT SPEC 4120.04, 4120.05 SHALL BE NECESSARY IF AGPAVE IS USED.
4. DETAIL "B" APPLIES TO ALIGNMENT 2, STATION 3+00 TO 5+00.
5. QUANTITIES OF MATERIALS ARE LOCATED ON SHEET 12.

DRAWING NUMBER: 1-2060-0-D-C5001-010

REV	DATE	BY	DESCRIPTION

SCALE: 0 10 20 SCALE IN FEET

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CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: PHASE 2
BERM CONSTRUCTION DETAILS

SHEET 10

...\DETAILS.dgn
5/5/2006

SEDIMENT STORAGE AREA

(APPROXIMATELY 47,000 CU YDS STORAGE CAPACITY)

NORTH PRIMARY SETTLING POND

SOUTH PRIMARY SETTLING POND

SECONDARY SETTLING POND

POLISHING POND

TRUCK ACCESS

ROAD

ACCESS ROAD

ISOLATION BERM

DISCHARGE POND

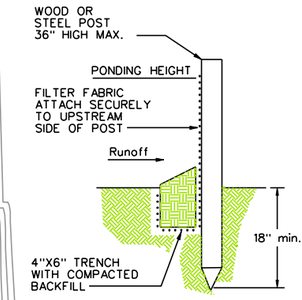
OUTFALL DRAINAGE MANHOLE

DISCHARGE INTO THE DRAINAGE MANHOLE FROM THE PUMP IS EXPECTED TO LAST ONE WEEK. TSS MEASUREMENTS TO BE CHECKED DAILY AT PUMP INTAKE DURING OPERATIONS

16" DIA CARBON STEEL PIPE SLEEVE (NOTE 5)

FENCE TO BE RELOCATED PRIOR TO CONSTRUCTION (BY OTHERS)

SAND BAGS (NOTE 3)



SILT FENCE BARRIER (1/11)

NTS

1/11 SILT FENCE BARRIER

BYPASS PIPE INSTALLED OUTSIDE OF POND AREA SHALL NOT LEAK

16" DIA CARBON STEEL PIPE SLEEVE (NOTE 5)

FLOW TOTALIZER

VARIABLE SPEED PUMP W/ MAX FLOW OF 1,500 GPM (NOTE 2)

N

LEGEND:

- —860— CONTOUR FROM GROUND SURVEY (NOV, 2005 & FEB, 2006)
- WATER LINE
- —865— PROPOSED CONTOURS
- —SF— SILT FENCE

NOTES:

1. BYPASS PIPING SHOWN IN SCHEMATIC AND NOT TO SCALE.
2. PUMP MUST BE GAS POWERED AND THE GAS STORAGE TANK MUST BE A DOUBLE WALLED.
3. TEMPORARY SAND BAGS TO BE PLACED BEFORE FLUME DURING PUMPING OPERATIONS AND SHALL NOT BE REMOVED UNTIL PUMPING IS COMPLETED AND TSS IN THE POLISHING POND DROPS BELOW 30 PPM.
4. BYPASS PIPE INSTALLED OUTSIDE OF POND AREA SHALL NOT LEAK.
5. PIPE SLEEVE INVERT ELEVATION NO LOWER THAN 864.0. MODIFY ACCESS ROAD AS NEEDED WITH ONSITE MATERIAL TO ALLOW TRAFFIC FLOW WHILE PROTECTING PIPE SLEEVES. PIPE SLEEVES TO BE REMOVED AND ROAD RESTORED TO ORIGINAL CONDITIONS WHEN BYPASS PUMPING IS COMPLETE.
6. SEDIMENT STORAGE AREA AND REGADING TO CONSTRUCT BERMS REQUIRES AN ESTIMATED A CUT OF 5,500 CU YDS AND A FILL OF 18,200 CU YDS. THE CUT MATERIAL MAY BE REUSED FOR FILL AND ADDITIONAL FILL MATERIAL NEEDED WILL COME FROM THE ASH BERM REMOVAL AREA.

DRAWING NUMBER: 1-2060-0-D-C5001-0

REV	DATE	BY	DESCRIPTION

SCALE: 0 30 60 SCALE IN FEET

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

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CLIENT: INTERSTATE POWER & LIGHT
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TITLE: PHASE 2 POLISHING POND AND SEDIMENT STORAGE DREDGING PLAN

SHEET 11

4/19/2006 ...\SED AREA.DGN

SEQUENCE OF CONSTRUCTION ACTIVITIES

THE FOLLOWING SEQUENCE OF OPERATIONS SHALL BE USED BY THE CONTRACTOR TO COMPLETE THE WORK DESCRIBED WITHIN THE PHASE II DESIGN:

1. THE SEDIMENT STORAGE AREA (SSA) (SEE SHEET 11) SHALL BE CONSTRUCTED FROM THE EXISTING BOTTOM ASH PILES SHOWN ON SHEET 1. THE NON-SATURATED MATERIAL REMOVED FROM THE BOTTOM ASH REMOVAL AREAS (BARAS) SHOWN ON SHEET 2, THE MATERIAL FROM THE TOP OF THE EXISTING FLOW DIVERSION TO PROVIDE ACCESS TO ALIGNMENT 4 (SHOWN ON SHEET 3), AND THE BOTTOM ASH MATERIAL REMOVED FOR THE EXISTING FLOW DIVERSION BERM STABILIZATION ON SHEET 3. THE SSA SHALL BE GRADED TO DRAIN INTO THE SECONDARY SETTLING POND (SSP) TO PROMOTE DEWATERING OF THE DREDGED SEDIMENTS. LIQUIDS GENERATED FROM THE DREDGED SEDIMENTS SHALL NOT DISCHARGE OFF SITE.

2. AFTER THE MATERIAL HAS BEEN REMOVED FROM THE BARAS AND PLACED IN THE SSA, THE STABILIZATION ACTIVITIES ON THE EXISTING FLOW DIVERSION BERM SHALL COMMENCE. THE STABILIZATION ACTIVITIES SHALL CONSIST OF REMOVAL OF BOTTOM ASH DOWN TO 1 FOOT ABOVE THE NORMAL WATER LEVEL, COMPACTION OF THE BOTTOM ASH SUBGRADE, PLACEMENT OF THE GEOGRID PER THE SPECIFIED INSTALLATION INSTRUCTIONS, AND PLACEMENT OF TWO NINE-INCH COMPACTED LIFTS OF AGPAVE AND SHOWN IN DETAIL B ON SHEET 10. THE AGPAVE MATERIAL IS AVAILABLE ON SITE WITH IN A QUARTER MILE AND MAY REQUIRE A HYDRAULIC HAMMER ATTACHMENT TO BREAK APART. THE CONTRACTOR IS RESPONSIBLE TO TRANSPORT, PLACE, AND COMPACT THE AGPAVE MATERIAL. THE STABILIZATION ACTIVITIES SHALL BE CONDUCTED ON ALIGNMENT 2 AT STATIONS 3+00 TO 5+00.

3. ONCE THE STABILIZATION ACTIVITIES OF THE EXISTING FLOW DIVERSION BERM HAVE BEEN COMPLETED, THE FLOW DIVERSION BERMS ON ALIGNMENTS 2 STATIONS 5+00 TO 8+60, 3, AND 4 SHALL BE CONSTRUCTED PER DETAIL A ON SHEET 10. THESE BERMS SHALL CONSIST OF LARGER STONE AT THE BOTTOM THAT WILL DISPLACE THE EXISTING SEDIMENT. THE TOP SHALL BE PLACED AT ELEVATION 863.0. A WELL-GRADED MATERIAL SHALL BE PLACED AND COMPACTED ATOP THE LARGE ROCK MATERIAL IN A 12-INCH LIFT FOLLOWED BY PLACEMENT OF THE GEOTEXTILE PER THE SPECIFIED INSTALLATION INSTRUCTIONS, AND PLACEMENT OF TWO NINE-INCH COMPACTED LIFTS OF AGPAVE.

4. ALIGNMENT 1 FLOW DIVERSION BERM SHALL BE CONSTRUCTED DIFFERENTLY THAN ALIGNMENTS 2 THROUGH 4. THE EXISTING MATERIAL IS UNSTABLE AND IS NOT A SUITABLE BASE MATERIAL FOR THE FLOW DIVERSION BERMS, THEREFORE THE MATERIAL MUST BE REMOVED DOWN TO A STABLE SUBGRADE (APPROVED BY IP&L) BEFORE THE LARGER STONE SHALL BE PLACED. AFTER THE STABLE SUBGRADE IS APPROVED BY IP&L, THE BERM MAY BE CONSTRUCTED AS DESCRIBED ABOVE FOR ALIGNMENTS 2 THROUGH 4.

5. DREDGING SHALL BE COMPLETED DOWN TO THE ORIGINAL POND BOTTOM. THE BOTTOM SHALL BE DETERMINED BY EITHER REFUSAL OR BY THE TYPE OF MATERIAL DREDGED FROM THE POND. THE BOTTOM ASH SEDIMENT IS SIGNIFICANTLY DIFFERENT IN APPEARANCE THAN THE CLAY THAT IS LOCATED BELOW THE SEDIMENTS. THE CONTRACTOR SHALL NOT REMOVE THE CLAY POND BOTTOM.

6. DREDGING ACTIVITIES SHALL BE STARTED IN THE SSP WHILE THE POND EFFLUENT IS MONITORED FOR TOTAL SUSPENDED SOLIDS (TSS). IT IS THE CONTRACTOR'S RESPONSIBILITY, ALONG WITH IP&L, FOR THE POND DISCHARGE TSS TO BE BELOW THE 30 PARTS PER MILLION (PPM) PER REGULATORY REQUIREMENT. BASED ON THE FIELD INVESTIGATION REPORT, POLYMER ADDITION WILL BE NECESSARY DURING DREDGING ACTIVITIES IN THE SSP. IP&L WILL SUPPLY THE POLYMER TO TREAT THE WATER AT THE POLISHING POND MIXING CHANNEL. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MINIMIZE TSS BY MONITORING THEIR ACTIVITY'S IMPACT UPON THE POND QUALITY. IF TSS TESTING DETERMINES THAT THE POND DISCHARGE HAS EXCEEDED LIMITS, THEN THE CONTRACTOR'S WORK MAY BE STOPPED BY IP&L UNTIL CORRECTIVE ACTIONS ARE TAKEN.

7. THE POLISHING POND SHALL BE DREDGED AFTER THE SSP DREDGING HAS BEEN COMPLETED. BEFORE THE CONTRACTOR INSTALLS THE BYPASS PUMPING SYSTEM FOR DREDGING OF THE POLISHING POND (SHOWN ON SHEET 11), A TSS SAMPLE MUST BE COLLECTED FROM THE WATER IN THE SSP 6-INCHES BELOW THE WATER SURFACE IMMEDIATELY BEFORE THE POLISHING POND. THE SAMPLE RESULT MUST BE BELOW 30 PPM. AFTER A PASSING TEST IS COLLECTED THE SANDBAGS SHALL BE INSTALLED AND THE BYPASS PUMPING SYSTEM OPERATED FOR THE DURATION OF THE POLISHING POND DREDGING ACTIVITIES. PUMP OPERATION MUST BE MANNED 24-HOURS A DAY AND THE SSP ELEVATION SHALL BE MAINTAINED AT AN ELEVATION OF 861.5. THE SEDIMENTS MUST ME REMOVED TO THE DEPTH SHOWN ON SHEET 3 OR AS OTHERWISE APPROVED BY IP&L. DREDGING SHALL BE COMPLETED DOWN TO THE ORIGINAL POND BOTTOM. THE BOTTOM SHALL BE DETERMINED BY IP&L PERSONNEL AND SHALL LARGELY DEPEND ON REFUSAL OR THE TYPE OF MATERIAL DREDGED FROM THE POND. BOTTOM ASH SEDIMENT IS SIGNIFICANTLY DIFFERENT IN APPEARANCE THAN THE CLAY THAT IS LOCATED BELOW THE SEDIMENTS. THE CONTRACTOR SHALL NOT REMOVE THE CLAY POND BOTTOM. AFTER DREDGING OF THE POND IS COMPLETED, A TSS SAMPLE SHALL BE COLLECTED NEAR THE DISCHARGE FLUME, FROM 6-INCHES BELOW THE WATER SURFACE AND SHALL BE LESS THAT 30 PPM. AFTER A PASSING SAMPLE IS COLLECTED, THE PUMP SHALL BE SHUT DOWN, THE SANDBAGS REMOVED, AND THE SETTLING POND SHALL BE RETURNED TO NORMAL OPERATING CONDITIONS.

GEOGRID INSTALLATION INSTRUCTIONS:

1. PREPARATION:
CONTACTOR SHALL COMPACT THE SUBGRADE USING A SMOOTH DRUM ROLLER WITH 4 PASSES EACH DIRECTION. THE CONTRACTOR SHALL PROVIDE A SURFACE THAT IS SMOOTH AND FREE OF STUMPS, SHARP OBJECTS, AND DEBRIS THAT MAY DAMAGE THE GEOGRID.

2. INSTALLATION:
UNROLL GEOGRIDS ON THE SUBGRADE AND APPLY TENSION BY HAND TO ELIMINATE WRINKLES. GEOGRID PANEL SHALL BE OVERLAPPED 2 FEET SIDE BY SIDE AND END TO END. ADJACENT GEOGRID ROLLS SHOULD BE OVERLAPPED IN THE DIRECTION OF ANTICIPATED FILL SPREADING.

3. NO EQUIPMENT SHALL DRIVE DIRECTLY ACROSS GEOGRID. A MINIMUM OF FOUR INCHES OF FILL IS REQUIRED BETWEEN THE GEOGRID AND THE OPERATING VEHICLES. TIGHT TURNS, SUDDEN STOPS, OR SPINNING OF TRACKS IN PROHIBITED.

4. LOW GROUND PRESSURE TRACTORS AND LOW TIRE PRESSURES (LESS THAN 4 PSI) ARE RECOMMENDED FOR HAULING AND SPREADING FILL OVER SOFT SUBGRADE. BACK DUMP SPECIFIED FILL MATERIALS ONTO THE GEOGRID WHERE THE SUBGRADE IS MOST STABLE, THEN SPREAD THE FILL OVER THE GEOGRID OUT TOWARD THE WEAKER SUBGRADE.

5. THE FILL MATERIAL ON THE GEOGRID SHOULD BE FREE FROM HAUL TRUCKS RIDING UNTIL THE TOTAL COMPACTED FILL THICKNESS HAS BEEN ACHIEVED. ANY RUTS DEVELOPED DURING SPREADING OR COMPACTING MUST BE FILLED WITH ADDITIONAL FILL MATERIAL TO REACH THE DESIGN THICKNESS.

6. AGPAVE MATERIAL PLACED ATOP THE GEOGRIDS SHALL BE PLACED IN TWO, 9-INCH COMPACTED LIFTS. EACH LIFT OF AGPAVE SHALL BE PLACED AT +/- 2% OF OPTIMUM MOISTURE CONTENT AND COMPACTED TO 95% OF THE STANDARD PROCTOR SHOWN ON THIS SHEET.

7. REPAIR:
GEOGRID SECTIONS DAMAGED DURING INSTALLATION MUST BE REPAIRED BY PATCHING. PLACE A GEOGRID PATCH TO COVER DAMAGED GEOGRID AREA AND EXTEND 3 FEET BEYOND IN ALL DIRECTIONS. AGPAVE SHALL BE PLACED AND COMPACTED ACCORDING TO THE REQUIREMENTS ABOVE.

8. PROTECTION:
THE GEOGRID SHALL BE PROTECTED FROM LONG-TERM EXPOSURE TO DIRECT SUNLIGHT DURING TRANSPORT AND STORAGE. AFTER PLACEMENT, THE GEOGRID SHALL NOT BE LEFT UNCOVERED FOR MORE THAN THREE (3) WEEKS.

COMPACTION TEST REPORT

Curve No.: AG PAVE

Project No.: 0744351-20 **Date:** 3/9/06
Project: MISC. LAB TESTS
INTERSTATE POWER & LIGHT
Location:
Elev./Depth:
Remarks:

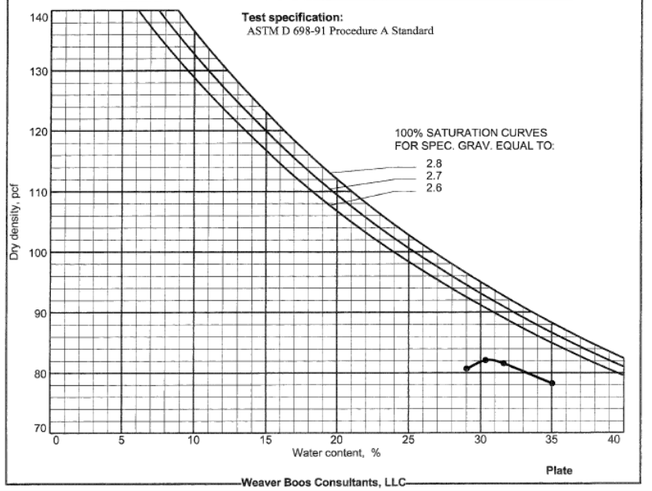
MATERIAL DESCRIPTION

Description: GRAY AGG PAVE MATERIAL

Classifications - **USCS:** **AASHTO:**
Nat. Moist. = **Sp.G. =** 2.75
Liquid Limit = **Plasticity Index =**
% > No.4 = 0.0 % **% < No.200 =** 50.1 %

TEST RESULTS
Maximum dry density = 82.1 pcf
Optimum moisture = 30.6 %

Test specification:
ASTM D 698-91 Procedure A Standard



Plate

Weaver Boos Consultants, LLC

GEOTEXTILE INSTALLATION INSTRUCTIONS:

1. PREPARATION:
CONTRACTOR SHALL PROVIDE A SURFACE THAT IS CLEARED OF TREE STUMPS, LARGE STONES, AND OTHER SHARP OBJECTS THAT COULD PUNCTURE THE FABRIC. CONTRACTOR SHALL COMPACT THE SUBGRADE USING A VIBRATORY SMOOTH DRUM ROLLER WITH FOUR (4) PASSES EACH DIRECTION.

2. INSTALLATION:
UNROLL GEOTEXTILES ON THE SUBGRADE AND APPLY TENSION BY HAND TO ELIMINATE WRINKLES. GEOTEXTILE PANELS SHALL OVERLAP TWO (2) FEET, BOTH SIDE BY SIDE AND END TO END, IN THE DIRECTION OF AGGREGATE PLACEMENT.

3. AGGREGATE PLACEMENT SHALL BE COMPLETED IN ACCORDANCE WITH SHEET 10. ON VERY SOFT SUBGRADES, ENSURE THAT THE FABRIC IS NOT MOVED OUT OF POSITION OR THE SUBGRADE OVERSTRESSED. NO EQUIPMENT SHALL DRIVE DIRECTLY ACROSS THE GEOTEXTILE. SUDDEN STOPS, TIGHT TURNS, OR SPINNING OF TRACKS IS PROHIBITED.

4. REPAIR:
GEOTEXTILE SECTIONS DAMAGED DURING INSTALLATION MUST BE REPAIRED BY PATCHING. PLACE A GEOTEXTILE PATCH OVER DAMAGED GEOTEXTILE AREA AND EXTEND 2 FEET BEYOND IN ALL DIRECTIONS. AGGREGATE SHALL BE REPLACED AND COMPACTED PER SPECIFICATION.

5. PROTECTION:
THE GEOTEXTILE SHALL BE PROTECTED FROM LONG-TERM EXPOSURE TO DIRECT SUNLIGHT DURING TRANSPORT AND STORAGE. AFTER PLACEMENT, THE GEOTEXTILE SHALL NOT BE LEFT UNCOVERED FOR MORE THAN THREE (3) WEEKS.

ALIGNMENT STATIONS

PI*	STATION	NORTHING	EASTING	ANGLE	Distance
ALIGNMENT 1					
BOP	0+00.00	3481046.07	5096314.55	NE90.0000	72.19
1	0+72.19	3481046.07	5096386.74	NE70.1137	27.89
2	1+00.08	3481055.52	5096412.98	NE58.0052	100
3	2+00.08	3481108.49	5096497.79	NE52.3757	16.02
EOP	2+16.10	3481118.21	5096510.53		
ALIGNMENT 2					
BOP	0+00.00	3481127.91	5096634.68	SW21.2607	52.07
1	0+52.07	3481079.44	5096615.65	SW51.2119	233.23
2	2+85.30	3480933.79	5096433.49	SW54.0313	94.54
3	3+79.84	3480878.29	5096356.95	SW34.4357	36.89
4	4+16.74	3480847.97	5096335.93	SW13.2801	52
5	4+68.74	3480797.40	5096323.82	SW1.1204	15.74
6	4+84.48	3480781.66	5096323.49	SE23.5517	18.42
7	5+02.90	3480764.82	5096330.96	SE48.0733	16.21
8	5+19.11	3480754.00	5096343.03	SE74.5624	12.62
9	5+31.74	3480750.72	5096355.22	NE90.0000	323.04
EOP	8+54.77	3480750.72	5096678.26		
ALIGNMENT 3					
BOP	0+00.00	3480870.72	5096777.62	NW90.0000	250.12
EOP	2+50.12	3480870.72	5096527.5		
ALIGNMENT 4					
BOP	0+00.00	3481038.73	5096581.48	SE39.0634	49.12
1	0+49.12	3481000.62	5096612.46	SE57.2355	15.18
2	0+64.30	3480992.44	5096625.25	SE75.2808	6.18
3	0+70.47	3480990.89	5096631.23	SE89.5210	39.31
EOP	1+09.78	3480990.8	5096670.54		

ESTIMATED MATERIAL QUATITIES

ITEM	APPROX. SQUARE FEET	APPROX. CUBIC YARDS
0" - 1.5" ROAD STONE	36,200	450
1.5" - 6" ROCK	NA	800
6" - 24" ROCK	NA	16,700
AGPAVE	NA	1,900
GEOTEXTILE	24,200	NA
GEOGRID	10,000	NA
TOTAL SEDIMENT IN POND	NA	38,000
TOTAL SEDIMENT IN POND AFER BERM PLACEMENT	NA	29,200
APPROX. QTY. OF SEDIMENT TO BE DREDGED	NA	35,000
ASH BERM TO BE REMOVED	NA	19,300

4/19/2006 ...\SHEET 12.dgn

REV	DATE	BY	DESCRIPTION

SCALE: NONE

DESIGNED: M. Loerop
DRAWN: HHSI
CHECKED: T. Blair

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

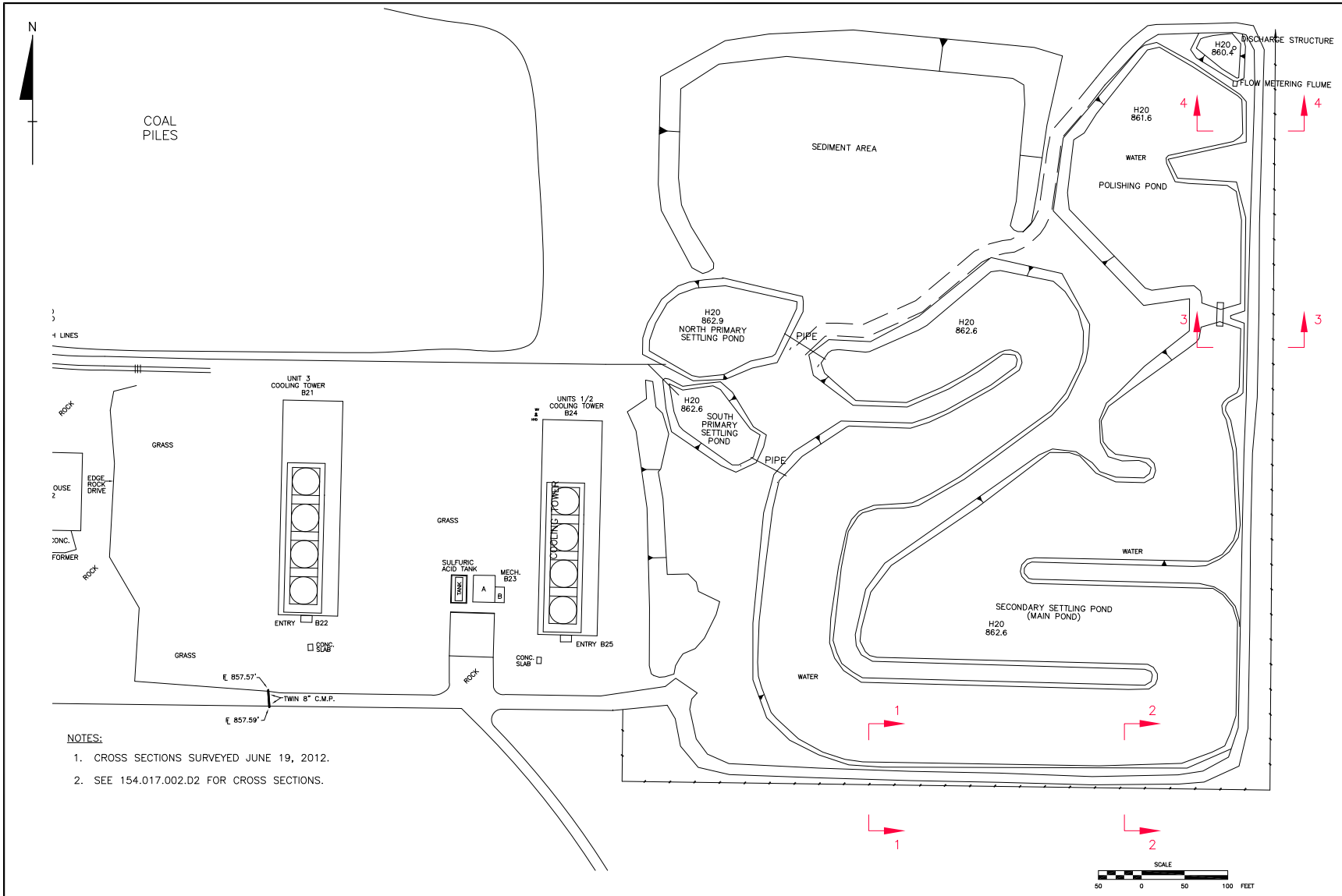
940 E. Diehl Rd, Suite 150
Naperville, IL 60563
(630) 637-9470

CLIENT: INTERSTATE POWER & LIGHT
SUTHERLAND GENERATING STATION

TITLE: CONSTRUCTION REQUIREMENTS AND ALIGNMENT COORDINATES

DRAWING NUMBER: 1-2060-0-D-C5001-012

SHEET 12



NOTES:

1. CROSS SECTIONS SURVEYED JUNE 19, 2012.
2. SEE 154.017.002.D2 FOR CROSS SECTIONS.

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

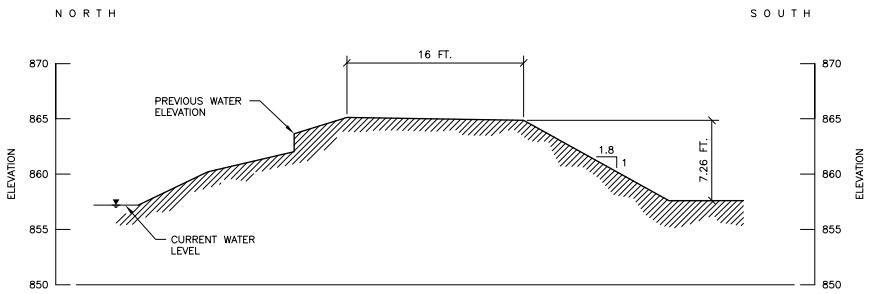
aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	06-26-2012
DRAWN BY:	M___A___M
CHKD. BY:	
APPROVED:	

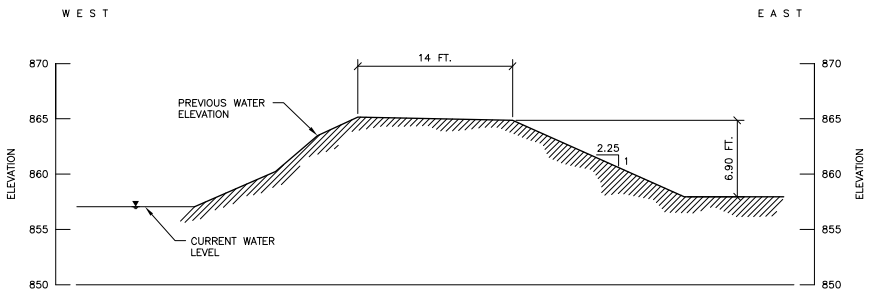
CLIENT / LOCATION
INTERSTATE POWER & LIGHT COMPANY
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION
CROSS SECTION LOCATIONS

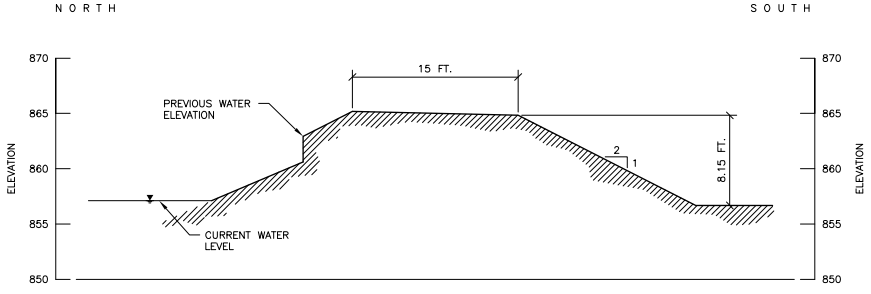
JOB 154.017.002
SHT. SHEET 1
DWG. 154.017.002.D1



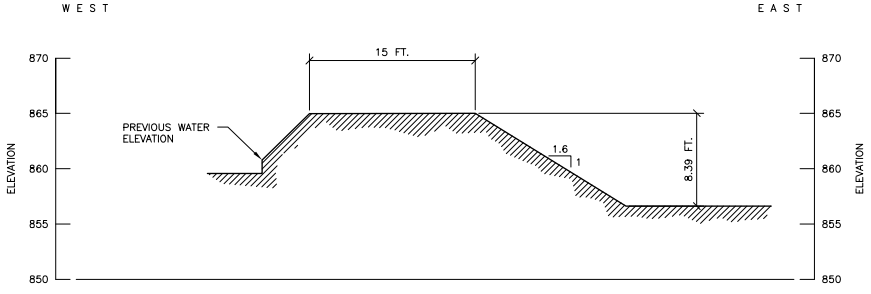
LOCATION 1



LOCATION 3



LOCATION 2



LOCATION 4

NOTES:

1. CROSS SECTIONS SURVEYED JUNE 19, 2012.

SCALE (HORIZONTAL AND VERTICAL)
5 0 5 10 FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	06-26-2012
DRAWN BY:	M___A___M
CHKD. BY:	
APPROVED:	

CLIENT / LOCATION
INTERSTATE POWER & LIGHT COMPANY
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION
CROSS SECTIONS

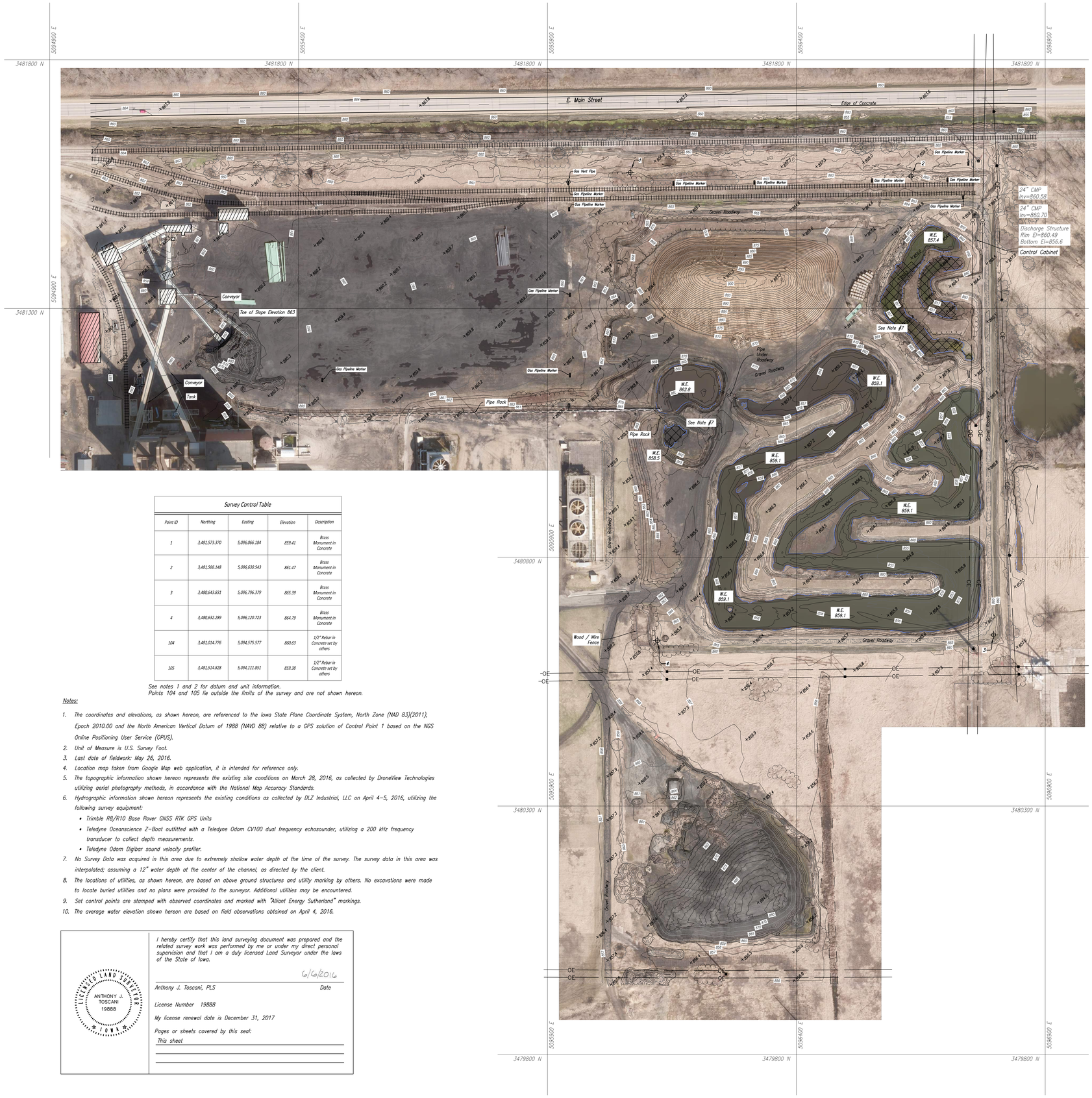
JOB 154.017.002
SHT. SHEET 2
DWG. 154.017.002.D2

Location Map

Not to Scale

160 0 80 160

Scale: 1" = 80'



Survey Control Table				
Point ID	Northing	Easting	Elevation	Description
1	3,481,573.370	5,096,066.184	859.41	Brass Monument in Concrete
2	3,481,566.148	5,096,630.543	861.47	Brass Monument in Concrete
3	3,480,643.831	5,096,796.379	865.39	Brass Monument in Concrete
4	3,480,632.289	5,096,120.723	864.79	Brass Monument in Concrete
104	3,481,014.776	5,094,575.577	860.63	1/2" Rebar in Concrete set by others
105	3,481,514.828	5,094,111.851	859.38	1/2" Rebar in Concrete set by others

See notes 1 and 2 for datum and unit information.
Points 104 and 105 lie outside the limits of the survey and are not shown hereon.

Legend:

- Intermediate Contour Line (701)
- Index Contour Line (700)
- Survey Control
- Spot Elevation (x 859.2)
- W.E. 859.1 — Water Elevation (on April 4, 2016)
- Sign
- Light Pole
- Utility Pole
- Deciduous Tree
- Discharge Structure
- Alliant Energy Gas Line Marker
- Alliant Energy Gas Line Vent
- Post
- Manhole
- Railroad
- Fence Line
- Vegetation Line
- Edge of Water
- Gravel Drive
- OE — Overhead Electric Line
- Existing Building
- Gravel Roadway
- See Note #7

Notes:

1. The coordinates and elevations, as shown hereon, are referenced to the Iowa State Plane Coordinate System, North Zone (NAD 83)(2011), Epoch 2010.00 and the North American Vertical Datum of 1988 (NAVD 88) relative to a GPS solution of Control Point 1 based on the NGS Online Positioning User Service (OPUS).
2. Unit of Measure is U.S. Survey Foot.
3. Last date of fieldwork: May 26, 2016.
4. Location map taken from Google Map web application, it is intended for reference only.
5. The topographic information shown hereon represents the existing site conditions on March 28, 2016, as collected by DroneView Technologies utilizing aerial photography methods, in accordance with the National Map Accuracy Standards.
6. Hydrographic information shown hereon represents the existing conditions as collected by DLZ Industrial, LLC on April 4–5, 2016, utilizing the following survey equipment:
   - Trimble R8/R10 Base Rover GNSS RTK GPS Units
   - Teledyne Oceanscience Z-Boat outfitted with a Teledyne Odom CV100 dual frequency echosounder, utilizing a 200 kHz frequency transducer to collect depth measurements.
   - Teledyne Odom Digibar sound velocity profiler.
7. No Survey Data was acquired in this area due to extremely shallow water depth at the time of the survey. The survey data in this area was interpolated; assuming a 12" water depth at the center of the channel, as directed by the client.
8. The locations of utilities, as shown hereon, are based on above ground structures and utility marking by others. No excavations were made to locate buried utilities and no plans were provided to the surveyor. Additional utilities may be encountered.
9. Set control points are stamped with observed coordinates and marked with "Alliant Energy Sutherland" markings.
10. The average water elevation shown hereon are based on field observations obtained on April 4, 2016.

I hereby certify that this land surveying document was prepared and the related survey work was performed by me or under my direct personal supervision and that I am a duly licensed Land Surveyor under the laws of the State of Iowa.

6/6/2016

Anthony J. Toscani, PLS — Date

License Number 19888

My license renewal date is December 31, 2017

Pages or sheets covered by this seal:

This sheet

DLZ
DLZ INDUSTRIAL, LLC
316 TECH DRIVE, BURNS HARBOR, INDIANA 46304
TELEPHONE (219) 764-4700 FAX (219) 764-4156

BY	DATE
KJM	6/6/2016

NO.	REVISION
1	Add Utility Markers and Drainage Structures

DRAWN: KJM CHK'D: CDC
DESIGNED: - APPR'D: AJT
DATE: May 6, 2016
SCALE: 1"=80'

PROJECT NUMBER 1650-9520-90

Iowa

Marshalltown

Sargent & Lundy, LLC
Alliant Energy

Sutherland Generating Station
Topographic Survey

SHEET 1
OF 1

DRAWING NUMBER 952010

P:\PROJ\1650\9520 - S&L ALLIANT ENERGY SUTHERLAND\TOPOGRAPHIC\952010-SUTHERLAND.DWG