



# HISTORY OF CONSTRUCTION

## HISTORY OF CONSTRUCTION

**Upstream Raise CCR Surface Impoundment  
Coal Creek Station  
Great River Energy**

**Submitted To:** Great River Energy  
Coal Creek Station  
2875 Third Street SW  
Underwood, North Dakota 58576

**Submitted By:** Golder Associates Inc.  
44 Union Boulevard, Suite 300  
Lakewood, Colorado 80228

**October 13, 2016**

**1649586**







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## 1.0 INTRODUCTION

### 1.1 Purpose

Golder Associates Inc. (Golder) has prepared the following History of Construction for the Upstream Raise CCR Surface Impoundment (Upstream Raise) at Great River Energy's (GRE's) Coal Creek Station (CCS). The Environmental Protection Agency's (EPA's) Coal Combustion Residual (CCR) Rule, 40 Code of Federal Regulations (CFR) Part 257, promulgated April 17, 2015 and effective October 19, 2015, requires compilation of the information specified in §257.73(c) to detail the construction history of CCR facilities no later than October 17, 2016 for facilities with either height of 5 feet or more and a storage volume of 20 acre-feet, or a height of more than 20 feet.

### 1.2 Site Background

Coal Creek Station is located in McLean County, approximately 10 miles northwest of Washburn, North Dakota. The Upstream Raise footprint comprises approximately 103 acres and is used as a combined dewatering and storage facility for CCRs including fly ash, bottom ash, and flue-gas desulfurization (FGD) material. The Upstream Raise consists of two connected underlying facilities: Ash Pond 92 and Southwest Section 16.

## 2.0 OWNER, OPERATOR, AND UNIT IDENTIFICATION (§257.73(C)(1)(II))

Coal Creek Station (and the Upstream Raise) is currently owned and operated by Great River Energy (GRE).

Corporate Address:

Great River Energy  
12300 Elm Creek Boulevard  
Maple Grove, Minnesota 55369

Coal Creek Station Address:

Great River Energy  
Coal Creek Station  
2875 Third Street SW  
Underwood, North Dakota 58576

The North Dakota Department of Health (NDDH) Division of Waste Management is the environmental regulatory body for the CCR facilities at CCS. The Upstream Raise is currently permitted with the North Dakota Department of Health (NDDH) under Permit Number 0033.





### 3.0 HISTORY OF CONSTRUCTION

#### 3.1 Location of Unit (§257.73(c)(1)(ii))

The Upstream Raise is located in the southwest ¼ of Section 16 of Township 145 North, Range 82 West, in McLean County, North Dakota. Figure 1 shows the location of the Upstream Raise on the most recent USGS topographic map, and Figure 2 shows the location of the Upstream Raise on a recent aerial photograph.

#### 3.2 Purpose (§257.73(c)(1)(iii))

The Upstream Raise is used as a combined dewatering and storage facility for CCRs including fly ash, bottom ash, and flue-gas desulfurization (FGD) material and will be closed with CCR materials in place.

#### 3.3 Watershed Information (§257.73(c)(1)(iv))

The Upstream Raise is located within the following Hydrologic Unit (Watershed-Based Performance Management Using Hydrologic Unit, ND 2016) per the Natural Resources Conservation Service (NRCS): Hydrologic Unit 12 Subwatershed 101301010701 Weller Slough-Coal Lake Coulee (40,582 acres).

#### 3.4 Foundation Information (§257.73(c)(1)(v))

The location of the Upstream Raise was originally characterized by Burns & McDonnell in 1973. A hydrogeologic study was performed for CCS by Barr Engineering in 1982 and an evaluation of the pond bottom conditions of the southwest portion of Section 16 was completed in 1986 by Eugene A. Hickok & Associates. Site geology, soils, and hydrology, including drainage and surface water flow, were examined during these prior studies to determine site suitability for disposal of CCRs. Additional subsurface field investigations were performed by Golder in 2001 and 2003 (Golder 2004b). Foundation soils consist of existing natural soils and are generally classified as lean clays, clayey sands, and fat clays. Sandy lean clays dominant the existing natural soils with an effective cohesion of 500 pounds per square foot (psf) and an effective friction angle of 19 degrees (based on shear strength testing).

The foundation soils of the west side of the Upstream Raise consist of native soils (sandy and silty-clay) and embankment fill materials sourced from nearby native soils (sandy and silty clay). The west side of the Upstream Raise was cleaned out, deepened, and relined in 1989 (Foth & Van Dyke 1990). According to construction documents, the foundation materials were compacted to 90% standard Proctor density.

Based on the report by Eugene A. Hickok & Associates (1986), the east side of the Upstream Raise was excavated into clay-rich material. The clay-rich zone is approximately 15 to 30 feet thick and is underlain by bedrock or sandy clay. CCR materials were placed on this clay-rich foundation prior to a composite liner being installed over the historically placed CCRs (a combination of hardened fly ash, FGD material, bottom ash, and native soil) between 2005 and 2008.





### **3.5 Materials and Site Preparation (§257.73(c)(1)(vi))**

The Upstream Raise encompasses two connected underlying facilities: Ash Pond 92 (west side) and Southwest Section 16 (east side).

#### **3.5.1 Ash Pond 92**

The west side of the Upstream Raise (Ash Pond 92) was originally part of the South Ash Pond, which was built in the late 1970s on a foundation of re-compacted site soils (glacial tills) and put into service in 1979. In 1981, the South Ash Pond was taken out of service to reconstruct the clay liner and was put back into service from 1982 until 1987, at which point CCR materials were removed. The South Ash Pond was then divided into Ash Pond 91 and Ash Pond 92 in 1988. Ash Pond 92 was deepened and a new composite liner consisting of a 2-foot thick compacted clay liner underlying a 40-mil high-density polyethylene (HDPE) geomembrane was completed in 1989. The 2-foot thick compacted clay liner was compacted in six-inch loose lifts at 98% of the standard Proctor compaction effort. The liner is overlain with 1 foot of sand, 1 foot of pit-run gravel, and a drainage system consisting of collection pipes that generally slope to the north side of the facility.

#### **3.5.2 Southwest Section 16**

The east side of the Upstream Raise (Southwest Section 16) was originally part of the East Ash Pond and is founded on clay-rich material. In 1982, a dike was built separating the East Ash Pond into Southeast Section 16 and Southwest Section 16. In 1989, the facility was reclassified as a solid waste disposal area and native soils and CCR materials from the other parts of the East Ash Pond were excavated and placed in Southwest Section 16, and a 12-inch interim soil cover was placed over the area. Southwest Section 16 was re-graded and a new composite liner consisting of 12 inches of low permeability soil (LPS) overlaid by a 60-mil linear low density polyethylene (LLDPE) geomembrane was installed over the historically placed CCRs and native soil in three phases between 2005 and 2008. This new composite liner was tied-in with the composite liner of Ash Pond 92. A “liner head reduction system” consisting of 18 inches of bottom ash and perforated pipes overlaid by a 1-foot thick layer of LPS material was constructed over the composite liner. Clay-rich materials used in construction of the LPS layers was compacted in 8-inch loose lifts at 95% of the standard Proctor compaction effort.

#### **3.5.3 Upstream Raise**

The Upstream Raise began by staging CCR materials to allow for vertical containment of CCR materials over the west side of the facility (Ash Pond 92) in 2002. After construction of the composite liner system over historically placed CCRs in the west side of the facility (Southwest Section 16) between 2005 and 2008, and connection of the Ash Pond 92 and Southwest Section 16 composite liner systems, CCR materials were placed in the combined facility. It is anticipated that the Upstream Raise will continue to operate as a surface impoundment receiving sluiced FGD material and dry CCR materials (fly ash and





bottom ash) until approximately 2018. After the sluiced FGD material reaches its design height, free liquid will be decanted off the surface, and the FGD material will begin to drain. From 2018 to approximately 2022, the Upstream Raise will only receive dry CCR materials in the construction of a cap/crown.

During active placement of CCR materials in the Upstream Raise, FGD material is sluiced directly to the Upstream Raise. Dewatered bottom ash and dry fly ash are hauled by truck to the Upstream Raise. Bottom ash is used as a perimeter drainage layer and fly ash around the perimeter provides an erosion and trafficking surface on the exterior of the facility. Both bottom ash and fly ash are trafficked and spread using dozers. Material properties information of CCR materials used in construction of the Upstream Raise are presented under separate cover in the Hazard Potential Classification Assessment, Structural Stability Assessment, and Safety Factor Assessment Report (Golder 2016a).

### **3.6 Detailed Dimensional Drawings (§257.73(c)(1)(vii))**

Permit Drawings for the Upstream Raise are included in Appendix A and show facility dimensions, drainage pathways, and facility surroundings. Appendix A-1 includes documentation drawings for the west half of the Upstream Raise (Ash Pond 92, Foth & Van Dyke 1990), Appendix A-2 includes permit modifications drawings completed in 2004 (Golder 2004a) and Appendix A-3 includes the permit modification drawings completed in 2012 for the vertical expansion of the Upstream Raise (Golder 2012).

The Upstream Raise operates with a minimum freeboard of approximately 3 feet and a design freeboard of approximately 6-feet. A run-on analysis was performed as part of the inflow design flood control system plan (Golder 2016b) indicating that the Upstream Raise is operated with adequate freeboard to contain the 24-hour, 100-year storm event.

### **3.7 Instrumentation (§257.73(c)(1)(viii))**

Water level readings in the Upstream Raise are taken monthly using 15 standpipe piezometers located within the placed CCR slopes of the facility. In addition, two inclinometers were installed in the CCR slopes of the facility to monitor slope movements associated with ongoing consolidation of FGD material. A plan view showing the location of instrumentation is shown in Figure 3.

### **3.8 Area-Capacity Curves (§257.73(c)(1)(ix))**

Elevation-area-capacity information is shown in Figure 4. Areas were calculated using as-built topography and design grades. Above the elevation of the original soil berms of the Upstream Raise, the area of the facility becomes smaller with increasing elevation. CCR capacities are approximate and were calculated using an average end area method. CCR capacities shown on Figure 4 do not include approximately 3,000,000 cubic yards of mixed CCR and native soil placed in the east side of the Upstream Raise (Southwest Section 16) prior to construction of the composite liner and operation as the Upstream Raise.





### 3.9 Spillways and Diversion Features (§257.73(c)(1)(x))

There are no spillways associated with the Upstream Raise. Existing controls are in place to monitor water levels in the Upstream Raise and limit potential overtopping of the impoundment. The only inflow to the facility (besides precipitation) includes hydraulically conveyed FGD material. The design crest of the soil perimeter berms surrounding the Upstream Raise are at approximate elevations between 1900 feet and 1920 feet, which is between 10 and 20 feet above surrounding topography, preventing stormwater run-on into the upstream raise.

Existing controls in place to monitor the water levels in the Upstream Raise include weekly observations of water levels by CCS personnel, and daily observations by CCS operations personnel. Additional observations are noted by GRE employees familiar with site CCR units. After large storm events, CCS personnel evaluate site conditions, including impoundment water levels, and are able to adjust operations to maintain water levels below design maximum elevations. Should water levels within the Upstream Raise reach above desired operating levels, GRE has operating procedures to lower gravity drain (decant) pipelines into the water to transfer water to the adjacent Ash Pond 91 facility. Contact water in perimeter ditches flows passively from the Upstream Raise to Ash Pond 91.

### 3.10 Construction Specifications and Provisions (§257.73(c)(1)(xi))

The following documents contain the specifications, construction quality assurance reports, and provisions for operation of the Upstream Raise.

- The construction quality assurance manual for the foundation, liner and embankment construction performed in 1989 on the Ash Pond 92 side of the Upstream Raise (Foth & van Dyke, 1989).
- The construction observations report for the foundation, liner and embankment construction performed in 1989 on the Ash Pond 92 side of the Upstream Raise (Foth & Van Dyke, 1990).
- The construction specifications for the foundation, liner, and embankment construction performed in 2005 and 2006 on the Southwest Section 16 side of the Upstream Raise (Golder, 2005).
- The construction quality assurance documentation and certification for the foundation, liner, and embankment construction performed in 2005 on the Southwest Section 16 side of the Upstream Raise (Golder, 2006).
- The construction quality assurance documentation and certification for the foundation, liner, and embankment construction performed in 2006 on the Southwest Section 16 side of the Upstream Raise (Golder, 2007).
- The construction specifications for the foundation, liner, and embankment construction performed in 2008 on the Southwest Section 16 side of the Upstream Raise (Golder, 2008).
- The construction quality assurance documentation and certification for the foundation, liner, and embankment construction performed in 2008 on the Southwest Section 16 side of the Upstream Raise (Golder, 2009).
- The operations plan for the Upstream Raise (Golder, 2015).





### **3.11 Record of Structural Instability (§257.73(c)(1)(xii))**

No record of structural instability has been noted for the Upstream Raise. Weekly Inspections are performed by site personnel and annual inspections are performed by a registered professional engineer.





#### 4.0 CLOSING

Golder Associates Inc. has prepared the above History of Construction for the Upstream Raise CCR Surface Impoundment at Great River Energy's Coal Creek Station. Based on our review of the available information, to the extent feasible, this report provides the information required by 40 CFR §257.73(c)(i) through (xii), as related to the construction of the Upstream Raise CCR Surface Impoundment.

#### **GOLDER ASSOCIATES INC.**

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Senior Engineer/Associate

TS/CS/rjg

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Senior Project Engineer





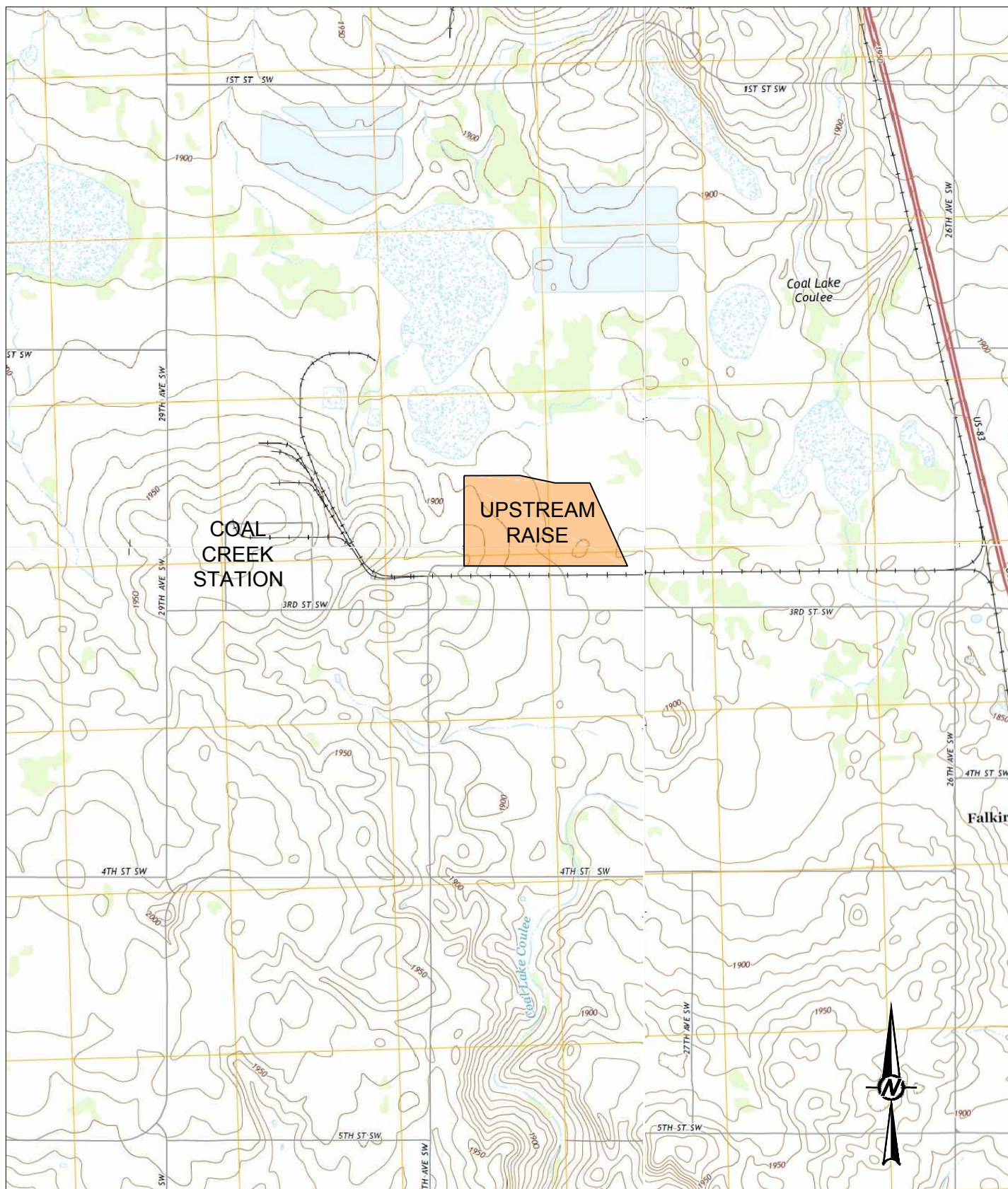
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## FIGURES





#### REFERENCES

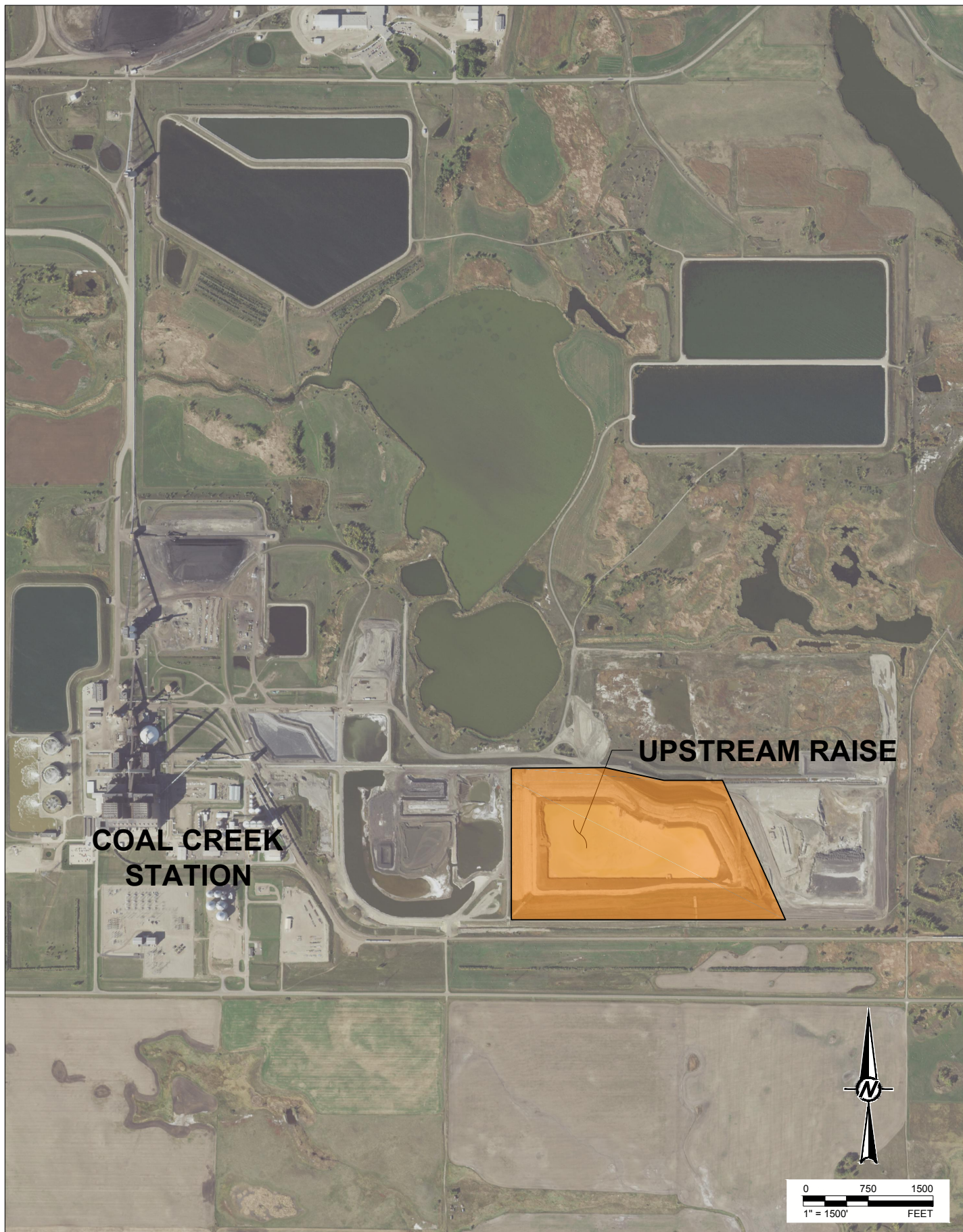
1. TOPOGRAPHIC MAP WAS COMPILED FROM THE FOLLOWING USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES:  
 UNDERWOOD, NORTH DAKOTA (2014)  
 WASHBURN NE, NORTH DAKOTA (2014)  
 WASHBURN, NORTH DAKOTA (2014)  
 WASHBURN SW, NORTH DAKOTA (2014)



**GREAT RIVER ENERGY  
 COAL CREEK STATION  
 UPSTREAM RAISE SITE LOCATION (USGS TOPOGRAPHIC MAPS)**

**FIGURE 1**





**GREAT RIVER ENERGY  
COAL CREEK STATION  
UPSTREAM RAISE SITE LOCATION (AERIAL PHOTOGRAPH)**

**FIGURE 2**





LEGEND



**PZ-2** PIEZOMETER



**PZ-14** SET OF TWO NESTED PIEZOMETERS



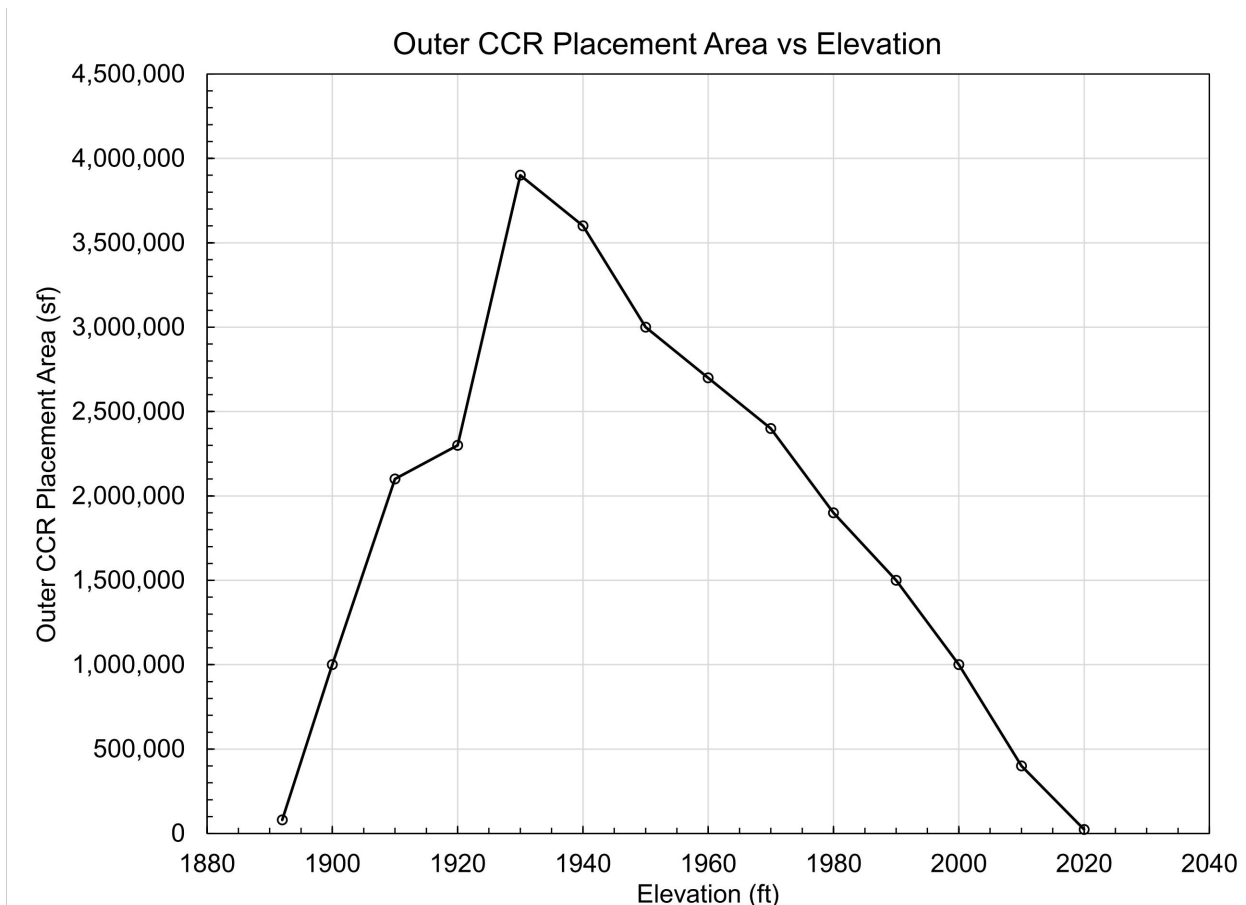
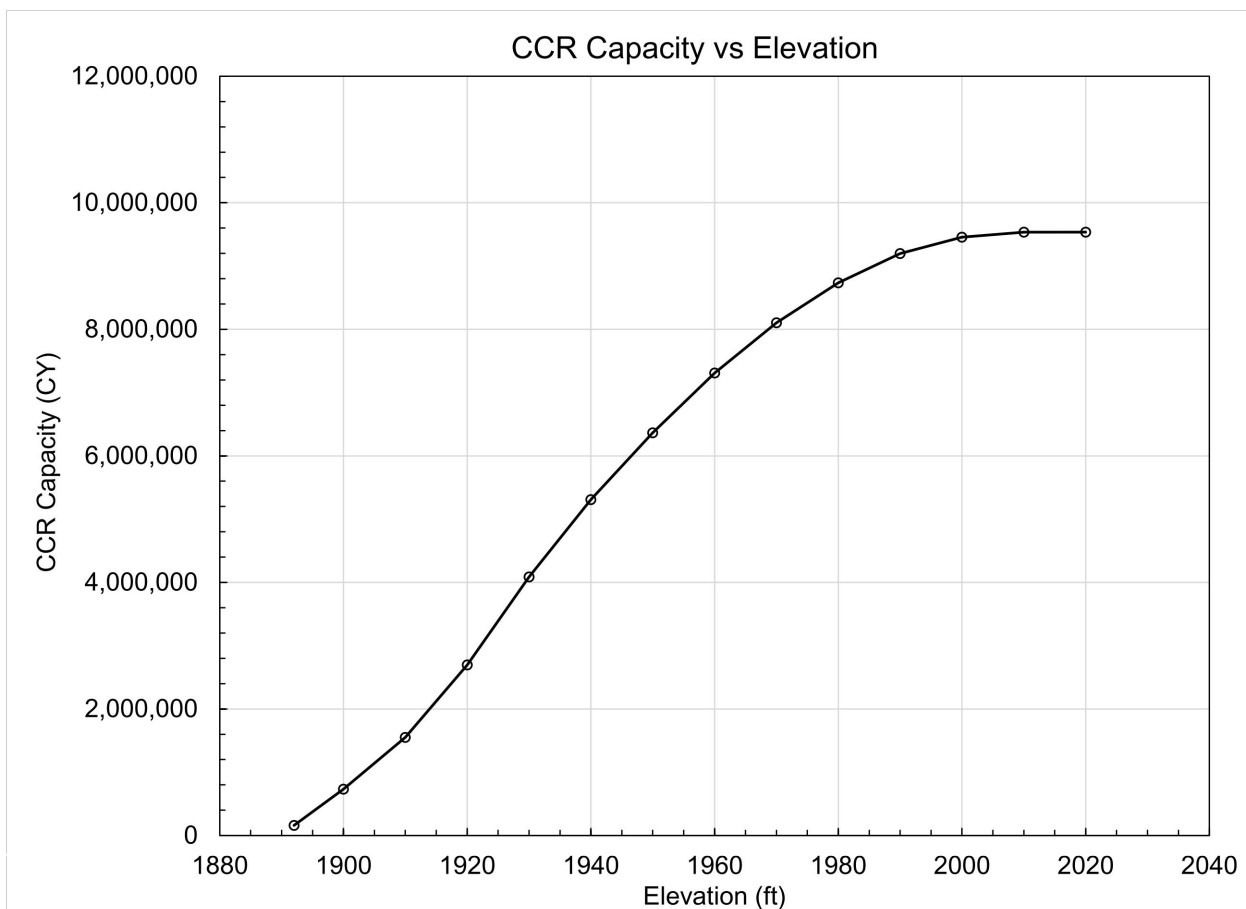
**IN-2** INCLINOMETER



GREAT RIVER ENERGY  
COAL CREEK STATION  
UPSTREAM RAISE INSTRUMENTATION OVERVIEW

FIGURE 3





**GREAT RIVER ENERGY  
COAL CREEK STATION  
UPSTREAM RAISE AREA-CAPACITY INFORMATION**

**FIGURE 4**



**APPENDIX A**  
**DESIGN DRAWINGS**



APPENDIX A1  
EAST HALF OF SOUTH ASH POND DOCUMENTATION DRAWINGS  
(FOTH & VAN DYKE 1990)



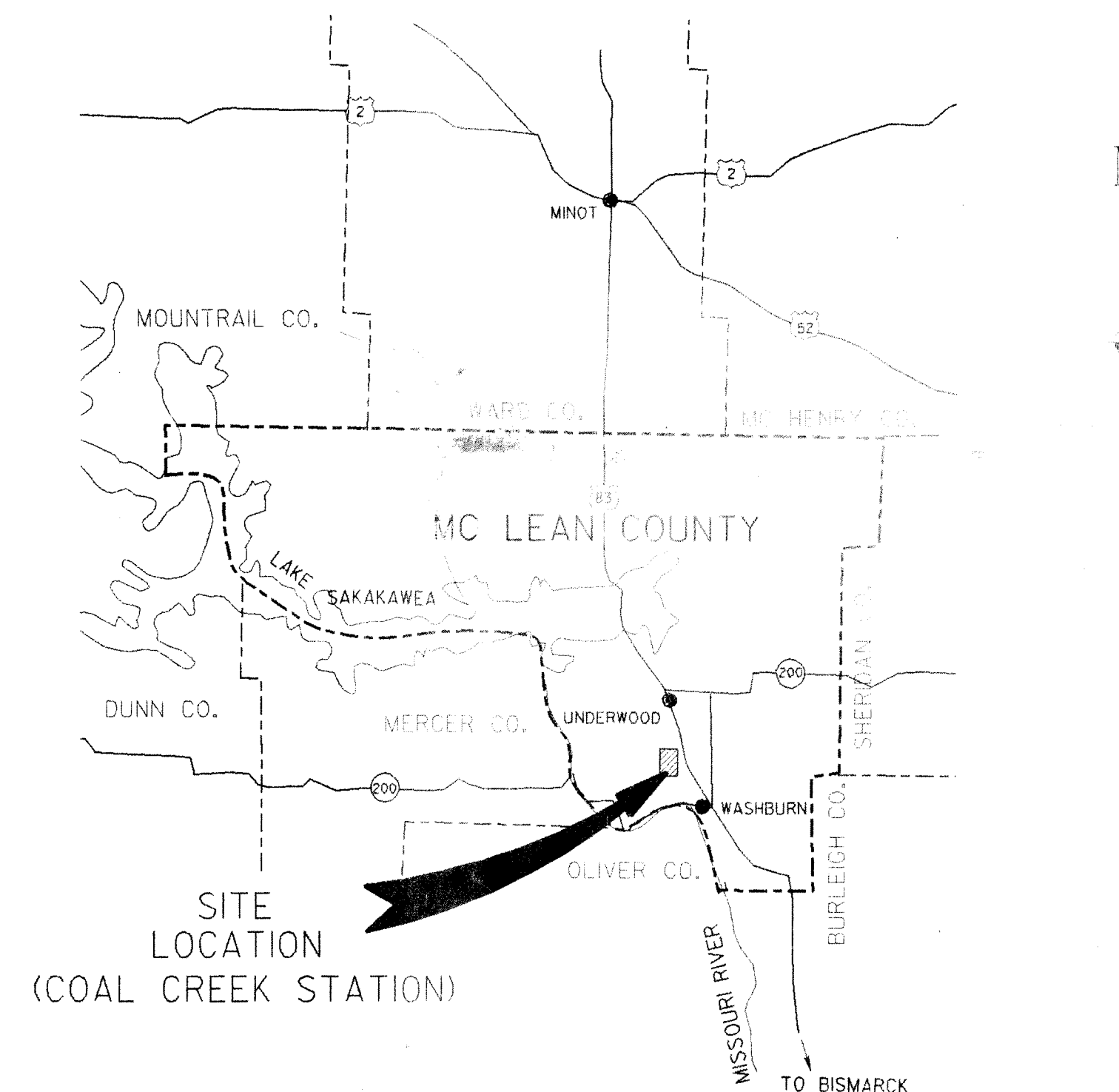
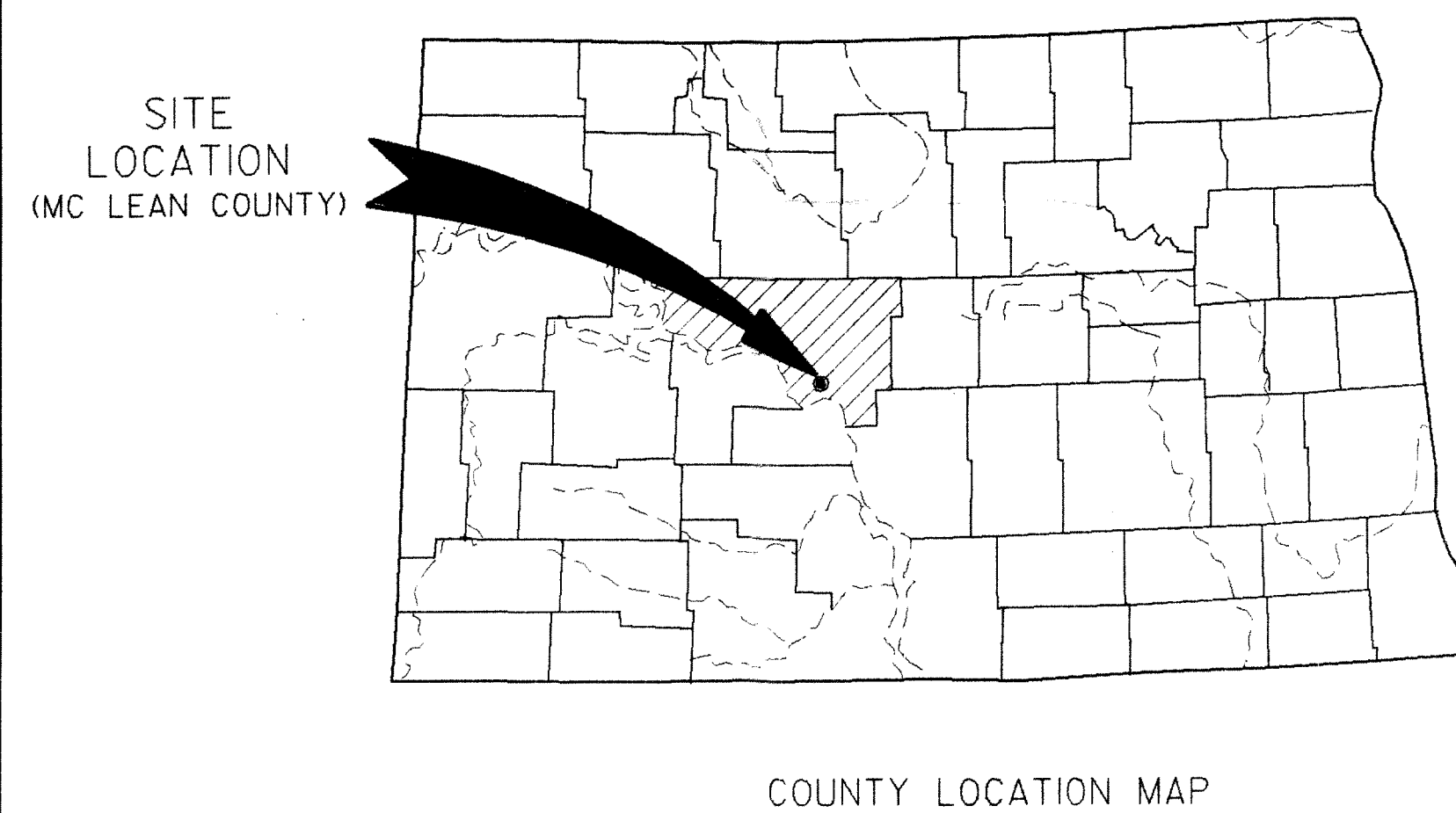
# DOCUMENTATION DRAWINGS

## FOR THE

# COAL CREEK STATION

## EAST HALF OF SOUTH ASH POND

MC LEAN COUNTY, NORTH DAKOTA



SITE LOCATION MAP  
APPROX. SCALE: 1"=5 MILES

INDEX	
GENERAL NOTES	
EXISTING GRADES	
PROPOSED GRADES	
EXISTING ASH GRADES	
PROPOSED ASH GRADES	
EXISTING GRADES AND PIPING	
PROPOSED GRADES AND PIPING	
ENGINEERING CROSS SECTIONS	
DETAILS	
DETAILS	

PREPARED BY:

FOTH & VAN DYKE  
GEOSCIENCES & ENVIRONMENTAL  
MANAGEMENT DIVISION  
GREEN BAY, WISCONSIN

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PREPARED FOR:

COOPERATIVE POWER  
EDEN PRAIRIE, MINNESOTA  
AND  
UNITED POWER ASSOCIATION  
ELK RIVER, MINNESOTA

*Steve Heltala*  
12-6-90

REUSE OF DOCUMENTS  
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE, IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE AND ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

DATE FEB. 1990 DRAWING NO. 1



This is a detailed topographic map of a coastal area, likely a bay or inlet. The map features numerous contour lines representing elevation, with labels such as 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790, 1800, 1810, 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060, 2070, 2080, 2090, 2100, 2110, 2120, 2130, 2140, 2150, 2160, 2170, 2180, 2190, 2200, 2210, 2220, 2230, 2240, 2250, 2260, 2270, 2280, 2290, 2300, 2310, 2320, 2330, 2340, 2350, 2360, 2370, 2380, 2390, 2400, 2410, 2420, 2430, 2440, 2450, 2460, 2470, 2480, 2490, 2500, 2510, 2520, 2530, 2540, 2550, 2560, 2570, 2580, 2590, 2600, 2610, 2620, 2630, 2640, 2650, 2660, 2670, 2680, 2690, 2700, 2710, 2720, 2730, 2740, 2750, 2760, 2770, 2780, 2790, 2800, 2810, 2820, 2830, 2840, 2850, 2860, 2870, 2880, 2890, 2900, 2910, 2920, 2930, 2940, 2950, 2960, 2970, 2980, 2990, 3000, 3010, 3020, 3030, 3040, 3050, 3060, 3070, 3080, 3090, 3100, 3110, 3120, 3130, 3140, 3150, 3160, 3170, 3180, 3190, 3200, 3210, 3220, 3230, 3240, 3250, 3260, 3270, 3280, 3290, 3300, 3310, 3320, 3330, 3340, 3350, 3360, 3370, 3380, 3390, 3400, 3410, 3420, 3430, 3440, 3450, 3460, 3470, 3480, 3490, 3500, 3510, 3520, 3530, 3540, 3550, 3560, 3570, 3580, 3590, 3600, 3610, 3620, 3630, 3640, 3650, 3660, 3670, 3680, 3690, 3700, 3710, 3720, 3730, 3740, 3750, 3760, 3770, 3780, 3790, 3800, 3810, 3820, 3830, 3840, 3850, 3860, 3870, 3880, 3890, 3900, 3910, 3920, 3930, 3940, 3950, 3960, 3970, 3980, 3990, 4000, 4010, 4020, 4030, 4040, 4050, 4060, 4070, 4080, 4090, 4100, 4110, 4120, 4130, 4140, 4150, 4160, 4170, 4180, 4190, 4200, 4210, 4220, 4230, 4240, 4250, 4260, 4270, 4280, 4290, 4300, 4310, 4320, 4330, 4340, 4350, 4360, 4370, 4380, 4390, 4400, 4410, 4420, 4430, 4440, 4450, 4460, 4470, 4480, 4490, 4500, 4510, 4520, 4530, 4540, 4550, 4560, 4570, 4580, 4590, 4600, 4610, 4620, 4630, 4640, 4650, 4660, 4670, 4680, 4690, 4700, 4710, 4720, 4730, 4740, 4750, 4760, 4770, 4780, 4790, 4800, 4810, 4820, 4830, 4840, 4850, 4860, 4870, 4880, 4890, 4900, 4910, 4920, 4930, 4940, 4950, 4960, 4970, 4980, 4990, 5000, 5010, 5020, 5030, 5040, 5050, 5060, 5070, 5080, 5090, 5100, 5110, 5120, 5130, 5140, 5150, 5160, 5170, 5180, 5190, 5200, 5210, 5220, 5230, 5240, 5250, 5260, 5270, 5280, 5290, 5300, 5310, 5320, 5330, 5340, 5350, 5360, 5370, 5380, 5390, 5400, 5410, 5420, 5430, 5440, 5450, 5460, 5470, 5480, 5490, 5500, 5510, 5520, 5530, 5540, 5550, 5560, 5570, 5580, 5590, 5600, 5610, 5620, 5630, 5640, 5650, 5660, 5670, 5680, 5690, 5700, 5710, 5720, 5730, 5740, 5750, 5760, 5770, 5780, 5790, 5800, 5810, 5820, 5830, 5840, 5850, 5860, 5870, 5880, 5890, 5900, 5910, 5920, 5930, 5940, 5950, 5960, 5970, 5980, 5990, 6000, 6010, 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130, 6140, 6150, 6160, 6170, 6180, 6190, 6200, 6210, 6220, 6230, 6240, 6250, 6260, 6270, 6280, 6290, 6300, 6310, 6320, 6330, 6340, 6350, 6360, 6370, 6380, 6390, 6400, 6410, 6420, 6430, 6440, 6450, 6460, 6470, 6480, 6490, 6500, 6510, 6520, 6530, 6540, 6550, 6560, 6570, 6580, 6590, 6600, 6610, 6620, 6630, 6640, 6650, 6660, 6670, 6680, 6690, 6700, 6710, 6720, 6730, 6740, 6750, 6760, 6770, 6780, 6790, 6800, 6810, 6820, 6830, 6840, 6850, 6860, 6870, 6880, 6890, 6900, 6910, 6920, 6930, 6940, 6950, 6960, 6970, 6980, 6990, 7000, 7010, 7020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130, 7140, 7150, 7160, 7170, 7180, 7190, 7200, 7210, 7220, 7230, 7240, 7250, 7260, 7270, 7280, 7290, 7300, 7310, 7320, 7330, 7340, 7350, 7360, 7370, 7380, 7390, 7400, 7410, 7420, 7430, 7440, 7450, 7460, 7470, 7480, 7490, 7500, 7510, 7520, 7530, 7540, 7550, 7560, 7570,

[illegible]

**SURVYOR'S CERTIFICATE**  
I, **WILLIAM A. REGISTERED LAND SURVEYOR**  
**DAKOTA**, HEREBY CERTIFY THAT THE  
COPY OF THE NOTES OF SURV  
NUMBER 18, 1989 AND IS A TRUE  
AS-BUILT CONDITION.

CIVIL ENGINEERING      LAND PLANNING      LAND SURVEYING

**SWENSON, HAGEN & CO. P.C.**

CONSULTING ENGINEERS

P.O. BOX 1108,    509 HAGEN AVENUE

BISSARD, NORTH DAKOTA    58503

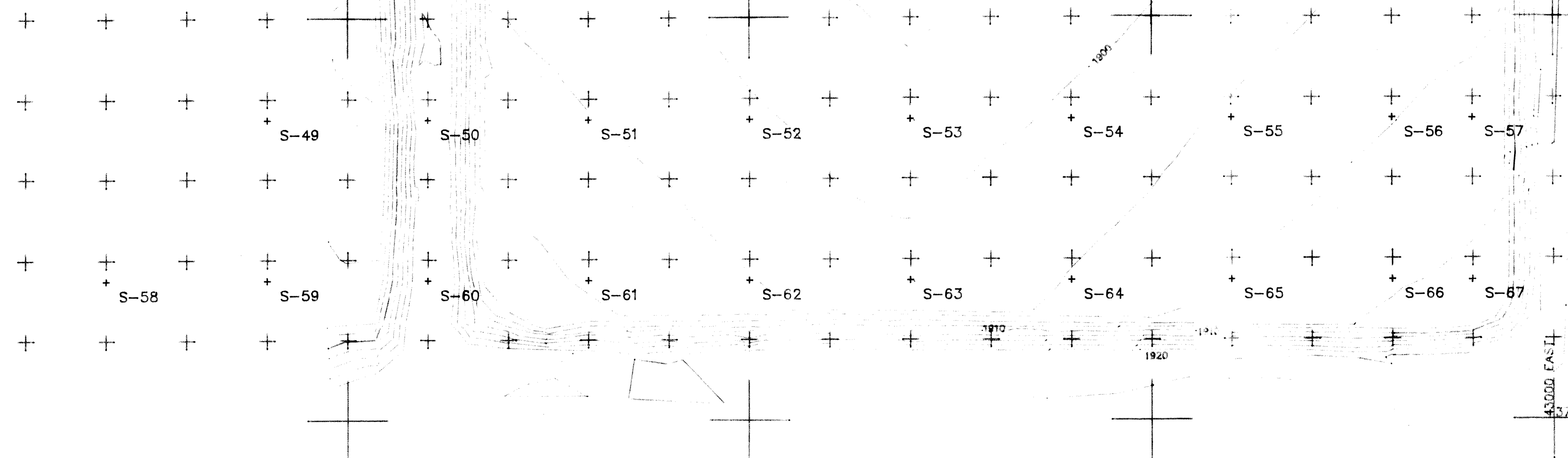
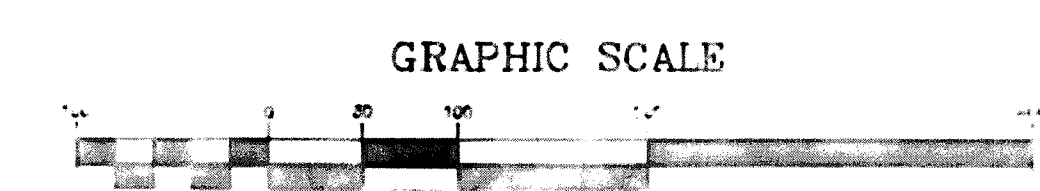
305-322-4222

DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND	SCALE	<p>1" = 100'</p> <p>SCOPE ID. 89C16</p> <p>DRAWING NO. 2</p>	<p>COOPERATIVE POWER ASSOCIATION EDEN AND UNITED POWER ELK RIVER, MINN.</p>	<p>Client: N. Van Dyke</p>	<p>NO. BY DATE</p> <p><u>Δ</u> <u>        </u> <u>        </u></p> <p><u>Δ</u> <u>        </u> <u>        </u></p> <p><u>Δ</u> <u>        </u> <u>        </u></p>	<p>APPROVED BY: <u>Δ</u> <u>NP</u></p> <p>DATE: <u>2-6-90</u></p>	<p>RECEIVED OFFICE OF COMPLETED CONSTRUCTION CONTRACTORS CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION. BY: <u>Δ</u> <u>NP</u> DATE: <u>2-6-90</u></p>	<p>LAST PROJ. CODE: <u>        </u></p> <p>DRAWN BY: <u>        </u> DP</p> <p>SURVEYED BY: <u>        </u> LS</p> <p>DATE: <u>9-8-89</u></p>	<p>PRJ. NAME: <u>        </u></p>
	<p>*SUBBASE GRADES</p>					<p>SURVEY DATA:</p>			



NORTH	EAST	ELEV	POINT
38575.00	41700.00	1892.7	S-1
38575.00	41800.00	1891.9	S-2
38575.00	42000.00	1889.9	S-3
38575.00	42200.00	1888.4	S-4
38575.00	42400.00	1889.8	S-5
38575.00	42600.00	1891.7	S-6
38575.00	42800.00	1893.4	S-7
38575.00	42900.00	1894.3	S-8
38375.00	41700.00	1894.5	S-9
38375.00	41800.00	1893.7	S-10
38375.00	42000.00	1891.7	S-11
38375.00	42200.00	1890.0	S-12
38375.00	42400.00	1891.6	S-13
38375.00	42600.00	1893.4	S-14
38375.00	42800.00	1895.1	S-15
38375.00	42900.00	1895.9	S-16
38175.00	41700.00	1896.2	S-17
38175.00	41800.00	1895.2	S-18
38175.00	42000.00	1893.4	S-19
38175.00	42200.00	1891.7	S-20
38175.00	42400.00	1893.4	S-21
38175.00	42600.00	1895.3	S-22
38175.00	42800.00	1896.9	S-23
38175.00	42900.00	1897.7	S-24
37975.00	41700.00	1898.0	S-25
37975.00	41800.00	1897.0	S-26
37975.00	42000.00	1895.1	S-27
37975.00	42200.00	1893.4	S-28
37975.00	42400.00	1895.1	S-29
37975.00	42600.00	1897.0	S-30
37975.00	42800.00	1898.6	S-31
37975.00	42900.00	1899.4	S-32
37775.00	41700.00	1899.6	S-33
37775.00	41800.00	1898.7	S-34
37775.00	42000.00	1897.0	S-35
37775.00	42200.00	1895.2	S-36
37775.00	42400.00	1896.9	S-37
37775.00	42600.00	1898.8	S-38
37775.00	42800.00	1900.4	S-39
37775.00	42900.00	1901.2	S-40
37575.00	41800.00	1900.4	S-41
37575.00	42000.00	1898.6	S-42
37575.00	42200.00	1897.1	S-43
37575.00	42400.00	1898.8	S-44
37575.00	42600.00	1900.5	S-45
37575.00	42800.00	1902.2	S-46
37575.00	42900.00	1902.9	S-47
37375.00	41400.00	1904.7	S-48
37375.00	41600.00	1919.9	S-49
37375.00	41800.00	1902.1	S-50
37375.00	42000.00	1900.3	S-51
37375.00	42200.00	1898.6	S-52
37375.00	42400.00	1900.4	S-53
37375.00	42600.00	1902.2	S-54
37375.00	42800.00	1903.9	S-55
37375.00	42900.00	1904.7	S-56
37175.00	41200.00	1905.8	S-57
37175.00	41400.00	1907.8	S-58
37175.00	41600.00	1909.8	S-59
37175.00	41800.00	1911.8	S-60
37175.00	42000.00	1913.8	S-61
37175.00	42200.00	1915.8	S-62
37175.00	42400.00	1917.8	S-63
37175.00	42600.00	1919.8	S-64
37175.00	42800.00	1921.8	S-65
37175.00	42900.00	1923.8	S-66
37175.00	42900.00	1926.4	S-67

# COAL CREEK STATION EAST HALF SOUTH ASH POND CLAY GRADES AS-BUILT UNDERWOOD, NORTH DAKOTA



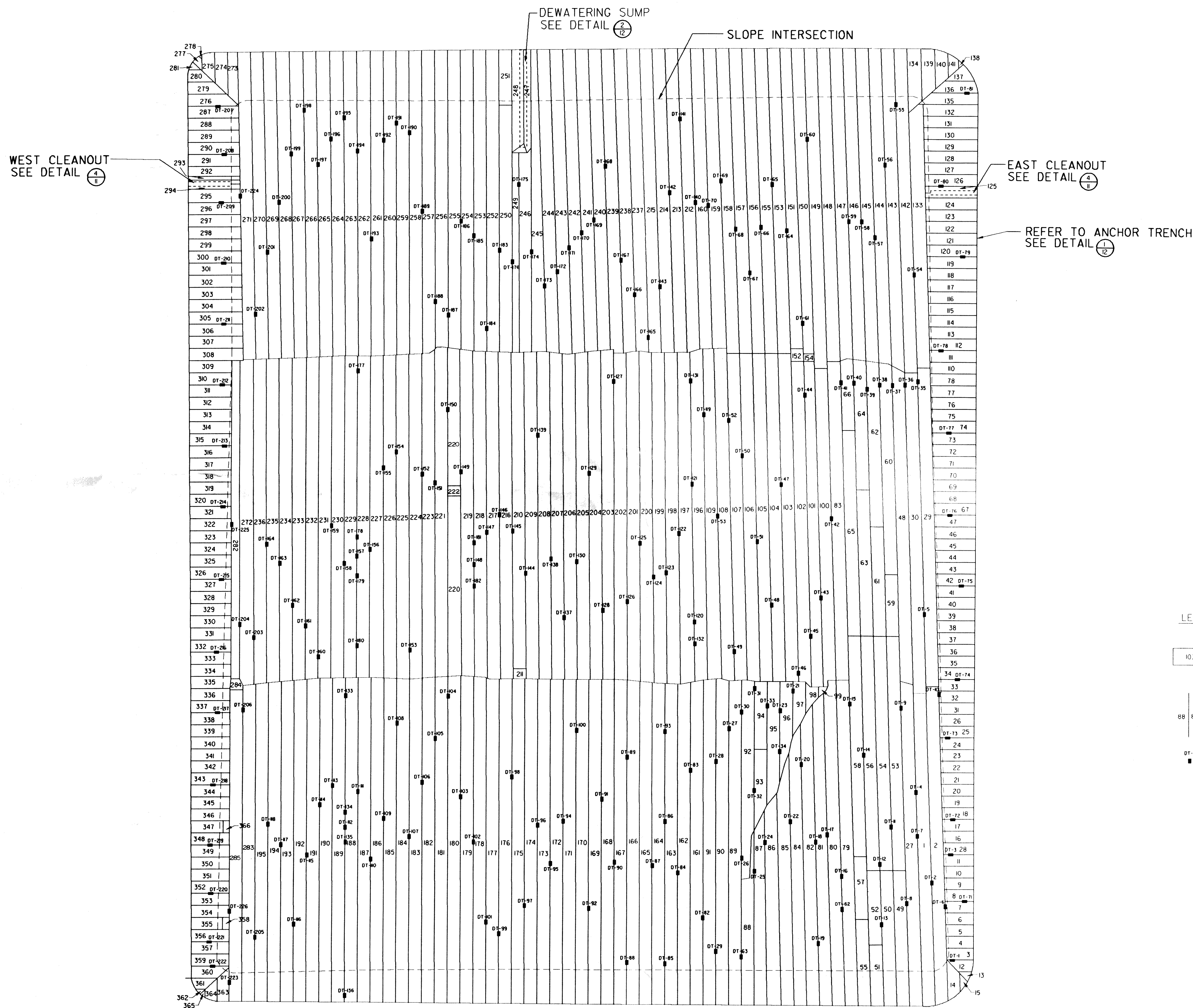
THIS IS A TRUE AND CORRECT COPY OF THE ORIGINAL SURVEY RECORDS OF THE COAL CREEK STATION, EAST HALF SOUTH ASH POND, CLAY GRADES AS-BUILT, UNDERWOOD, NORTH DAKOTA, AS SURVEYED BY J. W. SMITH, NORTH DAKOTA REGISTERED LAND SURVEYOR, IN 1926. THE SURVEY WAS MADE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE NORTH DAKOTA BOARD OF LAND SURVEYORS. THE SURVEY RECORDS ARE KEPT IN THE OFFICE OF THE SURVEYOR, BISMARCK, NORTH DAKOTA.

J. W. SMITH  
NORTH DAKOTA REGISTRATION  
NO. 1263

ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 909 BASIN AVENUE  
BISMARCK, NORTH DAKOTA 58502  
701-222-2800

CALC. PROJ. CODE:		PRJ. NAME:	
DRAWN BY:	DP:	DATE:	1-25-90
SURVEYED BY:	LS:	DATE:	10-6-89
SURVEY DATA:		RECORD DRAWINGS OF COMPLETED CONSTRUCTION BY CONTRACTORS AND/OR OWNERS. RECORDS DURING CONSTRUCTION.	
APPROVED BY: <i>[Signature]</i>		DATE: 1-6-90	
REVIEWED BY: <i>[Signature]</i>		DATE: 1-6-90	
PREPARED BY: LJS		DATE: 1-26-90	
COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.			
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND		CLAY GRADES	
SCALE 1" = 100'		SCOPE ID: 89C16	
DRAWING NO. 3			





LEGEND

103 = PANEL NUMBER

88 89 = SEAM NUMBERING

DT-1 = DESTRUCTIVE LOCATION & TEST NUMBER

NOTE:

DT'S 21 & 23 WERE LOST DUE TO HDPE BEING LOST.

CADD PROJ CODE: 9000 PRF NAME: 1/25/90	
DRAWN BY: DP	DATE: 1/25/90
SURVEYED BY: LS	DATE: 9/8/89
SURVEY DATA:	
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION.	
BY: JJA	DATE: 2-2-90
REVISIONS / REMARKS	
NO. BY DATE	APPROVED BY: JJA
1	DATE: 2-6-90
2	REVIEWED BY: JJA
3	DATE: 2-6-90
4	PREPARED BY: JJA
5	DATE: 2-6-90
Foth & Van Dyke	
COOPERATIVE POWER EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.	
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND	HDPE LINER PLACEMENT
SCALE NOT TO SCALE	
SCOPE ID 89C16	
DRAWING NO. 4	

REUSE OF DOCUMENTS

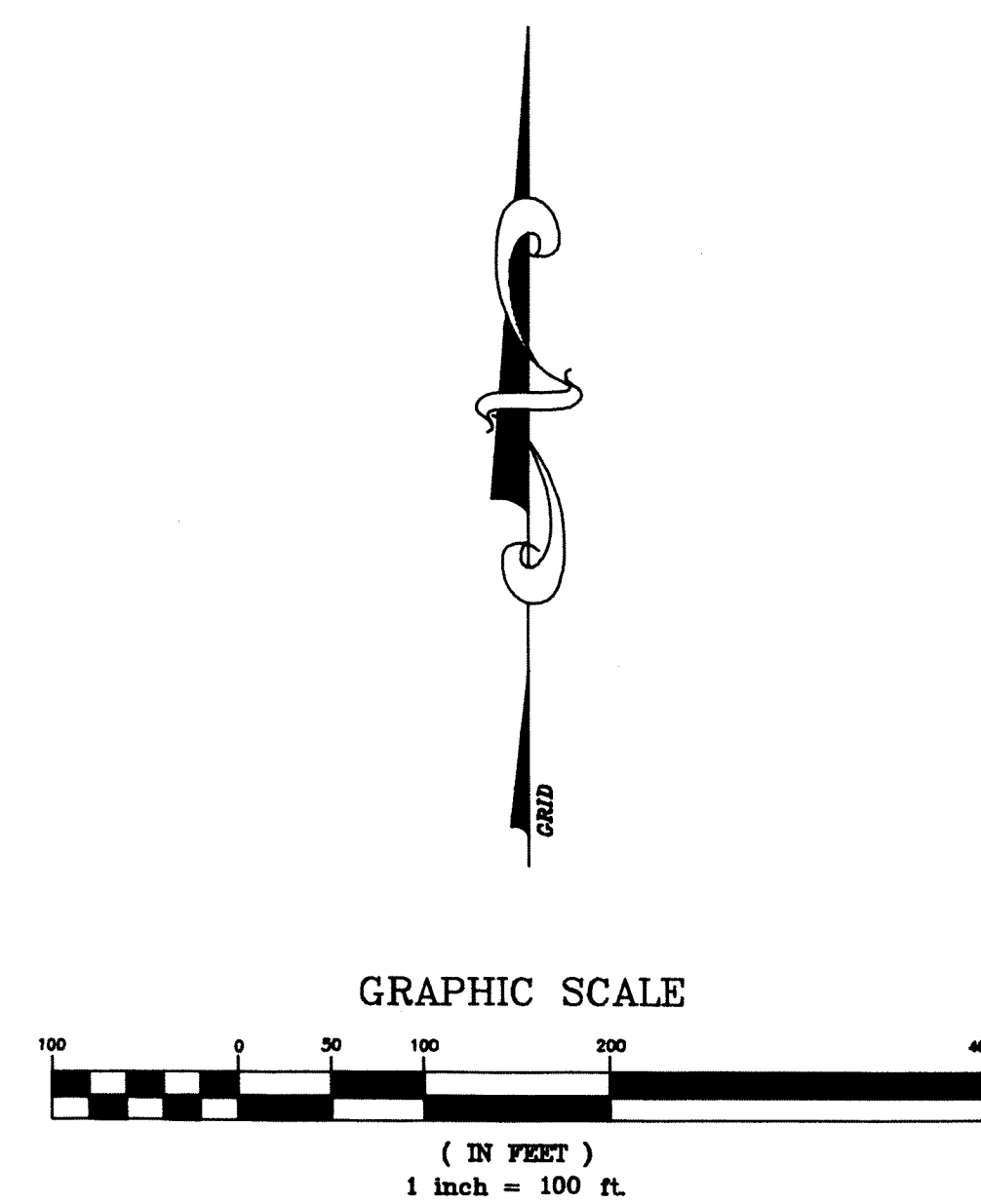
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE, IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE AND ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.



NORTH EAST ELEV POINT

38575.00	41700.00	1896.7	S-1
38575.00	41800.00	1892.9	S-2
38575.00	42000.00	1890.9	S-3
38575.00	42200.00	1889.9	S-4
38575.00	42400.00	1891.1	S-5
38575.00	42600.00	1892.9	S-6
38575.00	42800.00	1894.2	S-7
38575.00	42900.00	1895.6	S-8
38375.00	41700.00	1897.7	S-9
38375.00	41800.00	1894.4	S-10
38375.00	42000.00	1892.8	S-11
38375.00	42200.00	1891.1	S-12
38375.00	42400.00	1892.9	S-13
38375.00	42600.00	1894.6	S-14
38375.00	42800.00	1896.0	S-15
38375.00	42900.00	1896.8	S-16
38175.00	41700.00	1897.1	S-17
38175.00	41800.00	1896.2	S-18
38175.00	42000.00	1894.3	S-19
38175.00	42200.00	1892.7	S-20
38175.00	42400.00	1894.5	S-21
38175.00	42600.00	1896.1	S-22
38175.00	42800.00	1897.7	S-23
38175.00	42900.00	1898.5	S-24
37975.00	41700.00	1898.9	S-25
37975.00	41800.00	1897.8	S-26
37975.00	42000.00	1896.0	S-27
37975.00	42200.00	1894.4	S-28
37975.00	42400.00	1896.2	S-29
37975.00	42600.00	1897.9	S-30
37975.00	42800.00	1899.5	S-31
37975.00	42900.00	1900.4	S-32
37775.00	41700.00	1900.6	S-33
37775.00	41800.00	1899.5	S-34
37775.00	42000.00	1897.8	S-35
37775.00	42200.00	1896.1	S-36
37775.00	42400.00	1897.9	S-37
37775.00	42600.00	1899.7	S-38
37775.00	42800.00	1901.2	S-39
37775.00	42900.00	1902.3	S-40
37575.00	41600.00		S-41
37575.00	41800.00	1901.4	S-42
37575.00	42000.00	1899.6	S-43
37575.00	42200.00	1897.8	S-44
37575.00	42400.00	1899.6	S-45
37575.00	42600.00	1901.3	S-46
37575.00	42800.00	1903.0	S-47
37575.00	42900.00	1903.9	S-48
37375.00	41400.00		S-49
37375.00	41600.00		S-50
37375.00	41800.00	1903.0	S-51
37375.00	42000.00	1901.3	S-52
37375.00	42200.00	1899.5	S-53
37375.00	42400.00	1901.3	S-54
37375.00	42600.00	1903.1	S-55
37375.00	42800.00	1904.7	S-56
37375.00	42900.00	1905.7	S-57
37175.00	41200.00		S-58
37175.00	41400.00		S-59
37175.00	41600.00		S-60
37175.00	41800.00	1904.6	S-61
37175.00	42000.00	1903.0	S-62
37175.00	42200.00	1901.5	S-63
37175.00	42400.00	1903.1	S-64
37175.00	42600.00	1904.8	S-65
37175.00	42800.00	1906.4	S-66
37175.00	42900.00	1913.6	S-67

COAL CREEK STATION  
EAST HALF SOUTH ASH POND  
TOP OF SAND GRADES  
UNDERWOOD, NORTH DAKOTA



NOVEMBER 17, 1989

DRAWING REVISED JANUARY 25, 1990

- NOTES
1. SITE LOCATION: SW 1/4 OF SECTION 16, T. 145 N., R. 20 W., MCLEAN COUNTY, NORTH DAKOTA.
  2. TOPOGRAPHY IS BASED ON AN ACTUAL SURVEY OF THE GROUND.
  3. ELEVATIONS ARE BASED ON SEA LEVEL DATUM.
  4. HORIZONTAL DATUM IS BASED ON NORTH DAKOTA STATE PLANE COORDINATES SYSTEM AS FOLLOWS:  
SITE GRID NORTH = NORTH STATE PLANE COORDINATES MINUS 1,000,000.  
SITE GRID EAST = EAST STATE PLANE COORDINATES MINUS 1,800,000.

OUR EMPLOYER'S CERTIFICATE  
I, LARRY J. SMITH, A REGISTERED LAND SURVEYOR IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE ANNEXED PLANS ARE A TRUE COPY OF THE NOTES OF SURVEY COMPLETED ON NOVEMBER 17, 1989 AND IS A TRUE REPRESENTATION OF THE AS-BUILT CONDITION.

LARRY J. SMITH  
NORTH DAKOTA REGISTRATION  
NO. 2363

CIVIL ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 909 BASIN AVENUE  
BISMARCK, NORTH DAKOTA 58502  
701-223-2800

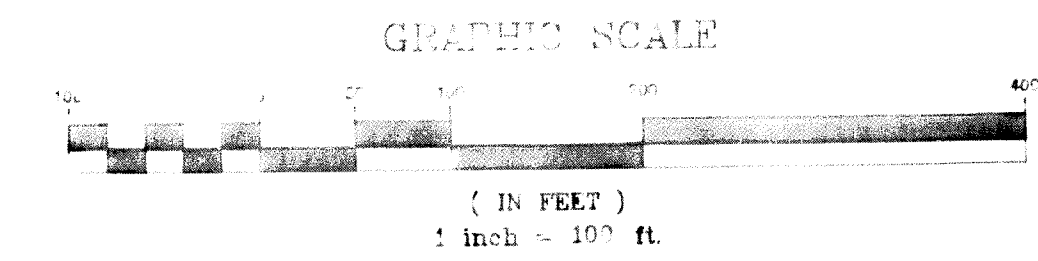
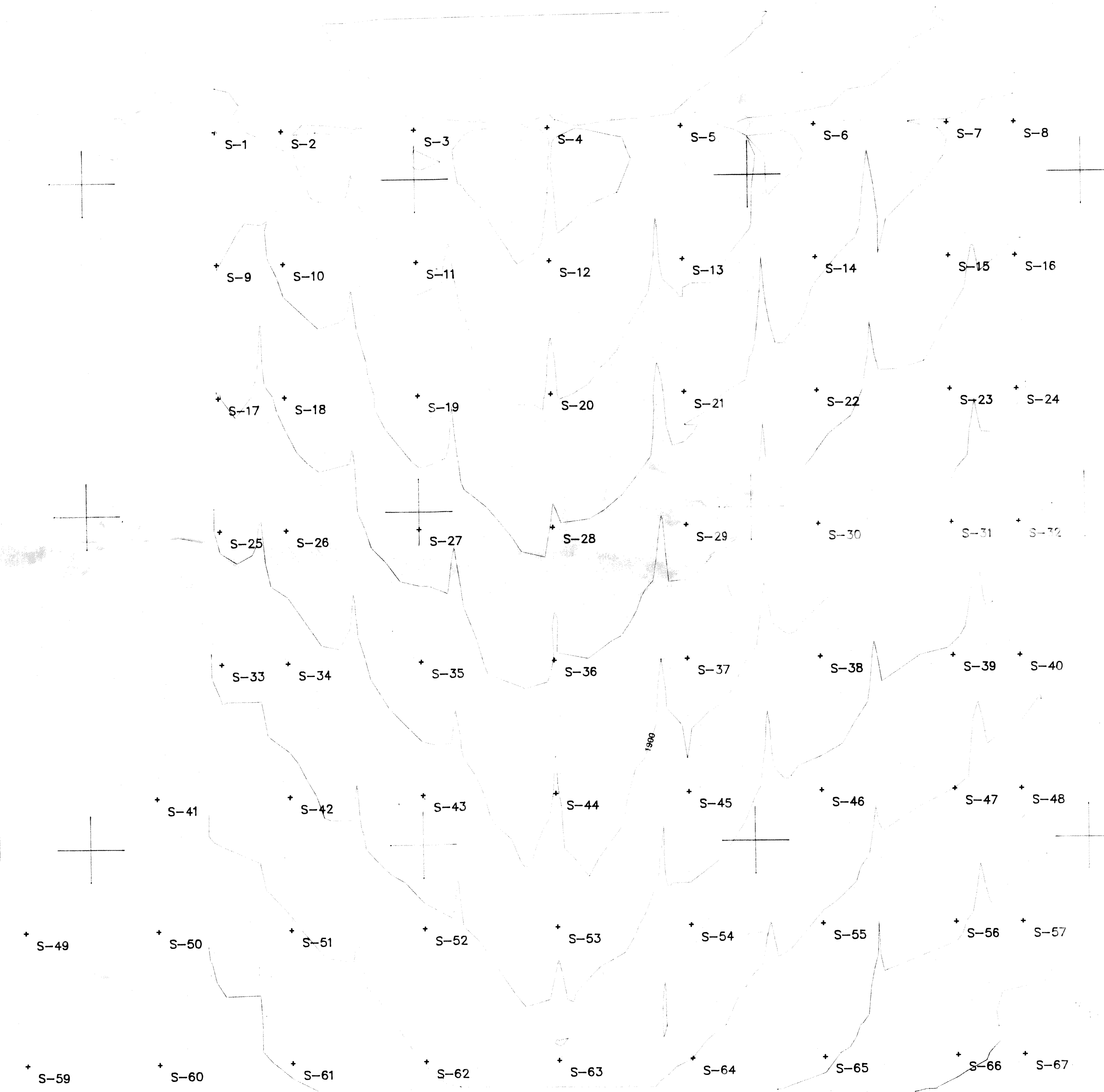
CADD PROJ CODE:	PRJ NAME:	DRAWN BY:	DATE:	SURVEYED BY:	DATE:	RECORD DRAWINGS OF COMPLETED PROJECTS FOR CONTRACTORS AND OWNERS
		LS	1-25-90	LS	11-17-89	DATE: 2-6-90
NO.	BY	DATE	APPROVED BY:	DATE:	REVIEWED BY:	DATE:
1	LS		LS	2-6-90	LS	1-26-90
Foth & Van Dyke						
COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.						
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND SAND GRADES						
SCALE 1" = 100'						
SCOPE ID. 89C16						
DRAWING NO. 5						



CADD PROJ CODE: _____		PRJ NAME: _____
DRAWN BY: _____	DATE: 1-26-90	
SURVEYED BY: _____	DATE: 11-27-89	
SURVEY DATA: _____		RECORD PLANNING OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION BY: <i>LJS</i> DATE: 2-6-90
NOI BY: _____	DATE: _____	APPROVED BY: <i>LJS</i> DATE: 2-6-90
FOOT & VAN DYKE		
COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.		
DOCUMENTATION STATION COAL CREEK STATION EAST HALF OF SOUTH ASH POND	PIT RUN GRADES	
SCALE 1" = 100'		
SCOPE ID. 89C16		
DRAWING NO. 6		

COAL CREEK STATION  
EAST HALF SOUTH ASH POND  
TOP OF PIT RUN  
UNDERWOOD, NORTH DAKOTA

NORTH	EAST	ELEV	POINT
38575.00	41700.00	1895.5	S-1
38575.00	41800.00	1893.6	S-2
38575.00	42000.00	1893.0	S-3
38575.00	42200.00	1892.4	S-4
38575.00	42400.00	1893.7	S-5
38575.00	42600.00	1894.9	S-6
38575.00	42800.00	1896.2	S-7
38575.00	42900.00	1897.1	S-8
38375.00	41700.00	1896.0	S-9
38375.00	41800.00	1895.5	S-10
38375.00	42000.00	1893.5	S-11
38375.00	42200.00	1893.1	S-12
38375.00	42400.00	1893.2	S-13
38375.00	42600.00	1895.6	S-14
38375.00	42800.00	1897.4	S-15
38375.00	42900.00	1898.2	S-16
38175.00	41700.00	1898.1	S-17
38175.00	41800.00	1897.7	S-18
38175.00	42000.00	1895.0	S-19
38175.00	42200.00	1894.5	S-20
38175.00	42400.00	1895.3	S-21
38175.00	42600.00	1897.3	S-22
38175.00	42800.00	1896.9	S-23
38175.00	42900.00	1899.8	S-24
37975.00	41700.00	1899.8	S-25
37975.00	41800.00	1899.0	S-26
37975.00	42000.00	1897.4	S-27
37975.00	42200.00	1896.2	S-28
37975.00	42400.00	1897.3	S-29
37975.00	42600.00	1899.1	S-30
37975.00	42800.00	1900.6	S-31
37975.00	42900.00	1901.5	S-32
37775.00	41700.00	1901.7	S-33
37775.00	41800.00	1900.8	S-34
37775.00	42000.00	1899.1	S-35
37775.00	42200.00	1898.1	S-36
37775.00	42400.00	1899.0	S-37
37775.00	42600.00	1900.6	S-38
37775.00	42800.00	1902.1	S-39
37775.00	42900.00	1903.2	S-40
37575.00	41600.00	1902.7	S-41
37575.00	41800.00	1902.7	S-42
37575.00	42000.00	1900.8	S-43
37575.00	42200.00	1900.3	S-44
37575.00	42400.00	1900.6	S-45
37575.00	42600.00	1902.5	S-46
37575.00	42800.00	1904.0	S-47
37575.00	42900.00	1905.1	S-48
37375.00	41400.00	1904.2	S-49
37375.00	41600.00	1904.2	S-50
37375.00	41800.00	1904.2	S-51
37375.00	42000.00	1902.3	S-52
37375.00	42200.00	1901.5	S-53
37375.00	42400.00	1902.4	S-54
37375.00	42600.00	1904.2	S-55
37375.00	42800.00	1905.7	S-56
37375.00	42900.00	1906.7	S-57
37175.00	41200.00	1905.7	S-58
37175.00	41400.00	1905.7	S-59
37175.00	41600.00	1905.7	S-60
37175.00	41800.00	1903.9	S-61
37175.00	42000.00	1902.4	S-62
37175.00	42200.00	1904.0	S-63
37175.00	42400.00	1905.9	S-64
37175.00	42600.00	1907.7	S-65
37175.00	42800.00	1908.9	S-66
37175.00	42900.00	1908.9	S-67



THIS SURVEY WAS MADE JANUARY 26, 1990  
FROM MEASUREMENTS MADE ON NOVEMBER 27, 1989

NOTES

1. WITHIN SECTION 16 OF TOWNSHIP 16N, RANGE 10E, COUNTY OF BURLINGTON, NORTH DAKOTA.
2. FOR THE PURPOSE OF DETERMINING AN ACTUAL SURVEY OF THE POND.
3. ALL ELEVATIONS ARE BASED ON SEA LEVEL DATUM.
4. HORIZONTAL COORDINATES ARE BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
NORTH DAKOTA STATE PLANE COORDINATES  
EASTING: 41700.00  
NORTHING: 1895.50  
MINUS 1,800,000.

AND ALL HORIZONTAL COORDINATES  
MINUS 1,800,000.

SURVEYOR'S CERTIFICATE

LARRY J. SMITH, A REGISTERED LAND SURVEYOR IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE ABOVE IS A TRUE AND CORRECT COPY OF THE NOTES OF SURVEY FOR THE POND DATED JANUARY 27, 1989 AND IS A TRUE REPRESENTATION OF THE AS-BUILT CONDITION.



LARRY J. SMITH  
NORTH DAKOTA REGISTRATION  
NO. 2363

CIVIL ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 909 BASIN AVENUE  
BISMARCK, NORTH DAKOTA 58502  
701-223-2800

41000 EAST  
37000 NORTH

43000 EAST  
37000 NORTH



POINT

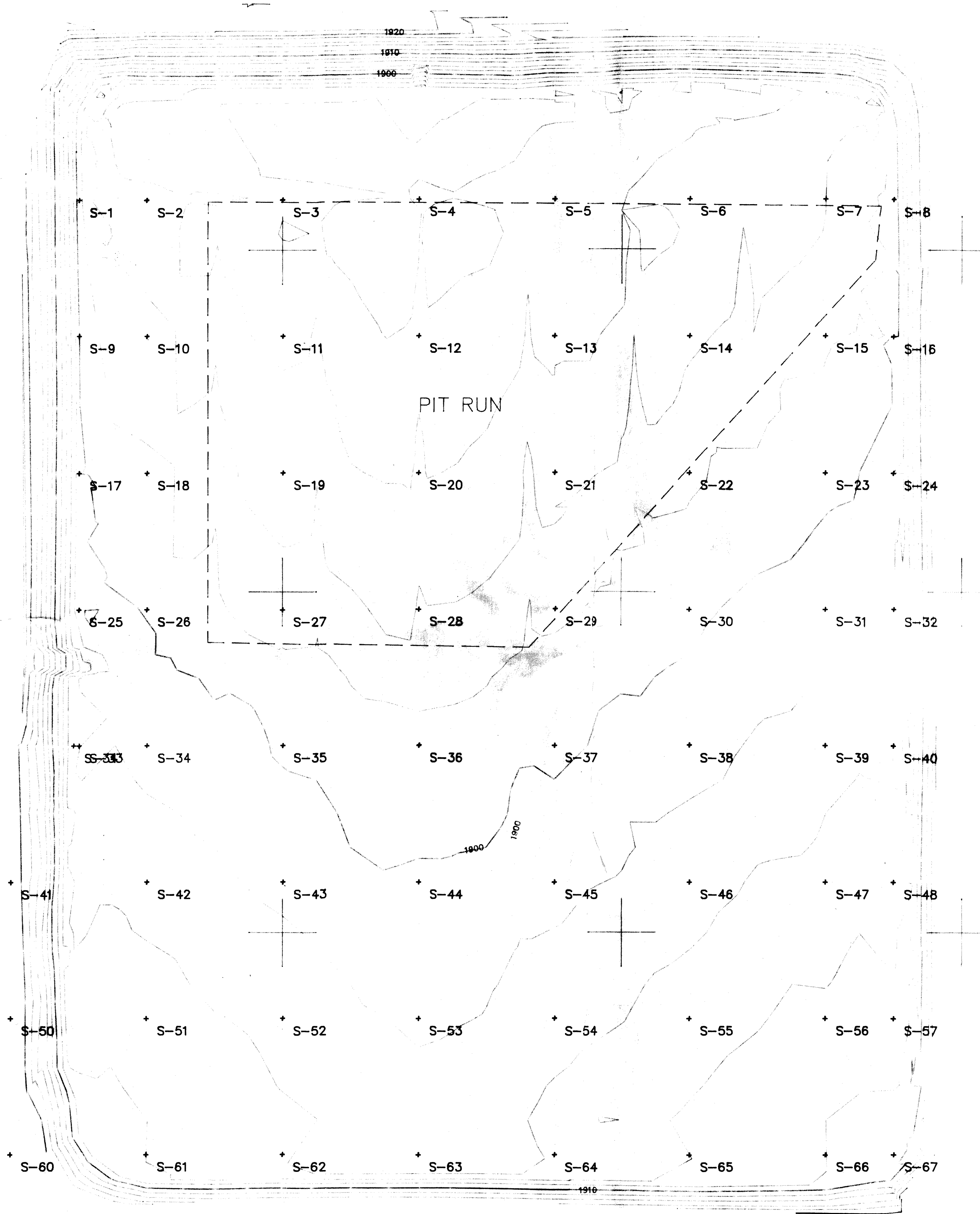
2 S-1  
 3 S-2  
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 5 S-4  
 9 S-5  
 7 S-6  
 0 S-7  
 4 S-8  
 4 S-9  
 5 S-10  
 5 S-11  
 1 S-12  
 2 S-13  
 6 S-14  
 8 S-15  
 8 S-16  
 6 S-17  
 4 S-18  
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 7 S-57  
 S-58  
 S-59  
 S-60  
 0 S-61  
 2 S-62  
 6 S-63  
 2 S-64  
 0 S-65  
 0 S-66  
 5 S-67

COAL CREEK STA

EAST HALF SOUTH AS

BOTTOM ASH

UNDERWOOD, NORTH



GRAPHIC SCALE

 ( IN FEET )  
 1 inch = 100 ft.

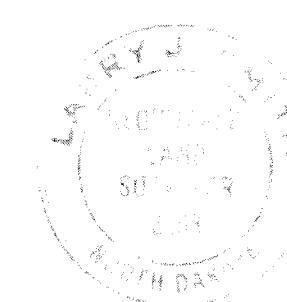
THIS DRAWING PREPARED JANUARY 26, 1989

## NOTES

1. SITE LOCATION: 1/4 OF SECTION 32, T. 145 N., R. 22 W., MCLEAN COUNTY, NORTH DAKOTA.
2. TOPOGRAPHY IS BASED ON AN ACTUAL SURVEY OF THE AREA.
3. ELEVATIONS ARE BASED ON SEA LEVEL DATUM.
4. HORIZONTAL DATUM IS BASED ON NORTH DAKOTA STATE PLANE COORDINATES SYSTEM AS FOLLOWS:  
 NORTH = NORTH STATE PLANE MINUS 1,000,000.  
 EAST = EAST STATE PLANE MINUS 1,800,000.

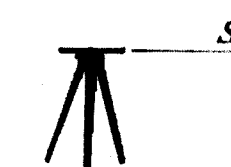
## SURVEYOR'S CERTIFICATE

I, LARRY J. SMITH, A REGISTERED LAND SURVEYOR IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THIS IS A TRUE COPY OF THE NOTES COMPLETED ON NOVEMBER 17, 1989 AND IS A REPRESENTATION OF THE AS-BUILT CONDITION.



LARRY J. SMITH  
 NORTH DAKOTA  
 NO. 2363

CIVIL ENGINEERING



37000 NORTH

43000 EAST



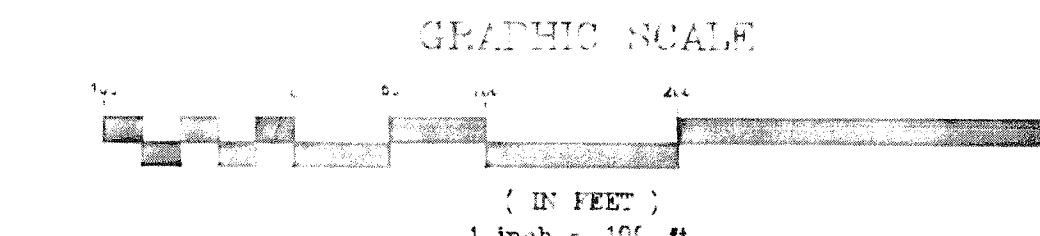
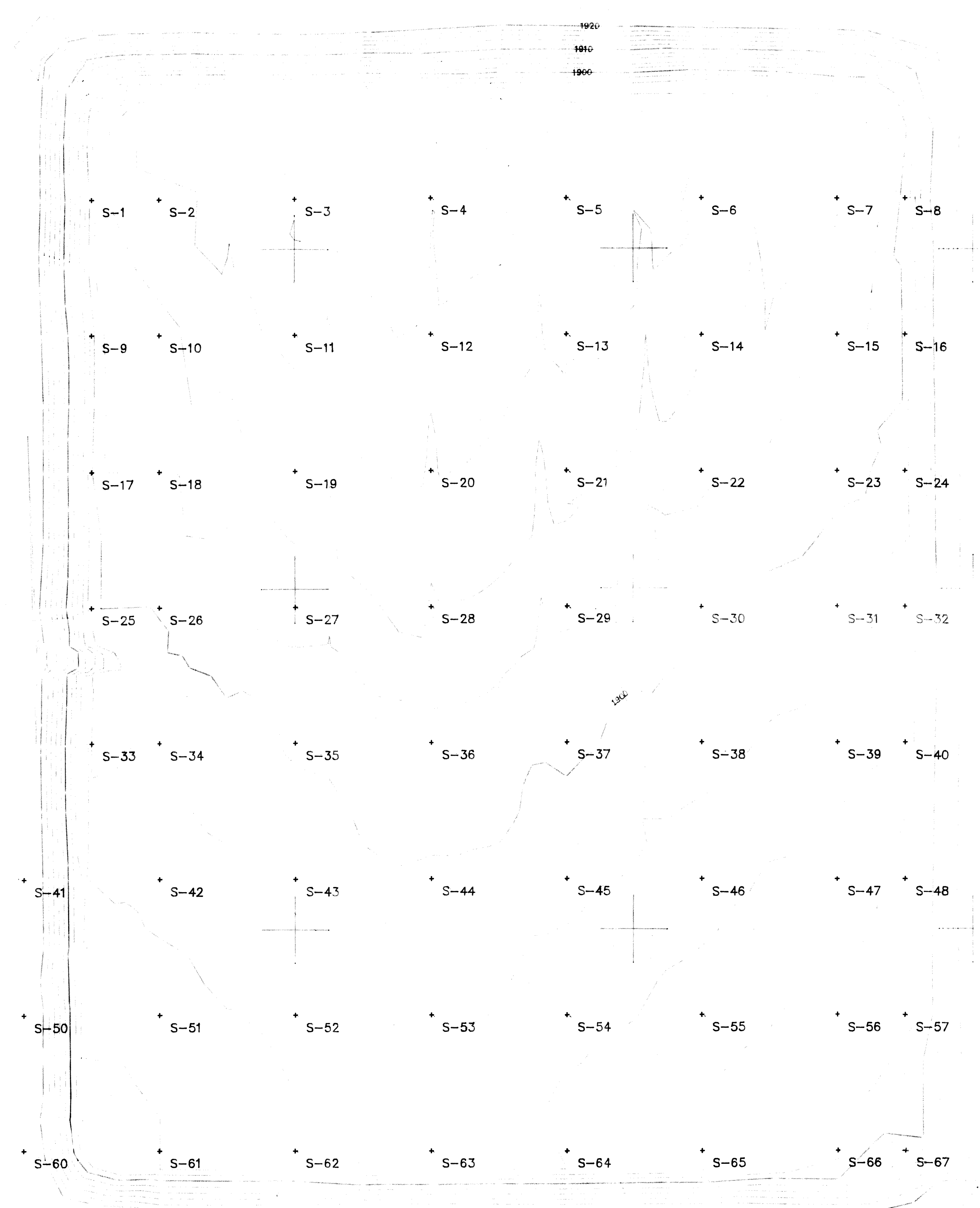
NORTH	EAST	ELEV	POINT
38575.00	41700.00	1899.4	S-1
38575.00	41800.00	1894.9	S-2
38575.00	42000.00	1892.2	S-3
38575.00	42200.00	1892.0	S-4
38575.00	42400.00	1892.3	S-5
38575.00	42600.00	1894.3	S-6
38575.00	42800.00	1896.0	S-7
38575.00	42900.00	1900.9	S-8
38375.00	41700.00	1901.3	S-9
38375.00	41800.00	1896.4	S-10
38375.00	42000.00	1893.5	S-11
38375.00	42200.00	1893.1	S-12
38375.00	42400.00	1893.2	S-13
38375.00	42600.00	1895.6	S-14
38375.00	42800.00	1897.8	S-15
38375.00	42900.00	1901.0	S-16
38175.00	41700.00	1900.5	S-17
38175.00	41800.00	1898.0	S-18
38175.00	42000.00	1895.0	S-19
38175.00	42200.00	1894.5	S-20
38175.00	42400.00	1895.3	S-21
38175.00	42600.00	1897.6	S-22
38175.00	42800.00	1899.1	S-23
38175.00	42900.00	1901.0	S-24
37975.00	41700.00	1901.5	S-25
37975.00	41800.00	1899.9	S-26
37975.00	42000.00	1897.4	S-27
37975.00	42200.00	1896.2	S-28
37975.00	42400.00	1897.5	S-29
37975.00	42600.00	1899.4	S-30
37975.00	42800.00	1901.1	S-31
37975.00	42900.00	1901.9	S-32
37775.00	41700.00	1901.8	S-33
37775.00	41800.00	1901.3	S-34
37775.00	42000.00	1899.7	S-35
37775.00	42200.00	1898.3	S-36
37775.00	42400.00	1899.7	S-37
37775.00	42600.00	1901.1	S-38
37775.00	42800.00	1903.0	S-39
37775.00	42900.00	1903.9	S-40
37575.00	41600.00		S-41
37575.00	41800.00	1903.2	S-42
37575.00	42000.00	1901.4	S-43
37575.00	42200.00	1900.2	S-44
37575.00	42400.00	1901.5	S-45
37575.00	42600.00	1902.9	S-46
37575.00	42800.00	1904.6	S-47
37575.00	42900.00	1905.8	S-48
37375.00	41400.00		S-49
37375.00	41600.00		S-50
37375.00	41800.00	1905.0	S-51
37375.00	42000.00	1903.1	S-52
37375.00	42200.00	1901.5	S-53
37375.00	42400.00	1903.1	S-54
37375.00	42600.00	1904.8	S-55
37375.00	42800.00	1906.5	S-56
37375.00	42900.00	1907.7	S-57
37175.00	41200.00		S-58
37175.00	41400.00		S-59
37175.00	41600.00		S-60
37175.00	41800.00	1906.0	S-61
37175.00	42000.00	1905.0	S-62
37175.00	42200.00	1903.0	S-63
37175.00	42400.00	1904.1	S-64
37175.00	42600.00	1906.1	S-65
37175.00	42800.00	1908.0	S-66
37175.00	42900.00	1911.9	S-67

# COAL CREEK STATION

## EAST HALF SOUTH ASH POND

### FINISHED GRADES

### UNDERWOOD, NORTH DAKOTA



THIS SURVEY WAS MADE JANUARY 26, 1990  
FROM SURVEY DATA OBTAINED IN DECEMBER 20, 1989

- NOTES
1. SITE LOCATED IN THE EAST HALF OF SECTION 16, T. 140 N., R. 122 W., SLEMAN COUNTY, NORTH DAKOTA.
  2. THE SURVEY WAS MADE BY AN ACTUAL SURVEY OF THE POND.
  3. ELEVATIONS ARE BASED ON SEA LEVEL DATUM.
  4. ELEVATIONS ARE BASED ON NORTH DAKOTA STATE PLANE COORDINATES SYSTEM AS FOLLOWS:  
NORTH AND EAST = NORTH STATE PLANE COORDINATES MINUS 1,000,000.  
NORTH AND EAST = EAST STATE PLANE COORDINATES MINUS 1,500,000.

SURVEYOR'S CERTIFICATE  
I, LARRY J. SMITH, A REGISTERED LAND SURVEYOR IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE ABOVE IS A TRUE COPY OF THE NOTES OF SURVEY MADE BY ME ON DECEMBER 20, 1989 AND IS A TRUE REPRESENTATION OF THE AS-BUILT CONDITION.

LARRY J. SMITH  
NORTH DAKOTA REGISTRATION  
NO. 2363

CIVIL ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 909 BASIN AVENUE  
BISMARCK, NORTH DAKOTA 58501  
701-223-9400

PMF NAME: _____ DATE: 1-26-90	
CAUD PROJ CODE: _____ DRAWN BY: _____ SURVEY DATA: _____ DATE: 12-20-89	RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION. BY: <i>LJS</i> DATE: 2-6-90
APPROVED BY: <i>LJS</i> DATE: 2-6-90 REVIEWED BY: <i>LJS</i> DATE: 2-6-90 PREPARED BY: <i>LJS</i> DATE: 1-26-90	
Foth & Van Dyke COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.	
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND	FINISHED GRADES
SCALE 1" = 100' SCOPE ID: 89C16 DRAWING NO. <b>8</b>	



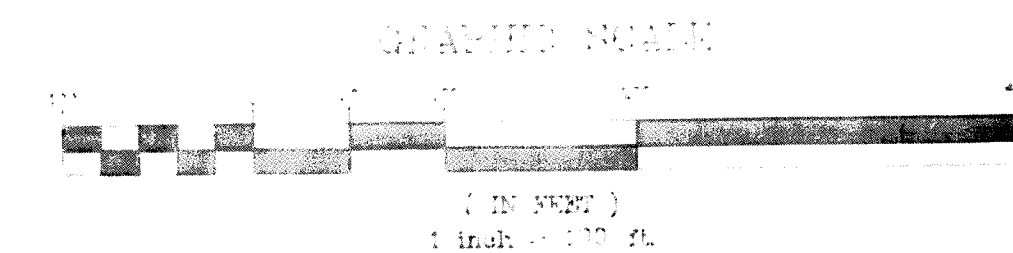
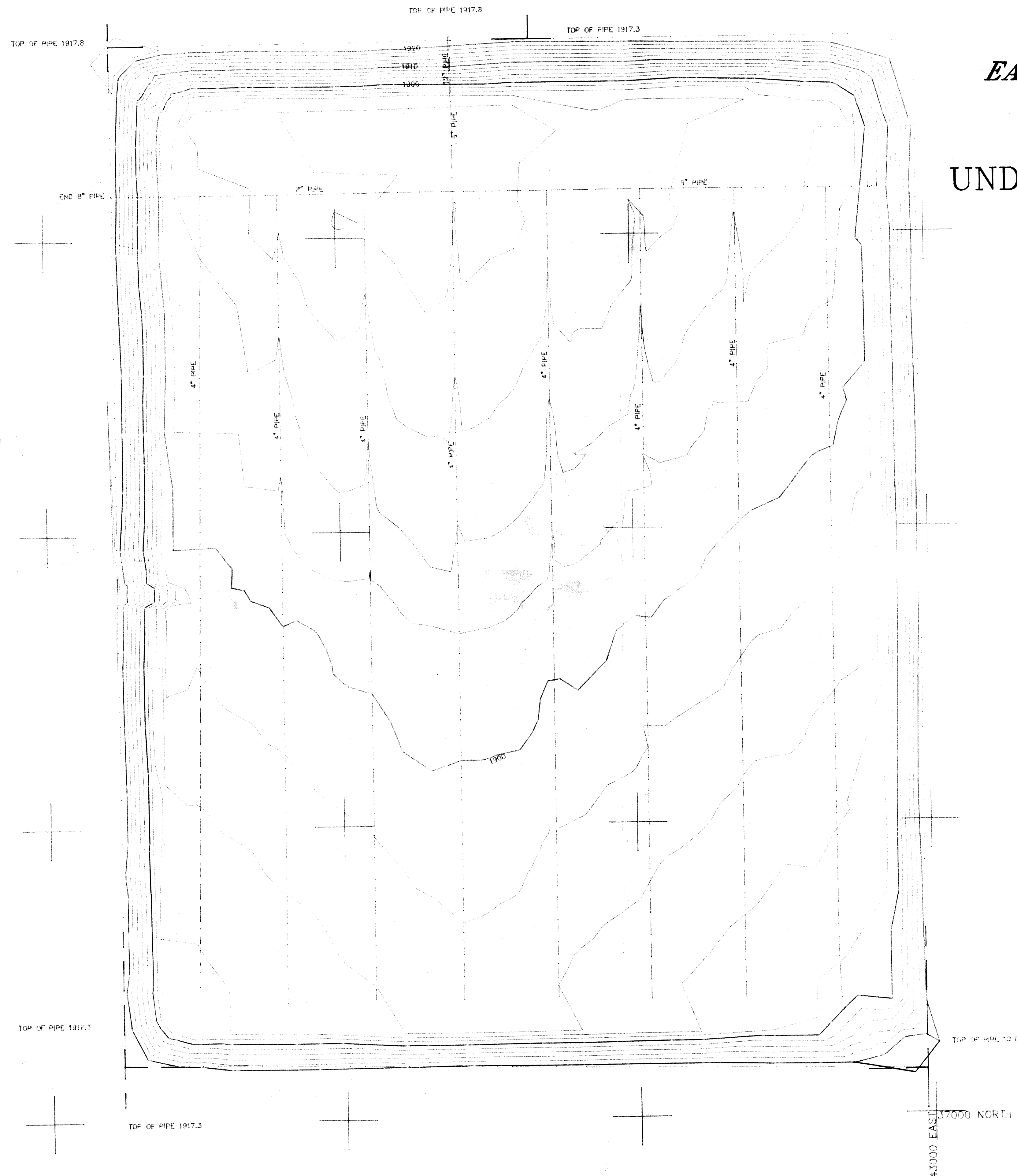
# COAL CREEK STATION

## *EAST HALF SOUTH ASH POND*

### FINISHED GRADES AND PIPING

## UNDERWOOD, NORTH DAKOTA

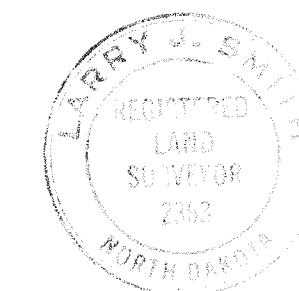
— VENT PIPE  
— PIPING  
— GAS TRENCH



THIS SURVEY WAS MADE JANUARY 26, 1990  
FROM AN ADJUDICATED SURVEY ON DECEMBER 20, 1989

1. SURVEYED FOR SECTION 16
2. TOWNSHIP 10N, RANGE 10E, SLOAN COUNTY, NORTH DAKOTA.
3. THE SURVEY WAS MADE IN AN ACTUAL SURVEY OF THE GROUND.
4. ELEVATIONS ARE GIVEN ON SEA LEVEL DATUM.
5. ELEVATIONS ARE BASED ON NORTH DAKOTA
6. STATE PLANE COORDINATES SYSTEM AS FOLLOWS:  
NORTH DAKOTA NORTH STATE PLANE COORDINATES  
MINUS 1,000,000.  
NORTH DAKOTA EAST STATE PLANE COORDINATES  
MINUS 1,800,000.

THE SURVEYOR'S CERTIFICATE  
I, LARRY J. SMITH, A REGISTERED LAND SURVEYOR IN  
THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE  
ADJUDICATED COPY OF THE NOTES OF SURVEY  
DATED JANUARY 20, 1990 AND IS A TRUE  
REPRESENTATION OF THE AS-BUILT CONDITION.



LARRY J. SMITH  
NORTH DAKOTA REGISTRATION  
NO. 2363

CIVIL ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 908 BASH AVENUE  
BISMARCK, NORTH DAKOTA 58102  
701-223-2016

DRAWING NO.		9	
SCOPE ID.		89C16	
SCALE		1" = 100'	
DOCUMENTATION DRAWINGS		COAL CREEK STATION EAST HALF OF SOUTH ASH POND FINISHED GRADES AND PIPING	
COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.		Foth & Van Dyke	
NO.	BY	DATE	
1	LS	2-6-90	
APPROVED BY: Jxp		DATE: 2-6-90	
REVIEWED BY: RA		DATE: 2-6-90	
PREPARED BY: LUS		DATE: 1-26-90	
CADD PROJ CODE:		DP	LS
DRAWN BY:		DATE: 1-26-90	
SURVEY DATA:		DATE: 12-20-89	
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION. BY: LSH DATE: 2-6-90			
PRJ NAME:		COAL CREEK STATION	

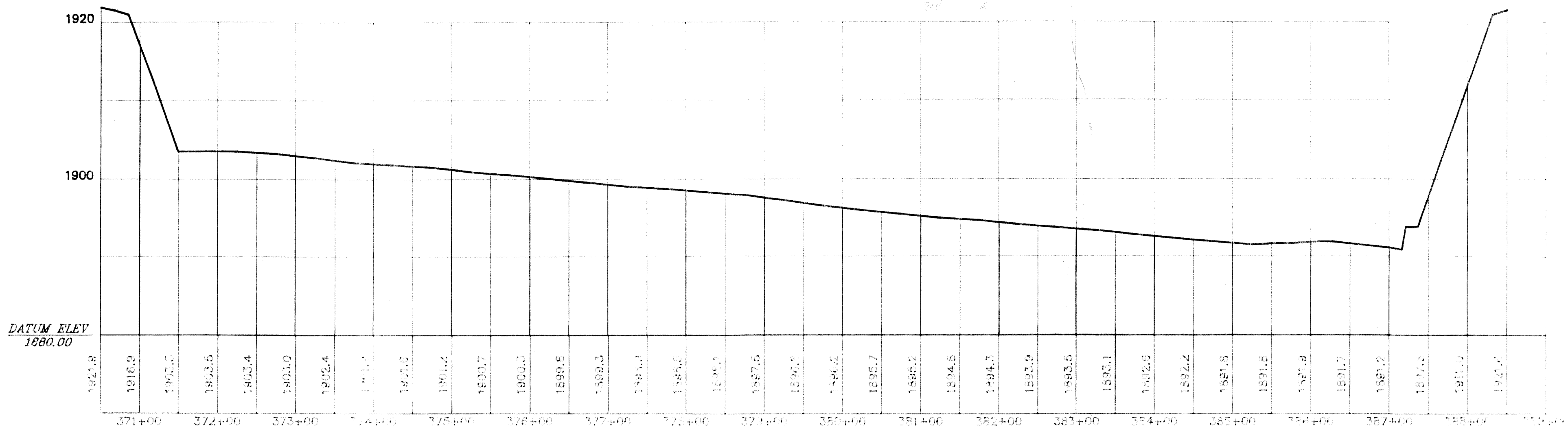
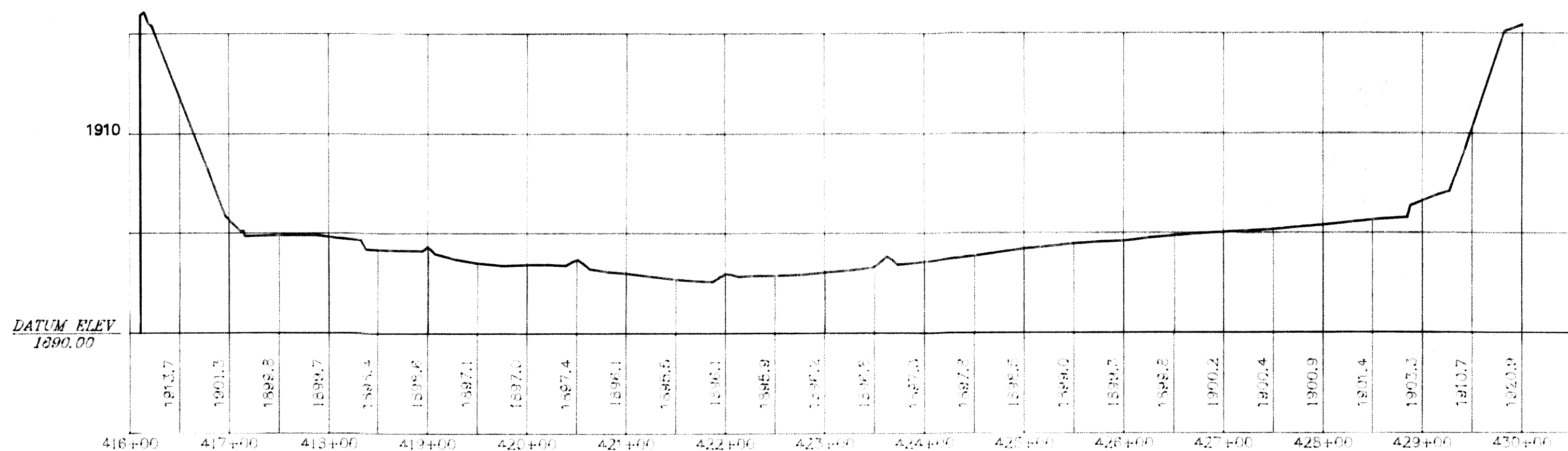


COAL CREEK STATION

EAST HALF SOUTH ASH POND

FINISHED GRADES  
PROFILES  
UNDERWOOD, NORTH DAKOTA

PROFILE AT 38000 NORTH FROM 41600 EAST TO 43000 EAST



PROFILE AT 42300 EAST FROM 37050 NORTH TO 38850 NORTH

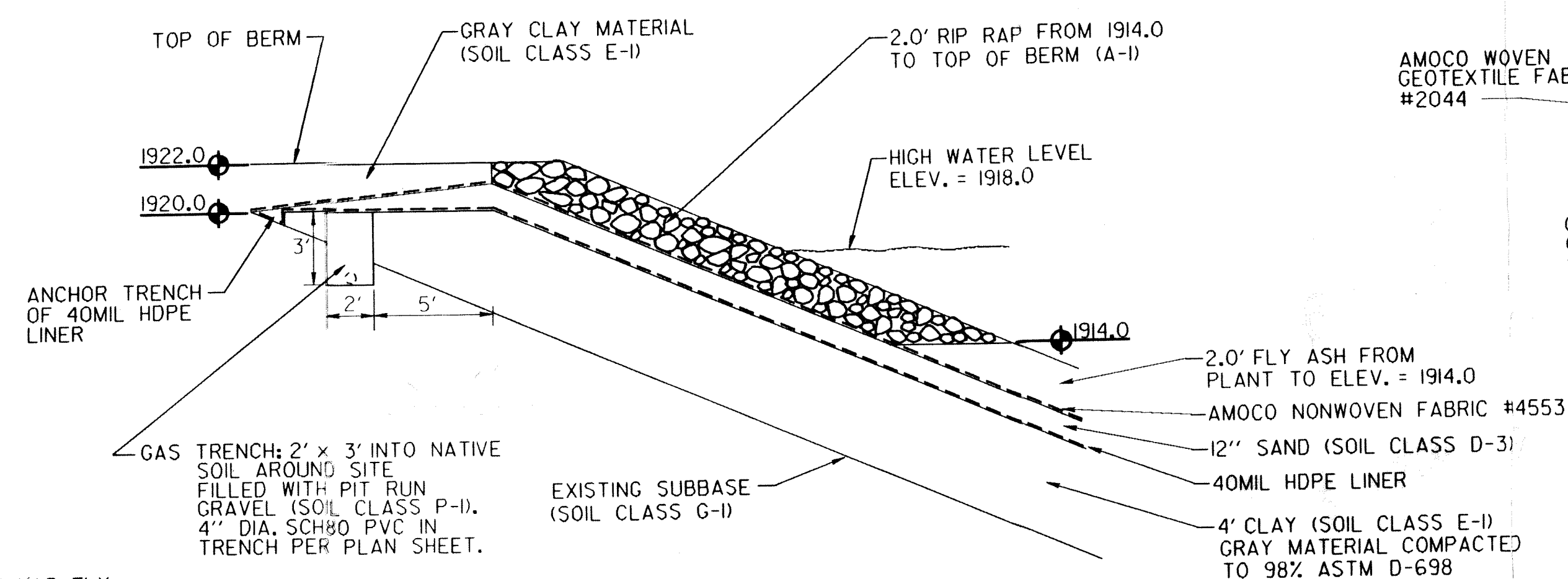
CIVIL ENGINEERING LAND PLANNING LAND SURVEYING  
**SWENSON, HAGEN & CO. P.C.**  
CONSULTING ENGINEERS  
P.O. BOX 1135, 909 BASIN AVENUE  
BISMARCK, NORTH DAKOTA 58502  
701-223-2800

SCALE 1" = 100'	
SCOPE ID. 89C16	
DRAWING NO. 10	
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND ENGINEERING CROSS SECTIONS	
COOPERATIVE POWER ASSOCIATION EDEN PRAIRIE, MINN. AND UNITED POWER ELK RIVER, MINN.	
Foth & Van Dyke	
NO. BY A	DATE
APPROVED BY: JUP DATE: 2-6-90	
RECORD DRAWINGS OF COMPLETED CONSTRUCTION FOR THE CONTRACTORS AND/OR OWNERS RECORDS DURING CONSTRUCTION. BY: JUP DATE: 2-6-90	
CADD PROJ. CODE:	PRJ. NAME:
DRAWN BY: DP	DATE: 1-26-90
SURVEYED BY: LS	DATE: 12-20-89

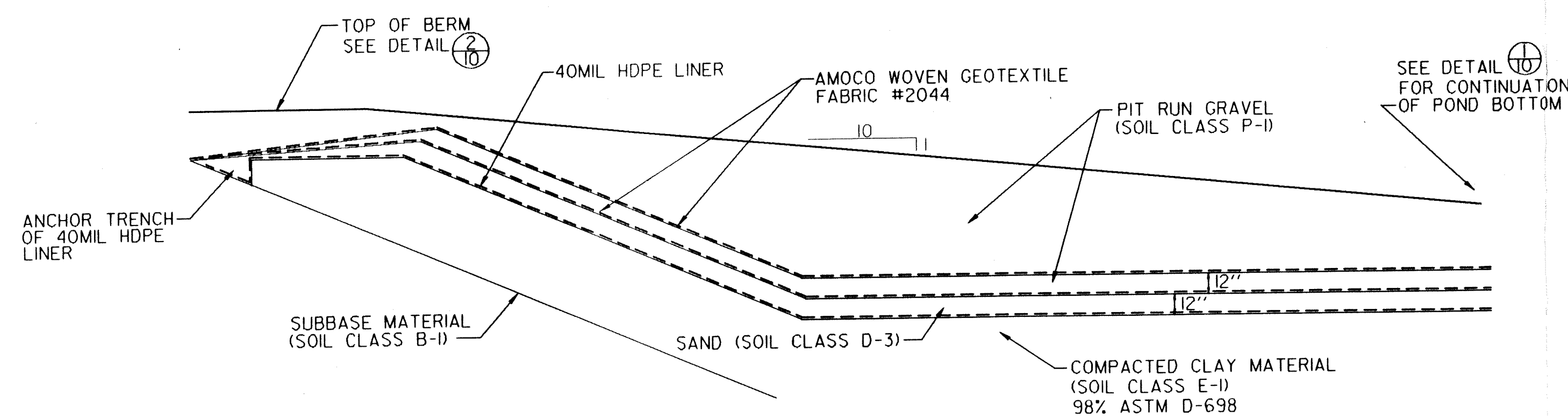


- 12" ON SITE BOTTOM ASH
- 12" PIT RUN GRAVEL (SOIL CLASS P-I)
- AMOCO WOVEN GEOTEXTILE #2044
- 12" SAND (SOIL CLASS D-3)
- 40 MIL HDPE LINER
- 6" GRAY CLAY (SOIL CLASS E-I) COMPACTED TO 98% ASTM D-698
- 18" BROWN CLAY (SOIL CLASS E-I) COMPACTED TO 98% ASTM D-698
- RECOMPACTED MAT'L (G-I), DEPTH VARIES THRU SITE

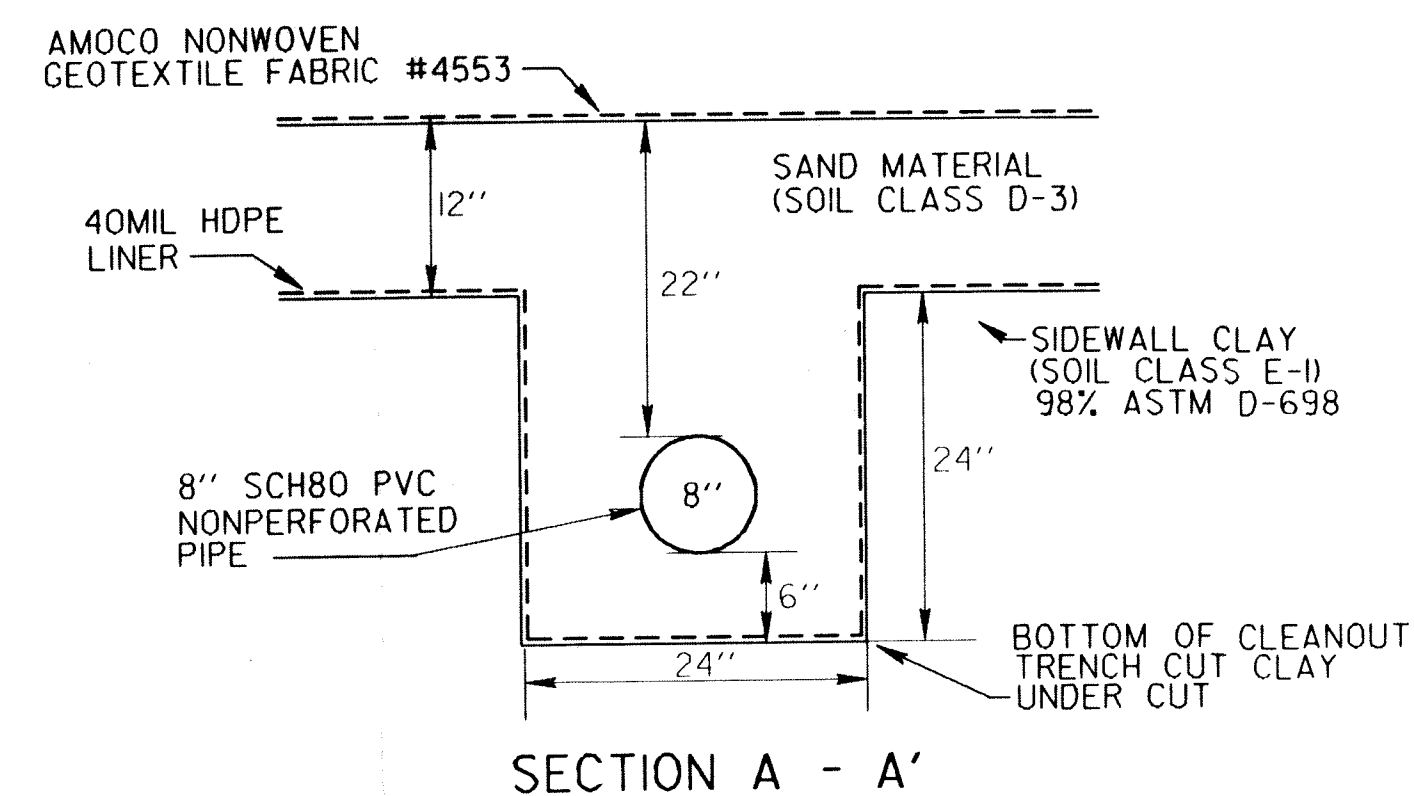
1 TYPICAL FLEXIBLE MEMBRANE LINER (FML) DETAIL  
NOT TO SCALE



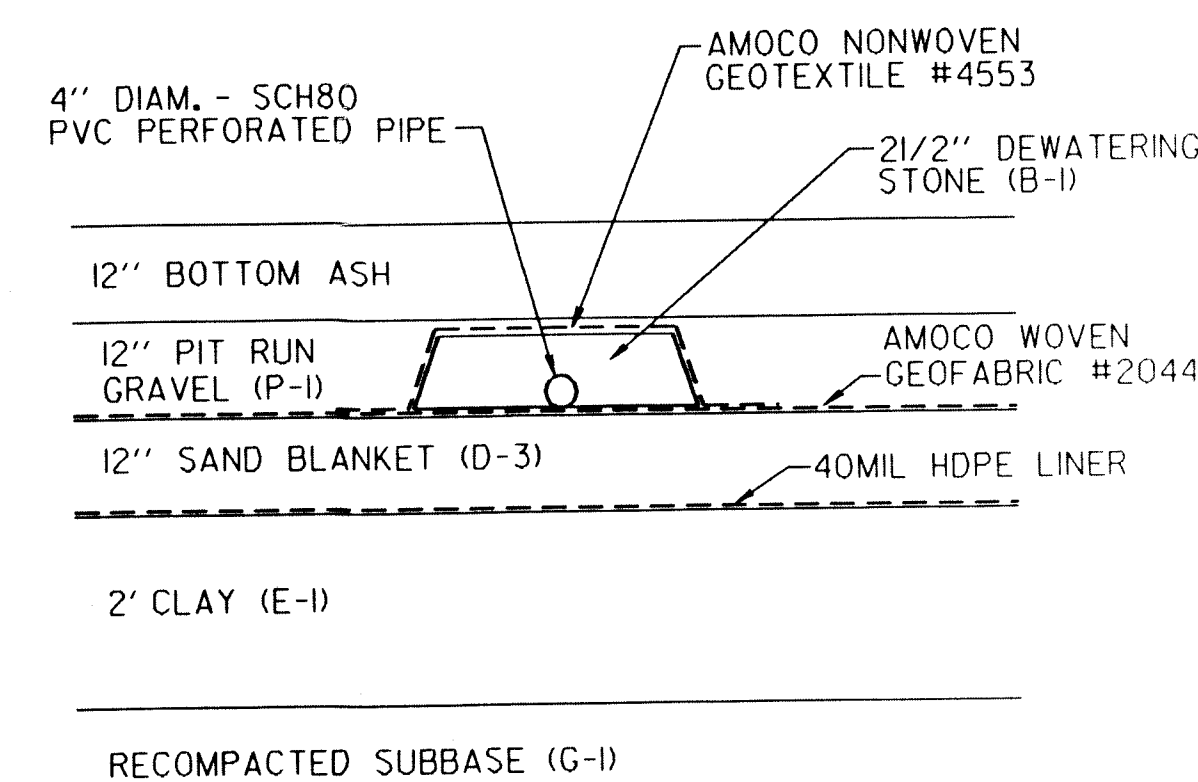
2 TYPICAL SIDE WALL DETAIL OF SOUTH, EAST AND WEST SLOPES  
NOT TO SCALE



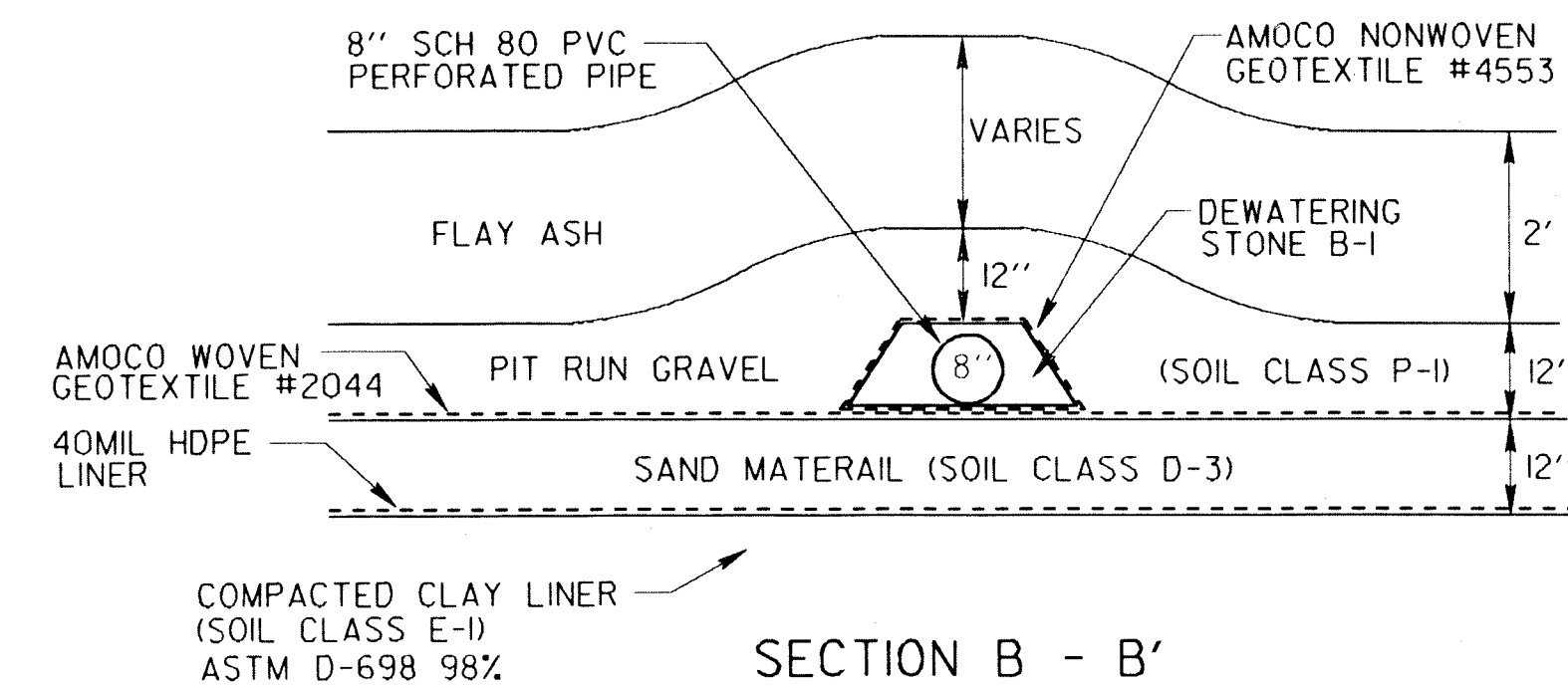
3 PERMANENT HEAVY EQUIPMENT ENTRANCE RAMP DETAIL (SOUTHEAST CORNER OF POND)  
NOT TO SCALE



4 TYPICAL CLEAN-OUT RISERS EAST AND WEST SLOPES  
NOT TO SCALE

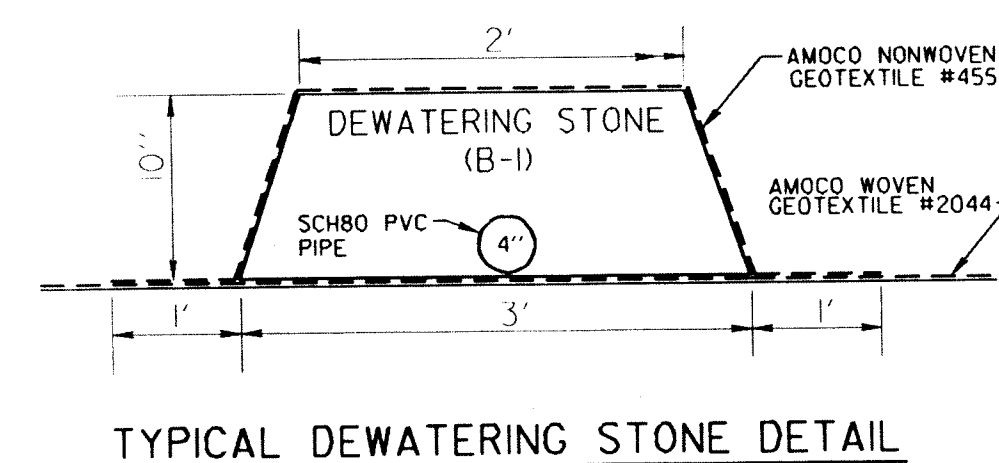


5 TYPICAL DEWATERING AND HEADER TRENCH DETAIL WITH DETAIL OF THE BEDDING AROUND THE PERFORATED PIPE  
NOT TO SCALE



SECTION B - B'

NOTE:  
ONCE CLEANOUT TRENCH IS FILLED WITH SAND, AND EVEN WITH THE ADJACENT SAND COVER, FINISH AS PER DETAIL 10



TYPICAL DEWATERING STONE DETAIL

CADD PROJ CODE: 9000	PRJ NAME: 9000	DATE: 1/25/90	DATE: 9/8/99
DRAWN BY: JLD	DATE: 1/25/90	DATE: 9/8/99	DATE: 9/8/99
SURVEYED BY: JLD	DATE: 1/25/90	DATE: 9/8/99	DATE: 9/8/99
SURVEY DATA: JLD	DATE: 1/25/90	DATE: 9/8/99	DATE: 9/8/99
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO RECORDS AND SPECIFICATIONS DURING CONSTRUCTION	DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90
APPROVED BY: JLD	DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90
REVIEWED BY: JLD	DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90
PREPARED BY: JLD	DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90
DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90	DATE: 2-6-90

Foth & Van Dyke

COOPERATIVE POWER  
EDEN PRAIRIE, MINN.  
AND  
UNITED POWER  
ELK RIVER, MINN.

DOCUMENTATION DRAWINGS  
COAL CREEK STATION  
EAST HALF OF SOUTH ASH POND  
DETAILS

SCALE NOT TO SCALE

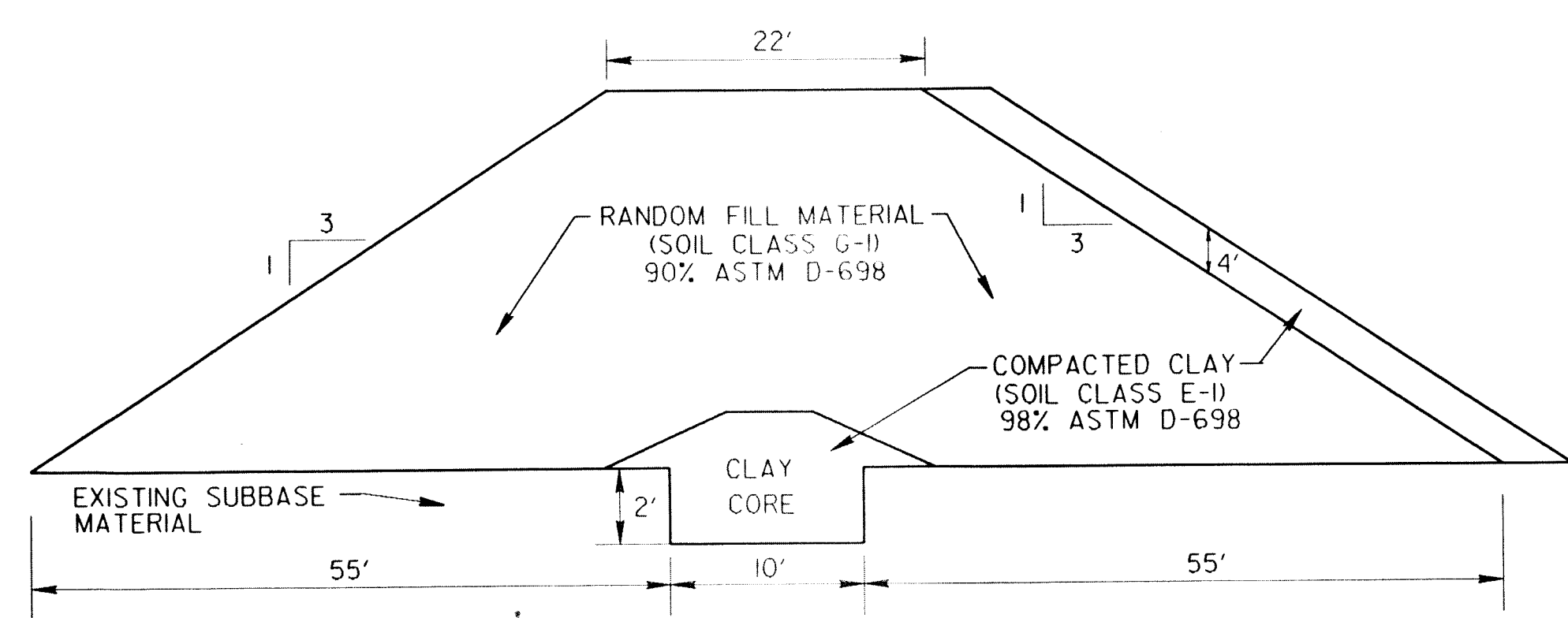
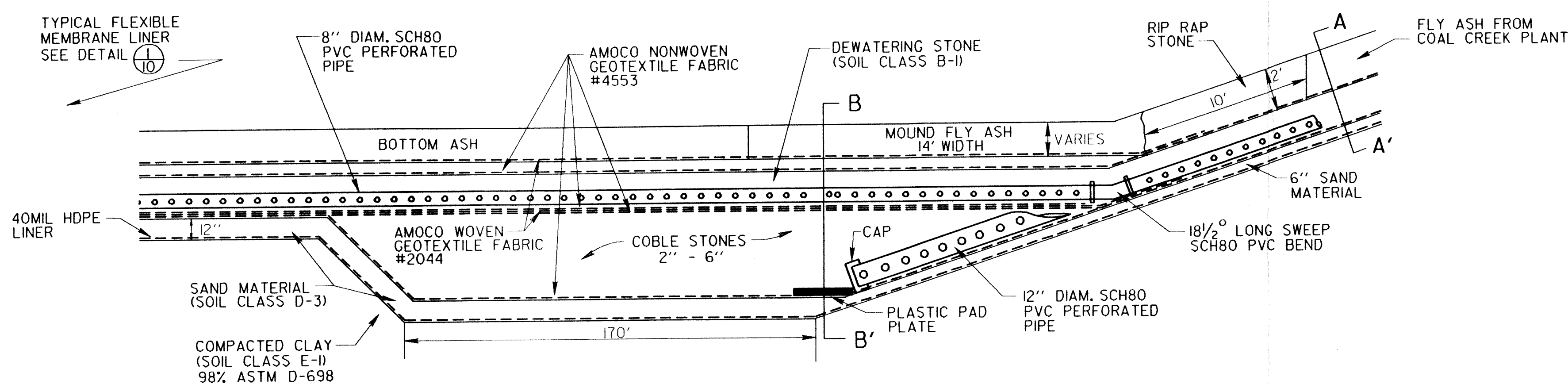
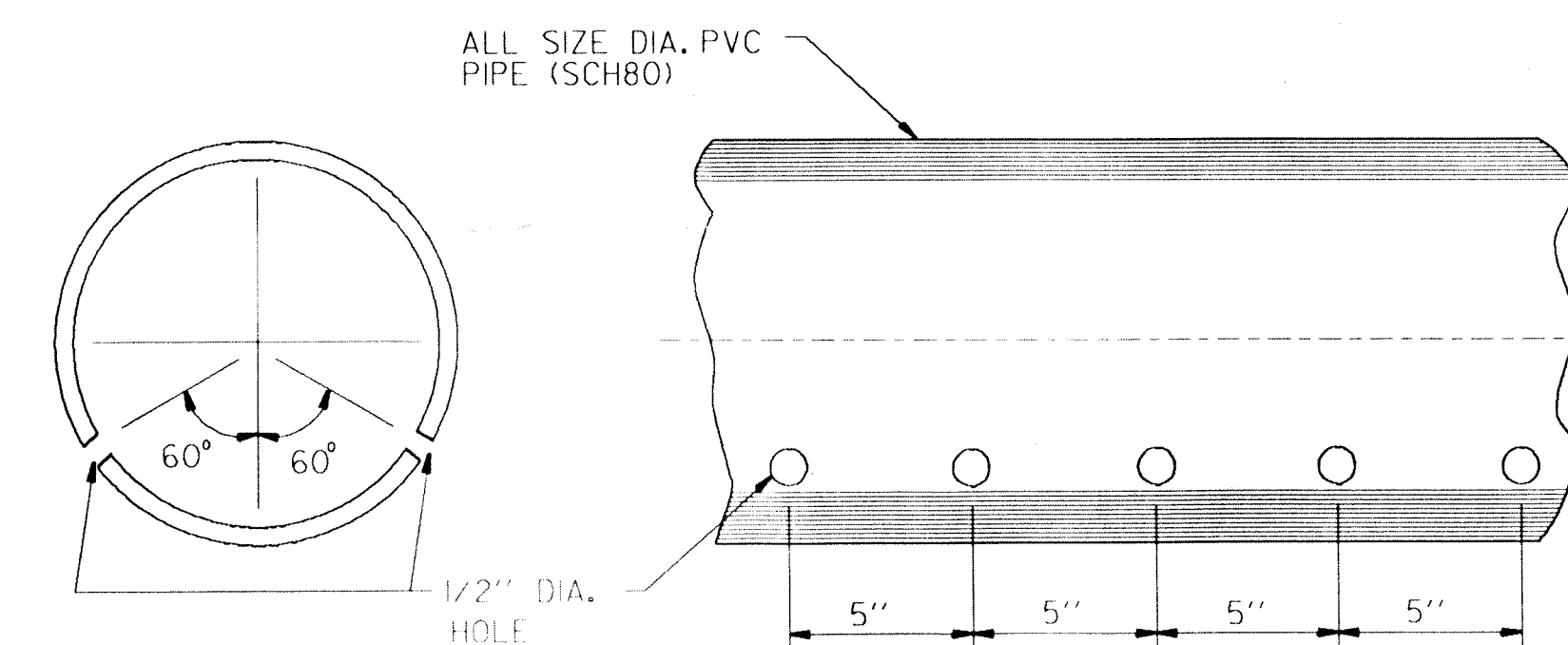
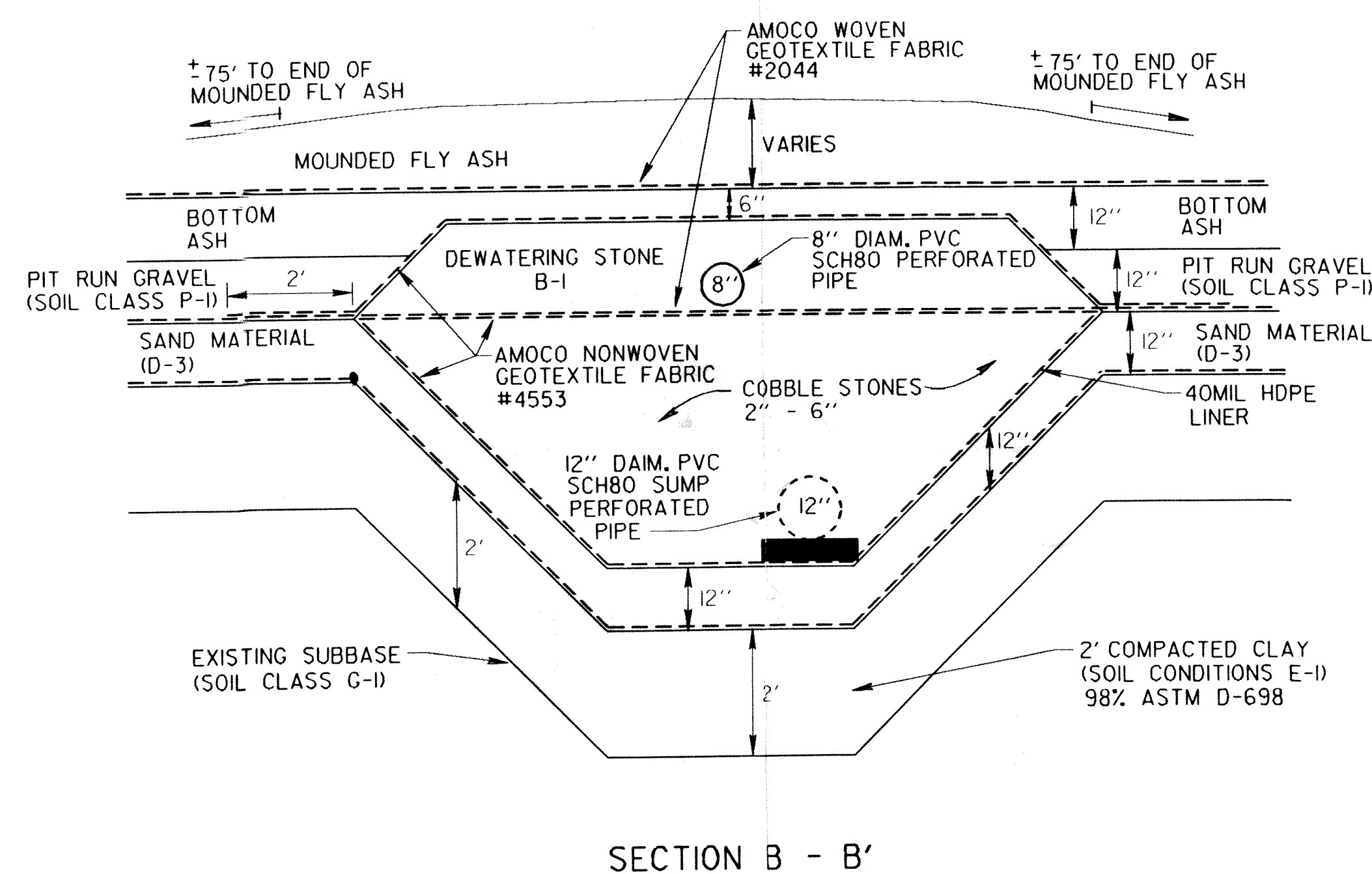
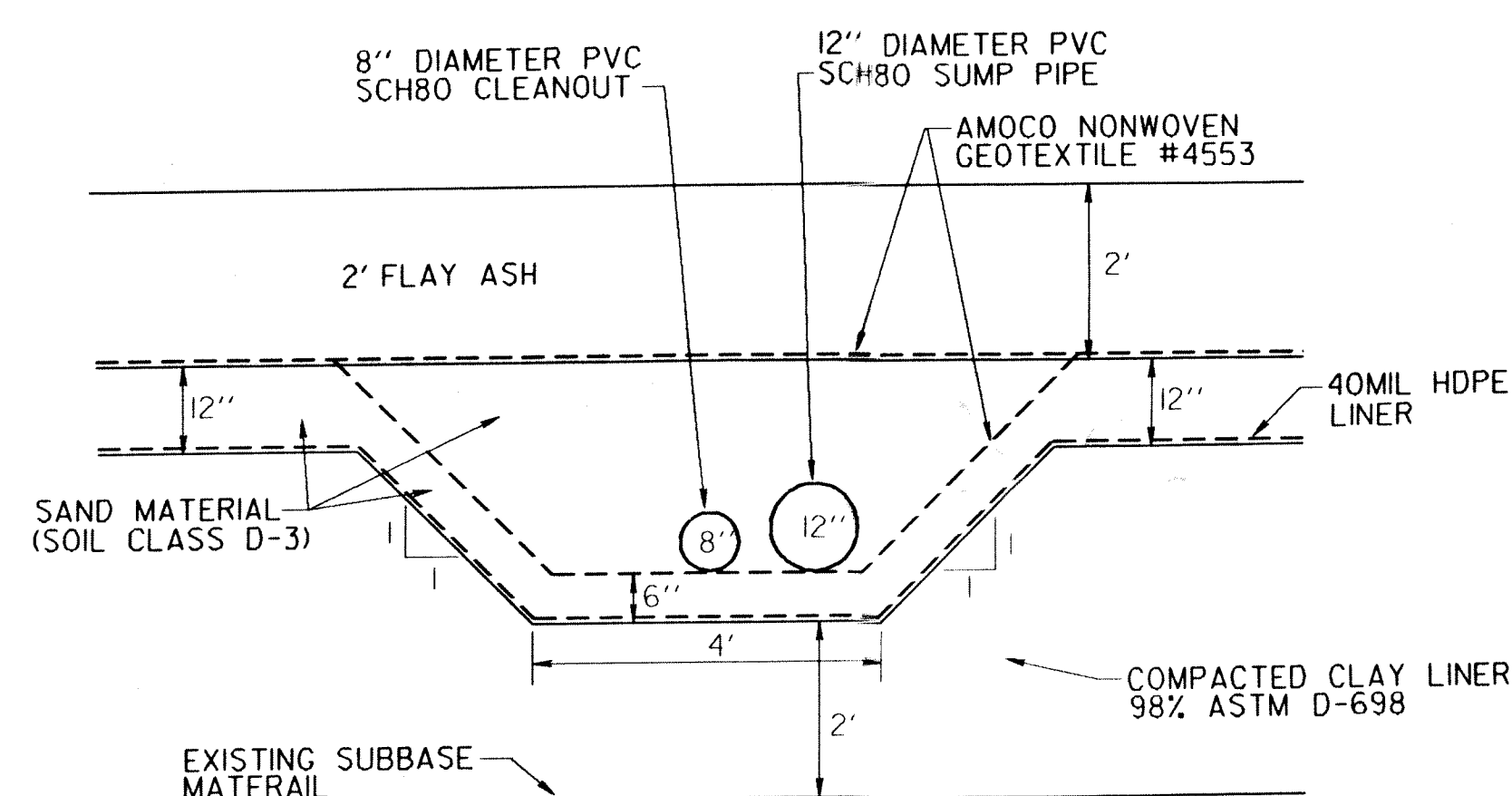
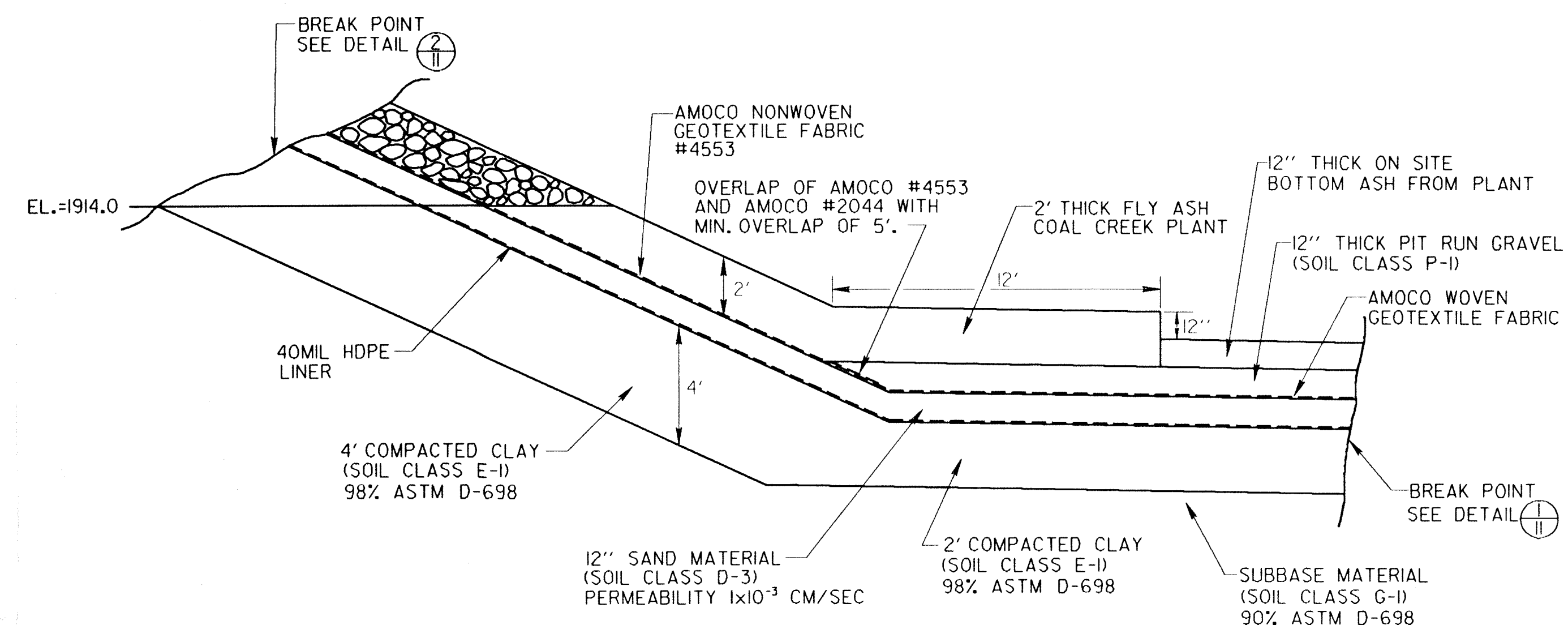
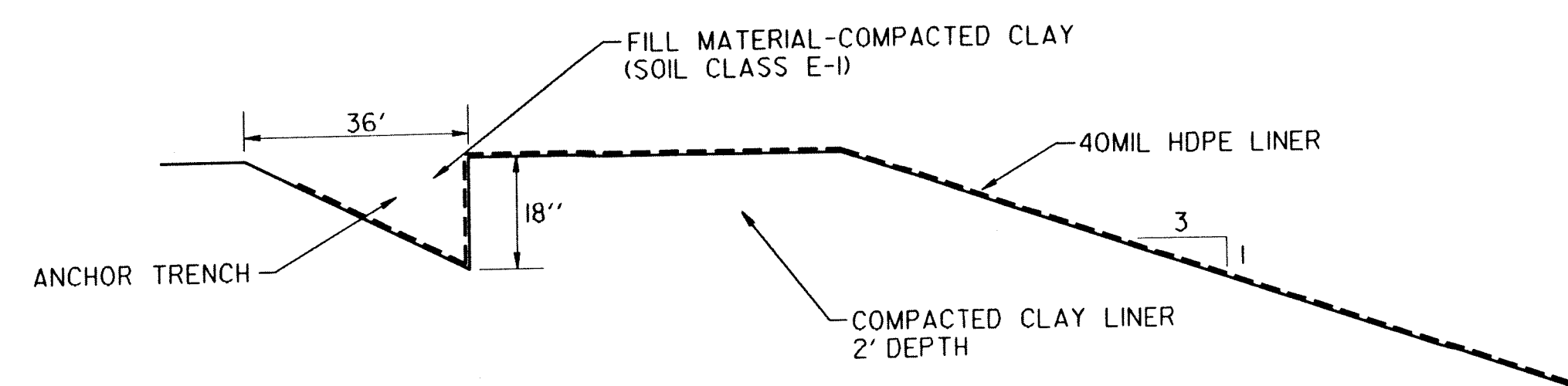
SCOPE ID 89CIG

DRAWING NO.

11

REUSE OF DOCUMENTS  
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE, IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE AND ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.






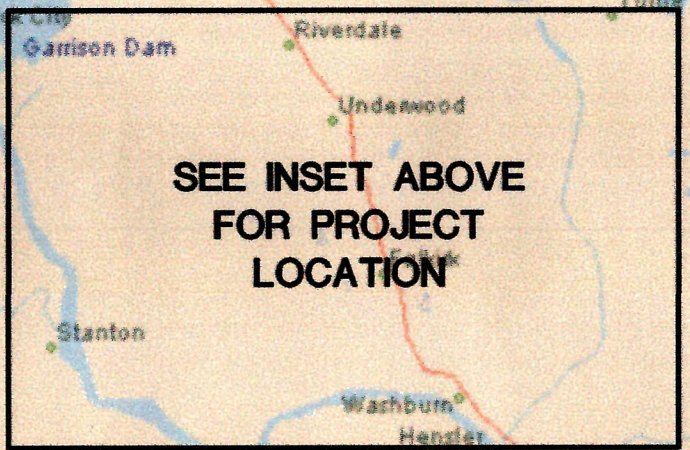
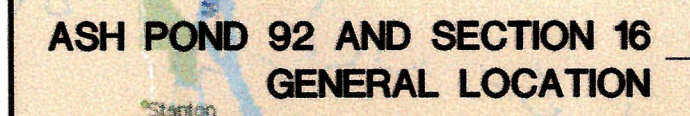
DOCUMENTATION DRAWINGS COAL CREEK STATION EAST HALF OF SOUTH ASH POND	SCALE	NOT TO SCALE	COOPERATIVE POWER EDEN PRAIRIE, MINN.  AND  UNITED POWER ELK RIVER, MINN.	Foth & Van Dyke	NO. BY DATE Δ Δ Δ Δ	REVISIONS / REMARKS APPROVED BY: $\Delta \times P$ DATE: 2-6-90 REVIEWED BY: $\Delta JV$ DATE: 3-6-90 PREPARED BY: $\Delta JA$ DATE: 2-6-90	CADD PROJ. CODE: 9C00 DRAWN BY: DP SURVEYED BY: LS SURVEY DATA: RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO RECORDS FOR CONSTRUCTION BY $\Delta JA$ DATE 2-6-90	9C00BET1 1/25/90 9/8/89
	SCOPE ID	89C16						
DRAWING NO.			12					



APPENDIX A2  
UPSTREAM RAISE PERMIT DRAWINGS  
(GOLDER 2004A)



**PERMIT NO. SP-033**  
**PERMIT MODIFICATION**



GREAT RIVER  
ENERGY

**Coal Creek Station**  
**Underwood, North Dakota**

**Golder Associates Inc.**  
**44 Union Boulevard, Suite 300**  
**Lakewood, Colorado USA 80228**

GOLDER DRAWING NO.	TITLE	REVISION NO.
1	TITLE SHEET	C
2	CURRENT CONDITIONS	C
3	GENERAL SITE PHASES	C
4	PHASE 1: ASH POND 92 RAISE	C
5	PHASE 2: SW SECTION 16 INTERMEDIATE LINER/CAP	C
6	PHASE 3: ASH POND 92 & SW SECTION 16 RAISE	C
7	PHASE 4: SE SECTION 16 LANDFILL	C
8	FINAL WASTE GRADES	C
9	FINAL COVER GRADES & SURFACE WATER PLAN	C
10	CROSS SECTIONS	C
11	DETAIL SHEET 1	C
12	DETAIL SHEET 2	C
13	DETAIL SHEET 3	A
Foth & Van Dyke 1989 Operations Plan	TITLE	DATE
A-2	EXISTING CONDITIONS	1-18-89
A-3	SITE SEQUENCING	1-18-89
A-5	BASE GRADES	1-18-89
A-11	FINAL GRADES	1-18-89

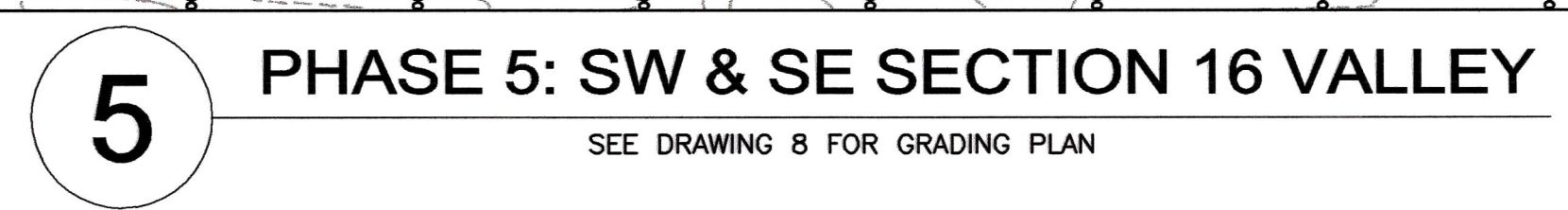
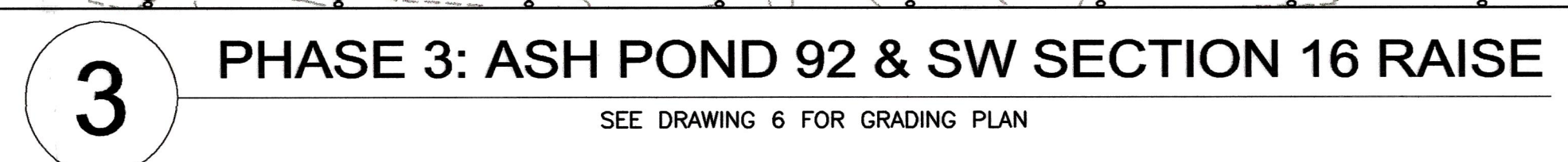
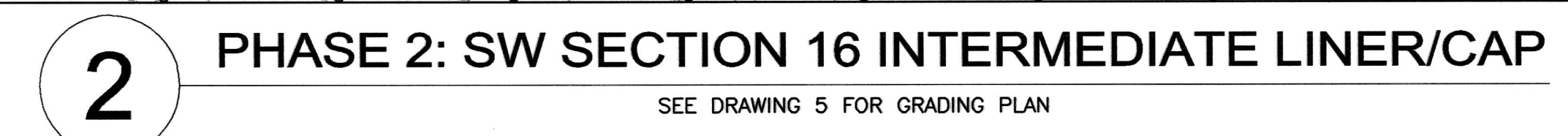
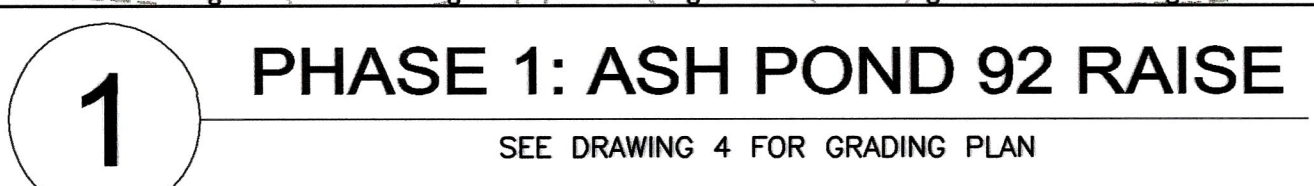
[illegible]

PROJECT	<b>GREAT RIVER ENERGY</b> <b>COAL CREEK STATION</b> <b>PERMIT NO. SP-033 PERMIT MODIFICATION</b>
TITLE	<b>TITLE SHEET</b>





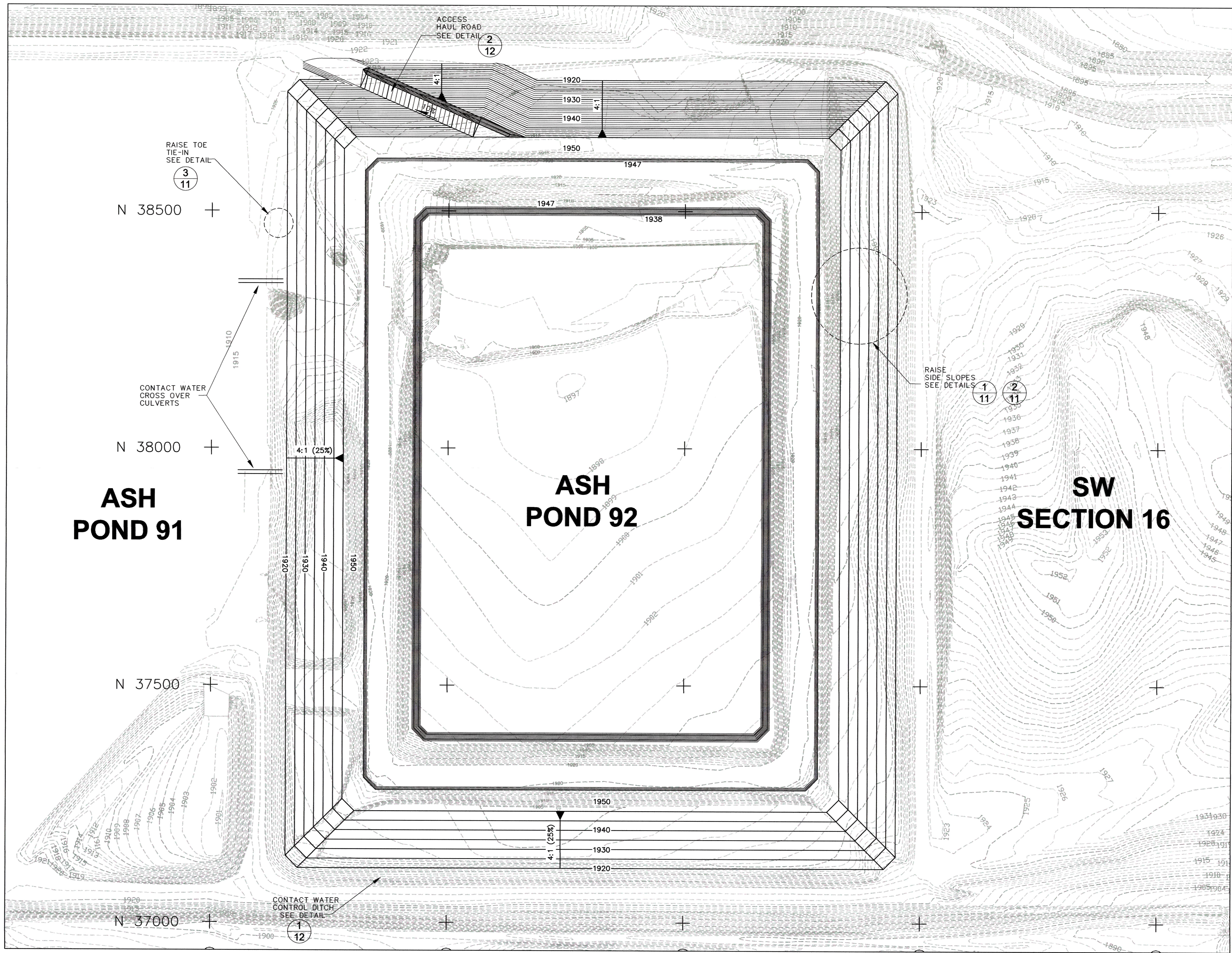




- 

PROJECT	<b>GREAT RIVER ENERGY</b> <b>COAL CREEK STATION</b> <b>PERMIT NO. SP-033 PERMIT MODIFICATION</b>
TITLE	<b>GENERAL SITE PHASES</b>





LEGEND

1920

1915

EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)

1920

1915

PROPOSED TOP OF WASTE TOPOGRAPHY

- NOTES
1. GRADES SHOWN REPRESENT TOP OF WASTE.

2. OVERALL RAISE SIDE SLOPE GEOMETRY IS 4H:1V (25%).

3. CONTACT WATER WILL BE CONTAINED IN A TEMPORARY PERIMETER DITCH AND WILL BE DIRECTED TO ASH POND 91 OR INTO THE UPSTREAM RAISE.

- REGULATORY DESIGN BASIS
1. CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.

2. OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.

3. MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

4. MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

5. EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

6. CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

7. COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.

8. APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.

9. ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

- REFERENCES
1. SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.

2. EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BY INTERSTATE ENGINEERING AND KADRMAS, LEE & JACKSON BETWEEN 1996 AND 2003.

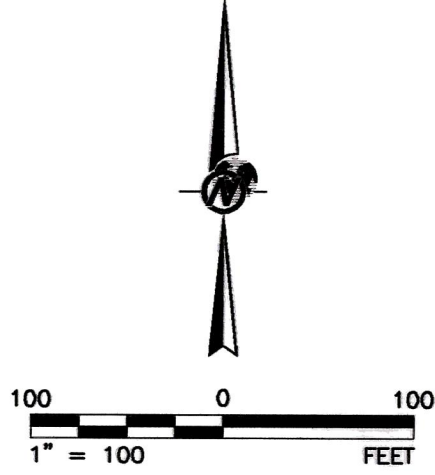
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS ONE FOOT.

4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:

SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000

SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000

5. ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



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Machine: engineering\_stong  
By: taling


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		△	ISSUED FOR PERMIT MODIFICATION	09/24/03	TJS	RRJ	RRJ				
		△	ISSUED FOR CLIENT REVIEW	06/04/03	TJS	-	RRJ				

PROJECT

GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE

PHASE 1: ASH POND 92 RAISE

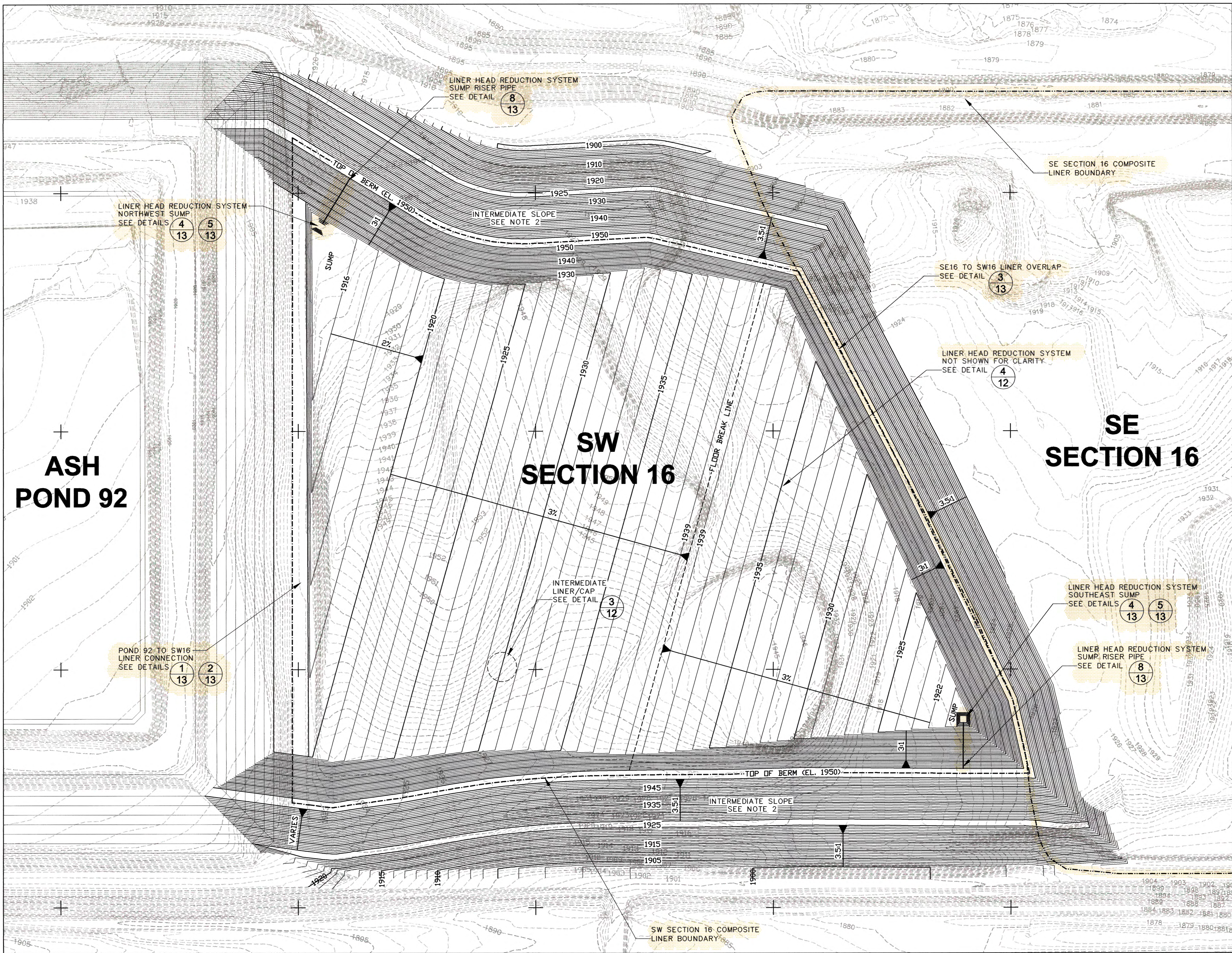
Golder Associates  
Denver, Colorado

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REVIEW	RRJ	06/02/03	

4



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Last Update: Jul 08, 2006 14:22 By: utorg  
Machine: engineering-utorg



## LEGEND

- 1920 1915  
1920 1915  
1920 1915
- EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)
- PREVIOUS PHASE PROPOSED TOPOGRAPHY
- PROPOSED CONSTRUCTION TOPOGRAPHY
- SW SECTION 16 COMPOSITE LINER BOUNDARY
- SE SECTION 16 COMPOSITE LINER BOUNDARY

## NOTES

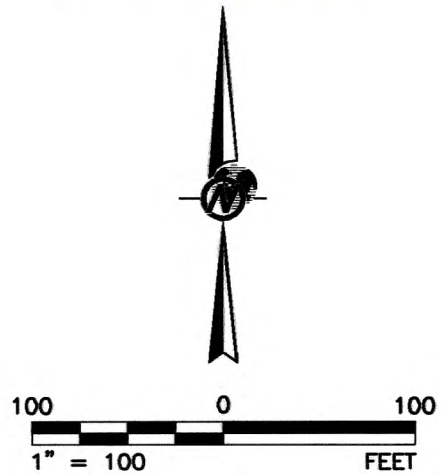
- SW SECTION 16 GRADES REPRESENT TOP OF CLAY LINER/SOIL DIKE.
- SW SECTION 16 CONTAINMENT DIKE SLOPES ARE INTERMEDIATE SLOPES AT 3.5H:1V. FINAL CLOSURE SLOPES WILL BE GRADED TO 4H:1V.

## REGULATORY DESIGN BASIS

- CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.
- OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.
- ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

## REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BY INTERSTATE ENGINEERING AND KADRMAS, LEE & JACKSON BETWEEN 1996 AND 2003.
- ELEVATIONS BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS ONE FOOT.
- HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:
  - SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000
  - SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000
- ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



ENGINEER'S STAMP

REFERENCE DRAWINGS

NO.

REVISION DESCRIPTION

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UNLESS LAST REVISION IS HAND WRITTEN

DATE

BY

CHKD

AP'VD

PRINT ISSUE RECORD

DATE  
FOR  
REVISED  
CLIENT  
FIELD

- ISSUED FOR DRAFT REVISED PERMIT MODIFICATION
- ISSUED FOR PERMIT MODIFICATION
- ISSUED FOR CLIENT REVIEW

07/09/04

09/24/03 TJS RRJ RRJ

06/04/03 TJS - RRJ

PROJECT

GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE

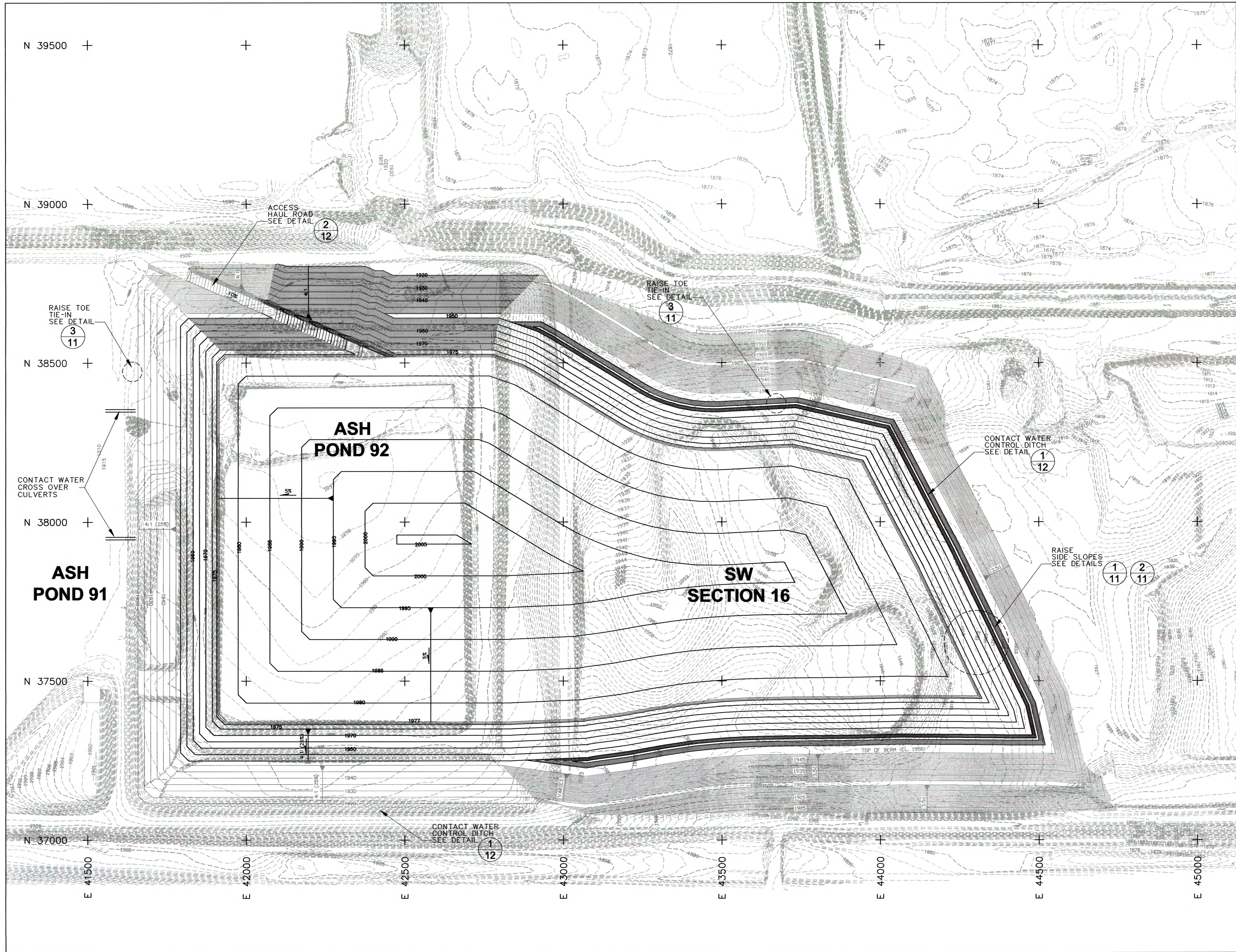
PHASE 2: SW SECTION 16  
INTERMEDIATE LINER/CAP



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CHECK	RRJ	06/02/03	
REVIEW	RRJ	06/02/03	



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User: tjung  
Last Modified: 09/20/04 08:41  
Machine: engineering\_along



#### LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)
- PREVIOUS PHASE PROPOSED TOPOGRAPHY
- PROPOSED TOP OF CCP TOPOGRAPHY

#### NOTES

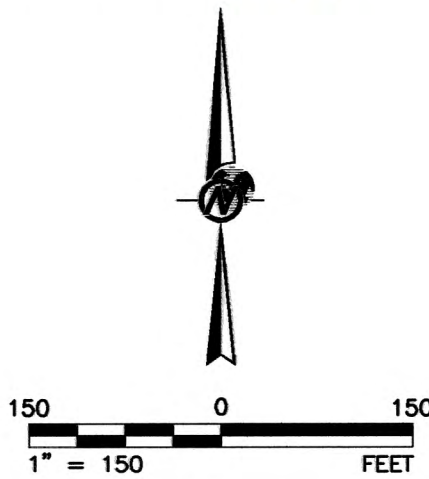
- GRADES REPRESENT TOP OF WASTE/SOIL DIKE.
- CONTACT WATER COLLECTED IN DITCH AROUND ASH POND 92 AND SW SECTION 16. WATER IS DIRECTED THROUGH CULVERT TO ASH POND 91 OR DOWNWARD INTO UPSTREAM RAISE.

#### REGULATORY DESIGN BASIS

- CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.
- OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.
- ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

#### REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BY INTERSTATE ENGINEERING AND KADRMAS, LEE & JACKSON BETWEEN 1996 AND 2003.
- ELEVATIONS BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS ONE FOOT.
- HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000  
SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000
- ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



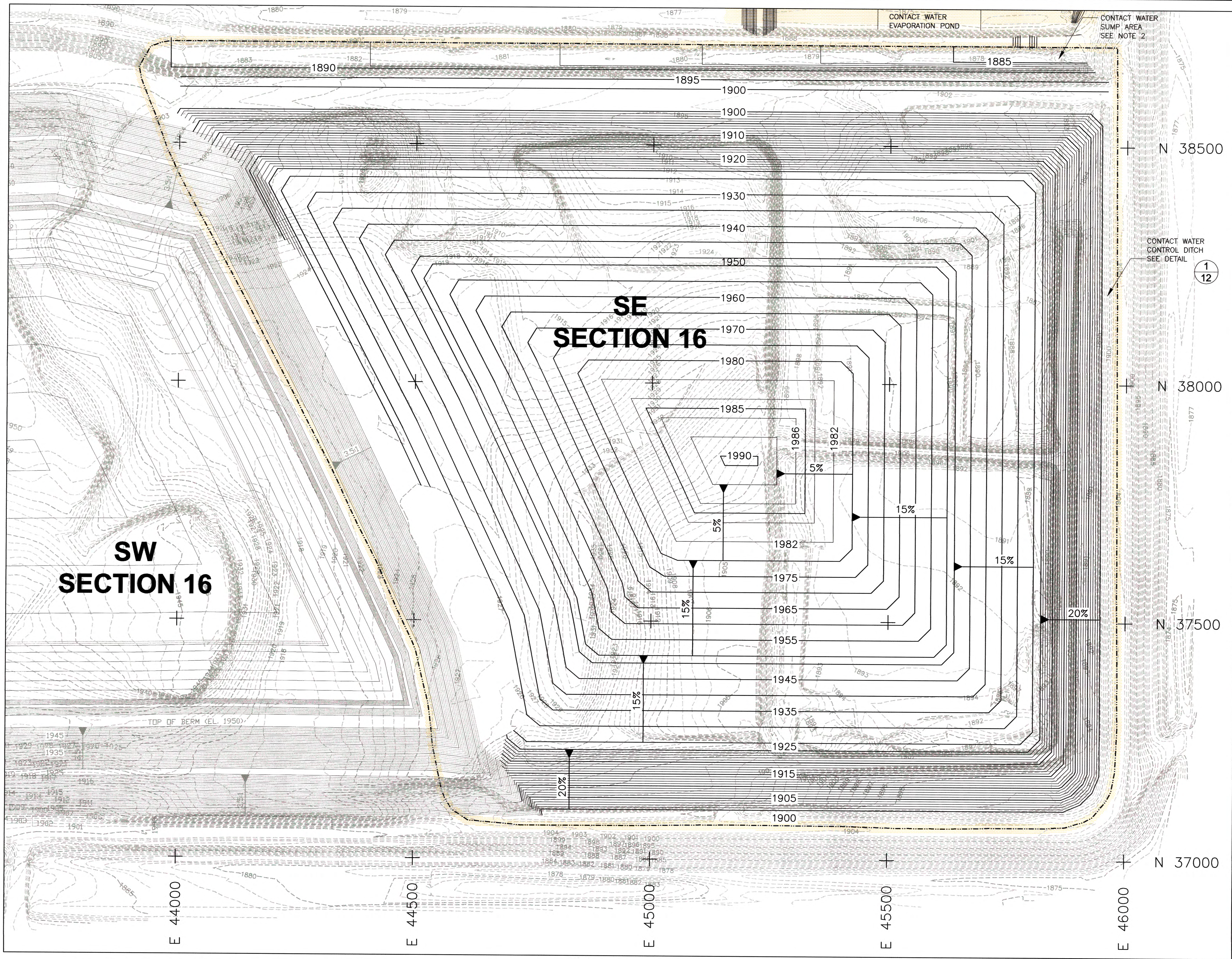
PROJECT  
**GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION**

TITLE  
**PHASE 3: ASH POND 92 &  
SW SECTION 16 RAISE**



PROJECT No.	023-2411	FILE No.	0232411A021
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CADD	TJS	05/01/03	
CHECK	RRJ	06/02/03	
REVIEW	RRJ	06/02/03	





**LEGEND**

EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)

PREVIOUS PHASE PROPOSED TOPOGRAPHY

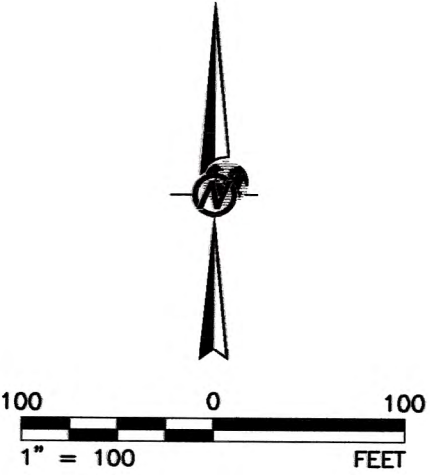
PROPOSED TOP OF CCP TOPOGRAPHY

SE SECTION 16 COMPOSITE LINER BOUNDARY

- NOTES**
- GRADES REPRESENT TOP OF CCP.
  - CONTACT WATER WILL BE COLLECTED IN PERIMETER TOE DITCH AND DIRECTED TO SUMP IN NE CORNER OF LANDFILL.

- REGULATORY DESIGN BASIS**
- CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.
  - OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
  - MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
  - MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
  - EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
  - CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
  - COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
  - APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.
  - ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

- REFERENCES**
- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
  - EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BY INTERSTATE ENGINEERING AND KADRMAS, LEE & JACKSON BETWEEN 1996 AND 2003.
  - ELEVATIONS BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS ONE FOOT.
  - HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000  
SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000
  - ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



ENGINEER'S STAMP

REFERENCE DRAWINGS

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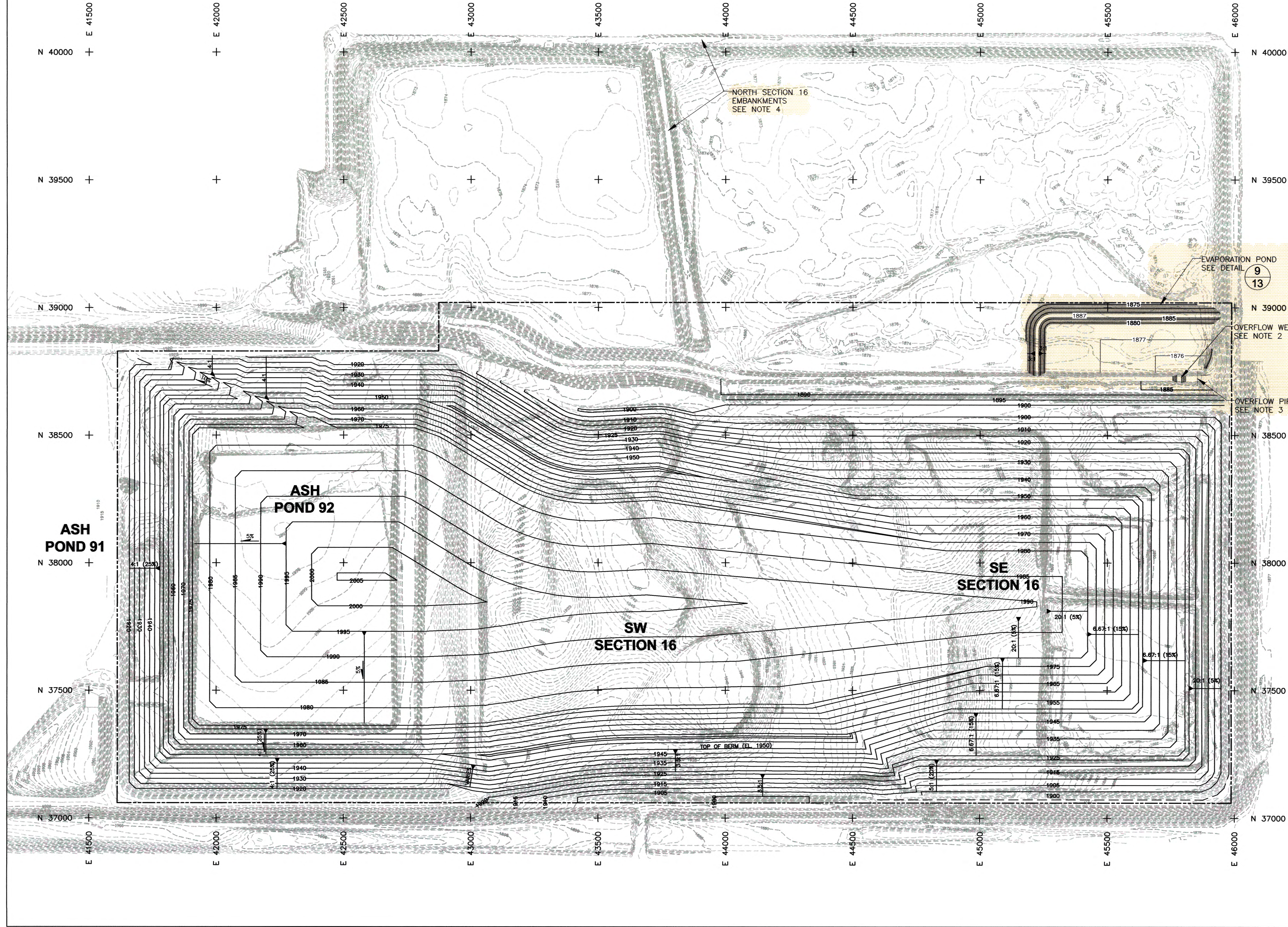
PROJECT  
**GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION**

**PHASE 4: SE SECTION 16 LANDFILL**



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CHECK	RRJ	06/02/03	
REVIEW	RRJ	06/02/03	





LEGEND

EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)

PROPOSED TOP OF CCP TOPOGRAPHY

PROPOSED LIMIT OF CCP PLACEMENT

- NOTES
1. GRADES REPRESENT TOP OF CCP.

2. A WEIR WILL BE CONSTRUCTED BETWEEN THE SE SECTION 16 SUMP AREA AND THE SE SECTION 16 OVERFLOW/EVAPORATION POND. SEE CONTACT WATER ENGINEERING WORKSHEET FOR DETAILS.

3. AN OVERFLOW PIPE WILL BE CONSTRUCTED BETWEEN THE SE SECTION 16 SUMP AREA AND THE SE SECTION 16 OVERFLOW/EVAPORATION POND. THE PIPE WILL CONTAIN A ONE-WAY CHECK VALVE TO ALLOW FLOW TO THE POND BUT NOT FROM THE POND.

4. THE EMBANKMENTS ON THE NORTH HALF OF THE SECTION 16 FACILITY WILL BE REMOVED AND MATERIAL USED AS STRUCTURAL FILL, LOW PERMEABILITY SOIL LINER, AND COVER MATERIAL. AFTER REMOVAL OF EMBANKMENTS, THE NORTH HALF OF THE SECTION 16 FACILITY WILL BE GRADED TO MATCH ORIGINAL AND SURROUNDING TOPOGRAPHY.

- REGULATORY DESIGN BASIS
1. CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.

2. OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.

3. MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

4. MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

5. EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

6. CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.

7. COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.

8. APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.

9. ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

- REFERENCES
1. SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.

2. EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BY INTERSTATE ENGINEERING AND KADRMAS, LEE & JACKSON BETWEEN 1996 AND 2003.

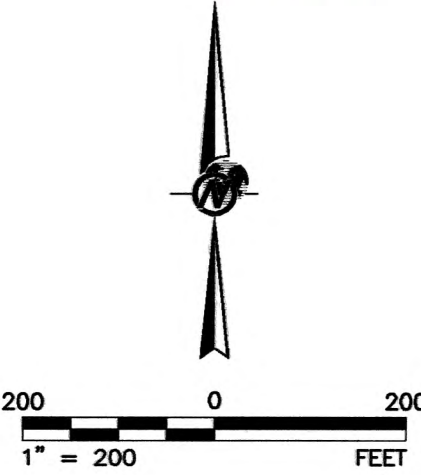
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS ONE FOOT.

4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:

SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000

SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000

5. ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



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By: tjtong  
Machine: engineering\_atong

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PROJECT

GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE

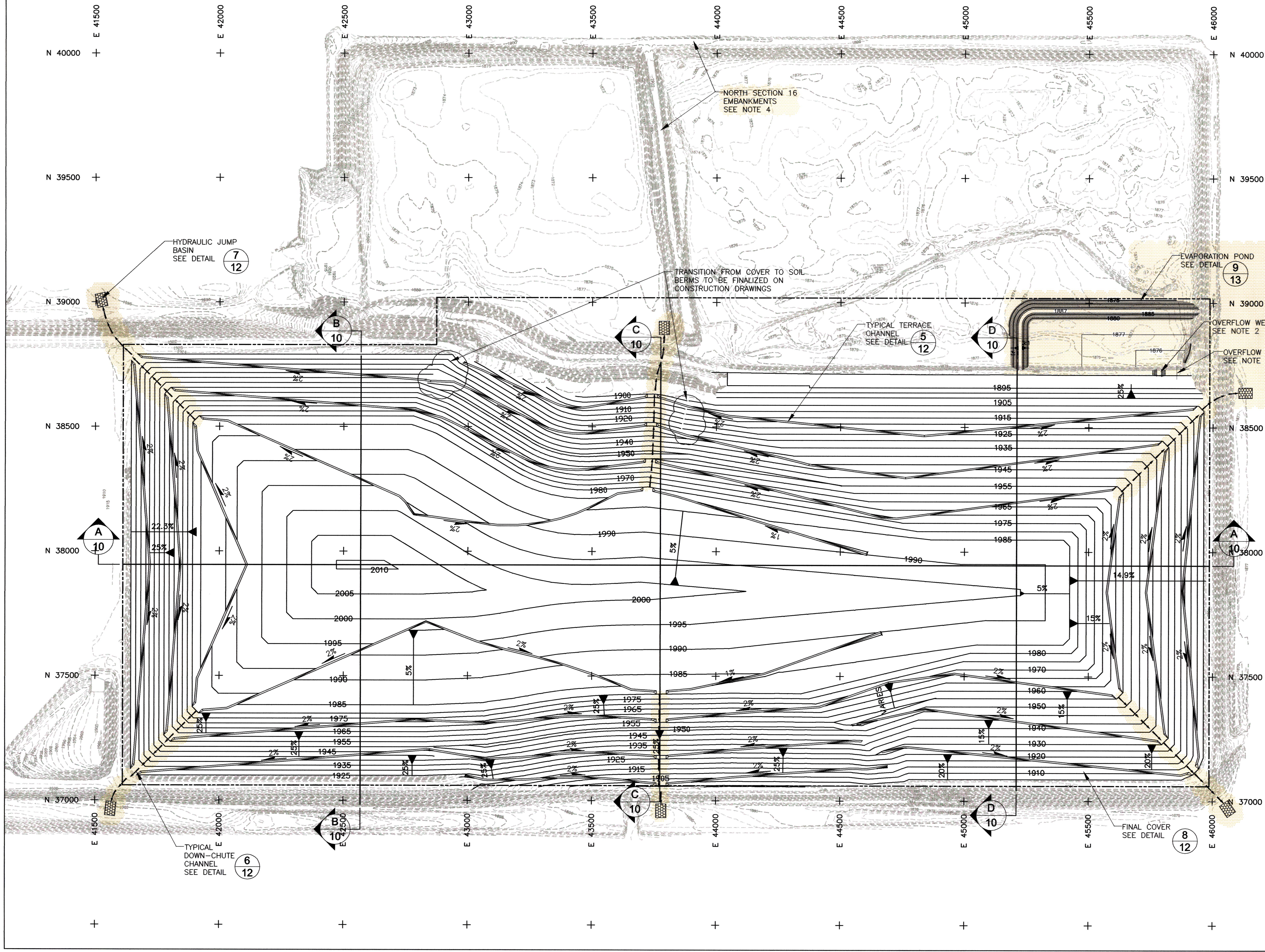
FINAL WASTE GRADES

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## LEGEND

- 1920  
1915  
EXISTING GROUND TOPOGRAPHY (SEE REFERENCES)
- 1920  
1915  
PROPOSED TOP OF FINAL COVER TOPOGRAPHY
- PROPOSED LIMIT OF CCP PLACEMENT

## NOTES

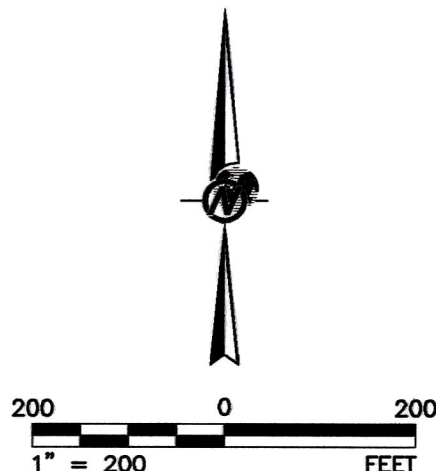
- GRADES REPRESENT TOP OF FINAL COVER.
- A WEIR WILL BE CONSTRUCTED BETWEEN THE SE SECTION 16 SUMP AREA AND THE SE SECTION 16 OVERFLOW/EVAPORATION POND. SEE CONTACT WATER ENGINEERING WORKSHEET FOR DETAILS.
- AN OVERFLOW PIPE WILL BE CONSTRUCTED BETWEEN THE SE SECTION 16 SUMP AREA AND THE SE SECTION 16 OVERFLOW/EVAPORATION POND. THE PIPE WILL CONTAIN A ONE-WAY CHECK VALVE TO ALLOW FLOW TO THE POND BUT NOT FROM THE POND.
- THE EMBANKMENTS ON THE NORTH HALF OF THE SECTION 16 FACILITY WILL BE REMOVED AND MATERIAL USED AS STRUCTURAL FILL, LOW PERMEABILITY SOIL LINER, AND COVER MATERIAL. AFTER REMOVAL OF EMBANKMENTS, THE NORTH HALF OF THE SECTION 16 FACILITY WILL BE GRADED TO MATCH ORIGINAL AND SURROUNDING TOPOGRAPHY.
- SEE THE SURFACE WATER ENGINEERING WORKSHEET FOR FURTHER DETAILS CONCERNING THE SURFACE WATER PLAN.

## REGULATORY DESIGN BASIS

- CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS FROM A TWENTY-FIVE-YEAR, TWENTY-FOUR-HOUR STORM EVENT (3.75"), PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.
- OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.
- ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.

## REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
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- HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORDINATE MINUS 100,000  
SITE GRID E = E STATE PLANE COORDINATE MINUS 1,800,000
- ALL PROPERTY SHOWN ON THIS MAP IS OPERATED BY GREAT RIVER ENERGY.



ENGINEER'S STAMP

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REVISION DESCRIPTION

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UNLESS LAST REVISION IS HAND WRITTEN

DATE

BY

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AP'VD

PRINT ISSUE RECORD

DATE

FOR

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FIELD

ISSUED FOR DRAFT REVISED PERMIT MODIFICATION

07/09/04

ISSUED FOR PERMIT MODIFICATION

09/24/03

ISSUED FOR CLIENT REVIEW

06/04/03

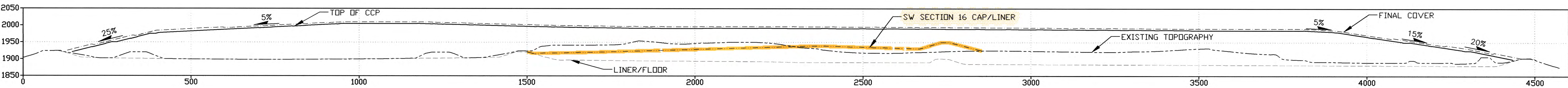
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GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

## FINAL COVER GRADES AND SURFACE WATER PLAN



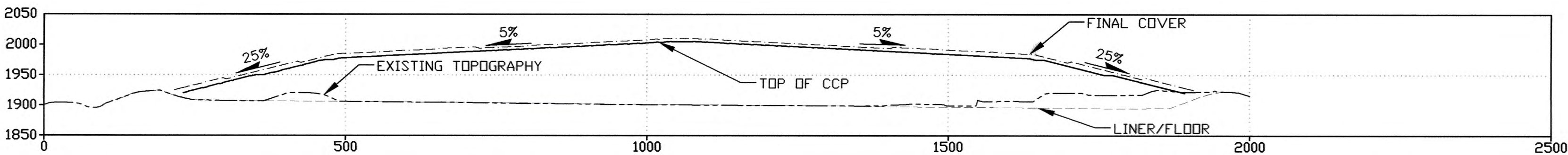
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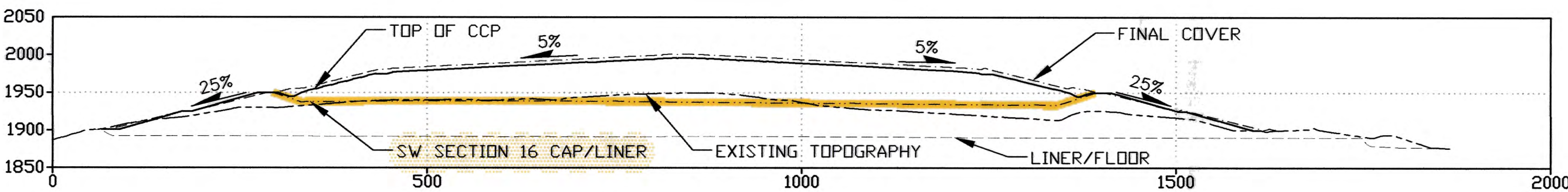
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SCALE FEET  
1X VERTICAL EXAGGERATION



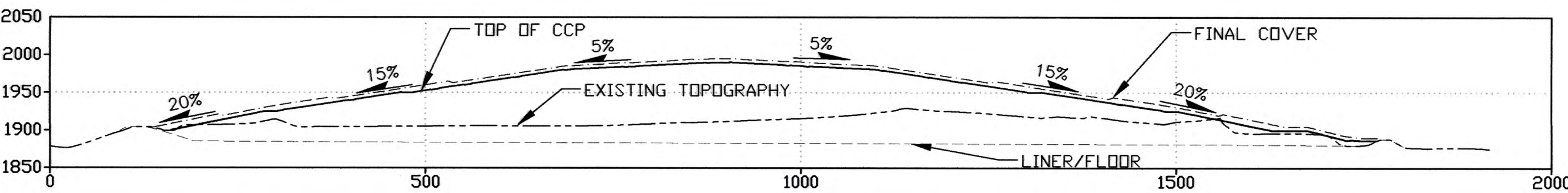
**B**  
**10** CROSS SECTION B-B'

150 0 150  
SCALE FEET  
1X VERTICAL EXAGGERATION



**C**  
**10** CROSS SECTION C-C'

150 0 150  
SCALE FEET  
1X VERTICAL EXAGGERATION



**D**  
**10** CROSS SECTION D-D'

150 0 150  
SCALE FEET  
1X VERTICAL EXAGGERATION

**LEGEND**

- PROPOSED TOP OF FINAL COVER TOPOGRAPHY
- PROPOSED TOP OF CCP TOPOGRAPHY
- PROPOSED TOP OF SW SECTION 16 CAP/LINER
- EXISTING GROUND TOPOGRAPHY
- APPROXIMATE FLOOR TOPOGRAPHY

ENGINEER'S STAMP

REFERENCE DRAWINGS

NO.

REVISION DESCRIPTION

THIS DRAWING IS NOT APPROVED  
UNLESS LAST REVISION IS HAND WRITTEN

DATE

BY

CHKD

AP'VD

PRINT ISSUE RECORD

DATE


FOR

REVISED

CLIENT

FIELD


PROJECT  
**GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION**

TITLE			
CROSS SECTIONS			
	PROJECT No.	023-2411	FILE No. 0232411A026
	DESIGN	TJS 06/04/03	SCALE AS SHOWN REV. C
	CADD	TJS 06/04/03	
	CHECK	RRJ 06/04/03	
	REVIEW	RRJ 06/04/03	

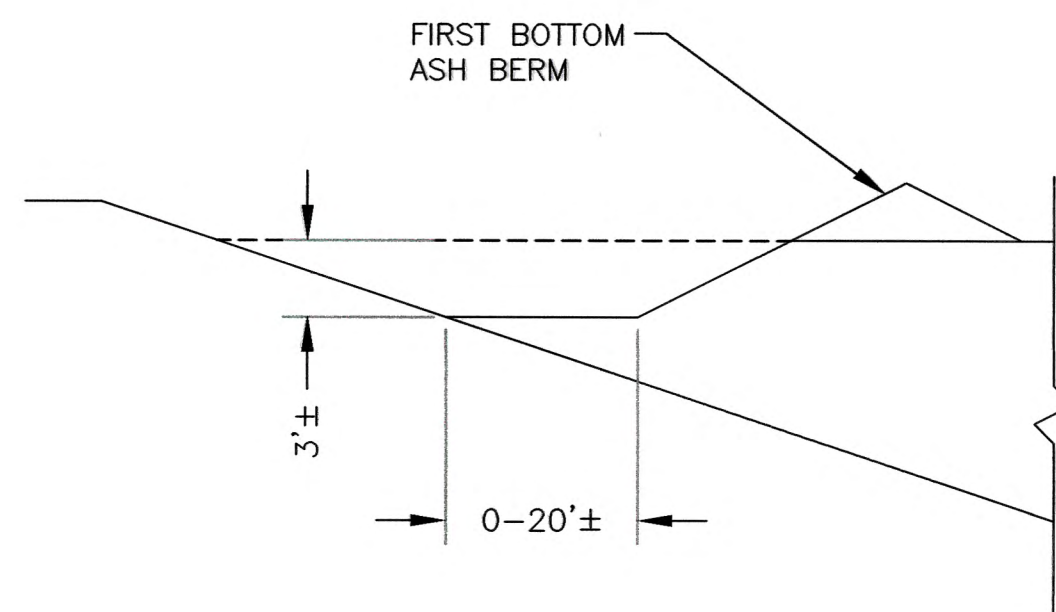
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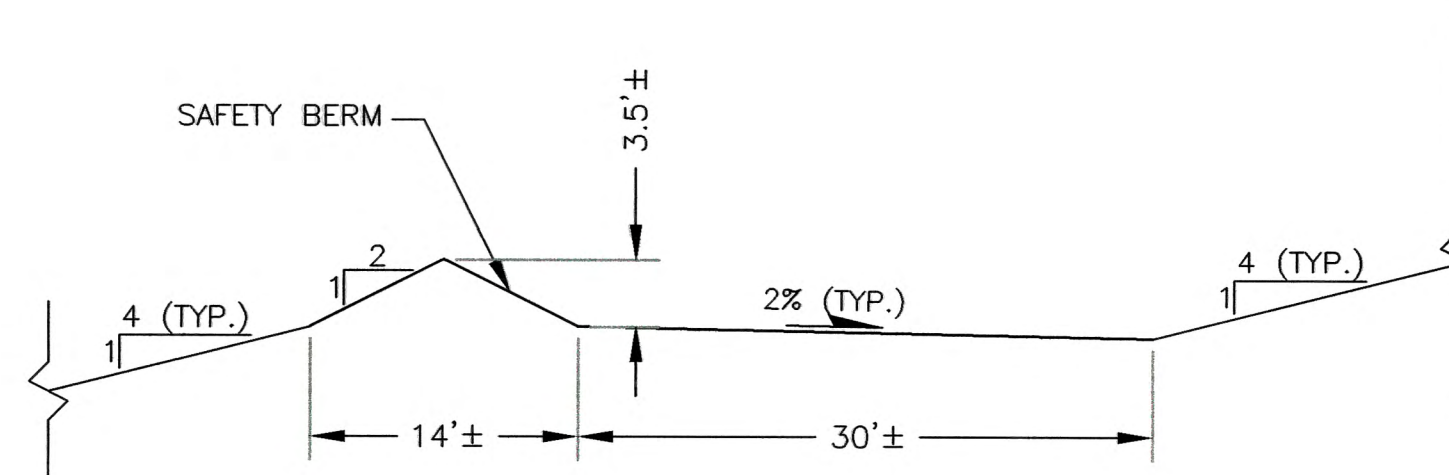
PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION					
TITLE		DETAIL SHEET 1					
	PROJECT No.		023--2411		FILE No. 0232411A027		
	DESIGN	TJS	06/02/03		SCALE	AS SHOWN	REV. C
	CADD	TJS	06/02/03		11		
	CHECK	RRJ	06/02/03				
	REVIEW	RRJ	06/02/03				



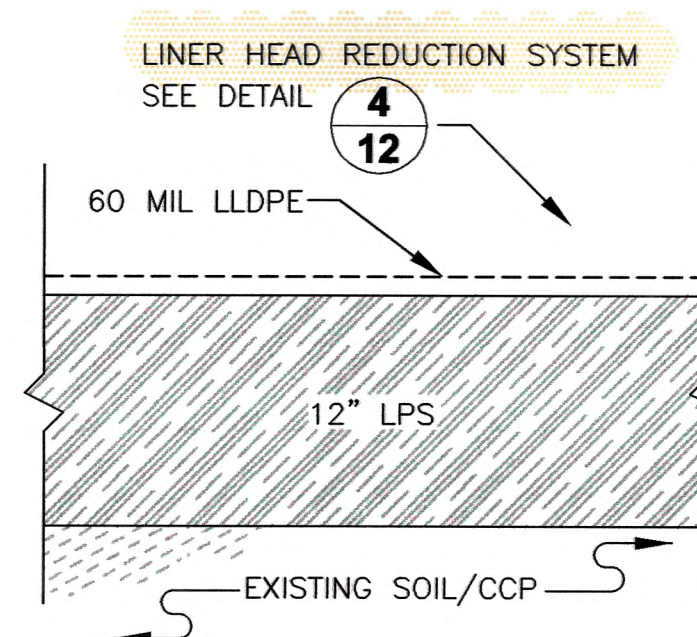


**1** **CONTACT WATER CONTROL DITCH**

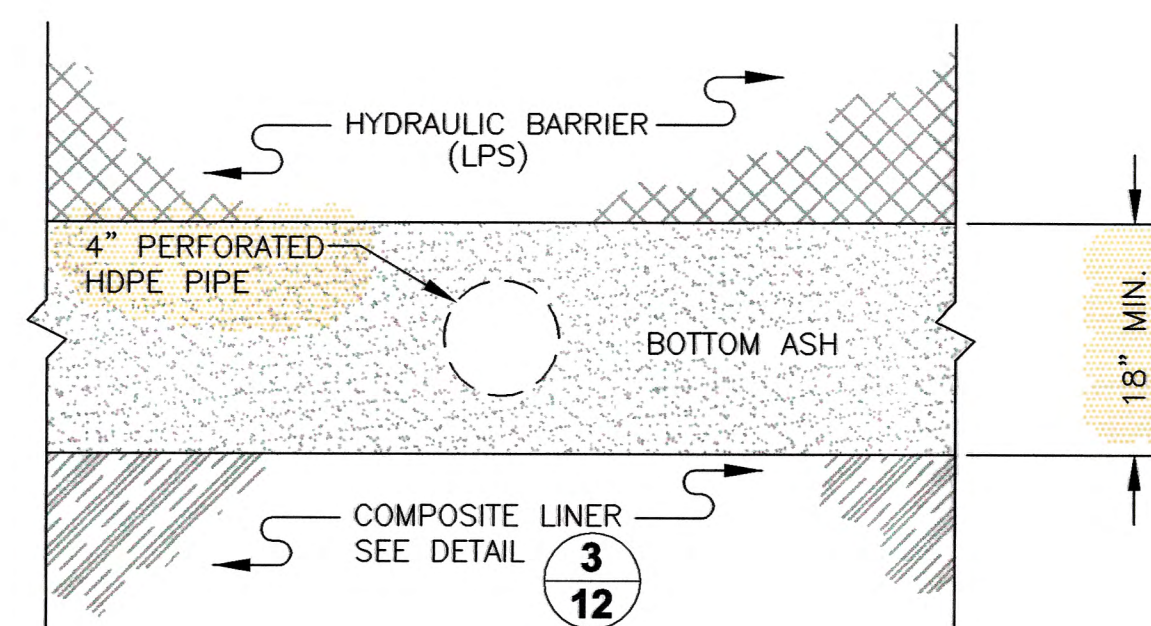
**12** NOT TO SCALE



**2** **ACCESS HAUL ROAD**  
**12** NOT TO SCALE



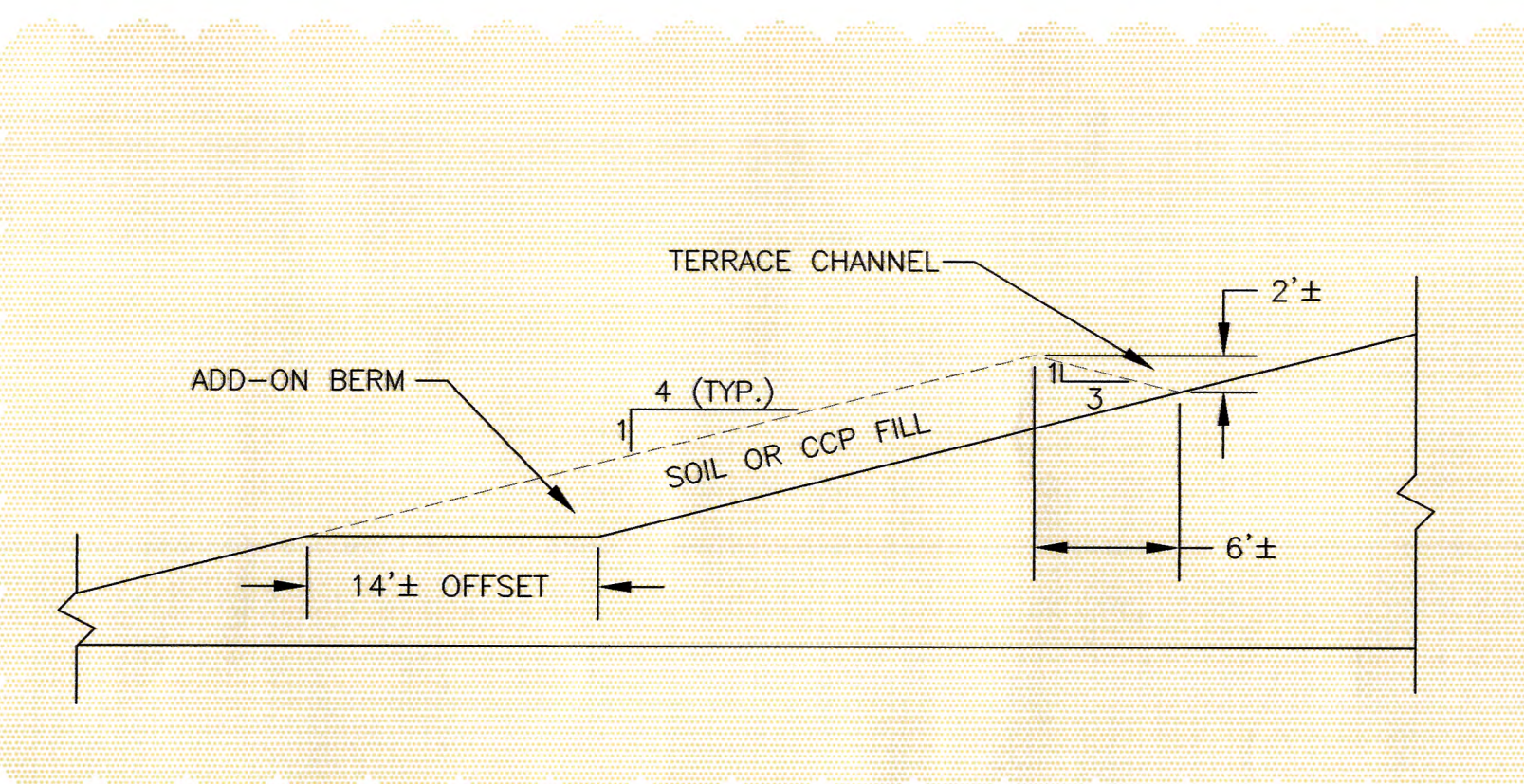
### 3 INTERMEDIATE LINER/CAP DETAIL



**4**  
**12**

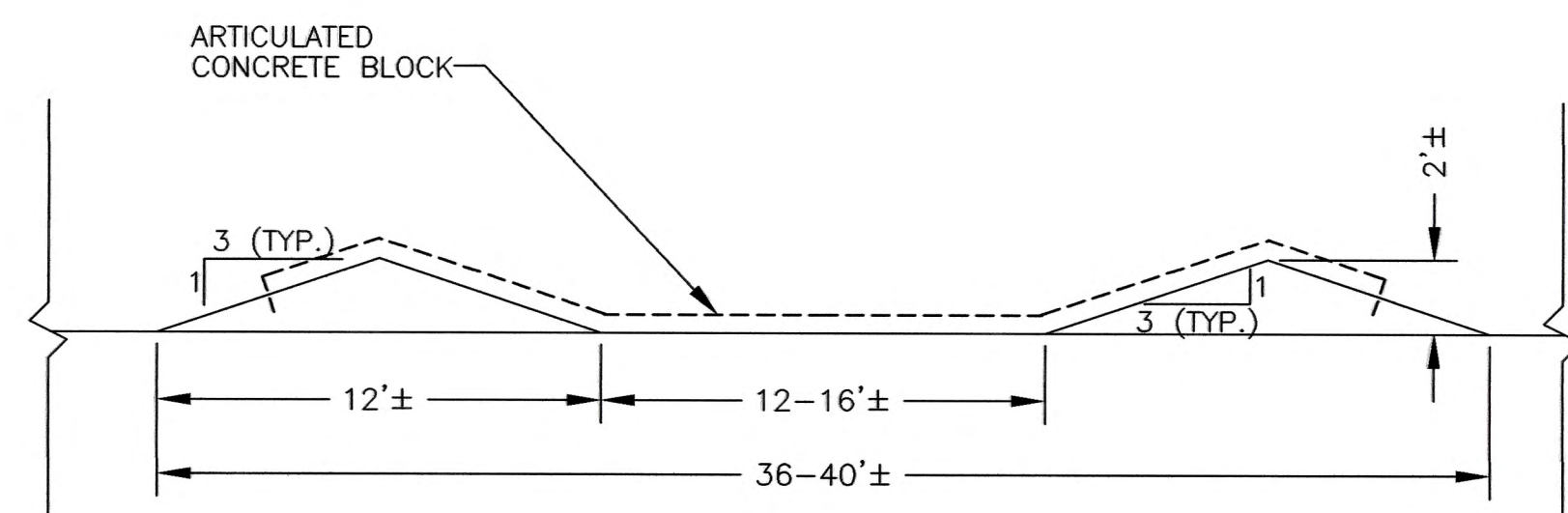
**LINER HEAD REDUCTION SYSTEM DETAIL**

NOT TO SCALE



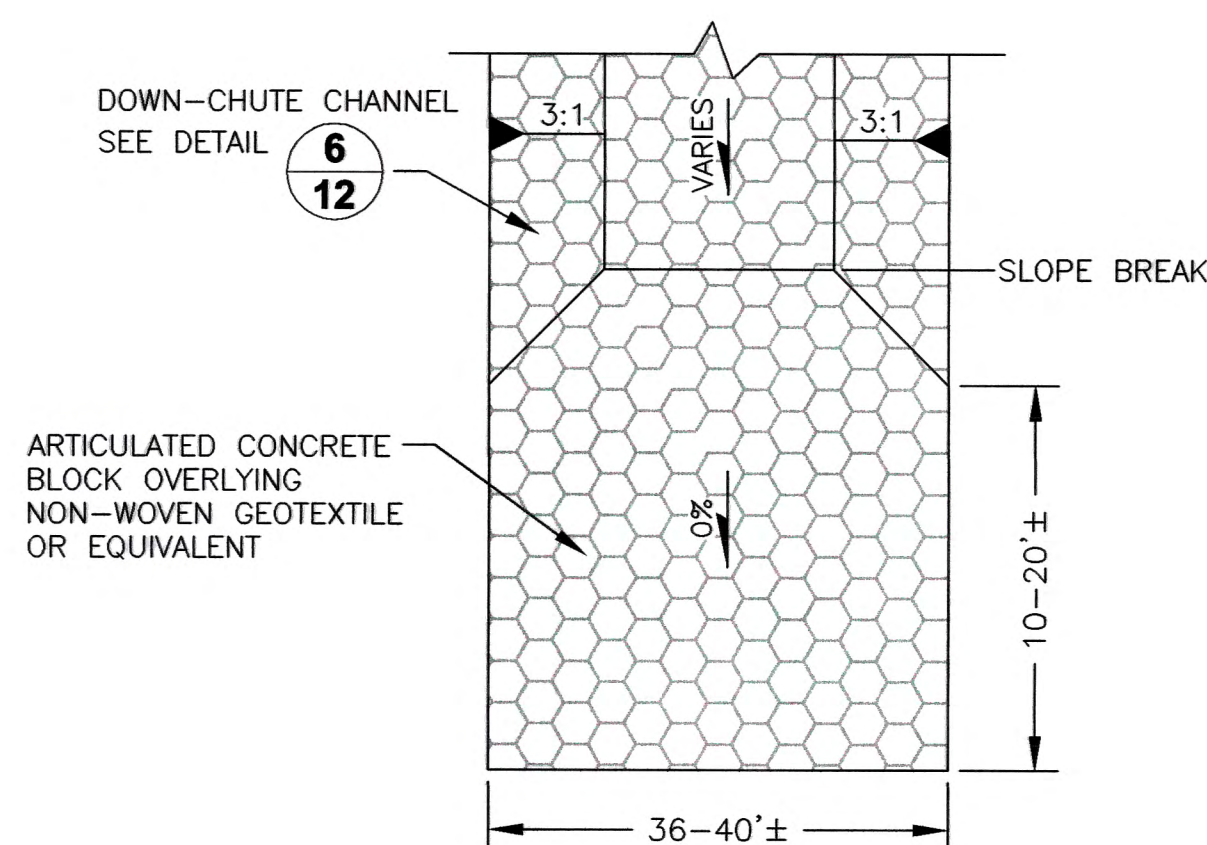
**5** **TERRACE CHANNEL DETAIL**

**12** NOT TO SCALE

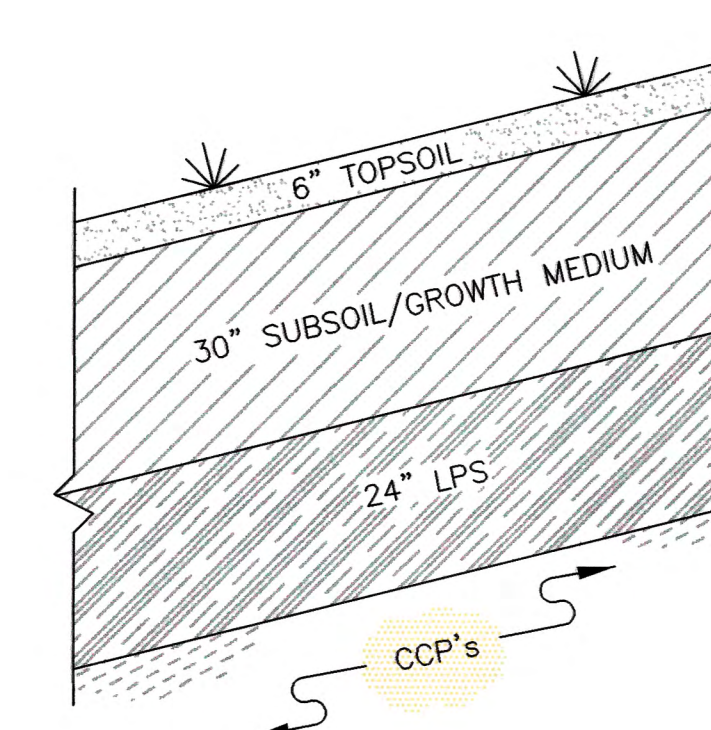


## 6 TYPICAL DOWN-CHUTE CHANNEL

12 NOT TO SCALE



**7** **HYDRAULIC JUMP BASIN**  
**12** NOT TO SCALE



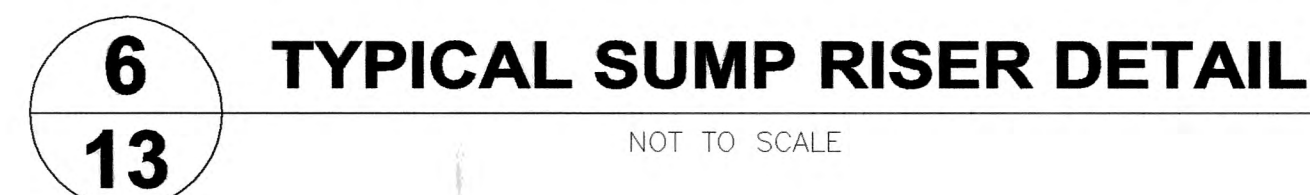
**8** **PRESCRIPTIVE COVER DETAIL**


**12** NOT TO SCALE

[illegible]

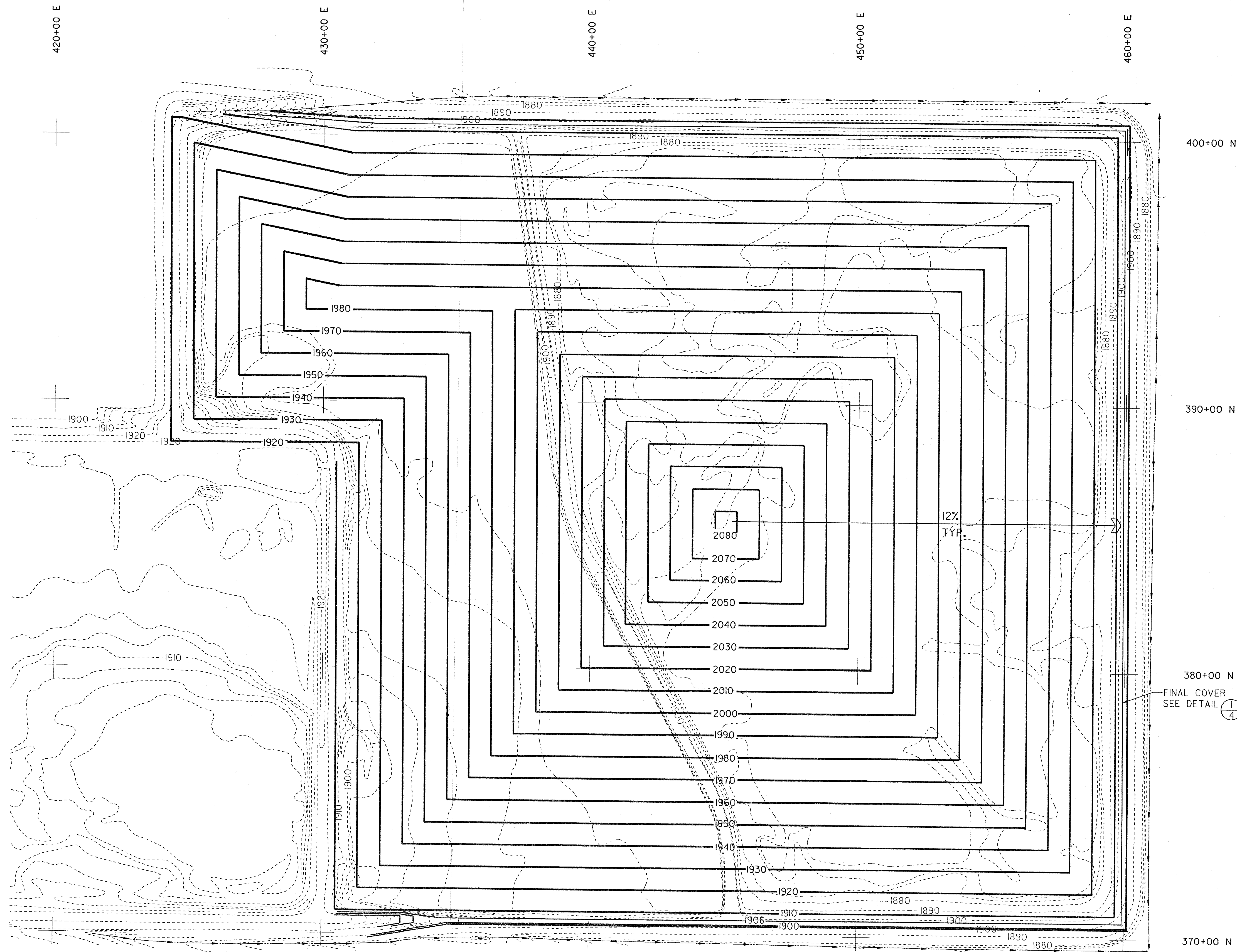
PROJECT	<b>GREATER RIVER ENERGY</b> <b>COAL CREEK STATION</b> <b>PERMIT NO. SP-033 PERMIT MODIFICATION</b>
TITLE	<b>DETAIL SHEET 2</b>





PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION				
TITLE		DETAIL SHEET 3				
 <b>Golder Associates</b> Denver, Colorado	PROJECT No.	023-2411	FILE No.	0232411AIO		
	DESIGN	TJS	05/28/04	SCALE	AS SHOWN	REV.
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	CHECK	MRN	06/02/04			
	REVIEW	RRJ	07/08/04			





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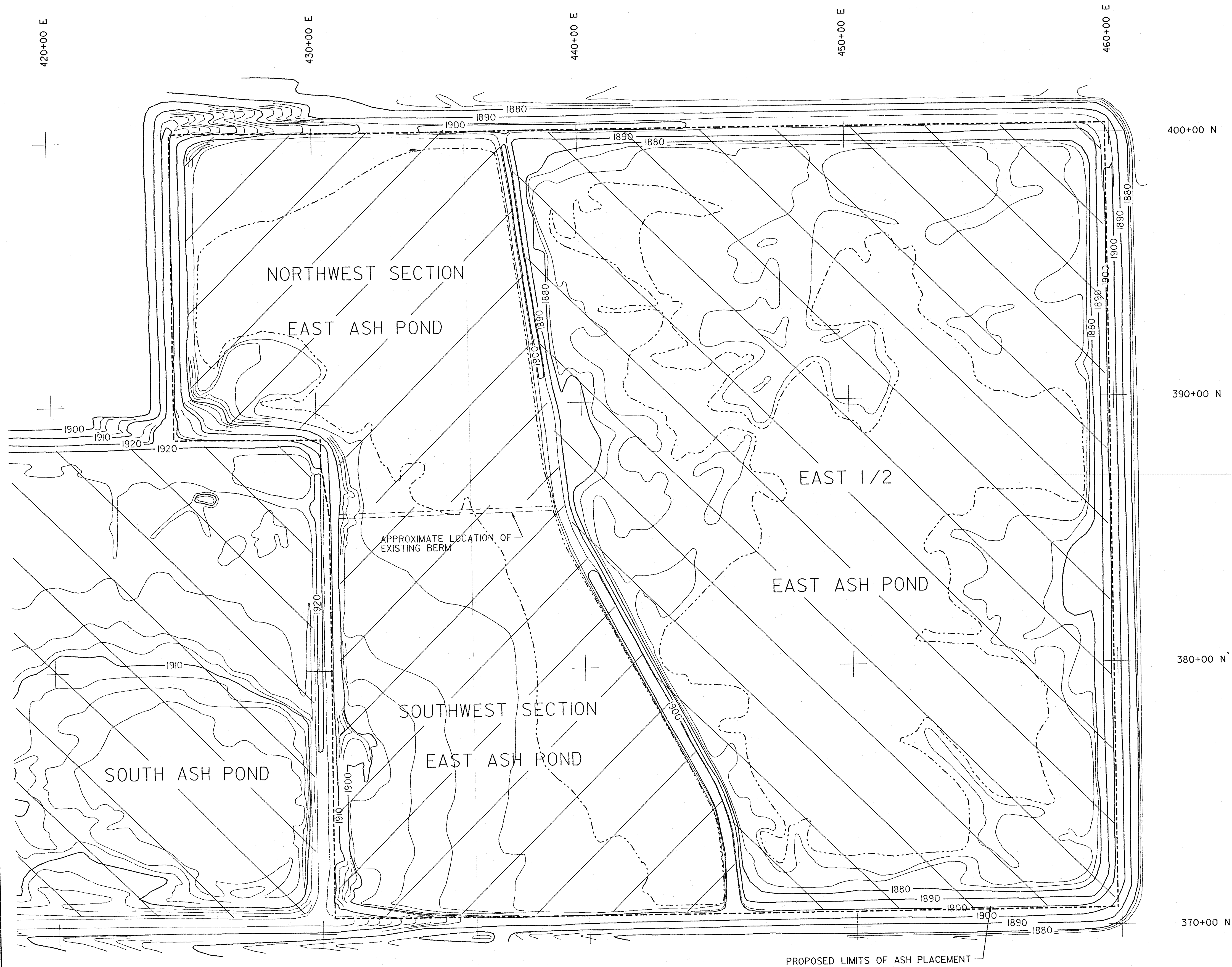
- EXISTING GROUND CONTOUR
- EXISTING EDGE OF WATER
- PROPOSED FINAL GRADE CONTOUR
- PROPOSED SLOPE RATIO
- PROPOSED SLOPE
- PROPOSED SPOT ELEVATION
- TOP OF BERM
- PROPOSED LIMIT OF FINAL COVER PLACEMENT
- DRAINAGE SWALE

## NOTES:

- SITE LOCATION: SECTION 16, T45N, R82W, MC LEAN COUNTY, NORTH DAKOTA.
- TOPOGRAPHIC MAP PREPARED FROM AERIAL SURVEY BY KBM, INC., GRAND FORKS, NORTH DAKOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 30, 1987.
- ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
- HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORD MINUS 150,000  
SITE GRID E = E STATE PLANE COORD MINUS 1,830,000
- THIS DRAWING SHOWS CONTOURS DEPICTING THE FINAL GRADES.

SECTION MANAGER		
PROJECT COORD.		
DESIGN COORD.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
ENGINEERING REVIEW		
SECTION MANAGER		
HYDRO.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
HYDROGEOLOGIC REVIEW		
PROJECT REVIEW		
6		
5		
4		
3		
2		
1		
NO.	BY:	DATE
DESCRIPTION		
REVISIONS		
PLAN OF OPERATION FOR THE COAL CREEK STATION EAST ASH POND DISPOSAL AREA MC LEAN COUNTY, NORTH DAKOTA		
FINAL GRADES		
<b>Foth &amp; Van Dyke</b> Geoscience and Environmental Management Division P.O. Box 1902 Green Bay, WI 54307-902 (414) 497-2500		
DRAWN BY MRS		
DATE JANUARY, 1989		
BOOK NO		
JOB NO. 87C61		
FILE NO		
SURVEYED BY		
SCALE 1" = 200'		
DRAWING NO. A-II		





**LEGEND**

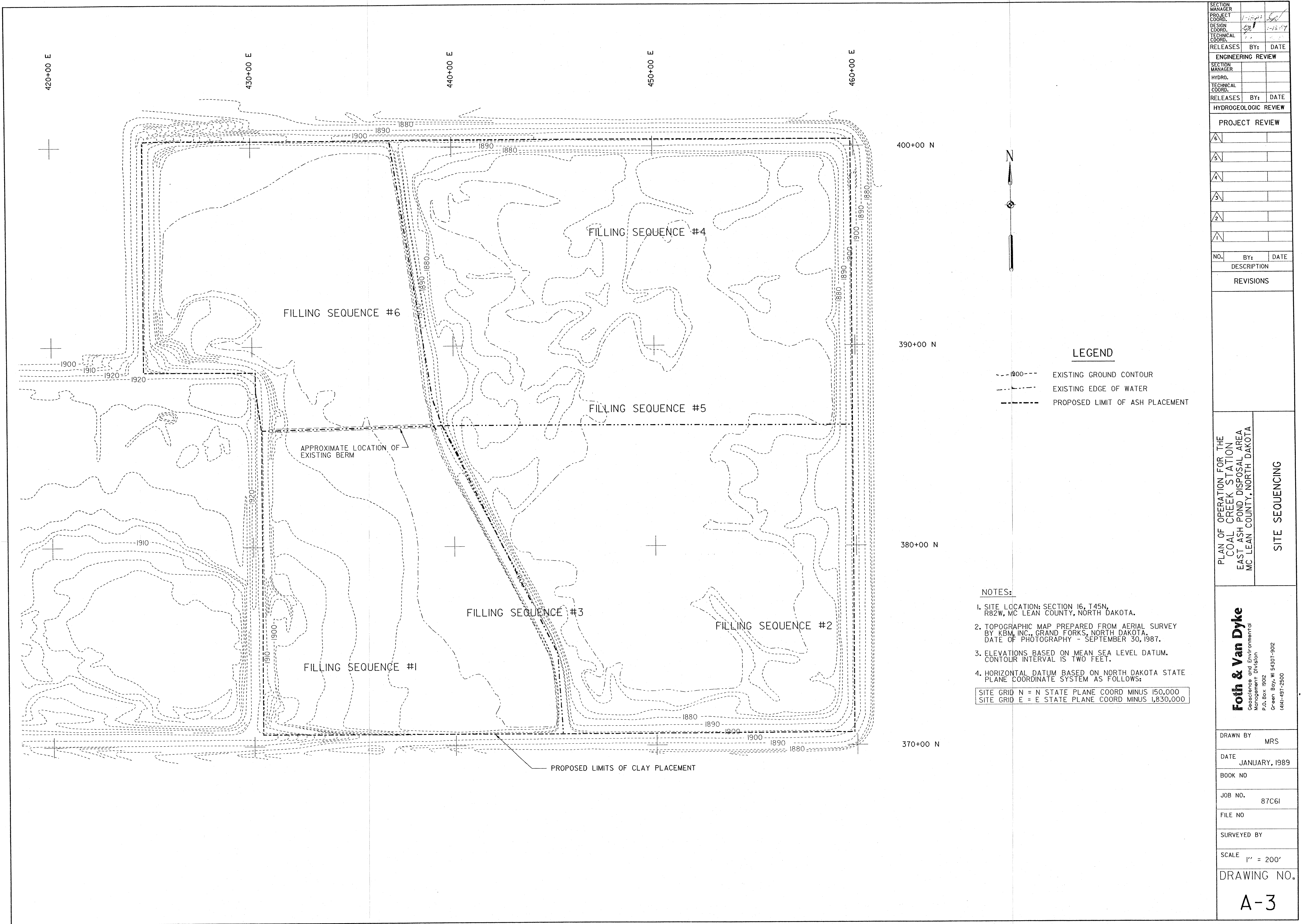
- 1290 — EXISTING GROUND CONTOUR
- - - EXISTING EDGE OF WATER
- - - - - PROPOSED LIMIT OF ASH PLACEMENT

**NOTES:**

1. SITE LOCATION: SECTION 16, T45N, R82W, MC LEAN COUNTY, NORTH DAKOTA.
2. TOPOGRAPHIC MAP PREPARED FROM AERIAL SURVEY BY KBM, INC., GRAND FORKS, NORTH DAKOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 30, 1987.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
 SITE GRID N = N STATE PLANE COORD MINUS 150,000  
 SITE GRID E = E STATE PLANE COORD MINUS 1,830,000
5. ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY COAL CREEK STATION.

SECTION MANAGER		
PROJECT COORD.		
DESIGN COORD.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
<b>ENGINEERING REVIEW</b>		
SECTION MANAGER		
HYDRO.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
<b>HYDROGEOLOGIC REVIEW</b>		
<b>PROJECT REVIEW</b>		
6		
5		
4		
3		
2		
1		
NO.	BY:	DATE
DESCRIPTION		
<b>REVISIONS</b>		
PLAN OF OPERATION FOR THE COAL CREEK STATION EAST ASH POND DISPOSAL AREA MC LEAN COUNTY, NORTH DAKOTA		<b>EXISTING CONDITIONS</b>
<div style="display: flex; justify-content: space-between;"> <div> <b>Foth &amp; Van Dyke</b>  <small>Geoscience and Environmental          Management Division          P.O. Box 1902          Green Bay, WI 54307-902          (414)-497-2500</small> </div> </div>		
DRAWN BY MRS		
DATE JANUARY, 1989		
BOOK NO		
JOB NO. 87C61		
FILE NO		
SURVEYED BY		
SCALE 1" = 200'		
DRAWING NO.		
<b>A-2</b>		





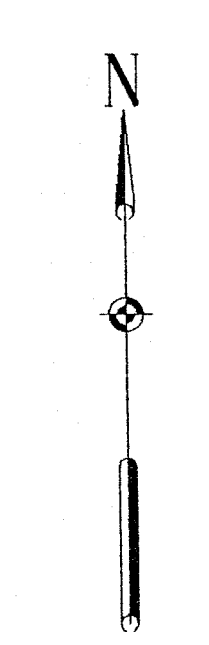
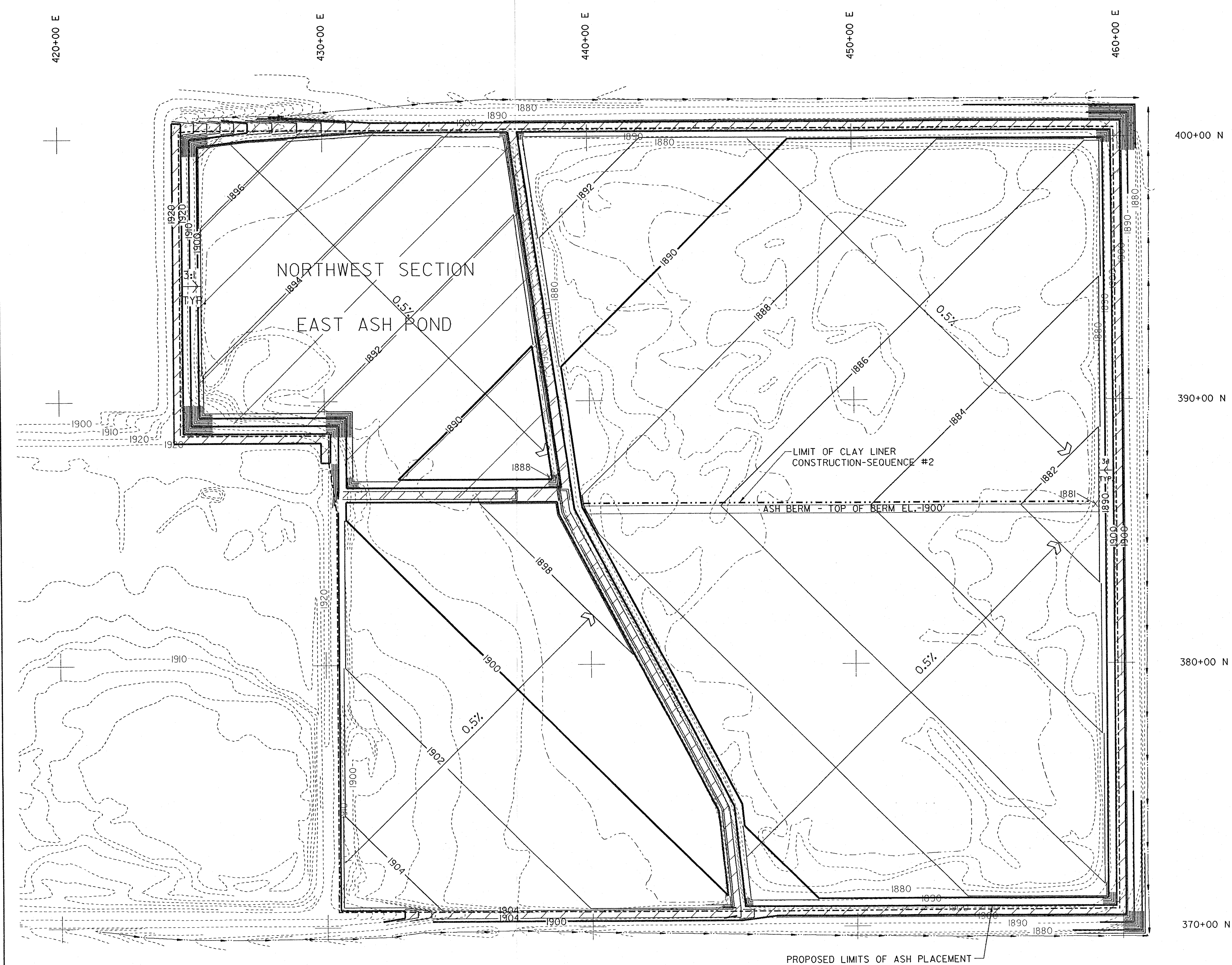
**LEGEND**

---1900--- EXISTING GROUND CONTOUR  
--- EXISTING EDGE OF WATER  
--- PROPOSED LIMIT OF ASH PLACEMENT

- NOTES:**
1. SITE LOCATION: SECTION 16, T45N, R82W, MC LEAN COUNTY, NORTH DAKOTA.
  2. TOPOGRAPHIC MAP PREPARED FROM AERIAL SURVEY BY KBM, INC., GRAND FORKS, NORTH DAKOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 30, 1987.
  3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
  4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORD MINUS 150,000  
SITE GRID E = E STATE PLANE COORD MINUS 1,830,000

SECTION MANAGER		
PROJECT COORD.		
DESIGN COORD.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
ENGINEERING REVIEW		
SECTION MANAGER		
HYDRO.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
HYDROGEOLOGIC REVIEW		
PROJECT REVIEW		
6		
5		
4		
3		
2		
1		
NO.	BY:	DATE
DESCRIPTION		
REVISIONS		
PLAN OF OPERATION FOR THE COAL CREEK STATION EAST ASH POND DISPOSAL AREA MC LEAN COUNTY, NORTH DAKOTA		
SITE SEQUENCING		
<b>Foth &amp; Van Dyke</b> Geoscience and Environmental Management Division P.O. Box 1902 Green Bay, WI 54307-9002 (414)-437-2500		
DRAWN BY MRS		
DATE JANUARY, 1989		
BOOK NO		
JOB NO. 87C61		
FILE NO		
SURVEYED BY		
SCALE 1" = 200'		
DRAWING NO. A-3		





**LEGEND**

- 1900--- EXISTING GROUND CONTOUR
- - - - - EXISTING EDGE OF WATER
- 1900— PROPOSED BASE GRADE CONTOUR
- 3:1 PROPOSED SLOPE RATIO
- 4% PROPOSED SLOPE
- 1876 PROPOSED SPOT ELEVATION
- /// TOP OF BERM
- > DRAINAGE SWALE
- - - - - PROPOSED LIMIT OF ASH PLACEMENT

**NOTES:**

1. SITE LOCATION: SECTION 16, T45N, R82W, MC LEAN COUNTY, NORTH DAKOTA.
2. TOPOGRAPHIC MAP PREPARED FROM AERIAL SURVEY BY KBM, INC., GRAND FORKS, NORTH DAKOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 30, 1987.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:  
SITE GRID N = N STATE PLANE COORD MINUS 150,000  
SITE GRID E = E STATE PLANE COORD MINUS 1,830,000
5. THIS DRAWING SHOWS CONTOURS DEPICTING THE BASE GRADES (TOP OF CLAY LINER).

SECTION MANAGER			
PROJECT COORD.			
DESIGN COORD.			
TECHNICAL COORD.			
RELEASES	BY:	DATE	
ENGINEERING REVIEW			
SECTION MANAGER			
HYDRO.			
TECHNICAL COORD.			
RELEASES	BY:	DATE	
HYDROGEOLOGIC REVIEW			
PROJECT REVIEW			
6			
5			
4			
3			
2			
1			
NO.	BY:	DATE	
DESCRIPTION			
REVISIONS			
PLAN OF OPERATION FOR THE COAL CREEK STATION EAST ASH POND DISPOSAL AREA MC LEAN COUNTY, NORTH DAKOTA			
<b>Foth &amp; Van Dyke</b> Geoscience and Environmental Management Division P.O. Box 1902 Green Bay, WI 54307-9002 (414) 437-2500			
DRAWN BY MRS			
DATE JANUARY, 1989			
BOOK NO			
JOB NO. 87C61			
FILE NO			
SURVEYED BY			
SCALE 1" = 200'			
DRAWING NO. A-5			



APPENDIX A3  
UPSTREAM RAISE VERTICAL EXPANSION PERMIT DRAWINGS  
(GOLDER 2012)



# GREAT RIVER ENERGY

## PERMIT NO. SP-033 MODIFICATION

Prepared for:



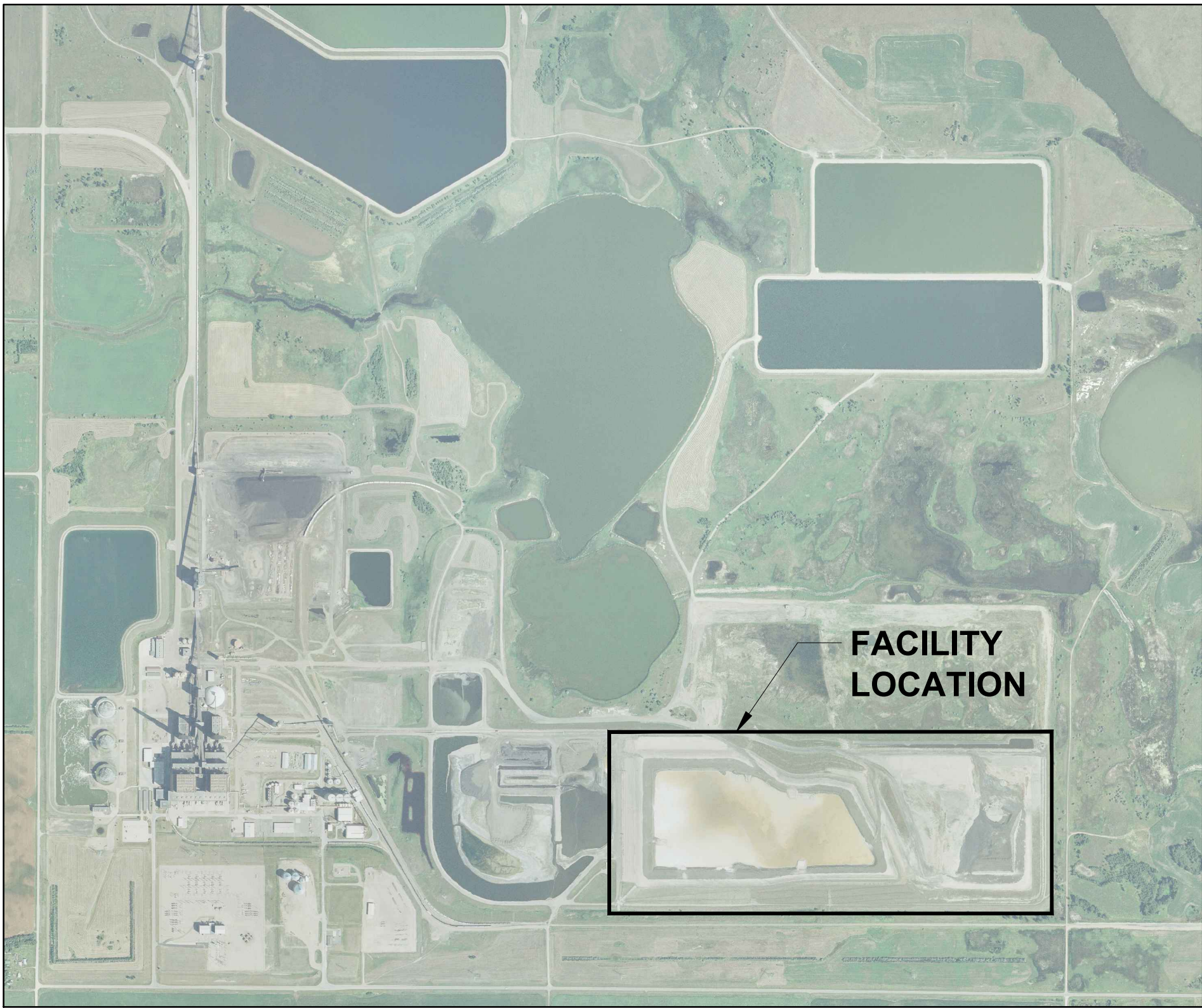
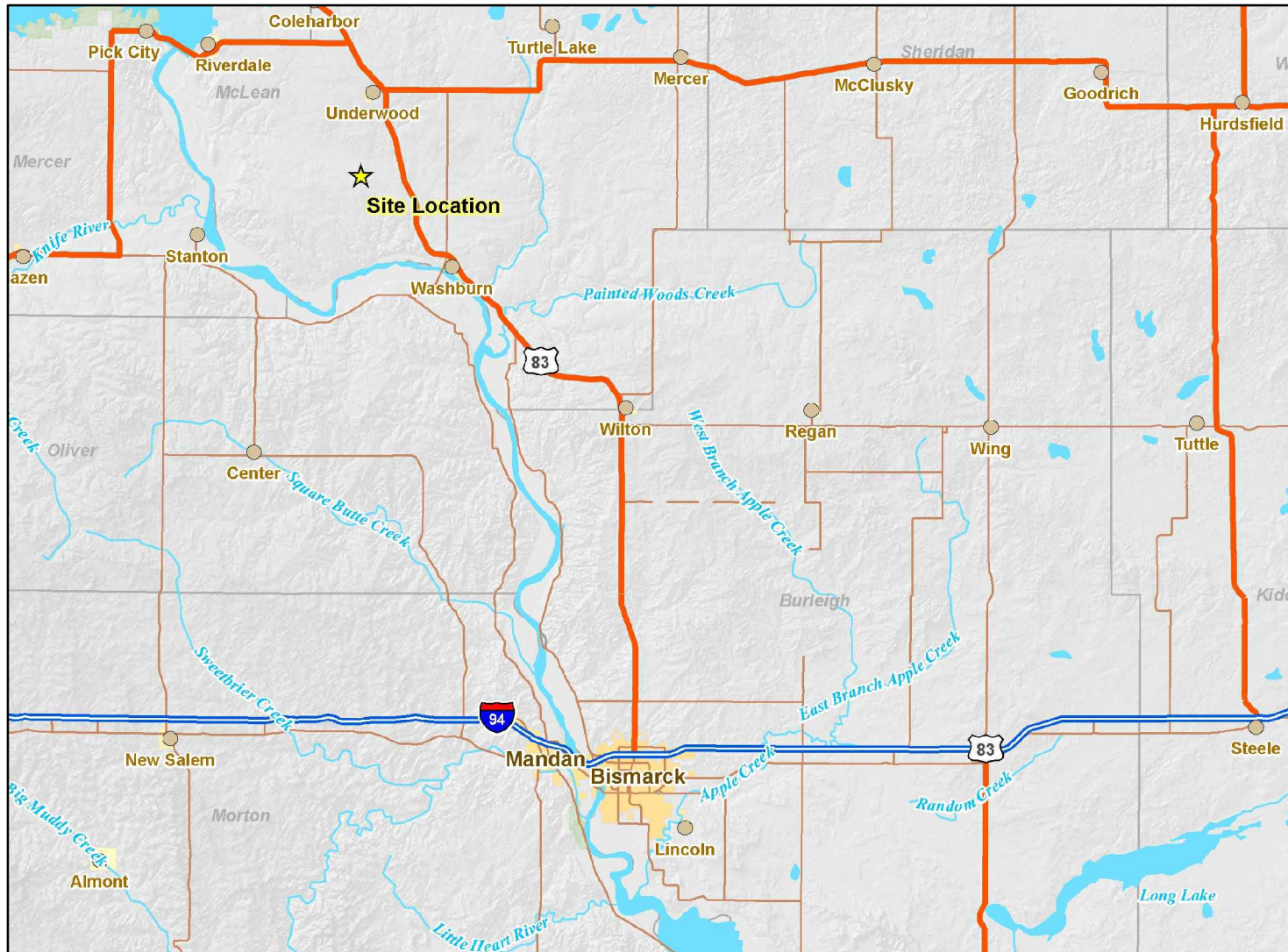
GREAT RIVER  
ENERGY®  
A Transocean Energy Cooperative

Coal Creek Station  
Underwood, North Dakota

Prepared by:



Golder Associates Inc.  
44 Union Boulevard, Suite 300  
Lakewood, Colorado USA 80228



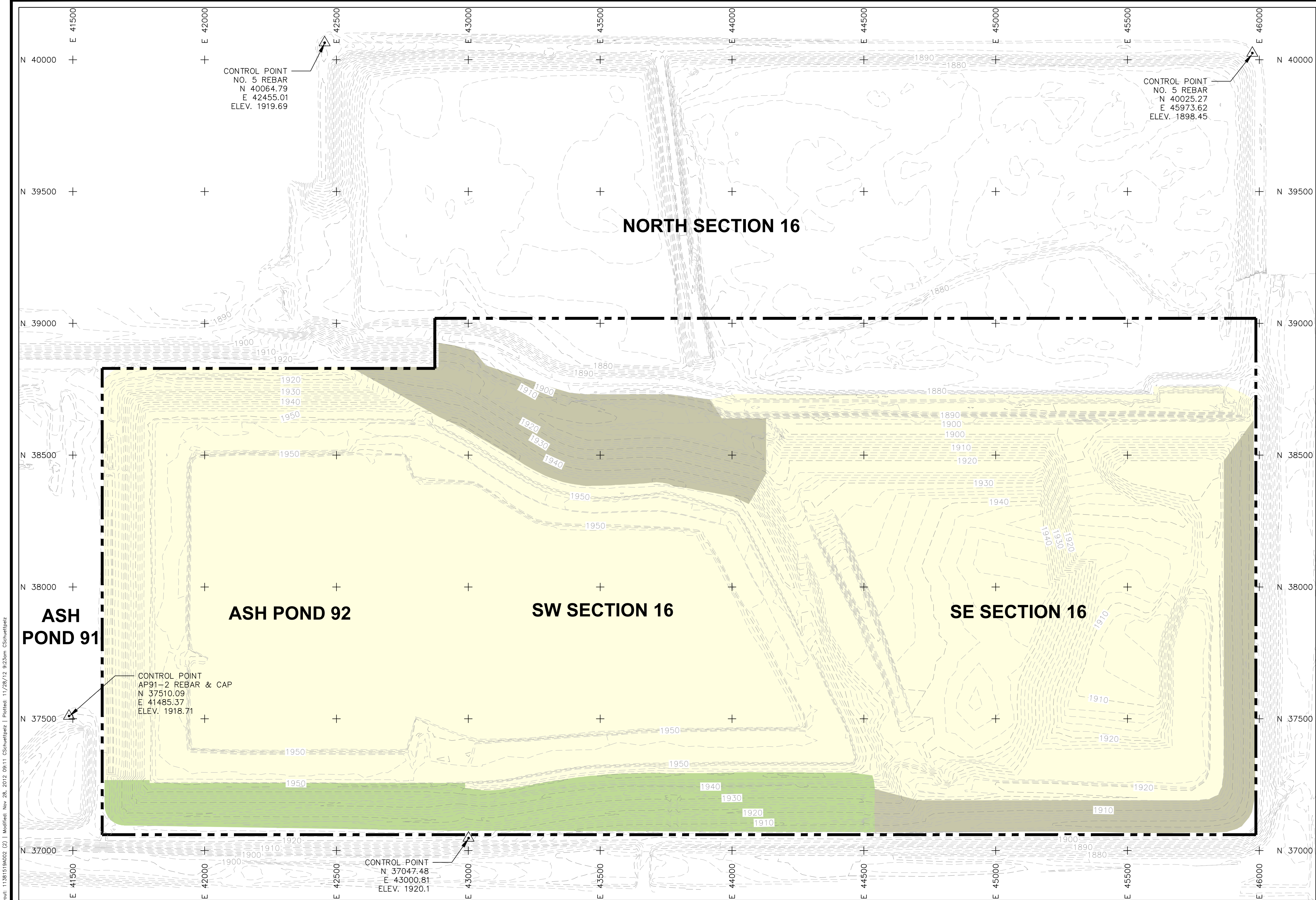
DRAWING NO.	TITLE	REVISION
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2	CURRENT CONDITIONS	△B
3	GEOMETRY MODIFICATIONS	△B
4	GENERAL SITE PHASES	△B
5	PHASES 3 AND 4: ASH POND 92 & SW SECTION 16 RAISE VERTICAL EXPANSION	△B
6	PHASE 5: SE SECTION 16 LANDFILL	△B
7	FINAL WASTE GRADES	△B
8	FINAL COVER GRADES AND SURFACE WATER PLAN	△B
9	CROSS SECTIONS	△B
10	DETAIL SHEET 1	△B
11	DETAIL SHEET 2	△B

ENGINEER'S STAMP  ORIGINAL DRAWING STAMPED BY TODD STONG, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA (PE #6144), IS ON FILE AT "GOLDER ASSOCIATES" LAKEWOOD, COLORADO, OFFICE.	NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
	△B						
	△B						
	△B						
	△B						
	△B	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
	△B	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT  GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 MODIFICATION	
TITLE  TITLE SHEET	
FILE No. 11381519A001 PROJECT No. 113-81519	1



Drawing File: N:\1\1\13-81519\URK-Permit Drawings\11381519A002.dwg | Layout: 11381519A002 (2) | Modified: Nov 28, 2012 09:11 | C:\shu\gelpz | Plotted: 11/28/12 9:23am | C:\shu\gelpz



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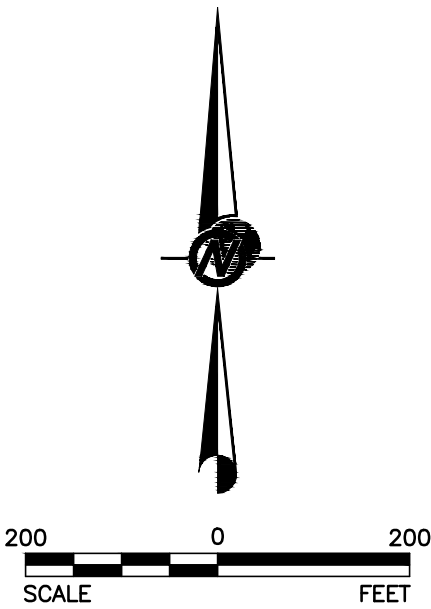
- EXISTING GROUND TOPOGRAPHY
- AREA OF ACTIVE CCP PLACEMENT
- TEMPORARY COVER PLACED
- FINAL COVER PLACED
- PERMITTED LIMIT OF CCP PLACEMENT
- SURVEY CONTROL POINT

## NOTES

- GRADES SHOWN REPRESENT FINAL AND INTERIM COVER AND CCP GRADES AS OF DECEMBER 2010.
- PERMITTED LIMIT OF CCP PLACEMENT BOUNDARY IS APPROXIMATE.

## REGULATORY DESIGN BASIS

- CONTROL OF RUN-ON AND RUN-OFF DURING OPERATIONS, PER SUBDIVISION A OF SUBSECTION 3 OF NDAC SECTION 33-20-04.1-09.
- OPERATE THE UPSTREAM RAISE (SURFACE IMPOUNDMENT) TO HAVE A FREEBOARD OF AT LEAST TWO FEET, PER SUBDIVISION D OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- MINIMIZE EROSION OF FINAL COVER, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- MAXIMUM FINAL SLOPES NOT LESS THAN THREE PERCENT, NOR MORE THAN TWENTY-FIVE PERCENT, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- EVALUATE SLOPES STEEPER THAN FIFTEEN PERCENT TO ENSURE STABILITY, PER SUBDIVISION B3 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- CONTROL OF SURFACE WATER DRAINAGE FROM FINAL SLOPES, PER SUBDIVISIONS B2-B4 OF SUBSECTION 4 OF NDAC SECTION 33-20-04.1-09.
- COMPOSITE LINER, PER SUBDIVISION B OF SUBSECTION 2 OF NDAC SECTION 33-20-08.1-01.
- APPROPRIATE ENGINEERED FINAL COVER DESIGN, PER NDAC SECTION 33-20-07.1-02.
- ALL OTHER APPLICABLE RULES FROM NDCC CHAPTER 23-29 AND NDAC ARTICLE 33-20.



## REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.
- COORDINATES BASED ON PLANT GRID SYSTEM.
- CONTOUR INTERVAL IS TWO FEET.
- ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

### ENGINEER'S STAMP

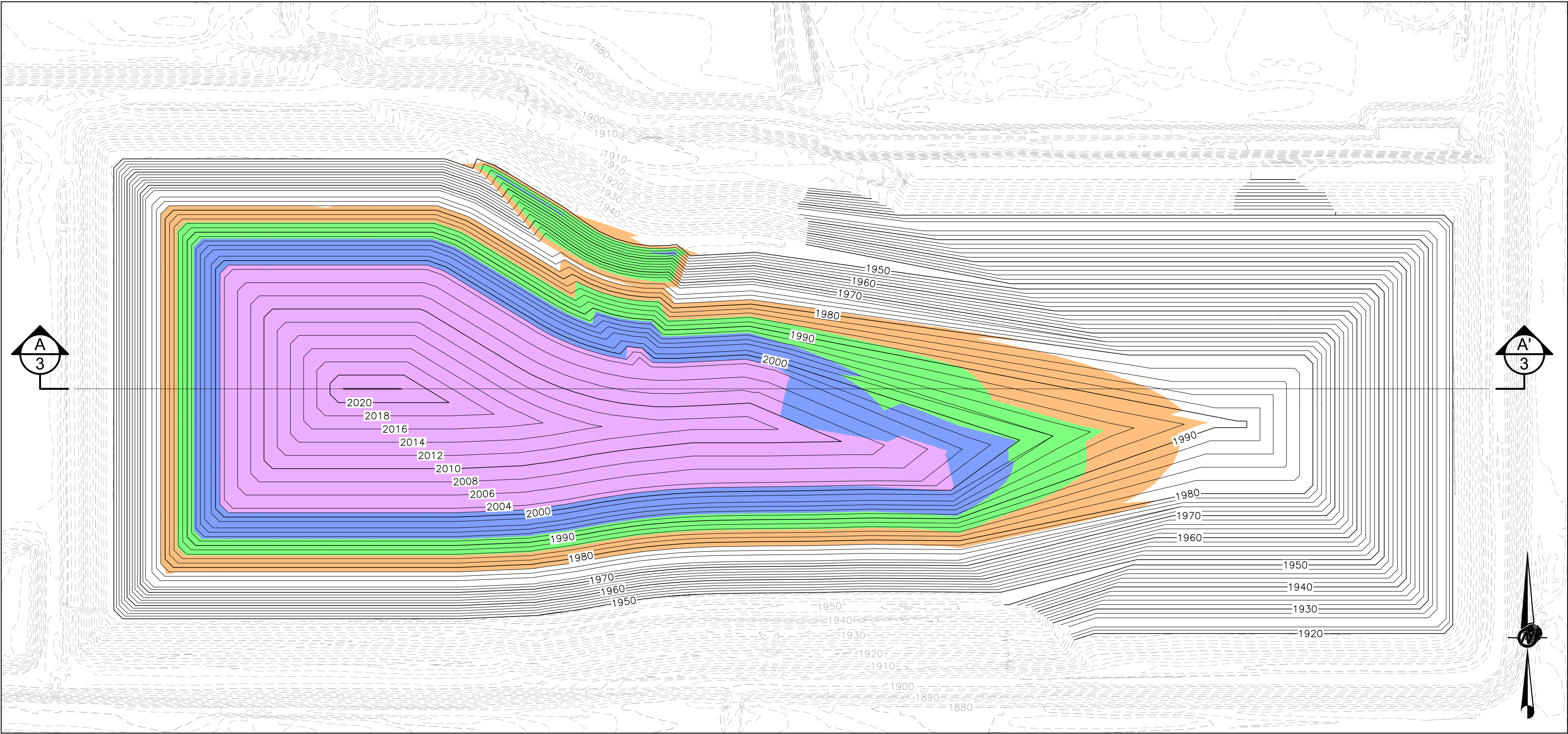
ORIGINAL DRAWING STAMPED BY TODD STONG, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA (PE #6144), IS ON FILE AT "GOLDER ASSOCIATES" LAKEWOOD, COLORADO, OFFICE.

NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ


PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE		CURRENT CONDITIONS	
FILE No. 11381519A002		PROJECT No. 113-81519	
		2	

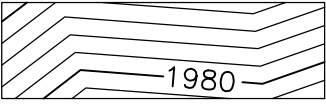


Drawing File: N:\1\1\13-81519\URGE Permit Drawings\11381519A015.dwg | Layout: 11381519A015.dwg | Modified: Nov 28, 2012 09:09 | C:\Schmitt\p1 | Plotted: 11/28/12 9:24am | C:\Schmitt\p1







**LEGEND**

EXISTING GROUND TOPOGRAPHY



PROPOSED TOP OF CCP TOPOGRAPHY

**ELEVATIONS LEGEND**

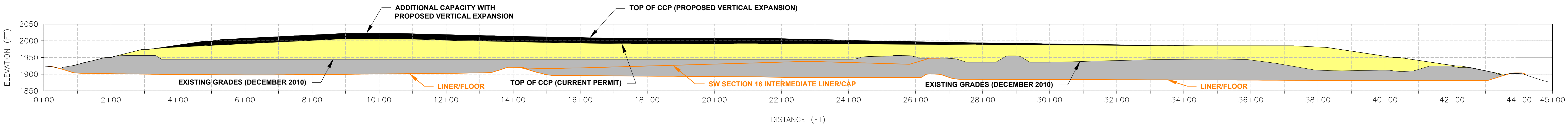
ELEVATION CHANGE (PROPOSED PERMIT - CURRENT PERMIT)	
Elevation Change	Color
Less than 5 ft	
5 to 10 ft	
10 to 15 ft	
15 to 20 ft	

**NOTES**

- GRADES SHOWN REPRESENT FINAL AND INTERIM COVER AND CCP GRADES AS OF DECEMBER 2010.
- ELEVATION CHANGE BETWEEN THE PROPOSED VERTICAL EXPANSION AND THE CURRENTLY PERMITTED HEIGHT ARE APPROXIMATE. CURRENTLY PERMITTED CONTOURS ARE BASED ON 2003 PERMIT MODIFICATION DRAWINGS. PROPOSED VERTICAL EXPANSION TOP OF WASTE GRADES ARE A MAXIMUM OF APPROXIMATELY 20 FEET HIGHER THAN CURRENTLY PERMITTED GRADES.

PROJECT	
GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE	
GEOMETRY MODIFICATIONS	
	
FILE No. 11381519A015	PROJECT No. 113-81519
3	

**1**  
**3** VERTICAL EXPANSION MODIFICATIONS

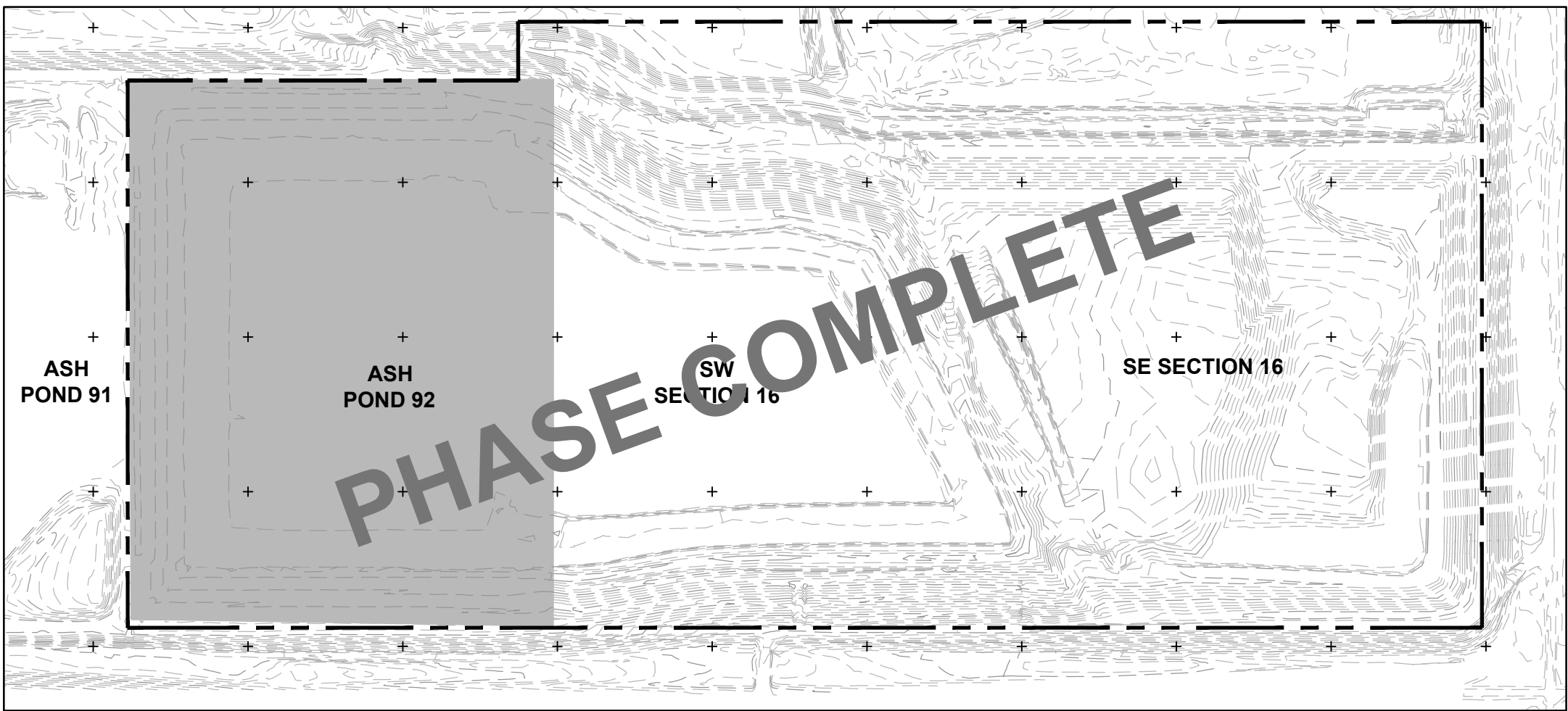


**A**  
**3** CROSS SECTION A-A'

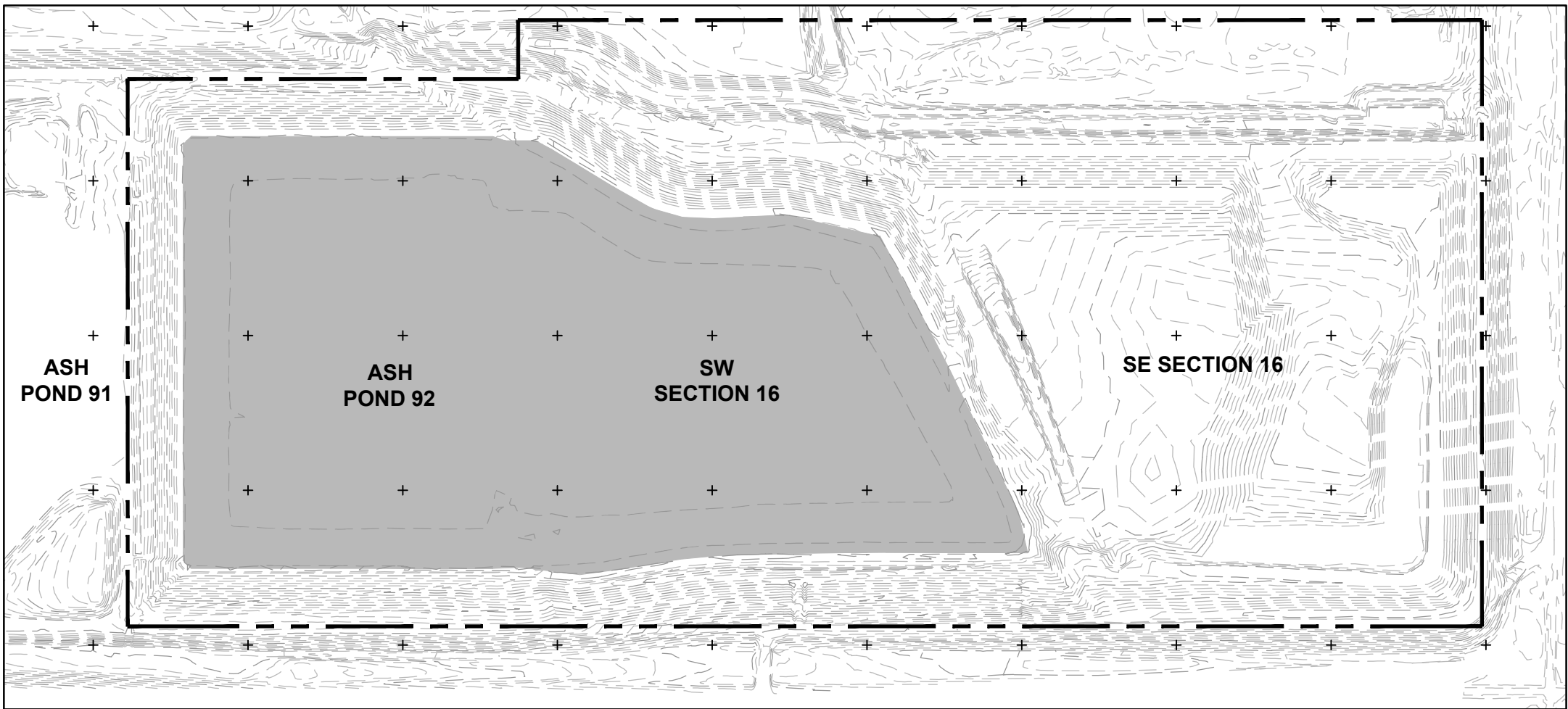
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ORIGINAL DRAWING STAMPED BY TODD STONG, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA (PE #6144), IS ON FILE AT GOLDER ASSOCIATES' LAKEWOOD, COLORADO, OFFICE.	△						
	△						
	△						
	△						
	△						
	△	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
	△	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ



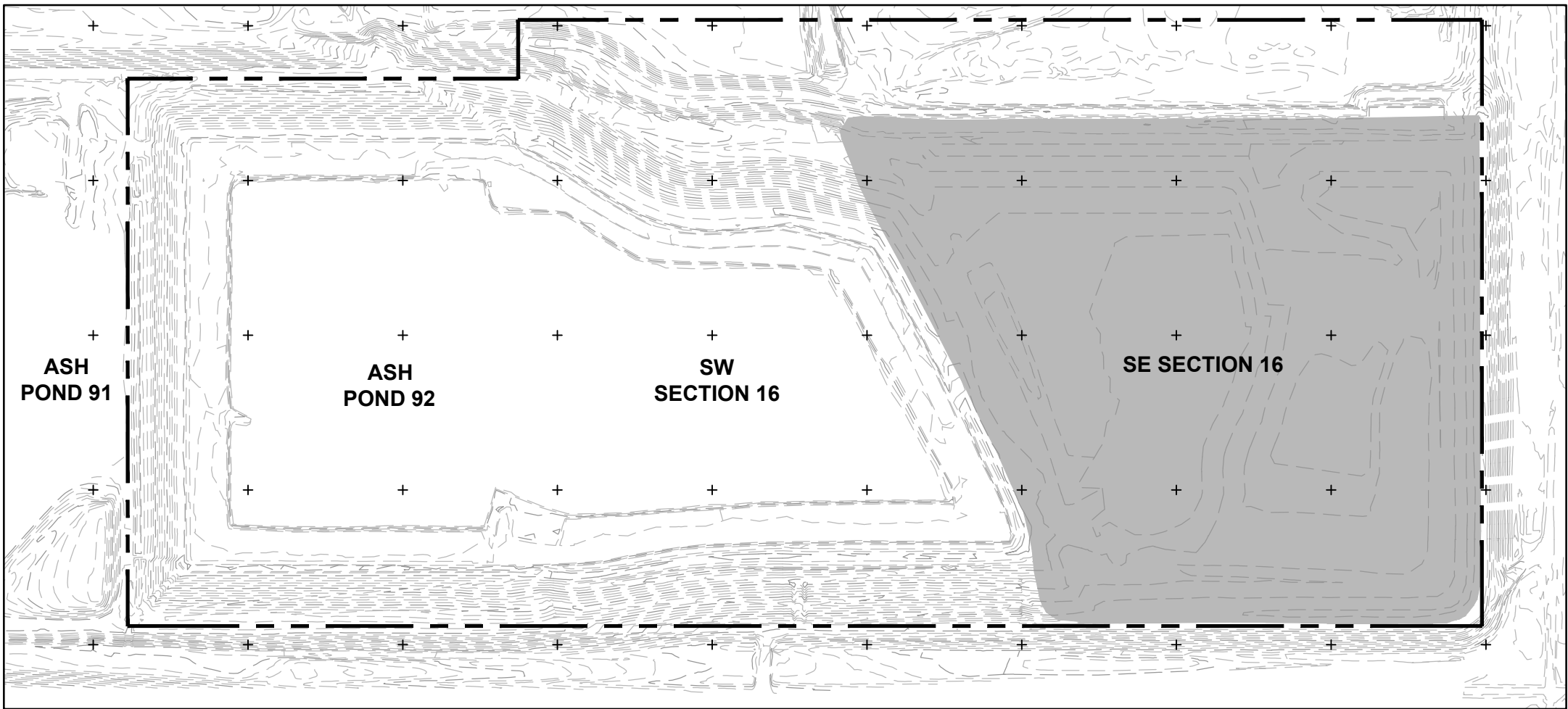
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1  
4 PHASE 1: ASH POND 92 RAISE



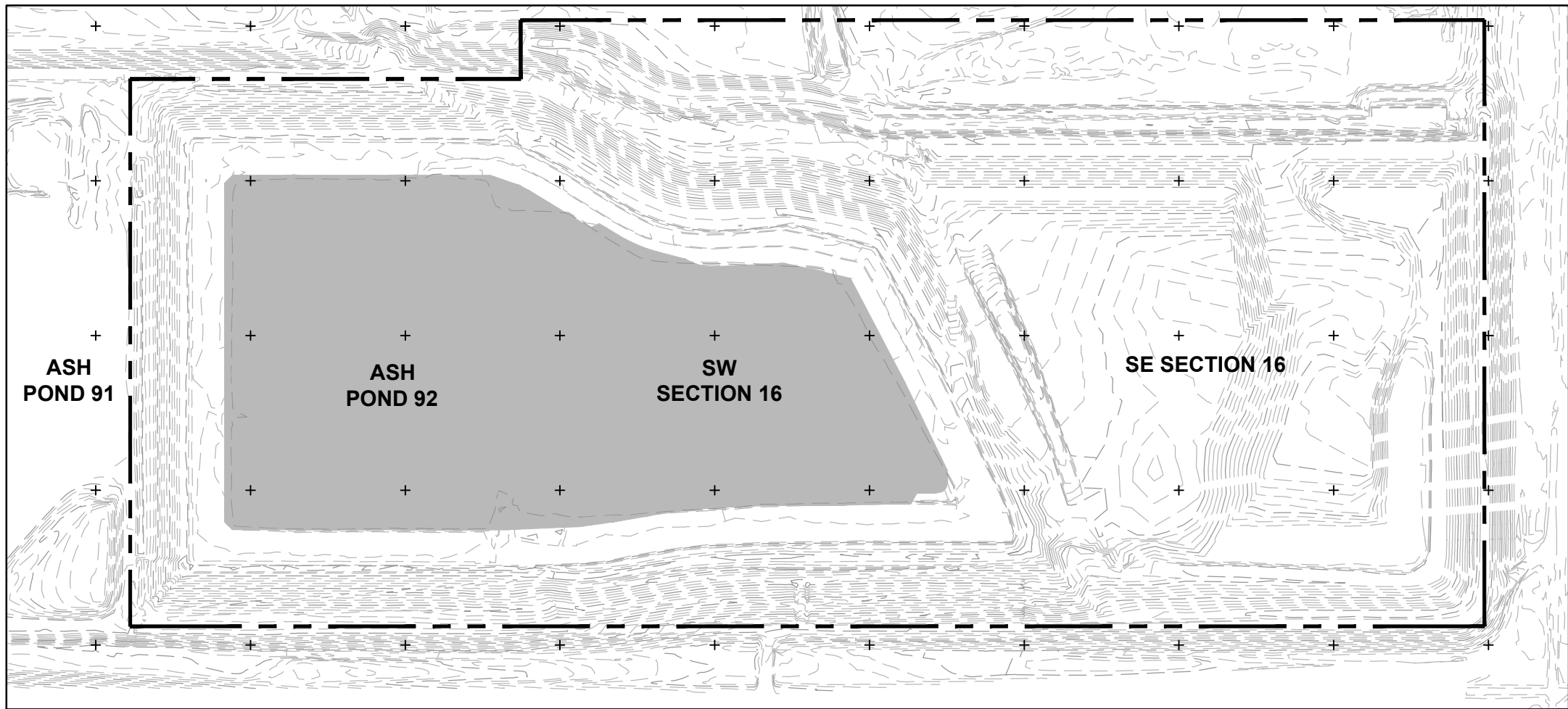
3  
4 PHASE 3: ASH POND 92 AND SW SECTION 16 RAISE



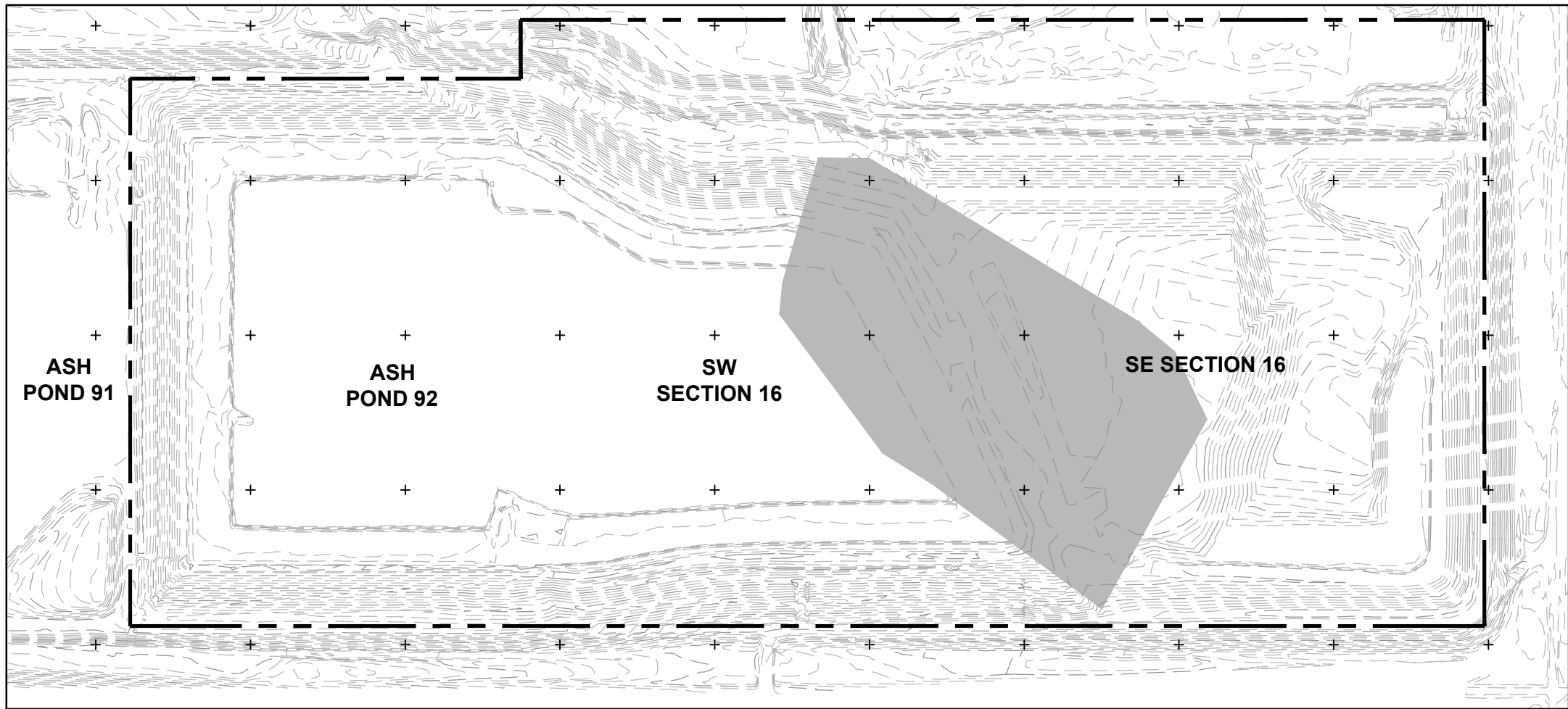
5  
4 PHASE 5: SE SECTION 16 LANDFILL



2  
4 PHASE 2: SW SECTION 16 INTERMEDIATE LINER/CAP



4  
4 PHASE 4: ASH POND 92 AND SW SECTION 16 RAISE VERTICAL EXPANSION



6  
4 PHASE 6: SW AND SE SECTION 16 VALLEY

LEGEND

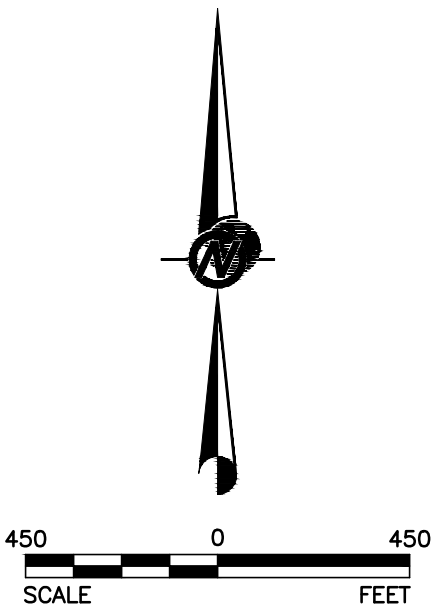
- EXISTING GROUND TOPOGRAPHY
- PERMITTED LIMIT OF CCP PLACEMENT
- PHASE AREA

NOTES


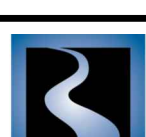
- GRADES SHOWN REPRESENT FINAL AND INTERIM COVER AND CCP GRADES AS OF DECEMBER 2010. PHASE 1 AND PHASE 2 ARE COMPLETE AND PHASE 3 IS CURRENTLY BEING FILLED.
- PHASES DO NOT NECESSARILY OCCUR IN SEQUENTIAL ORDER FROM 1 TO 6, AND MAY OCCUR CONGRUENTLY. THIS PERMIT MODIFICATION REFERS TO THE VERTICAL EXPANSION OF THE ASH POND 92/SW SECTION 16 UPSTREAM RAISE (PHASE 4).
- PHASE BOUNDARIES AND THE PERMITTED LIMIT OF CCP PLACEMENT BOUNDARY ARE APPROXIMATE.

REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY, PERFORMED BETWEEN 1996 AND 2011.
- COORDINATES BASED ON PLANT GRID SYSTEM.
- CONTOUR INTERVAL IS TWO FEET.
- ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

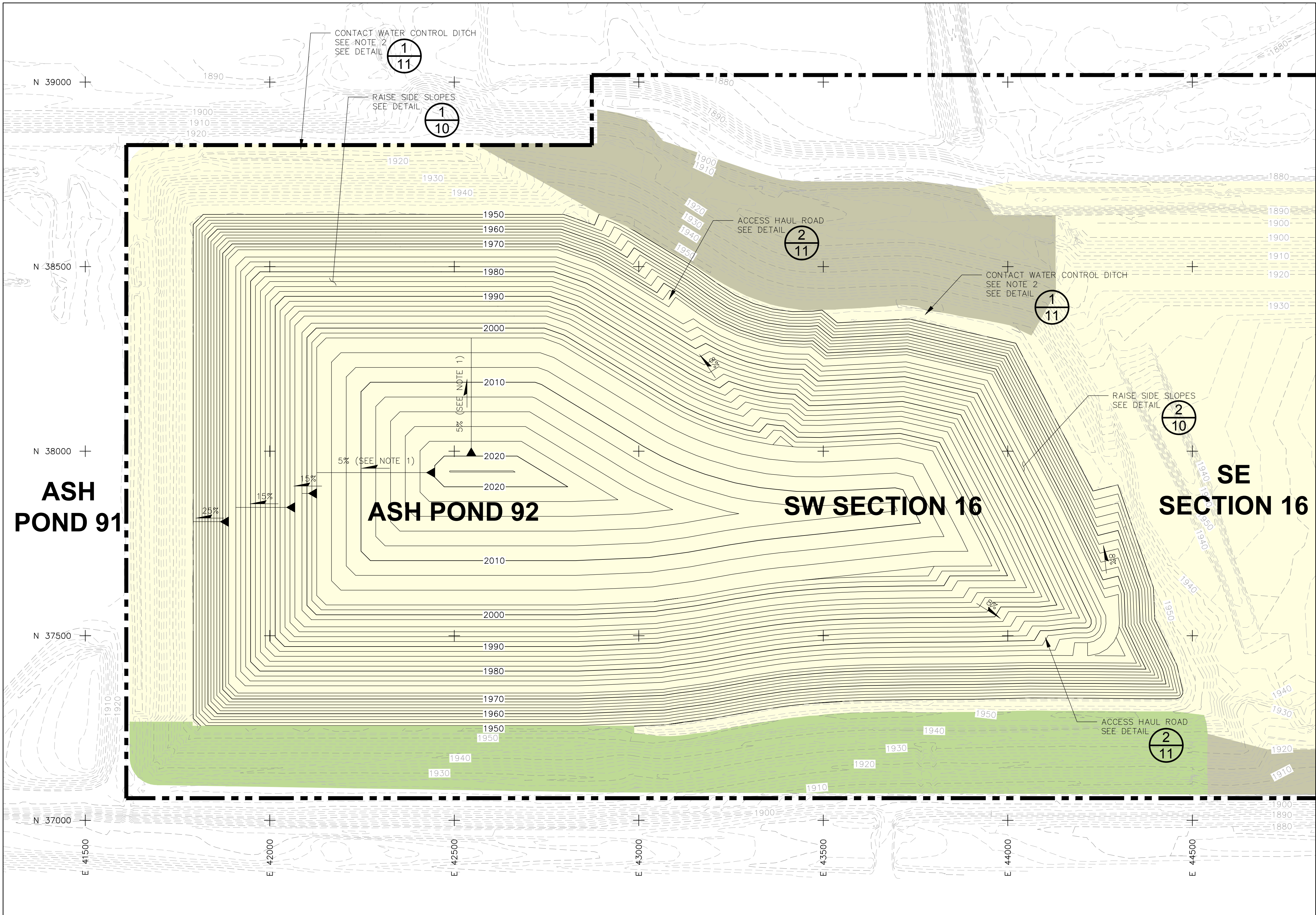


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ORIGINAL DRAWING STAMPED BY TODD STONG, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA (PE #6144), IS ON FILE AT "GOLDER ASSOCIATES" LAKEWOOD, COLORADO, OFFICE.		ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
		ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE		GENERAL SITE PHASES	
 <b>Golder Associates</b>	 <b>GREAT RIVER ENERGY</b> <small>A Southern Company Corporation</small>	FILE No.	11381519A003
		PROJECT No.	113-81519
		4	



Drawing File: N:\1\1\13-81519\UR\Permit Drawings\11381519A006.dwg | Modified: Nov 28, 2012 09:08 | Plotted: 11/28/12 9:24am | CSchuelte@gr

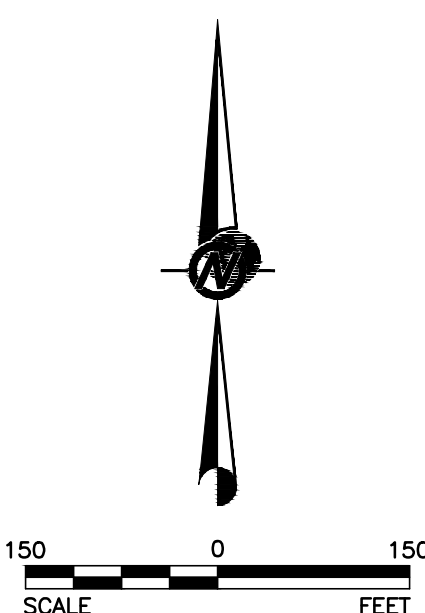


**LEGEND**

- EXISTING GROUND TOPOGRAPHY
- PROPOSED TOP OF CCP TOPOGRAPHY
- AREA OF ACTIVE CCP PLACEMENT
- TEMPORARY COVER PLACED
- FINAL COVER PLACED
- PERMITTED LIMIT OF CCP PLACEMENT

- NOTES**
- CCP GRADES OF THE CROWN OF THE FACILITY ARE SHOWN AT 5%, BUT MAY BE CONSTRUCTED BETWEEN 3% AND 5%.
  - CONTACT WATER IS COLLECTED IN THE DITCH AROUND ASH POND 92 AND SW SECTION 16. WATER IS DIRECTED THROUGH CULVERTS TO ASH POND 91 OR DOWNWARD INTO THE UPSTREAM RAISE.

- REFERENCES**
- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
  - EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.
  - COORDINATES BASED ON PLANT GRID SYSTEM.
  - CONTOUR INTERVAL IS TWO FEET.
  - ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

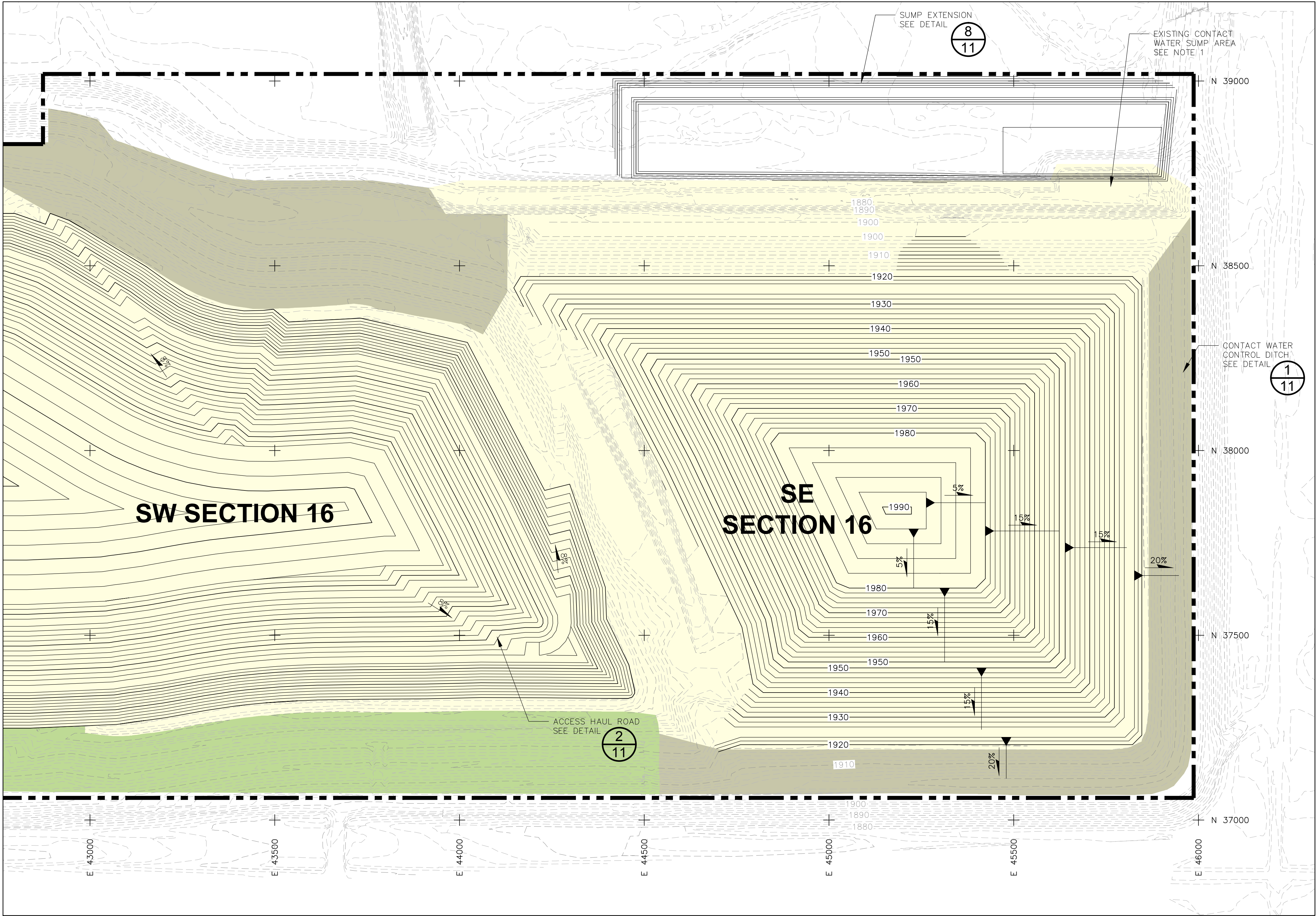


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		B	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
		A	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE		PHASES 3 AND 4: ASH POND 92 & SW SECTION 16 RAISE VERTICAL EXPANSION	
	FILE No.	11381519A006	
	PROJECT No.	113-81519	
		5	



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LEGEND

EXISTING GROUND/CCP TOPOGRAPHY

PROPOSED TOP OF CCP TOPOGRAPHY

AREA OF ACTIVE CCP PLACEMENT

TEMPORARY COVER PLACED

FINAL COVER PLACED

PERMITTED LIMIT OF CCP PLACEMENT

NOTES

1. CONTACT WATER WILL BE COLLECTED IN PERIMETER TOE DITCHES AND DIRECTED TO THE SUMP IN THE NE CORNER OF THE SE SECTION 16 LANDFILL.

REFERENCES

1. SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.

2. EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.

3. COORDINATES BASED ON PLANT GRID SYSTEM.

4. CONTOUR INTERVAL IS TWO FEET.

5. ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

ENGINEER'S STAMP		NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
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		B	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
		A	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT

GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE

PHASE 5: SE SECTION 16 LANDFILL

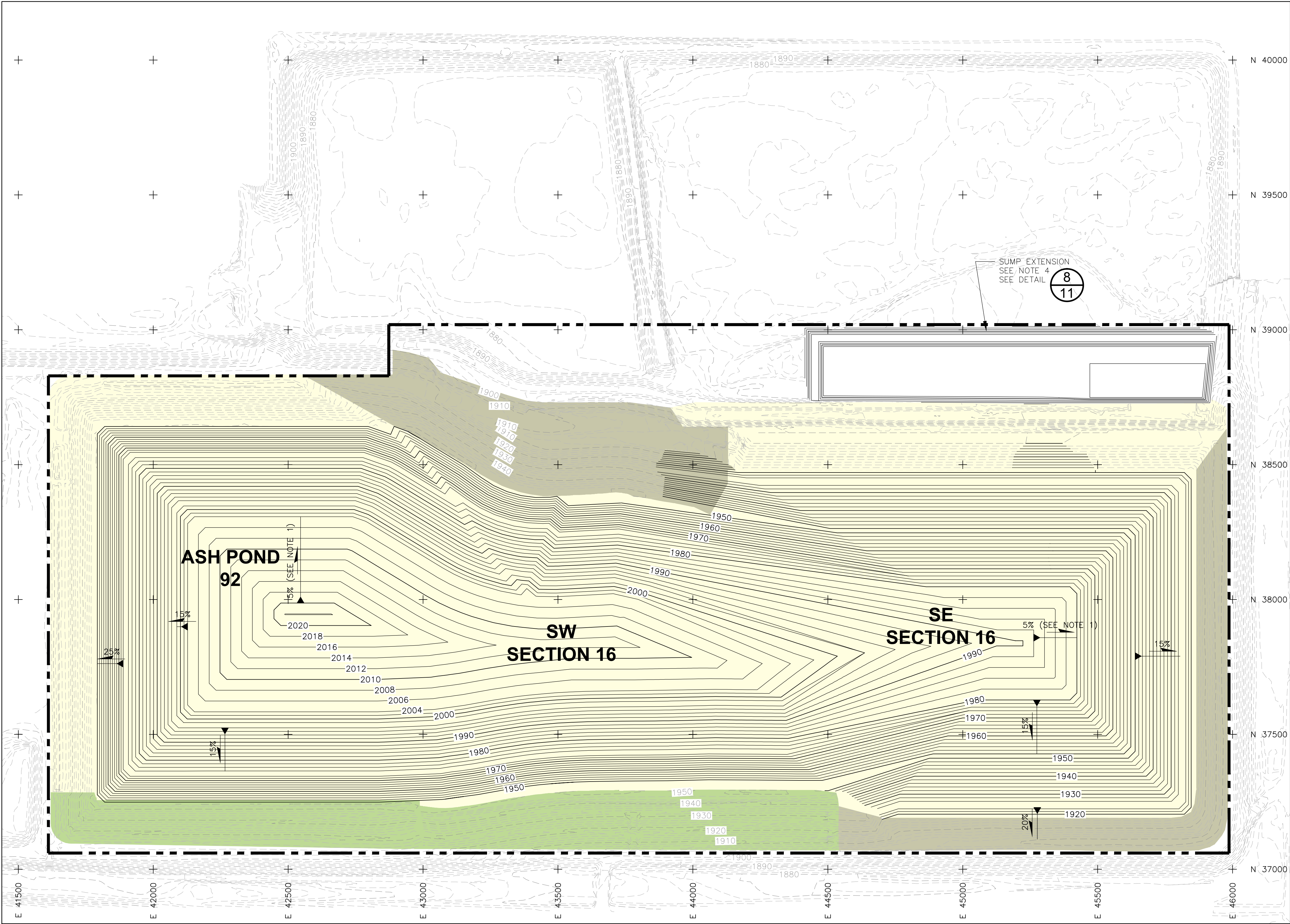
FILE No. 11381519A007

PROJECT No. 113-81519

6



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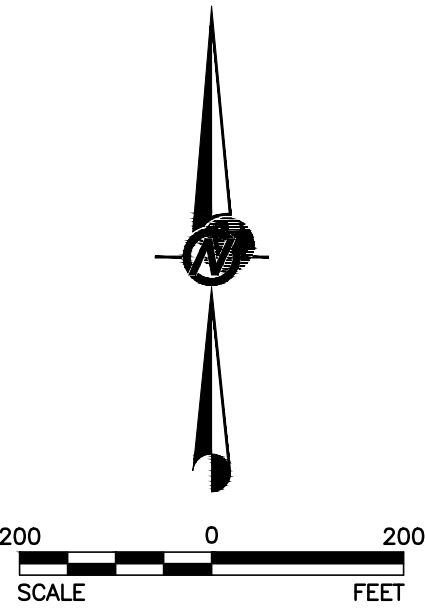
- EXISTING GROUND TOPOGRAPHY
- PROPOSED TOP OF CCP TOPOGRAPHY
- AREA OF ACTIVE CCP PLACEMENT
- TEMPORARY COVER PLACED
- FINAL COVER PLACED
- PERMITTED LIMIT OF CCP PLACEMENT

NOTES

- CCP GRADES OF THE CROWN OF THE FACILITY ARE SHOWN AT 5%, BUT MAY BE CONSTRUCTED BETWEEN 3% AND 5%.
- CONTACT WATER IS COLLECTED IN THE DITCH AROUND ASH POND 92 AND SW SECTION 16. WATER IS DIRECTED THROUGH CULVERTS TO ASH POND 91 OR DOWNWARD INTO THE UPSTREAM RAISE.
- CONTACT WATER WILL BE COLLECTED IN PERIMETER TOE DITCHES AROUND SE SECTION 16 AND DIRECTED TO THE SUMP IN THE NE CORNER OF THE LANDFILL.
- THE SUMP WILL BE ENLARGED AS REQUIRED. SEE CONTACT WATER ENGINEERING WORKSHEET FOR DETAILS.

REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.
- COORDINATES BASED ON PLANT GRID SYSTEM.
- CONTOUR INTERVAL IS TWO FEET.
- ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.



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	B	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
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PROJECT

GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE

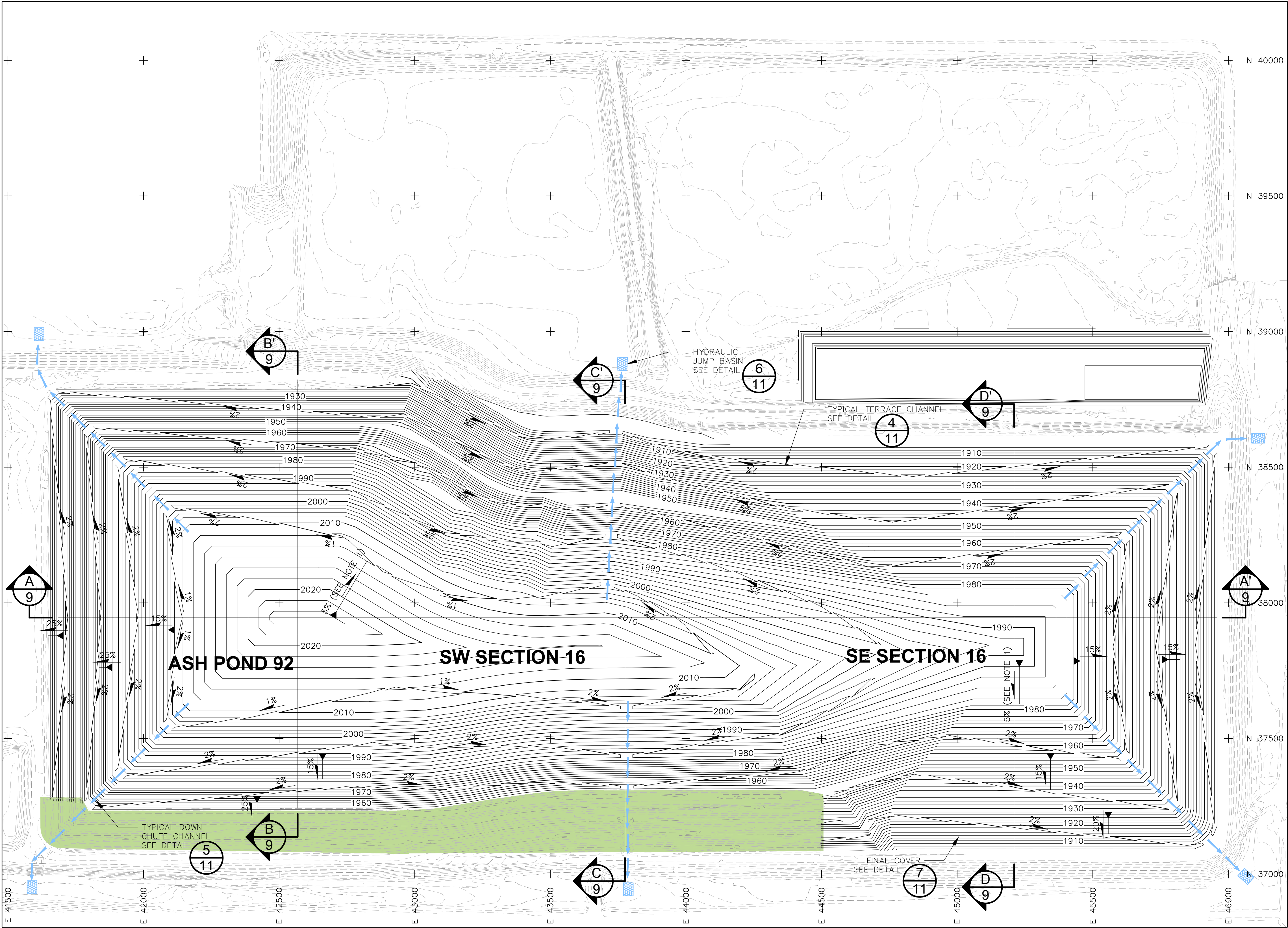
FINAL WASTE GRADES

FILE No. 11381519A008  
PROJECT No. 113-81519

7



Drawing File: N:\1\1\13-81519\UR\Permit Drawings\11381519A009.dwg | Layout: 11381519A008 (2) | Modified: Nov 28, 2012 09:05 | C:\shu\gpa\ | Plotted: 11/28/12 9:25am | C:\shu\gpa\



LEGEND

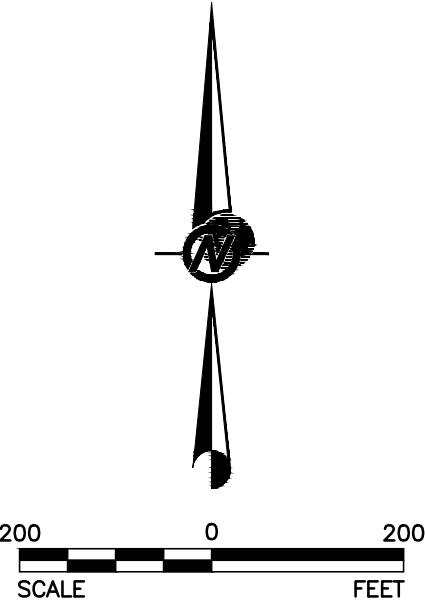
- EXISTING GROUND TOPOGRAPHY
- PROPOSED TOP OF COVER TOPOGRAPHY
- FINAL COVER PLACED
- DOWNCHUTE/OUTLET CHANNEL

NOTES

- TOP OF COVER GRADES OF THE CROWN OF THE FACILITY ARE SHOWN AT 5%, BUT MAY BE CONSTRUCTED BETWEEN 3% AND 5%.
- SEE THE SURFACE WATER ENGINEERING WORKSHEET FOR FURTHER DETAILS CONCERNING THE SURFACE WATER CONTROL PLAN.

REFERENCES

- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
- EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.
- COORDINATES BASED ON PLANT GRID SYSTEM.
- CONTOUR INTERVAL IS TWO FEET.
- ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

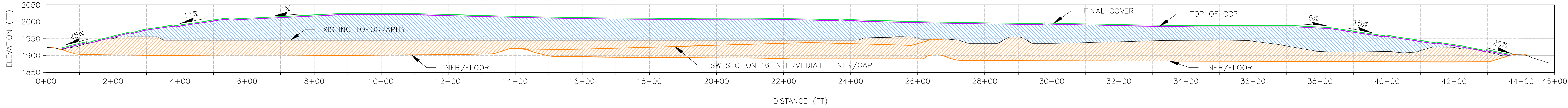


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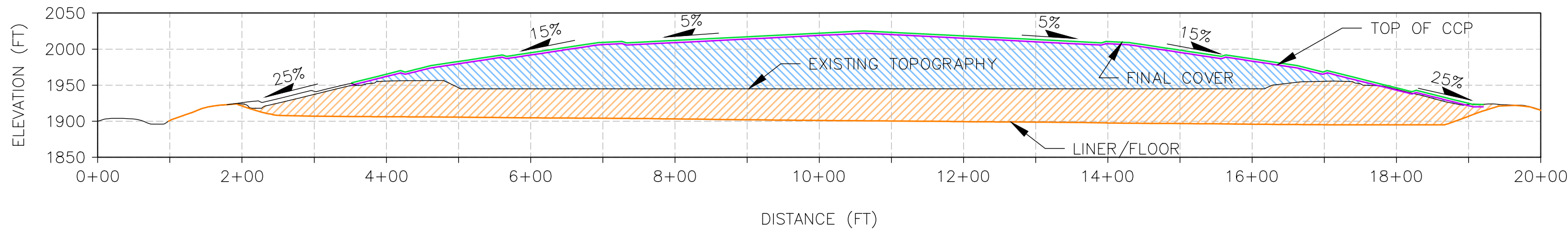
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TITLE		FINAL COVER GRADES AND SURFACE WATER PLAN	
	FILE No.	11381519A009	
	PROJECT No.	113-81519	
		8	



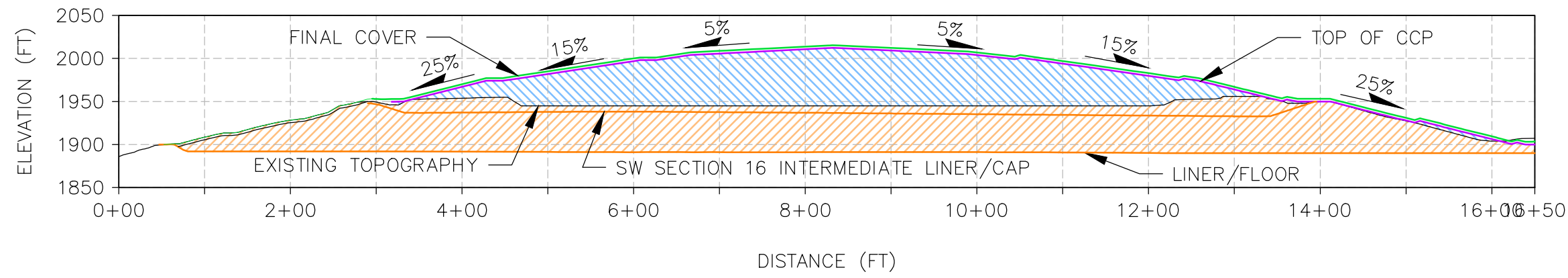
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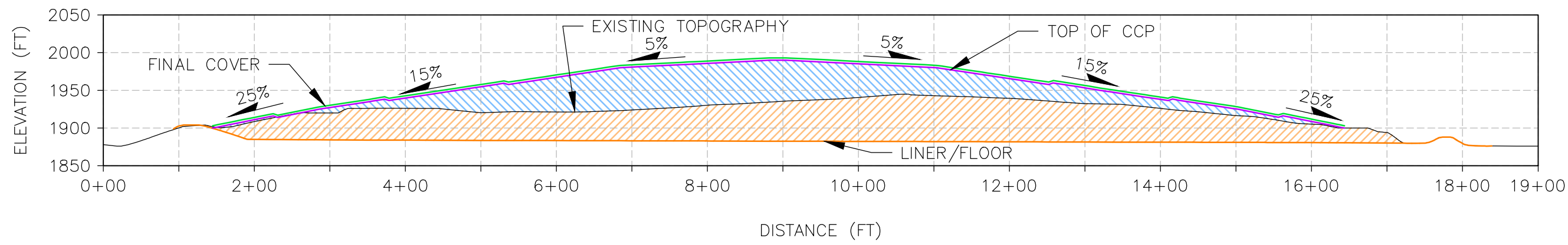
**A**  
**9** **CROSS SECTION A-A'**  
150 0 150  
SCALE FEET  
NO VERTICAL EXAGGERATION



**B**  
**9** **CROSS SECTION B-B'**  
150 0 150  
SCALE FEET  
NO VERTICAL EXAGGERATION



**C**  
**9** **CROSS SECTION C-C'**  
150 0 150  
SCALE FEET  
NO VERTICAL EXAGGERATION



**D**  
**9** **CROSS SECTION D-D'**  
150 0 150  
SCALE FEET  
NO VERTICAL EXAGGERATION

**LEGEND**

- PROPOSED TOP OF FINAL COVER TOPOGRAPHY
- PROPOSED TOP OF CCP TOPOGRAPHY
- EXISTING GROUND TOPOGRAPHY
- APPROXIMATE LINER/FLOOR TOPOGRAPHY
- EXISTING CCP PLACEMENT
- PROPOSED (FUTURE) CCP PLACEMENT

ENGINEER'S STAMP

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PROJECT  
**GREAT RIVER ENERGY  
COAL CREEK STATION  
PERMIT NO. SP-033 PERMIT MODIFICATION**

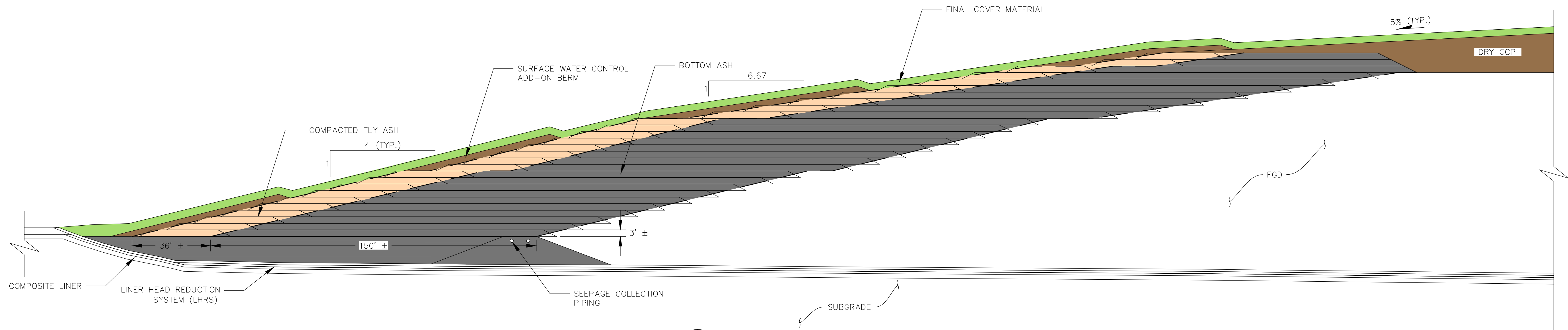
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**CROSS SECTIONS**



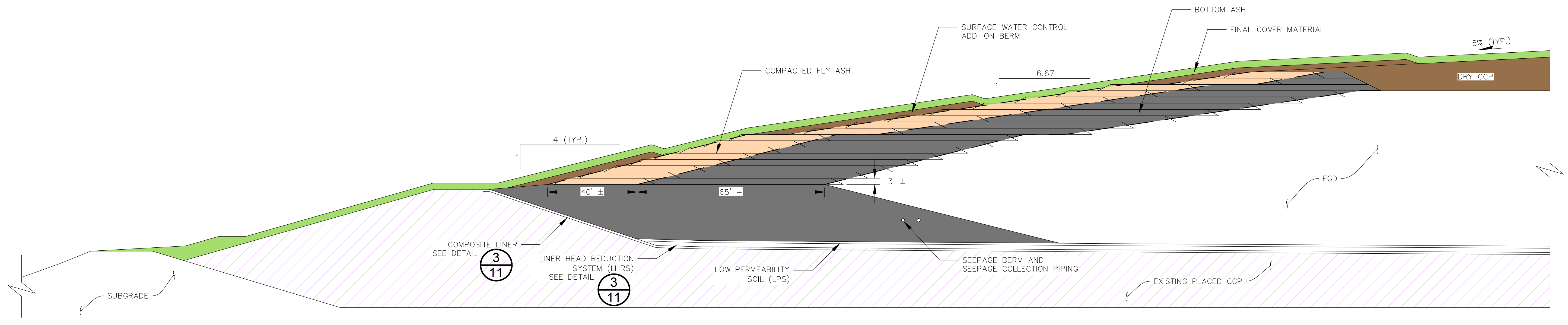
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PROJECT No. 113-81519



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**1**  
**10** ASH POND 92 PROFILE  
NOT TO SCALE

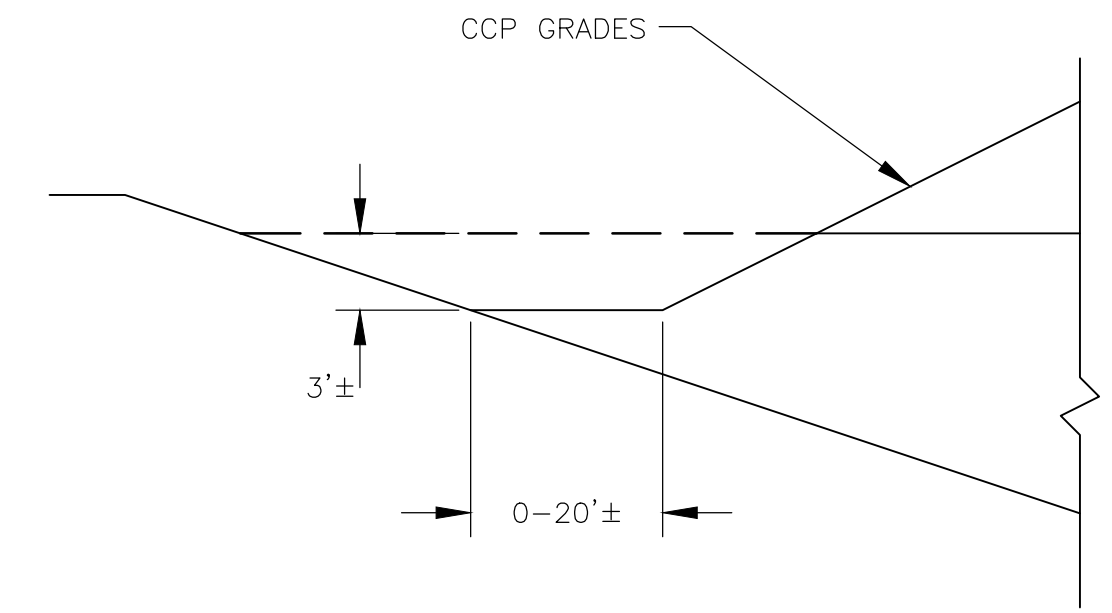


**2**  
**10** SW SECTION 16 PROFILE  
NOT TO SCALE

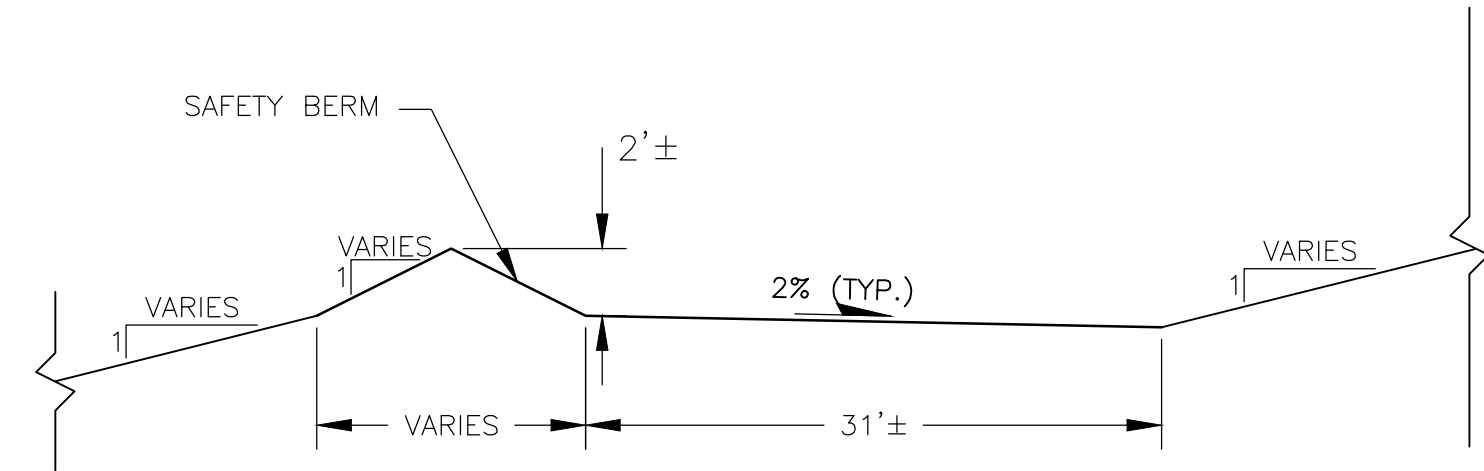
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	△	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
	△	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE DETAIL SHEET 1	
	FILE No. 11381519A011
	PROJECT No. 113-81519
	<b>10</b>

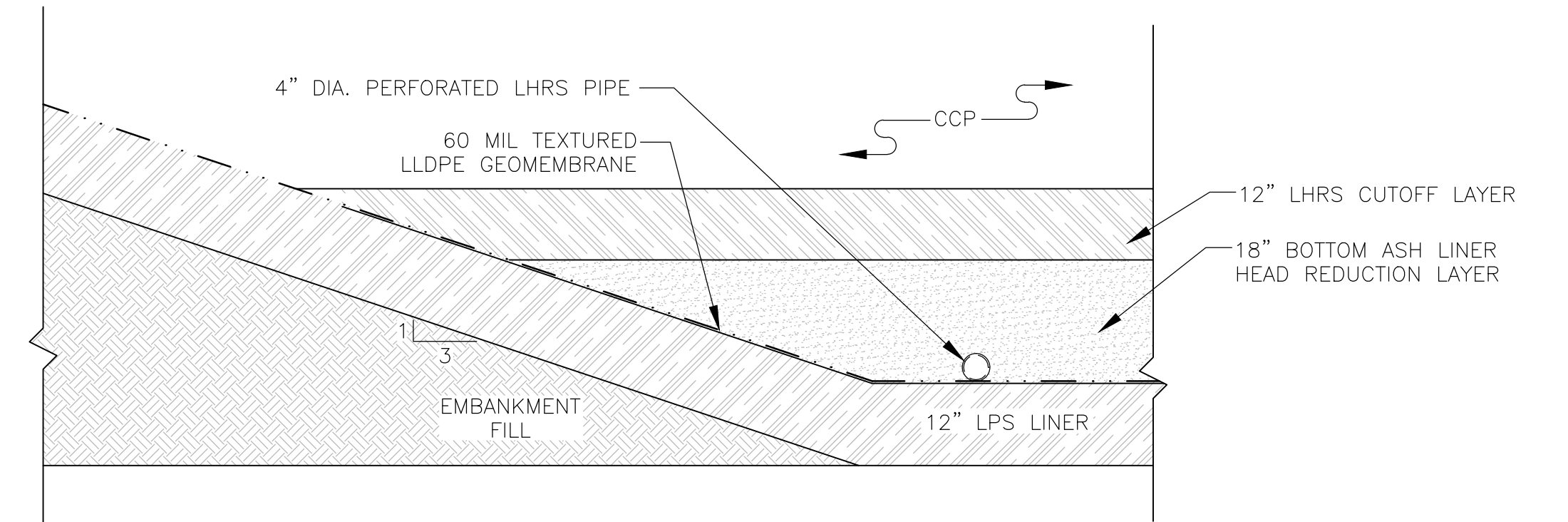




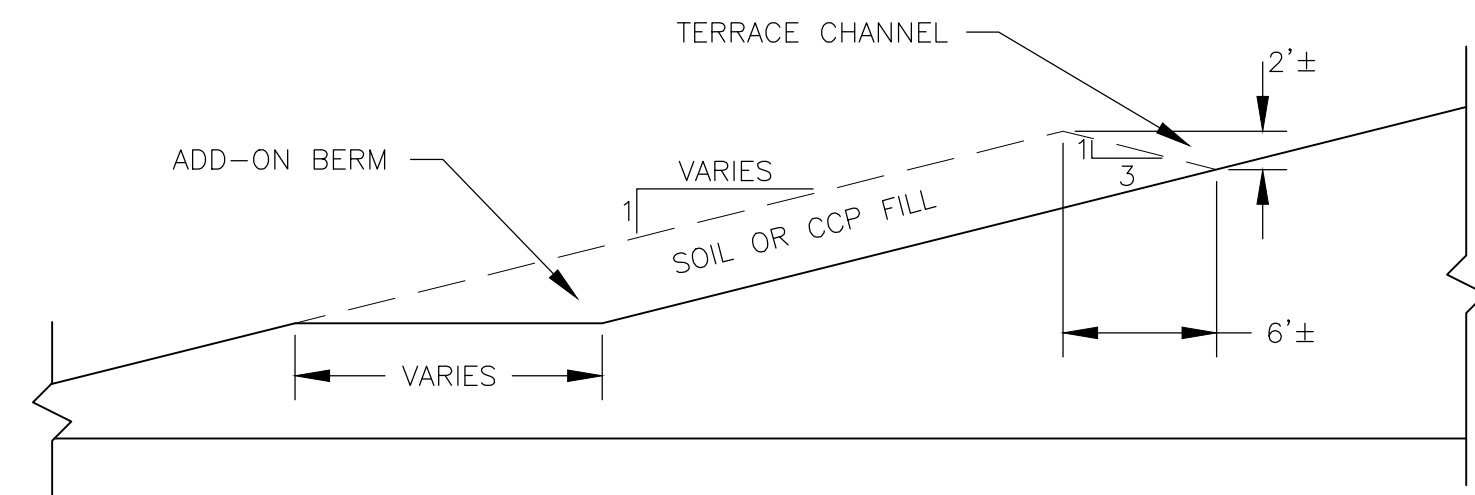
**1**  
**11** **CONTACT WATER CONTROL DITCH**  
NOT TO SCALE



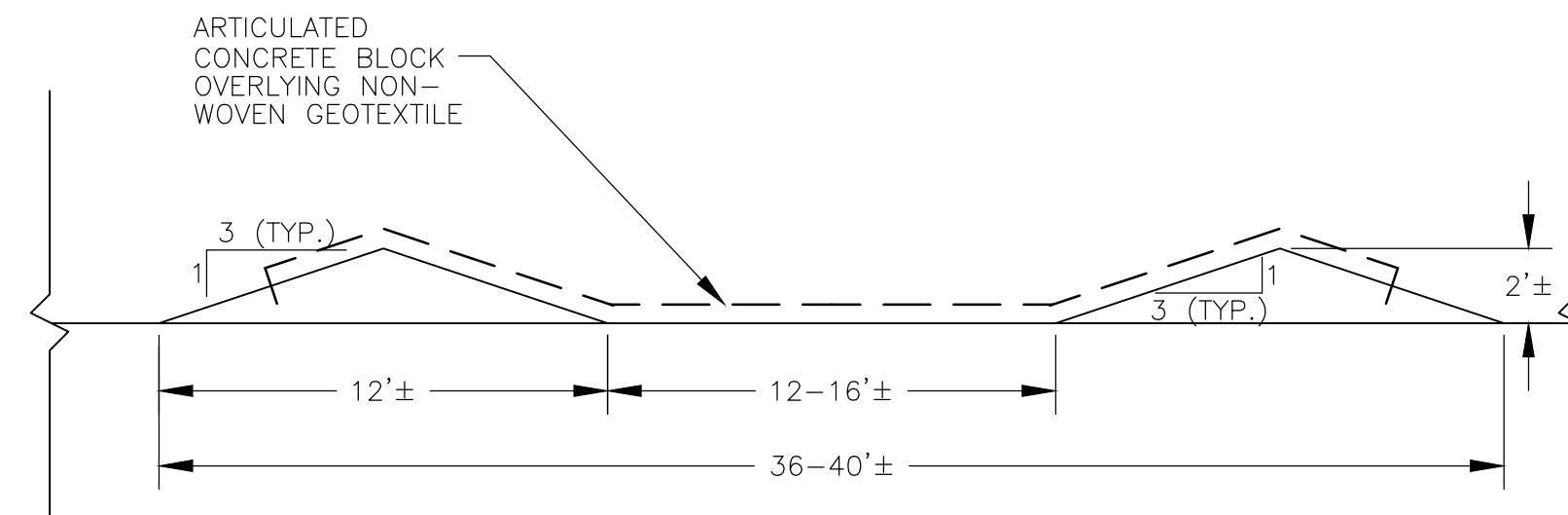
**2**  
**11** **ACCESS HAUL ROAD**  
NOT TO SCALE



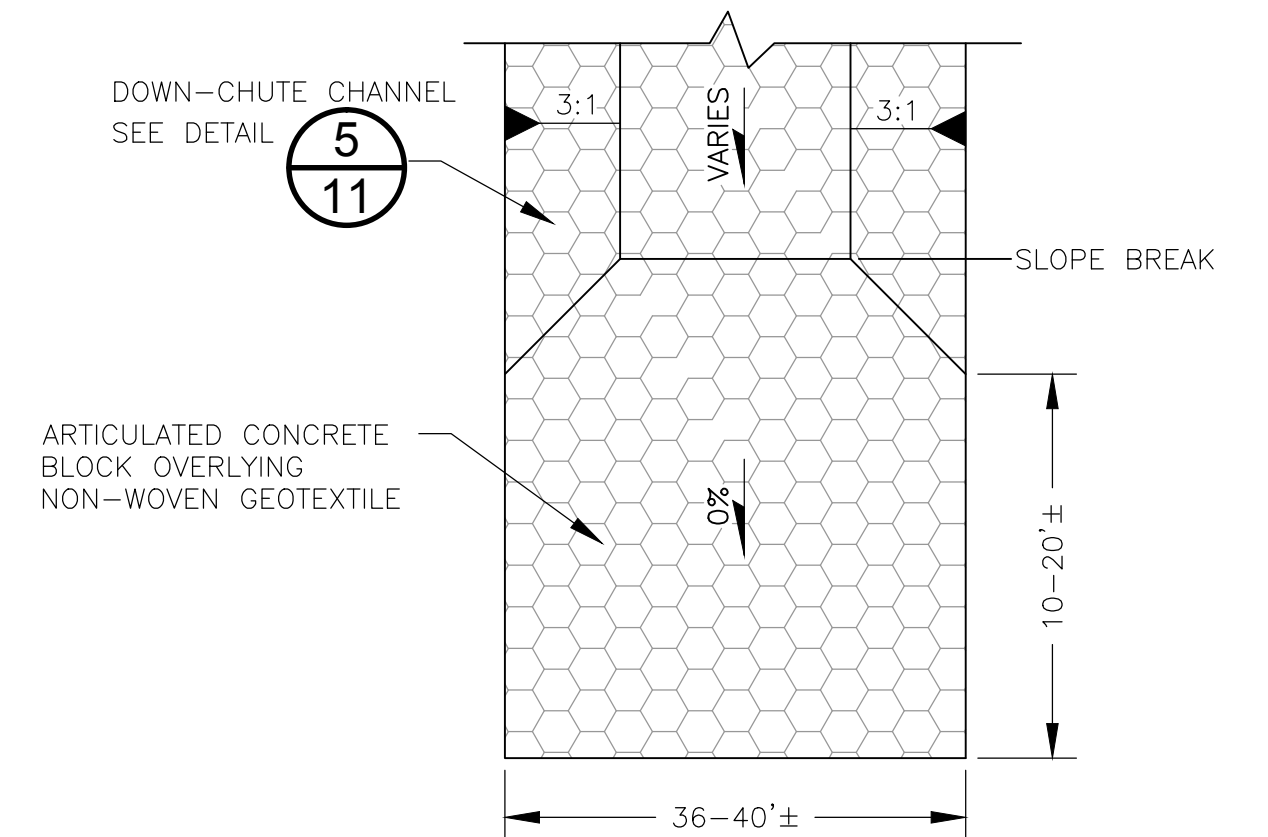
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**11** **SW 16 INTERMEDIATE LINER/CAP AND LHRS DETAIL**  
NOT TO SCALE



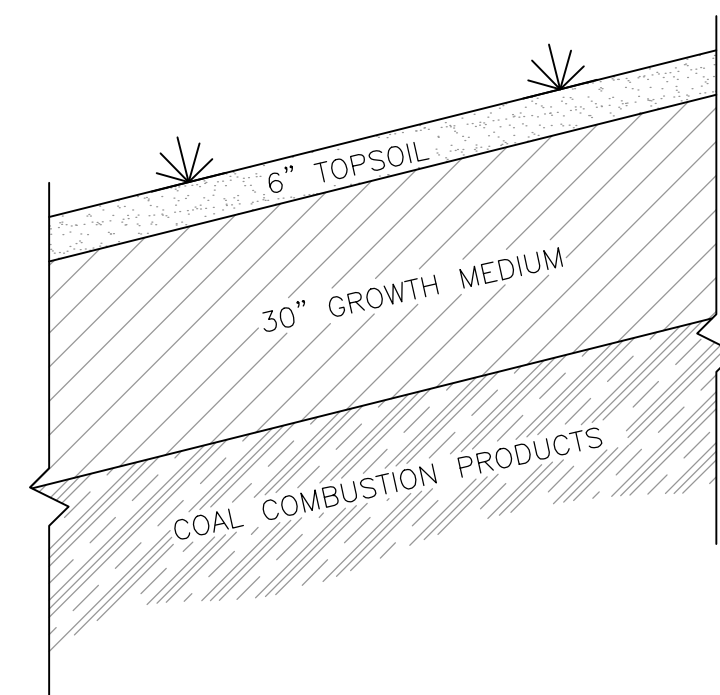
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**11** **TERRACE CHANNEL DETAIL**  
NOT TO SCALE



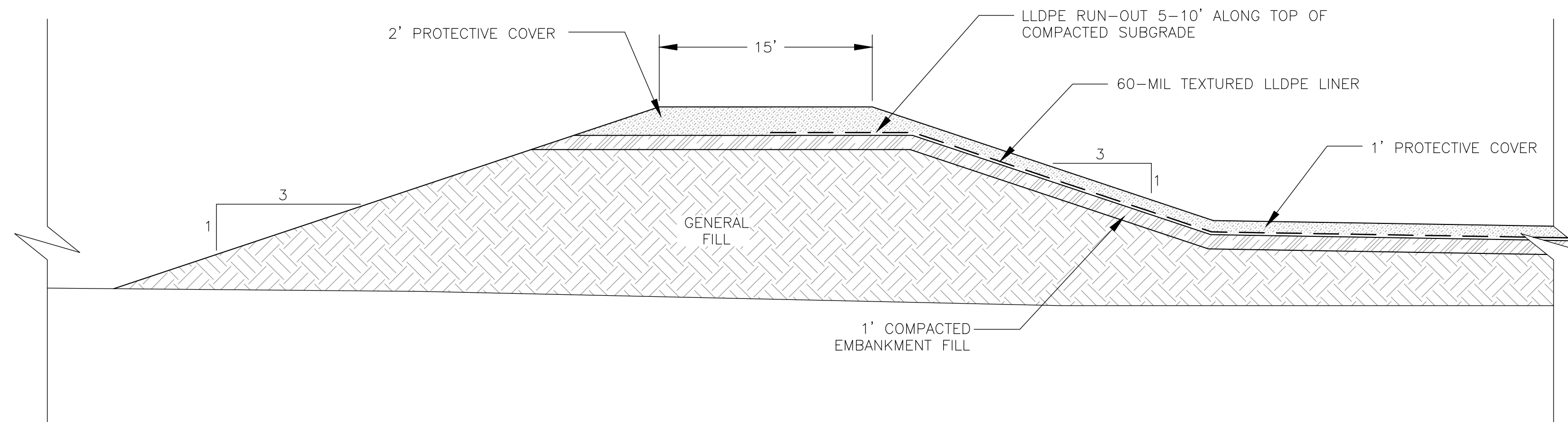
**5**  
**11** **TYPICAL DOWN-CHUTE CHANNEL**  
NOT TO SCALE



**6**  
**11** **HYDRAULIC JUMP BASIN**  
NOT TO SCALE





**7**  
**11** **FINAL COVER DETAIL**  
NOT TO SCALE



**8**  
**11** **SUMP EXTENSION DETAIL**  
NOT TO SCALE

ENGINEER'S STAMP	NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
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	A	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE		DETAIL SHEET 2	
	 GREAT RIVER ENERGY® <small>A Southern Energy Company</small>	FILE No.	11381519A012
		PROJECT No.	113-81519
		11	



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Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

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[www.golder.com](http://www.golder.com)

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**44 Union Boulevard, Suite 300**  
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**Tel: (303) 980-0540**  
**Fax: (303) 985-2080**

