

REPORT**2021 Annual Inspection***Coal Creek Station – Southeast Section 16 CCR Landfill*

Submitted to:

Great River Energy

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Figure 2: Southeast 16 - Site Overview

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1.0 INTRODUCTION

As part of 40 Code of Federal Regulations (CFR) Part 257 of the Subtitle D solid waste provisions under the Resource Conservation and Recovery Act (RCRA), utilities are required to complete annual inspections for surface impoundments and landfills containing coal combustion residuals (CCRs). Golder Associates USA Inc. (Golder), a Member of WSP, prepared this report for Great River Energy (GRE) to satisfy the 2021 annual inspection requirements for CCR landfills under 40 CFR Part 257.84.

Coal Creek Station (CCS) is located in McLean County, approximately 10 miles northwest of Washburn, North Dakota. There are four facilities located at CCS that fall under the CCR rule requirements (Figure 1):

- 1) Drains Pond System CCR Surface Impoundment (Drains Pond System)
- 2) Upstream Raise 91 CCR Surface Impoundment (Upstream Raise 91)
- 3) Upstream Raise 92 CCR Surface Impoundment (Upstream Raise 92)
- 4) Southeast Section 16 CCR Landfill (Southeast 16)

Upstream Raise 91 and Upstream Raise 92 both operate as impoundments and will be closed with CCR in-place. The Drains Pond System is currently being used to dewater bottom ash and as a process water impoundment to return conveyance water back to the plant. The Southeast 16 landfill operates as a landfill and is used as a storage/disposal facility for CCRs that do not contain free liquid. This report presents a review of available facility information and findings of the inspection of Southeast 16 at CCS performed September 1, 2021.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Geological Conditions

Southeast 16 is generally constructed over a glacial till layer consisting of sandy and silty-clay soils. Glacial till varies in thickness from 20 feet to several hundred feet near CCS. Silty-sand and sand lenses and discontinuous coal seams are present throughout the glacial till formation, which is underlain by poorly consolidated siltstone/sandstone bedrock (Barr Engineering 1982; CPA and UPA 1989).

2.2 Site History and Liner Systems

Southeast 16 (Figure 2) is located in Section 16, Township 145N, Range 82W, and covers approximately 71 acres. The facility is used as a storage/disposal facility for CCRs, including fly ash, bottom ash, economizer ash, and flue gas desulfurization (FGD) material as required. Moisture-conditioned CCRs are transported to Southeast 16 using haul trucks. The material is placed using a dozer and compacted by routing the haul traffic over placed CCR. In addition, Southeast 16 receives non-CCR materials associated with plant processes, and a small construction and demolition (C&D) disposal area receives C&D material from CCS. Contact water at Southeast 16 is routed to the north side of the facility to a contact water collection area and sump. As required, contact water is pumped from the sump to Upstream Raise 92, Upstream Raise 91, or the Drains Pond System. Southeast 16 is adjacent to hay fields and wetland areas to the north and east, Upstream Raise 92 to the west, and is approximately 100 feet north of rail lines.

Southeast 16 was originally part of the East Ash Pond. In 1989, the facility was reclassified as a solid waste disposal area and CCRs disposed of at Southeast 16 were excavated and placed in the Southwest Section 16 Landfill. After being cleaned out, Southeast 16 was regraded with berms along the east, south, and west sides. The footprint was relined in 1994 with a composite liner consisting of 2 feet of compacted clay, a 60-mil

geomembrane liner, a non-woven geotextile cushion, and fly ash protective cover. In 2001, a contact water collection area was defined by construction of an embankment along the north side and installation of a composite liner consisting of a geosynthetic clay liner (GCL) and a 60-mil high-density polyethylene (HDPE) geomembrane liner. In 2015 this contact water collection area along the north side of the facility was expanded by approximately 4.5 acres. Protective cover material (bottom ash and fly ash) was constructed over the liner system in the fall of 2020 and the north side of the contact water collection area embankment was covered with soil and seeded to promote vegetative growth. The contact water collection area expansion liner consists of a GCL and 60-mil geomembrane overlain with fly ash and bottom ash protective cover.

Selected construction drawings from the 1994, 2001, 2015, and 2020 work and current permit drawings are included in Appendix A.

2.3 Site Geometry

The design top of embankment surrounding Southeast 16 has an approximate elevation (El.) of 1,904 feet (ft) along the south and east sides, and between El. 1,887 ft and El. 1,892 ft along the north side. The original berm along the west side was at El. 1,901 ft, but CCR storage/disposal along this side extends over this berm onto Upstream Raise 92 slopes. The upstream slopes of the embankment surrounding Southeast 16 were designed with three horizontal units to one vertical unit (3:1) slopes to a bottom of landfill between El. 1,887 feet and El. 1,876 ft. The downstream slopes from the soil embankment have a 3:1 slope. The surrounding topography has elevations varying from approximate El. 1,882 ft to El. 1,876 ft. The crest is a gravel surfaced roadway supporting light passenger vehicles. All heavy haul equipment accesses the site from the north and west sides along internal roads constructed on placed CCR material.

2.4 Changes in Geometry

No significant changes to geometry were noted other than the continued placement of CCR materials, non-CCR materials, and C&D debris to the design grades. Based on site documentation of the materials disposed of over the previous year, estimated disposal through 2021 included approximately 90,000 cubic yards (CY) of CCR and non-CCR material primarily deposited along the south and east sides to bring outside grades up to approximate El. 1,940 ft. Approximately 150,000 CY of material were also transferred from Southeast 16 to Upstream Raise 92 between January and April of 2021. Based on these quantities, an approximate net 60,000 CY of material was removed from Southeast 16 in 2021.

2.5 Storage Capacity and Volumes

Based on annual placement estimates and survey placement estimates, the amount of CCR and non-CCR material contained in the facility at the end of 2021 is estimated to be approximately 4,090,000 CY.

2.6 Permits

Southeast 16 is currently permitted with the North Dakota Department of Environmental Quality (NDDEQ) under Permit Number 0033. Previous permit modification documents describe additional historical information about the design of the facility (CPA 1997; CPA and UPA 1989; GRE 2003, 2012, 2015).

2.7 Summary of Previous Inspections

Golder performed the most recent annual Professional Engineer (PE) inspection of Southeast 16 in September of 2020 (Golder 2021) and a summary of the observations of that inspection are as follows:

- Generally good vegetation and site maintenance.
- No signs of significant seepage, settlement, or cracking of Southeast 16.
- Minor rutting of access roads on the south and east berm crests.
- Minor erosion of fly ash used as part of the CCR downstream slopes and crest.
- Contact water control features (sump, pump, and piping) were in good condition.

2.8 Summary of 2021 Weekly Inspections

Routine weekly inspections of Southeast 16 were performed as a part of the final CCR Rule. Based on a review of the available inspection forms, the following items were noted:

- Generally good site maintenance.
- No signs of significant seepage or settlement of the berm downstream slopes.
- In July 2021, a crack was noted in the temporary cover placed on the east CCR downstream slope.
- Woody vegetation (small saplings) surrounding the facility were cut as required.

3.0 2021 ANNUAL INSPECTION

On September 1, 2021, Craig Schuettepelz of Golder performed an inspection of Southeast 16 per United States Environmental Protection Agency (USEPA) Regulation 40 CFR Part 257.84(b) requirements. The inspection consisted of visual observations while walking around the facility traversing up and down the perimeter berm and CCR placement areas. An annual inspection checklist used during the inspection is presented in Appendix B. Photographs were taken and are presented in Appendix C. The following presents a summary of the observations made during the 2021 annual inspection.

3.1 Hydraulic Structures

Contact water is collected in the contact water collection area located in the northeast corner of Southeast 16. As contact water accumulates, it can be pumped from the area to Upstream Raise 92, Upstream Raise 91, or the Drains Pond System through an HDPE pipe (above and below grade). One area of exposed geomembrane was noted within the contact water collection area during the inspection where protective cover had been eroded and water was flowing outside of the area reinforced with articulated concrete block. Protective cover should be added to this area to direct the flow into the reinforced channel. The contact water collection area and pipe observed appeared to be in good condition with no noticeable damage or significant corrosion.

3.2 Perimeter Berm

3.2.1 Berm Upstream Slope

The majority of perimeter berm upstream slopes have been covered with CCR, with only the berm upstream slope along the north side visible at the time of inspection on September 1, 2021. The slopes appeared to match the design slopes with no observed cracks, sloughs, settlement, or seepage. Some minor erosion of the bottom ash protective cover on the north perimeter berm upstream slope was noted, but no geomembrane was exposed. Additionally, there was minor fly ash erosion on the north and south sides of the contact water collection area. The berm upstream slopes of Southeast 16 appear to be in good condition.

3.2.2 Berm Crest

The berm crest around the east and south sides of Southeast 16 is surfaced with gravel and used for light vehicle traffic. The berm crest along the north side is narrow and rarely used for light vehicle traffic. Heavy haul traffic bringing CCR to the site use an internal road constructed over previously placed CCR. The road on the berm crest of Southeast 16 appears to be in good condition, with no noticeable cracking or settlement, and appears to be well maintained. When wet, the road surface can become rutted and slippery. Minor rutting was observed at the access ramp in the southeast corner of Southeast 16 at the time of inspection. Ruts that develop on the road surface should be repaired as soon as practical to maintain access.

3.2.3 Berm Downstream Slope

The berm downstream slopes on the south and east sides had good vegetation. Some small animal burrows were identified along the berm downstream slope, particularly in the southeast corner. The north berm downstream slope was recently covered with growth medium and topsoil. After one year of growth, most of the vegetation on this slope consisted of weeds and GRE should consider reseeding this area to promote growth of native grasses. Golder did not observe indications of seepage, sloughing, cracking, or excessive settlement on the berm downstream slopes. The berm downstream slopes on the south and east sides appeared to be in good condition, and the berm downstream slope on the north side of Southeast 16 was in fair condition.

3.2.4 Toe

The environment at the toe of the berm slope varies surrounding Southeast 16. Golder did not observe indications of sloughing, cracking, significant erosion, excessive settlement, or vegetation that seemed to be thriving abnormally along the toe. No signs of seepage were noted. The toe appeared to be in good condition.

3.3 Coal Combustion Residual Placement

3.3.1 Coal Combustion Residual Downstream Slope (No Cover)

Uncovered CCR downstream slopes appeared to be in fair condition with no noticeable cracks, settlement, sloughing, seepage, or other signs of structural distress. The uncovered CCR downstream slopes appeared to match the design slopes with only minor erosion noted, particularly of fly ash along the north CCR downstream slope. Golder recommends that the contact water separation ditch be periodically cleaned out to allow contact water to flow unobstructed through the ditch.

3.3.2 Coal Combustion Residual Downstream Slope (with Cover)

Portions of CCR downstream slopes on the north, east, and south sides of Southeast 16 have temporary cover installed as of late 2016. These areas had fair vegetation (a combination of grassy vegetation and weeds) and minor erosion on the soil surface below. However, these CCR downstream slopes with temporary cover appeared to be in generally good condition to aid in controlling erosion of the outer fly ash "shell" and limit wind-blown fugitive dust. A minor crack was noted in the temporary cover on the east side of Southeast 16 at a consistent elevation. The crack is not affecting safe access or inspection of the facility.

The east and south CCR downstream slopes of Southeast 16 have final cover to El. 1,925 ft with terrace channels and downchute drainage channels along the side slopes. This final cover was installed in 2015 and has good native grass vegetative growth. Golder recommends that isolated areas receive additional topsoil and be reseeded, especially along the crests of the terrace channels where vegetation appears poorest.

Golder did not observe indications of seepage, sloughing, or settlement on the covered CCR downstream slopes. The covered CCR downstream slopes appeared to be in generally good condition.

3.4 Signs of Structural Weakness or Other Observations that Could Affect Stability

No signs of structural weakness or other observations that could affect the stability of Southeast 16 were observed during the site inspection in September 2021.

4.0 SUMMARY AND CONCLUSIONS

An annual inspection was performed for Southeast 16 at Coal Creek Station on September 1, 2021. The inspection met the requirements for CCR landfills under 40 CFR Part 257.84. Golder observed good vegetation and site maintenance and did not identify significant deficiencies such as seepage, excessive erosion, or settlement, or cracking during visual observations of Southeast 16. Exposed geomembrane liner on the north perimeter berm upstream slope was covered at the end of 2020, and growth medium and topsoil was placed on the downstream slope. Vegetation on the downstream slope mostly consists of weeds, and GRE may consider reseeding this slope to promote growth of native grasses.

In addition to annual inspections by the PE, trained and qualified site personnel perform required weekly facility inspections to look for signs of potential structural weaknesses.

Minor maintenance items that may need to be continually addressed include repairing large animal burrows as they appear, monitoring erosion along CCR slopes, repairing rutted perimeter roads to maintain access, reseeding poorly vegetated CCR downstream slopes where final cover has been placed, removing woody vegetation growing on the berm downstream slopes and toes, and placing CCR over exposed geomembrane liner, particularly in the contact water collection area.

Signature Page

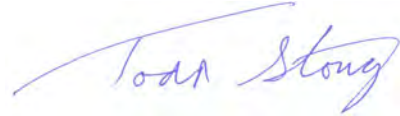
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Todd Stong, PE
Practice Leader

MRS/CCS/TS/df

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[https://golderassociates.sharepoint.com/sites/140044/project files/6 deliverables/21451024/reports/18-r-se16_2021_annual_report/18-r-0/21451024-18-r-0-southeast_section_16_2021_annual_report_28jan22.docx](https://golderassociates.sharepoint.com/sites/140044/project%20files/6%20deliverables/21451024/reports/18-r-se16_2021_annual_report/18-r-0/21451024-18-r-0-southeast_section_16_2021_annual_report_28jan22.docx)

5.0 REFERENCES

Barr Engineering. 1982. Coal Creek Station Hydrogeologic Study, June 3, 1982.

CPA (Cooperative Power Association). 1997. Application to Renew Permit SU-033 and Combine with Permit SU-118. Eden Prairie, Minnesota, July 30, 1997.

CPA and UPA (United Power Association). 1989. *Application to Renew Permit to Operate a Special Use Disposal Site, Coal Creek Station, Permit Number SU-033*. Prepared for the North Dakota State Department of Health and Consolidated Laboratories.

Golder (Golder Associates Inc.) 2021. 2020 Annual Inspection Report – Great River Energy – Coal Creek Station – Southeast Section 16 CCR Landfill. January 2021.

GRE (Great River Energy – Coal Creek Station). GRE 2003. Permit Modification Document, Permit No. SP-033. Original Permit Modification submitted September 30, 2003. Revised Permit Modification submitted to NDDH on July 8, 2004.

GRE. 2012. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated December 12, 2012.

GRE. 2015. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated February 2015.

Figures



NOTE(S)

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURE AERIAL IMAGERY PROGRAM, TAKEN IN 2020.



REFERENCE(S)

1. FOREGROUND IMAGERY PROVIDED BY GREAT RIVER ENERGY, TAKEN IN 2021.
2. BACKGROUND IMAGERY FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURE AERIAL IMAGERY PROGRAM, TAKEN 2020.

APPENDIX A

**Selected Construction Drawings
and Permit Drawings**

NOTES

1. TOPOGRAPHY AND AERIAL PHOTOGRAPH PROVIDED BY GREAT RIVER ENERGY (GRE) 9/2000.

2. GRE SHALL PROVIDE SOIL MATERIALS, GEOSYNTHETIC CLAY LINER (GCL), AND GEOMEMBRANE LINER.

3. EARTHWORKS CONTRACTOR RESPONSIBLE FOR BERM CONSTRUCTION, INCLUDING SOIL EXCAVATION, TRANSPORTATION, STOCKPILING AND PLACEMENT TO THE LINES AND GRADES ON THESE DRAWINGS; AND DEPLOYMENT OF GCL AND GEOMEMBRANE LINER; AND GCL SEAMING.

4. LINER SEAMING CONTRACTOR RESPONSIBLE FOR SEAMING GEOMEMBRANE PANELS.

5. GCL REQUIRED FOR CONSTRUCTION SHALL CONSIST OF A LAYER OF SODIUM BENTONITE BETWEEN WOVEN OR NON-WOVEN NEEDLE-PUNCHED GEOTEXTILES.

6. GEOMEMBRANE LINER REQUIRED FOR CONSTRUCTION SHALL BE 60-MIL SMOOTH HIGH-DENSITY POLYETHYLENE (HDPE).

7. SOIL MATERIALS USED FOR BERM CONSTRUCTION SHALL BE CLEAN, GRANULAR BOTTOM ASH FREE OF ORGANIC MATERIALS.

8. THE EXISTING LINER IN THE AREA SHOWN ON THE DRAWINGS SHALL BE CUT IF REQUIRED AND ROLLED AWAY FROM CONSTRUCTION ACTIVITIES TO PROTECT IT FROM DAMAGE.

9. NATURAL GROUND WITHIN THE LIMITS OF BERM CONSTRUCTION SHALL BE STRIPPED OF TOPSOIL, AND SCARIFIED IN PREPARATION FOR PLACEMENT OF SOIL CONSTRUCTION MATERIALS.

10. SOIL MATERIALS SHALL BE PLACED IN MAXIMUM 12-INCH THICK HORIZONTAL LIFTS AND COMPACTED USING METHODS APPROVED BY THE OWNERS REPRESENTATIVE.

11. PORTIONS OF THE BERM TO BE COVERED BY GCL AND GEOMEMBRANE LINER SHALL BE SMOOTH-DRUM ROLLED TO PROVIDE A FLAT SURFACE.

12. OVERSIZED SOIL MATERIALS LOCATED WITHIN PORTIONS OF THE BERM THAT WILL BE COVERED WITH GCL AND GEOMEMBRANE SHALL BE REMOVED AS DETERMINED BY THE OWNERS REPRESENTATIVE.

13. GEOSYNTHETICS SHALL BE DEPLOYED FROM EAST TO WEST TO PROVIDE OVERLAP IN THE DOWNSTREAM DIRECTION.
14. GCL SHALL BE DEPLOYED USING MANUFACTURER-RECOMMENDED METHODS, AVOIDING UNNECESSARY FOLDS OR IRREGULARITIES.

15. GCL PANEL OVERLAP SHALL BE ACCORDING TO THE MANUFACTURES RECOMMENDATIONS.

16. GEOMEMBRANE LINER SHALL BE DEPLOYED USING MANUFACTURER-RECOMMENDED METHODS, AVOIDING UNNECESSARY FOLDS OR IRREGULARITIES.

17. GEOMEMBRANE OVERLAP SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND COORDINATED WITH THE SEAMING CONTRACTOR.

18. GEOMEMBRANE SHALL BE TEMPORARILY ANCHORED USING SANDBAGS FILLED WITH BOTTOM ASH.

19. THE EXISTING GEOMEMBRANE SHALL BE RE-DEPLOYED AND EDGE CLEANED (TOP AND BOTTOM) AND DRIED IN PREPARATION FOR SEAMING TO THE NEW LINER, AS DIRECTED BY THE OWNER.

20. THE GEOMEMBRANE LINER PANELS SHALL BE SEAMED USING FUSION OR EXTRUSION WELDING PROCESSES.

21. GEOMEMBRANE LINER CQA SHALL CONSIST OF DESTRUCTIVE AND NON-DESTRUCTIVE TESTING.

22. FUSION SEAMS SHALL BE TESTED USING AIR CHANNEL TESTS WITH A PRESSURE OF 30 PSI FOR 5 MINUTES. PASSING TESTS SHALL CONSTITUTE A PRESSURE DROP OF LESS THAN 3 PSI WITHIN 5 MINUTES.

23. EXTRUSION WELDS SHALL BE TESTED USING A VACUUM BOX AND AN APPLIED PRESSURE OF 5 PSI FOR 10 SECONDS.

24. DESTRUCTIVE TESTING SHALL BE CONDUCTED FOR SHEAR AND PEEL.

25. LINER CQA SHALL BE OBSERVED AND DOCUMENTED BY THE OWNER'S REPRESENTATIVE.



LOCATION PLAN

ESTIMATED MATERIAL QUANTITIES

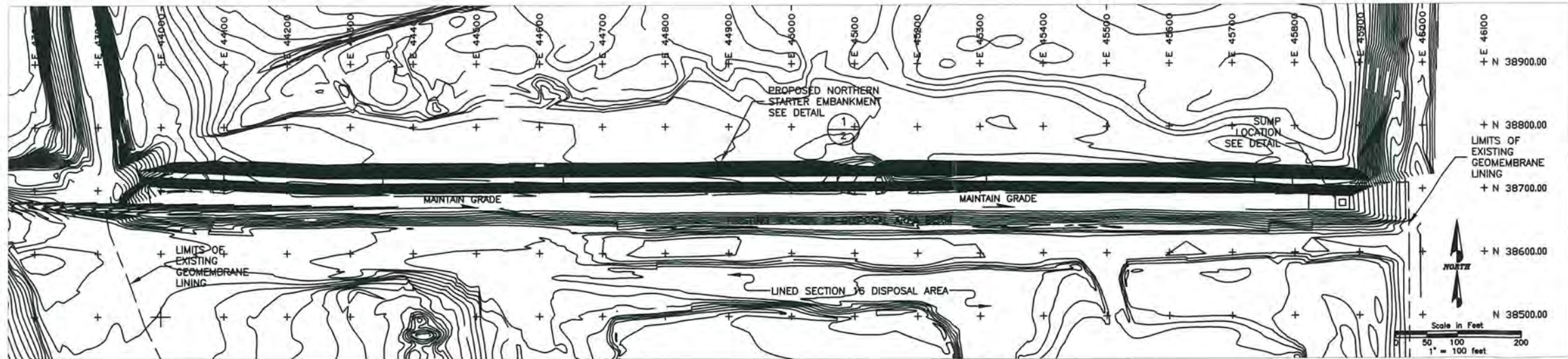
MATERIAL	UNIT	QUANTITY
BOTTOM ASH*	YD ³	15,000
60mil SMOOTH GEOMEMBRANE LINER	FT ²	50,000
GEOSYNTHETIC CLAY LINER (GCL)	YD ²	6,400

* DENOTES IN-PLACE VOLUME

LEGEND

- EXISTING GROUND CONTOURS
- PROPOSED BERM CONTOURS
- - -

EXISTING LIMITS OF SECTION 16 GEOMEMBRANE LINER



SECTION 16 NORTHERN STARTER EMBANKMENT PLAN

IF THE ABOVE BAR DOES NOT SCALE 1 INCH THE DRAWING SCALE IS ALTERED

CLIENT

DATE

ENGINEER'S STAMP

NO.	REVISION DESCRIPTION	DATE	BY	CHKD	AP'VD	NO.	REVISION DESCRIPTION	DATE	BY	CHKD	AP'VD	DATE	PRINT ISSUE RECORD
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2	ISSUED WITH DESIGN REPORT	10/10/00				2	ISSUED WITH DESIGN REPORT	10/10/00					
3	ISSUED FOR CLIENT REVIEW					3	ISSUED FOR CLIENT REVIEW						

CLIENT/PROJECT

GREAT RIVER ENERGY
COAL CREEK STATION

TITLE

SECTION 16 ASH DISPOSAL FACILITY
NORTHERN STARTER EMBANKMENT PLAN

Denver, Colorado

Goldier
Associates

DBS

DATE

OCT. 2000

DESIGNED

GE

SCALE

AS SHOWN

REVIEWED

RRJ

JOB NO.

003-2178

APPROVED

RRJ

DRW. NO.

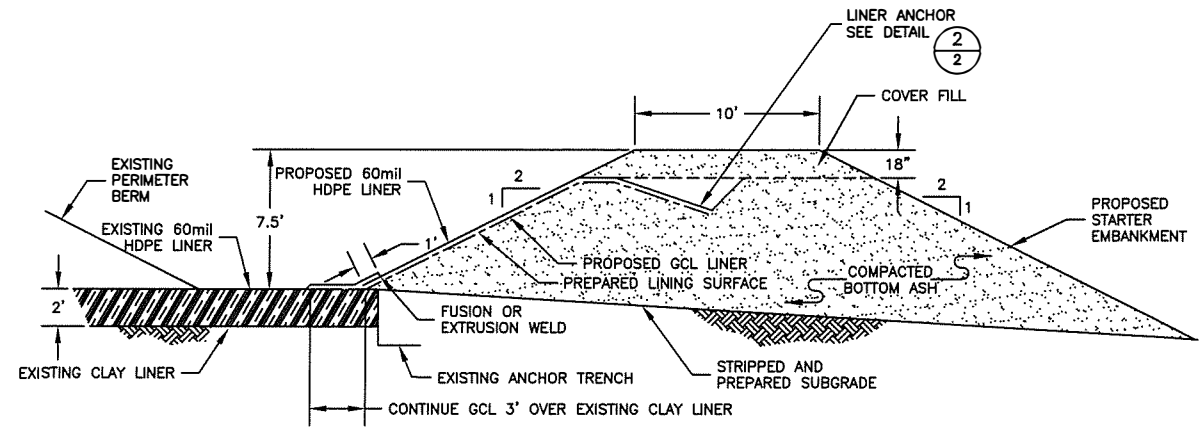
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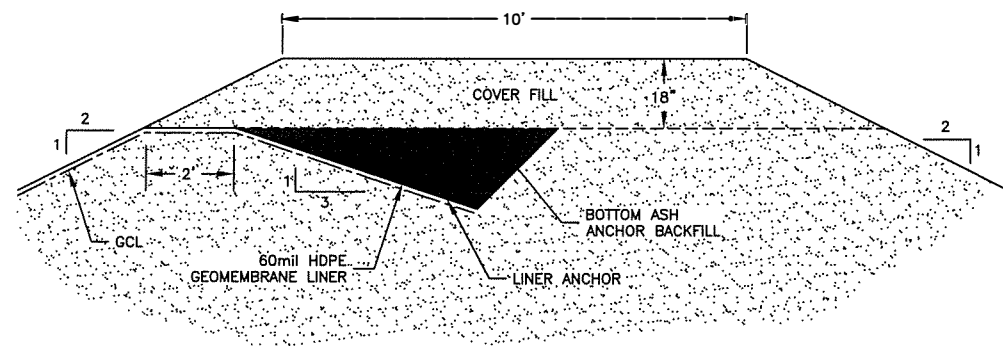
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REVISION

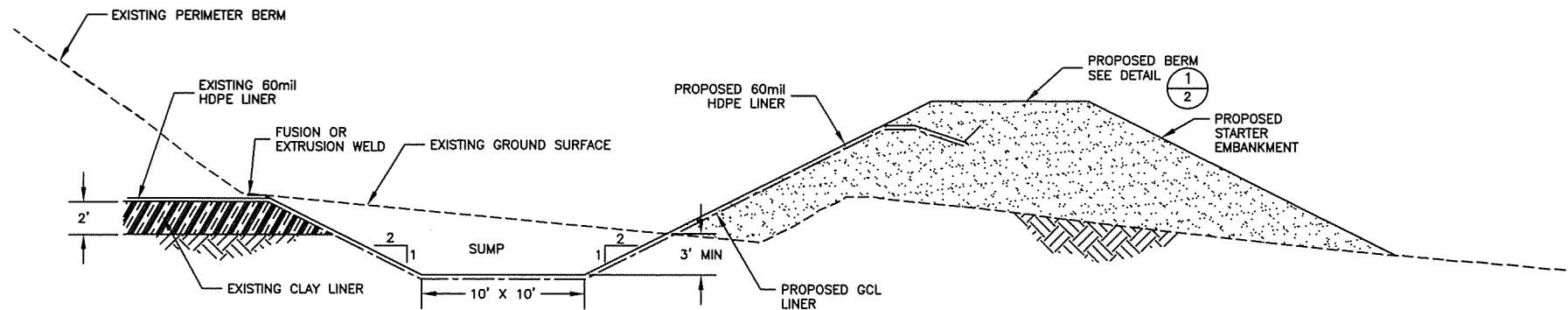
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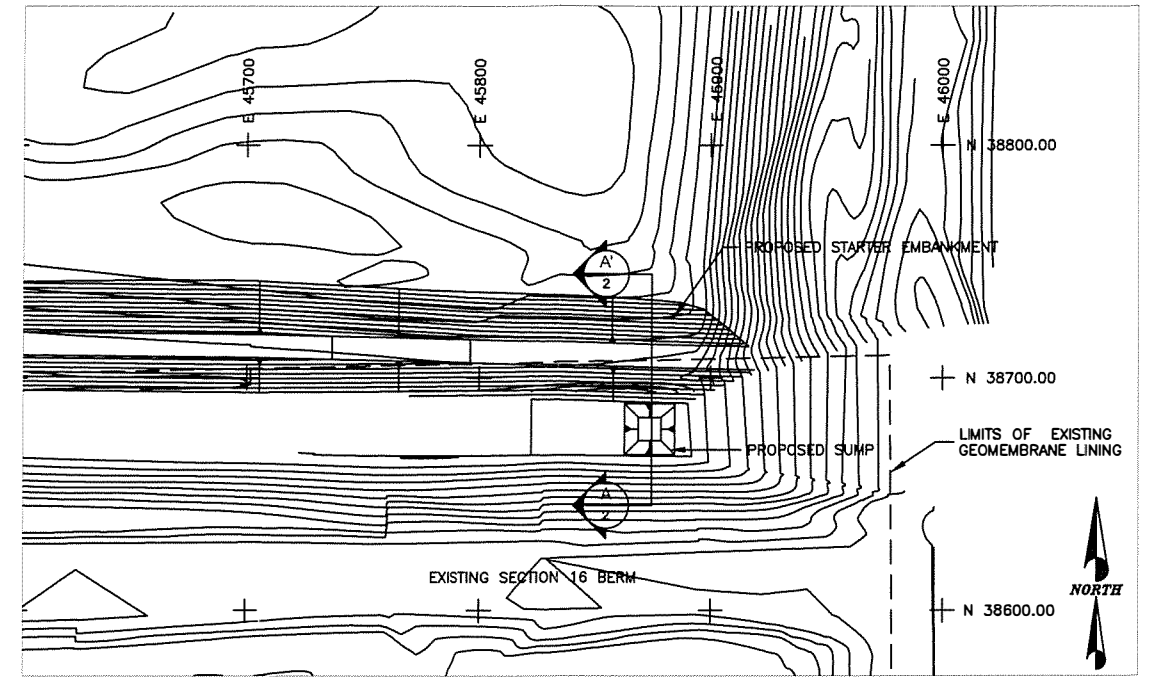
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1" = 10 feet



2 LINER ANCHOR DETAIL
2
N.T.S.



A SECTION A-A'
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1" = 5 feet



SUMP PLAN
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1" = 40 feet

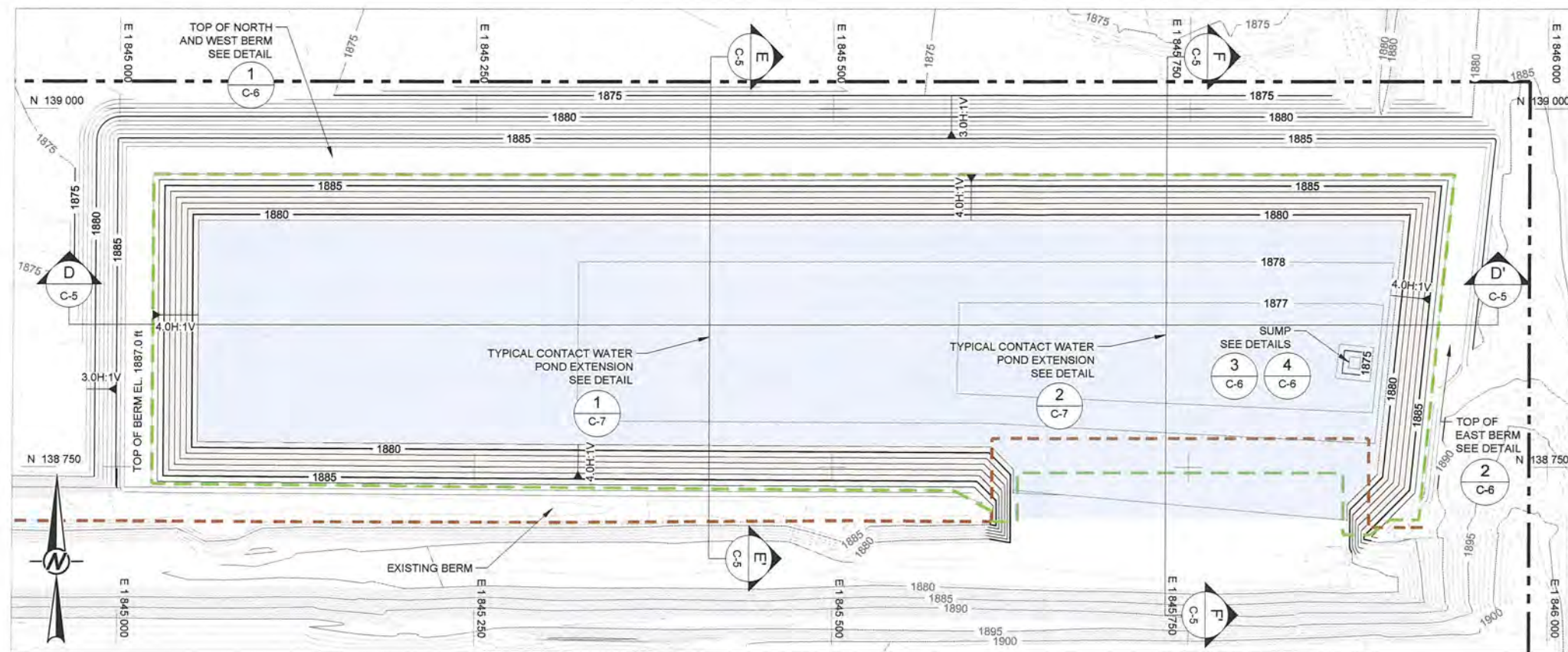
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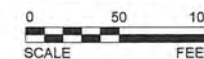
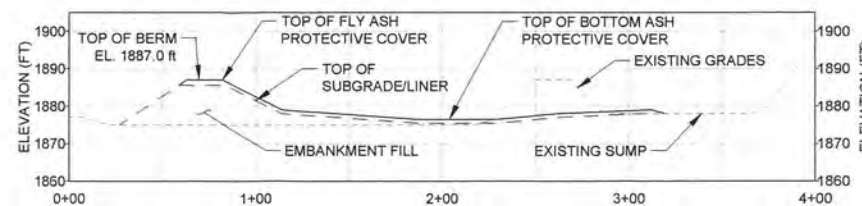
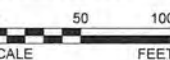
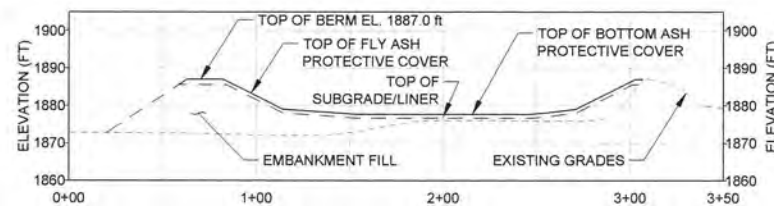
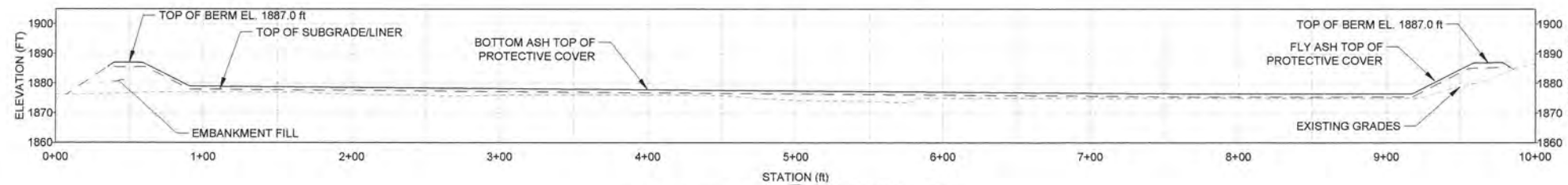
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NOT SCALE 1 INCH THE
DRAWING SCALE IS ALTERED

CLIENT _____ DATE _____

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1	ISSUED FOR CONSTRUCTION	10/23/00				1					
2	ISSUED WITH DESIGN REPORT	10/10/00				2					
3	ISSUED FOR CLIENT REVIEW					3					



1 PLAN VIEW - TOP OF PROTECTIVE COVER



- LEGEND**
- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 2)
 - TOP OF PROTECTIVE COVER OR EMBANKMENT (NOTE 2)
 - FLY ASH PROTECTIVE COVER (NOTE 5)
 - BOTTOM ASH PROTECTIVE COVER (NOTE 5)
 - PERMITTED LIMIT OF CCR FACILITY (NOTE 1)
 - APPROXIMATE EXISTING LINER BOUNDARY
 - APPROXIMATE NEW LINER BOUNDARY

- NOTES**
- THE PERMIT BOUNDARY IS APPROXIMATE.
 - PROPOSED GRADES REPRESENT THE TOP OF PROTECTIVE COVER AND EMBANKMENT.
 - FOUR MONITORING WELLS ARE LOCATED IN A LINE ORIENTED EAST-WEST APPROXIMATELY 200 FEET NORTH OF THE NORTH BOUNDARY OF THE WORK AREA AND A PIEZOMETER IS LOCATED APPROXIMATELY 40 FEET WEST OF THE WORK AREA. EXERCISE CAUTION WHEN WORKING AROUND OR NEAR THE MONITORING WELLS AND PIEZOMETER. CONTRACTOR IS RESPONSIBLE FOR PROTECTING THESE WELLS/PIEZOMETERS DURING CONSTRUCTION ACTIVITIES.
 - A MINIMUM OF 12 INCHES OF PROTECTIVE COVER SHALL BE PLACED OVER THE NEW AND EXISTING GEOMEMBRANE, AS DIRECTED BY OWNER'S REPRESENTATIVE.
 - BOTTOM ASH SHALL BE USED ON THE FLOOR AS PROTECTIVE COVER AND FLY ASH SHALL BE USED ON THE INTERIOR SLOPES AS PROTECTIVE COVER.

- REFERENCE(S)**
- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
 - EXISTING GROUND TOPOGRAPHY WAS PROVIDED BY GREAT RIVER ENERGY. THE SURVEYS WERE PERFORMED BETWEEN 1996 AND 2011.
 - COORDINATES ARE BASED ON THE PLANT GRID SYSTEM.
 - THE CONTOUR INTERVAL IS ONE FOOT.
 - ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

SEAL

CLIENT



GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

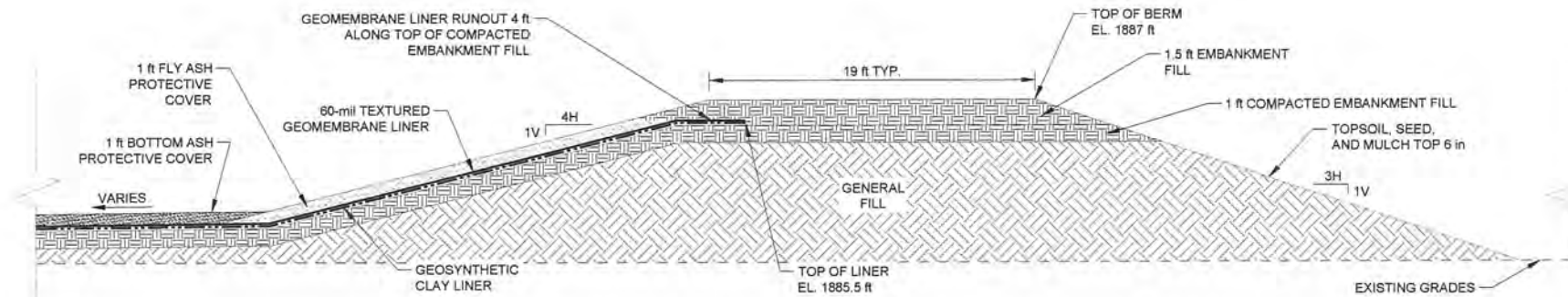
CONSULTANT



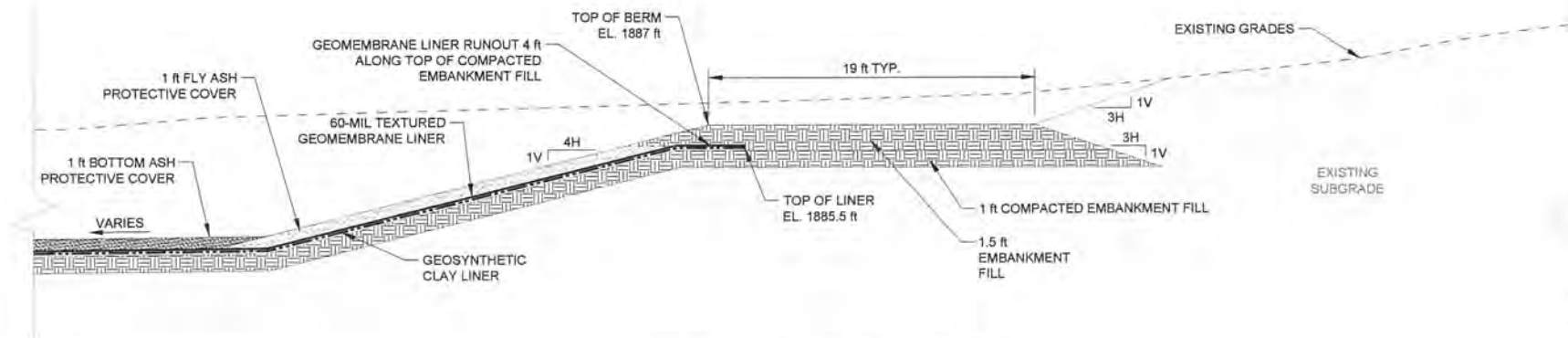
GOLDER ASSOCIATES, INC.
44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK C
SOUTHEAST SECTION 16 CONTACT WATER POND
TITLE
TOP OF PROTECTIVE COVER

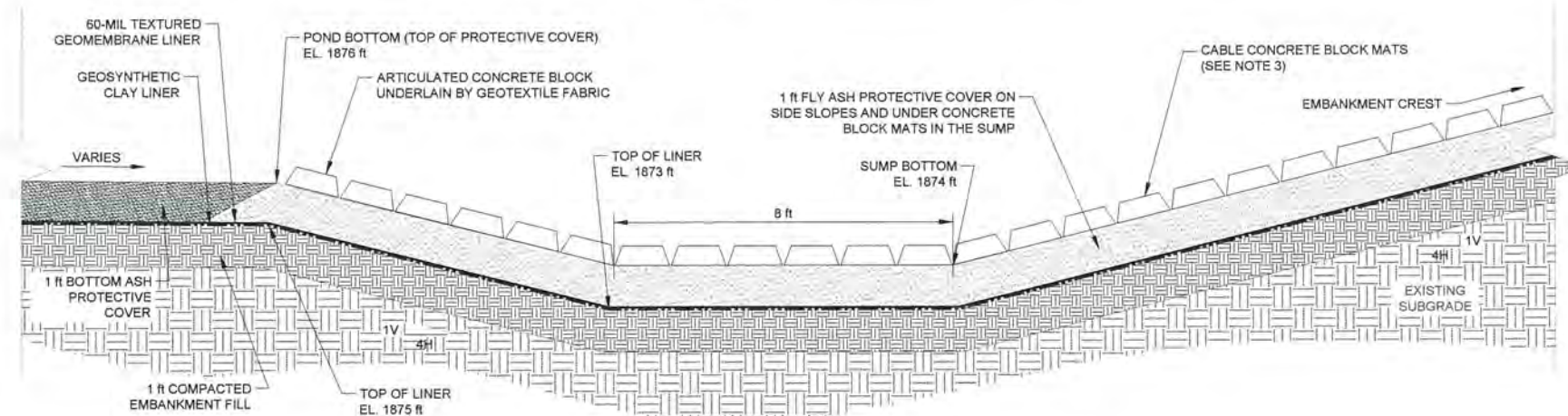
PROJECT No
1523661
Rev
0
C-5 of C-7
DRAWING
C-5



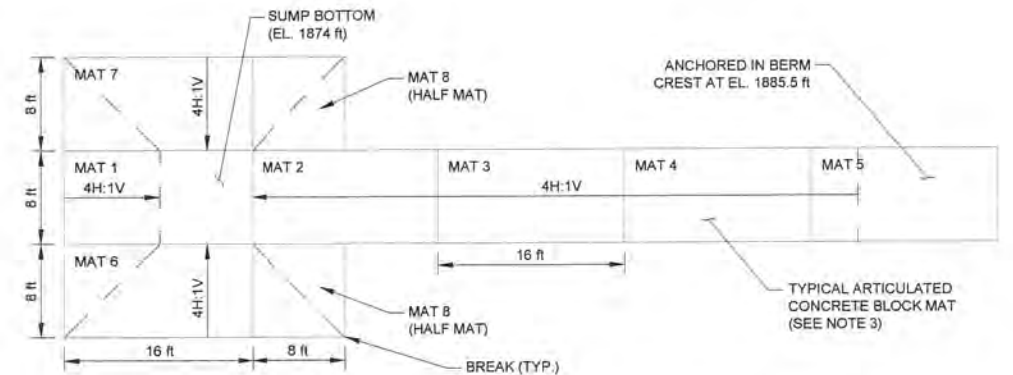
1 TYPICAL BERM DETAIL (NORTH AND WEST BERMS)



2 TYPICAL BERM DETAIL (EAST BERM)



3 POND SUMP DETAIL (PROFILE VIEW)



4 POND SUMP ACB PLACEMENT DETAIL (PLAN VIEW)

NOTES

1. PRIOR TO PLACEMENT OF GENERAL FILL OR EMBANKMENT FILL, UNSUITABLE MATERIAL TO BE REMOVED AND PLACED NORTH OF THE WORK AREA. AREAS AT GRADE SHALL BE SUBCUT TO ALLOW FOR 1-FOOT OF EMBANKMENT PLACEMENT.
2. A MINIMUM OF 12 INCHES OF PROTECTIVE COVER SHALL BE PLACED OVER THE NEW AND EXISTING GEOMEMBRANE, AS DIRECTED BY OWNER'S REPRESENTATIVE.
3. CLOSED CELL CABLE CONCRETE BLOCK MATS SHALL BE PROVIDED IN 8-FOOT BY 16-FOOT SECTIONS (OR APPROVED ALTERNATIVE) TO BE PLACED IN THE POND SUMP BOTTOM AND SLOPES AND UP THE UPSTREAM SLOPE EAST OF THE SUMP TO THE BERM CREST. MATS SHALL BE UNDERLAIN BY GEOTEXTILE FABRIC, 12 INCHES OF PROTECTIVE COVER, AND THE LINER SYSTEM.

SEAL

CLIENT



GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

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USA
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PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK C
SOUTHEAST SECTION 16 CONTACT WATER POND

TITLE
DETAILS 1 OF 2

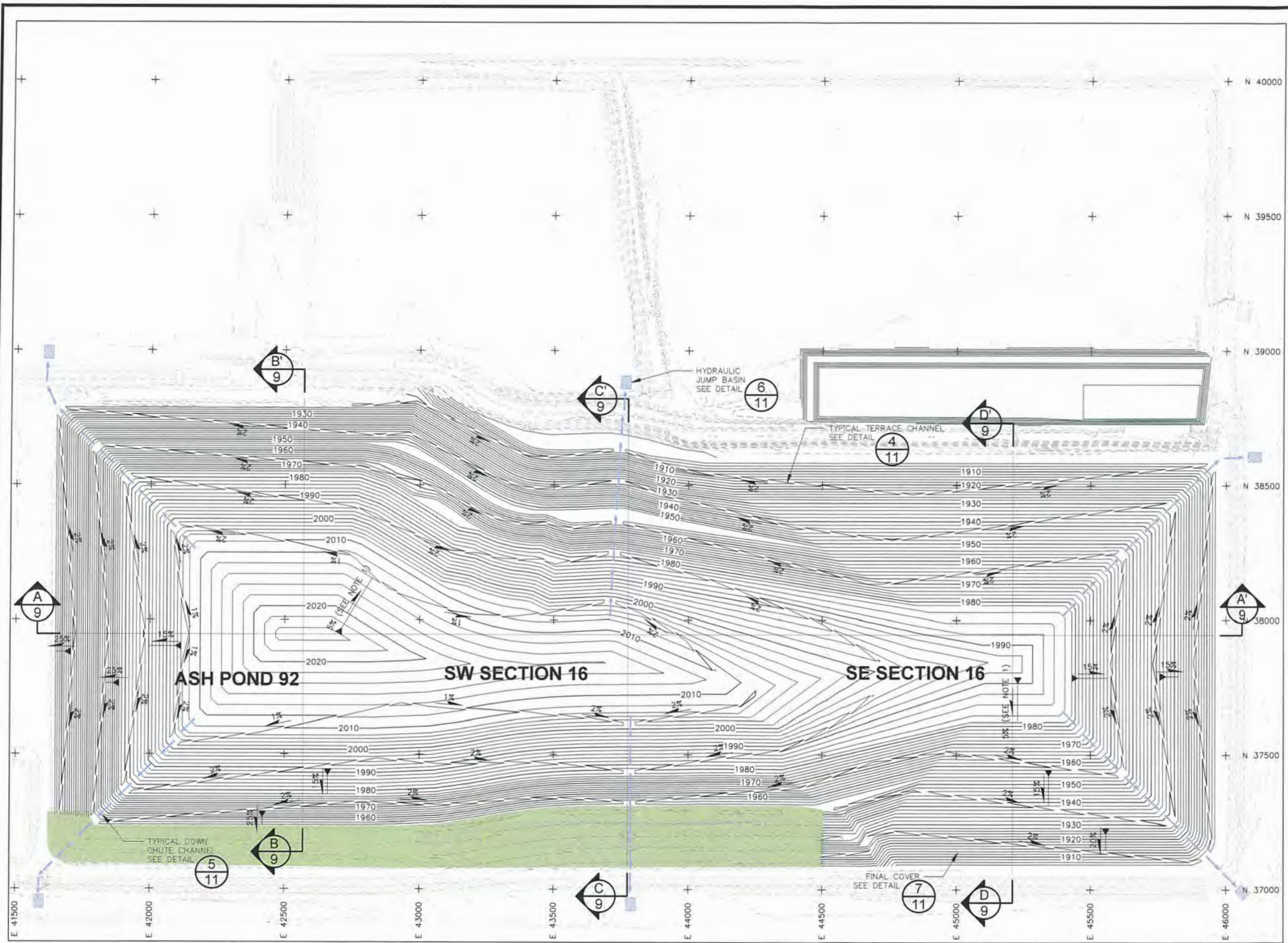
PROJECT No.
1523661

Rev. 0 C-6 of C-7 DRAWING
C-6



Rev.	DATE	DESCRIPTION
0	2015-06-24	ISSUED FOR CONSTRUCTION
A	2015-06-02	ISSUED FOR BID

AMS	AMS	RFS	TJS
AMS	AMS	RFS	TJS
PREPARED	DESIGN	REVIEW	APPROVED



LEGEND

- EXISTING (GROUND) TOPOGRAPHY
- PROPOSED TOP OF COVER TOPOGRAPHY
- FINAL COVER PLACED
- DOWNHOLE/OUTLET CHANNEL

NOTES

1. TOP OF COVER GRADES OF THE CROWN OF THE FACILITY ARE SHOWN AT 5%, BUT MAY BE CONSTRUCTED BETWEEN 3% AND 5%.

2. 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.

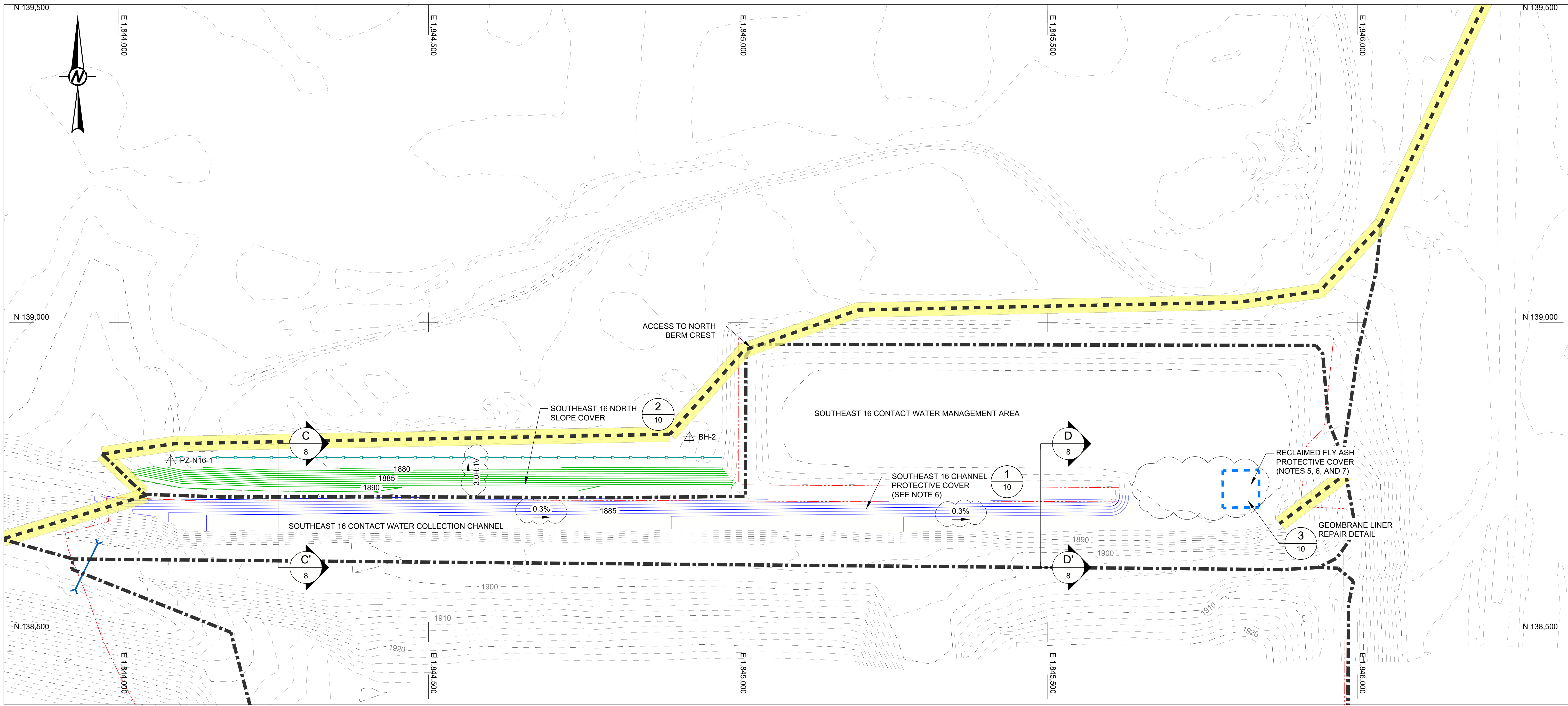


DRAFT
FOR CLIENT REVIEW

ENGINEER'S STAMP		NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
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.								
		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		FINAL COVER GRADES AND SURFACE WATER PLAN	
	FILE No.	11381519A009	
	PROJECT No.	113-81519	
	8		

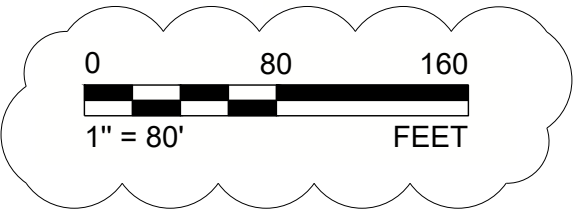
Path: U:\powerdata\great_river_energy\coal_creek\09_projects\2014\272\02_PRODUCTION\DWG\FCG | File Name: 20141272-6.dwg | Last Edited By: kcentik | Date: 2020-09-15 Time: 9:23:05 AM | Printed By: Kcentik | Date: 2020-09-15 Time: 1:02:21 PM



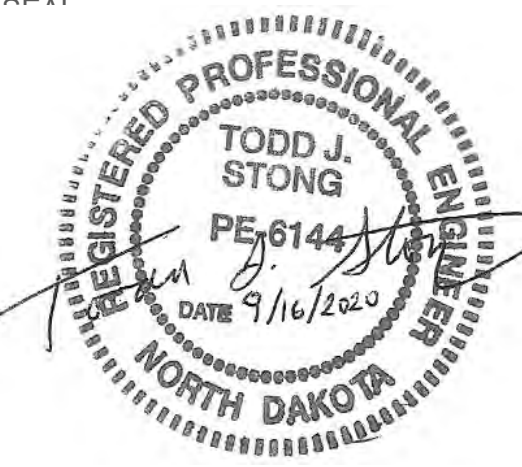
LEGEND	
	EXISTING TOPOGRAPHY
	PROPOSED TOP OF SOIL COVER
	PROPOSED BOTTOM ASH PROTECTIVE COVER
	PIEZOMETER (SEE NOTE 3)
	POTENTIAL ACCESS/HAUL ROUTE
	TEMPORARY ACCESS ROAD (SEE NOTE 1)
	EXISTING LINER EXTENTS (SEE NOTE 4)
	SILT FENCE EROSION CONTROL
	WATER BENEATH EXPOSED GEOMEMBRANE LINER (SEE NOTE 5 AND 7)
	EXISTING CONCRETE CULVERT

- NOTE(S)**
- CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING ANY TEMPORARY ROADS OR RAMPS AND FOR WORKING WITH THE OWNER TO PROVIDE ADEQUATE SAFETY FEATURES (SIGNAGE, BERMS, BARRIERS, ETC.) APPROVED BY THE OWNER FOR POTENTIAL INTERSECTIONS WITH EXISTING HAUL ROADS. TEMPORARY ROADS FOR SITE ACCESS AND STOCKPILE ACCESS TO BE APPROVED BY OWNER'S REPRESENTATIVE. CARE SHALL BE TAKEN WHILE EQUIPMENT IS OPERATING NEAR THE EXPOSED LINER.
 - MONITORING WELL/PIEZOMETERS ARE LOCATED NORTH OF THE SOUTHEAST 16 LANDFILL AND WEST OF THE SOUTHEAST 16 CONTACT WATER POND. CARE SHALL BE TAKEN WHEN WORKING NEAR OR AROUND THESE PIEZOMETERS.
 - THE EXTENTS OF THE EXISTING LINER ARE APPROXIMATE AND ARE BASED ON AS-BUILT INFORMATION OR SITE OBSERVATIONS.
 - GEOMEMBRANE LINER ON THE FLOOR OF THE SOUTHEAST 16 CONTACT WATER COLLECTION CHANNEL IS TO BE CUT OPEN TO ALLOW DRAINAGE OF CONTACT WATER FROM BENEATH THE LINER AND REPAIRED OF ALL DEFECTS BY EXTRUSION WELDING.
 - EXPOSED GEOMEMBRANE SHALL BE INSPECTED BY OWNER AND ANY IDENTIFIED DEFECTS SHALL BE REPAIRED (EXTRUSION WELDING) BY CONTRACTOR PRIOR TO PLACEMENT OF BOTTOM ASH AND RECLAIMED FLY ASH PROTECTIVE COVER STOCKPILED WITHIN THE SOUTEAST SECTION 16 LANDFILL AREA BY THE OWNER.
 - THE AREA OF EXPOSED GEOMEMBRANE LINER SHALL BE COVERED BY APPROXIMATELY 2 FEET OF RECLAIMED FLY ASH PROTECTIVE COVER AS DIRECTED BY OWNER'S REPRESENTATIVE (DO NOT RESTRICT FLOW FROM THE SOUTHEAST 16 CONTACT WATER COLLECTION CHANNEL TO THE SOUTHEAST 16 CONTACT WATER MANAGEMENT AREA).

- REFERENCE(S)**
- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
 - AERIAL IMAGERY FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, TAKEN 2018.
 - CONTOUR INTERVAL IS 2 FEET.
 - TOP OF SOIL PROTECTIVE COVER AND BOTTOM ASH PROTECTIVE COVER GRADES CONTOUR INTERVAL IS 1 FOOT.



REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
0	2020-09-16	ISSUED FOR CONSTRUCTION	KAC	AGD	CCS	TJS
C	2020-08-06	ISSUED FOR BID	KAC	KAC	CCS	TJS
B	2020-07-31	REVISED ISSUED FOR CLIENT REVIEW	KAC	KAC	CCS	TJS
A	2020-07-23	ISSUED FOR CLIENT REVIEW	KAC	KAC	CCS	TJS



CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA 58576

CONSULTANT



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USA
[+1](303)-980-0540
www.golder.com

PROJECT
2020 PARTIAL FINAL COVER
UPSTREAM RAISE 92

TITLE
PROPOSED SOUTHEAST 16 CONTACT WATER CHANNEL

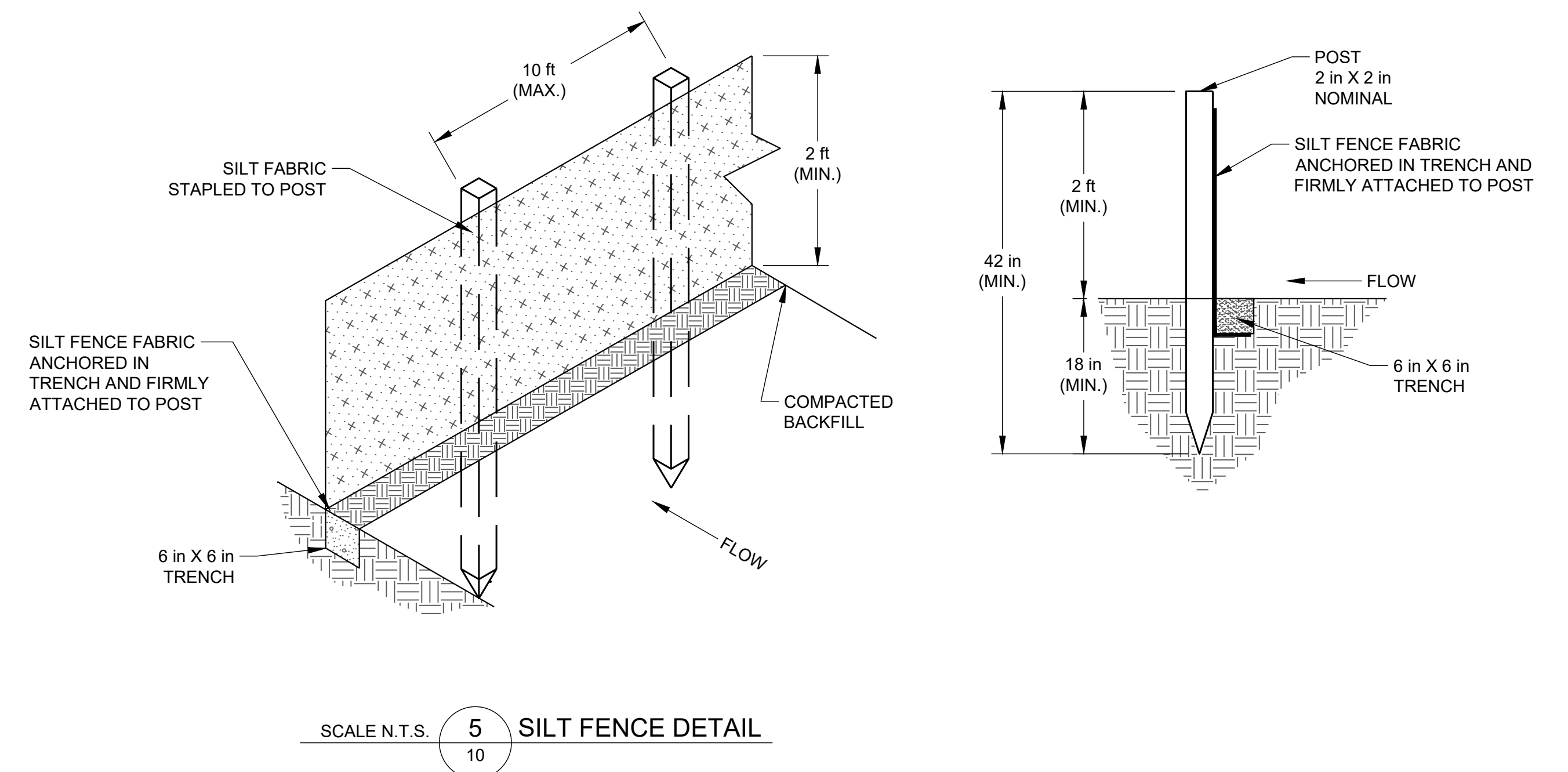
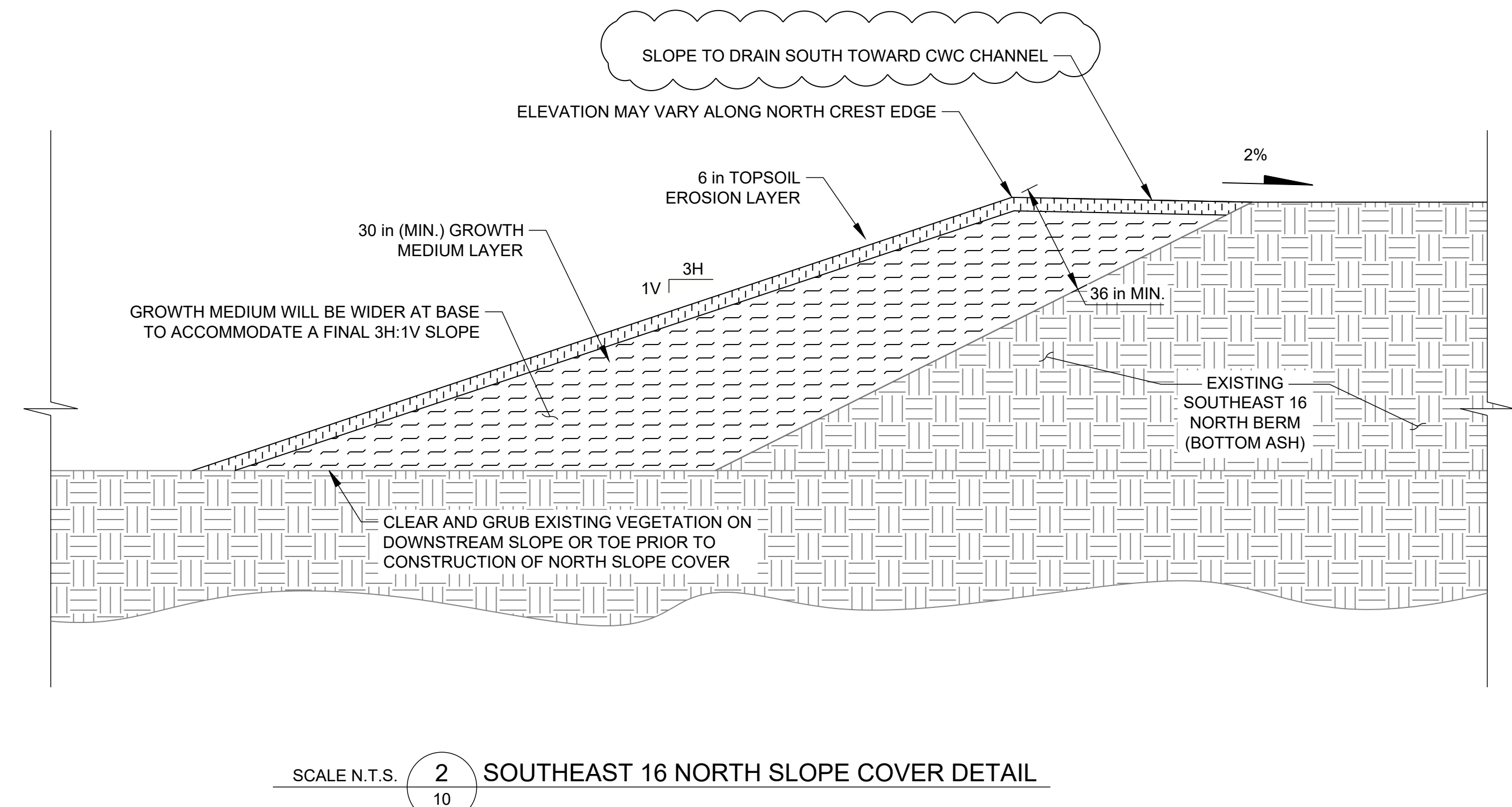
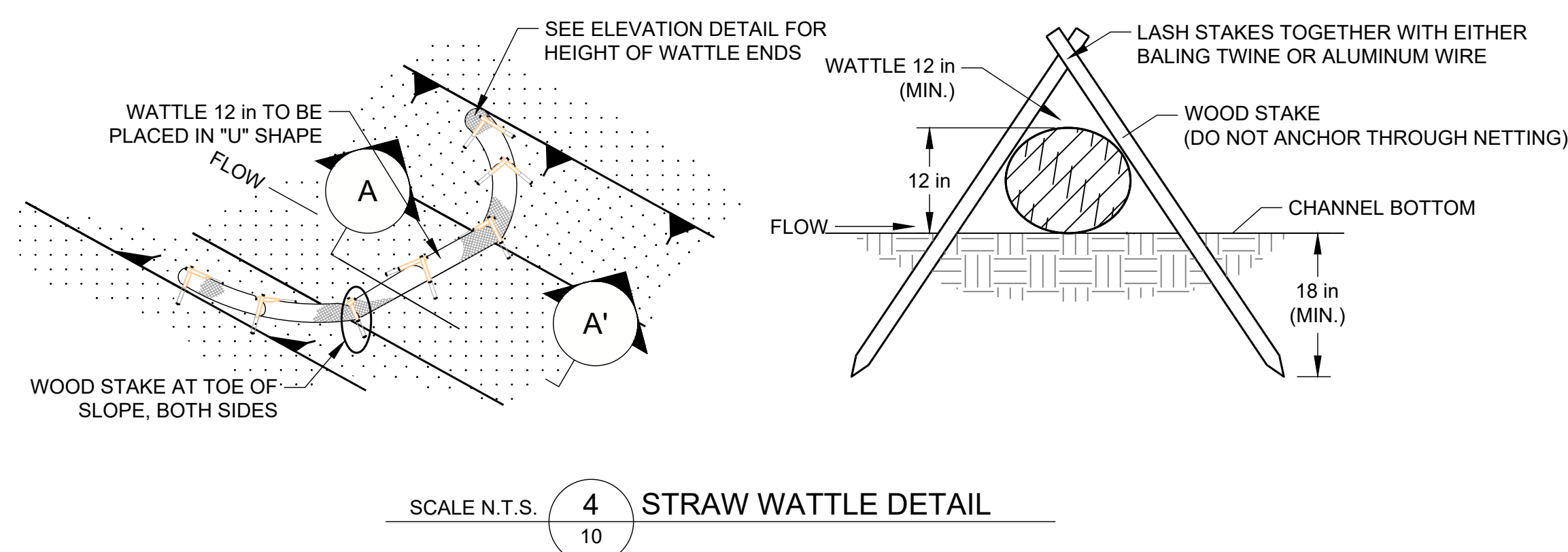
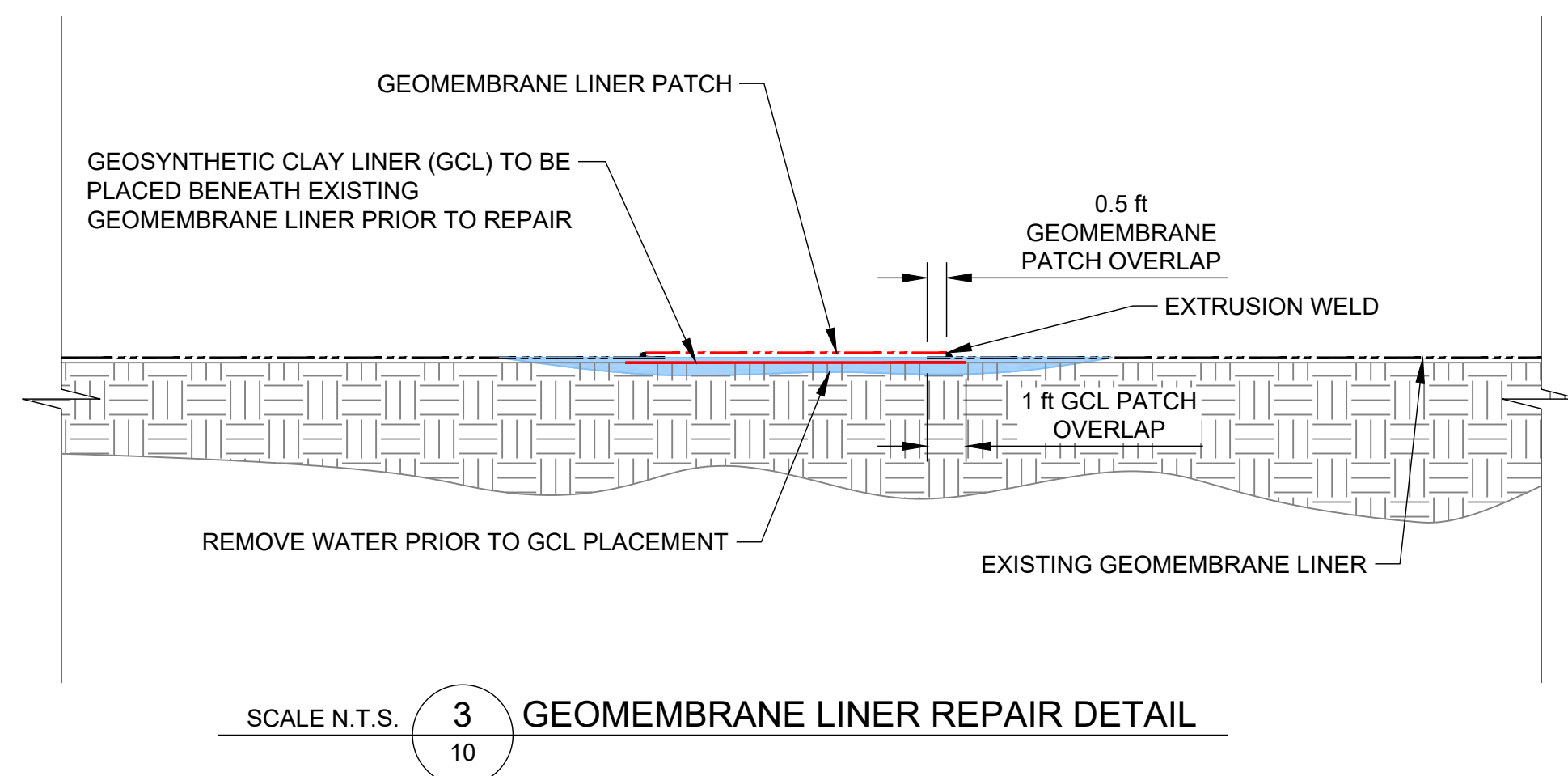
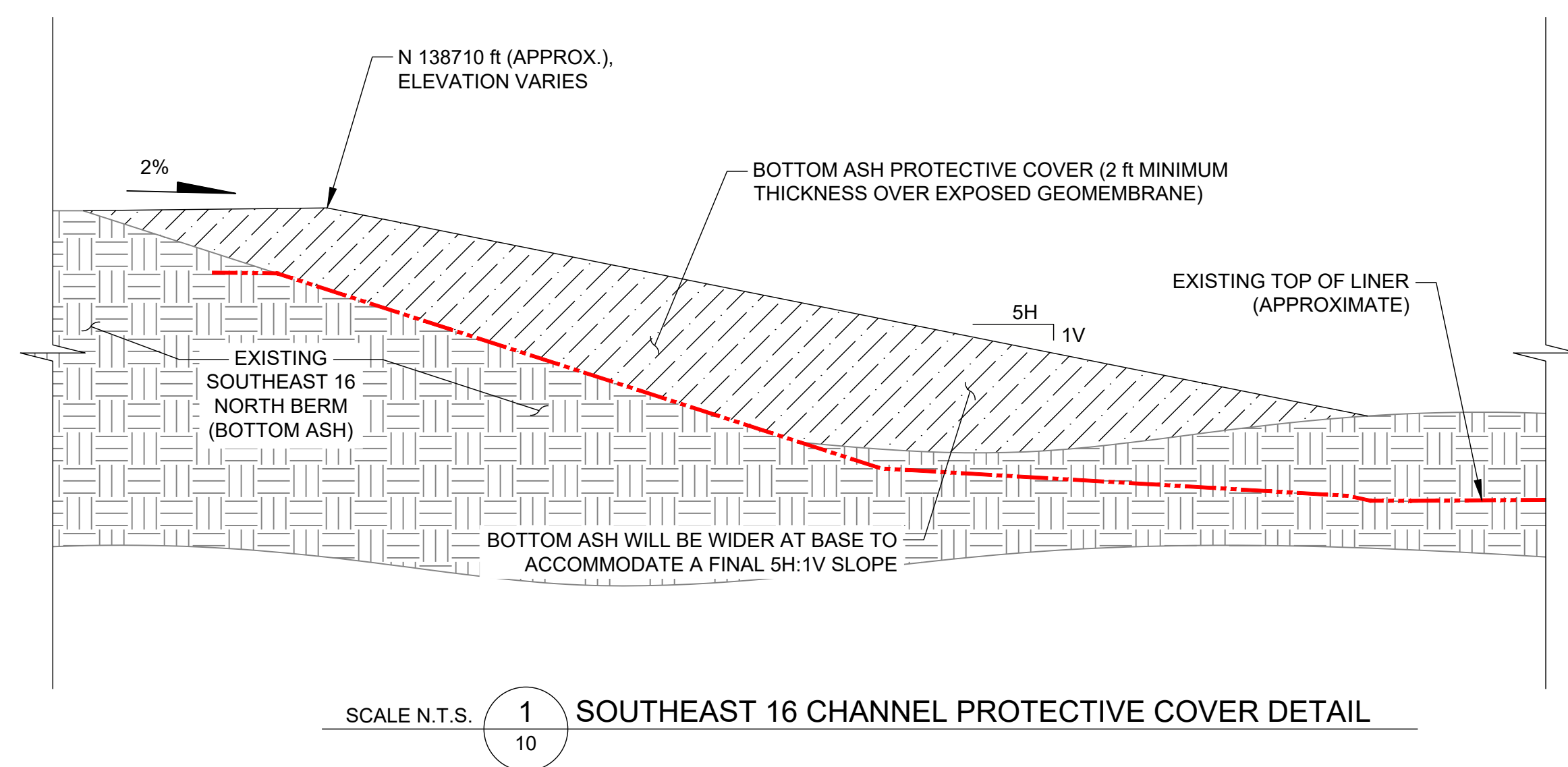
PROJECT NO.
20141272

REV.
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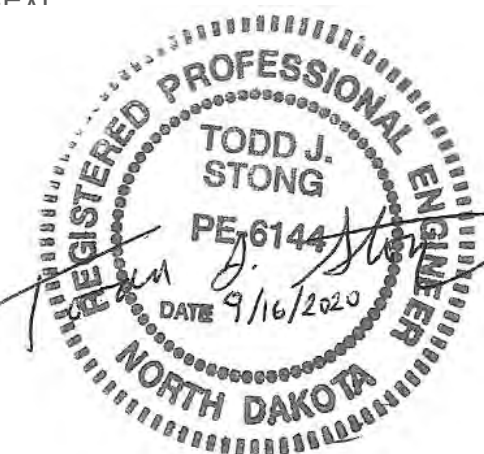
7 of 10

DRAWING
7

1" IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI D



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C	2020-08-06	ISSUED FOR BID	KAC	KAC	CCS	TJS
B	2020-07-31	REVISED ISSUED FOR CLIENT REVIEW	KAC	KAC	CCS	TJS
A	2020-07-23	ISSUED FOR CLIENT REVIEW	KAC	KAC	CCS	TJS
REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED



CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA 58576

CONSULTANT



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[+1](303)-980-0540
www.golder.com

PROJECT
2020 PARTIAL FINAL COVER
UPSTREAM RAISE 92

TITLE
DETAILS 2

PROJECT NO.
20141272

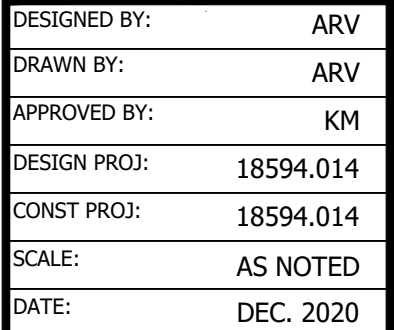
REV. 10 of 10
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DRAWING
10

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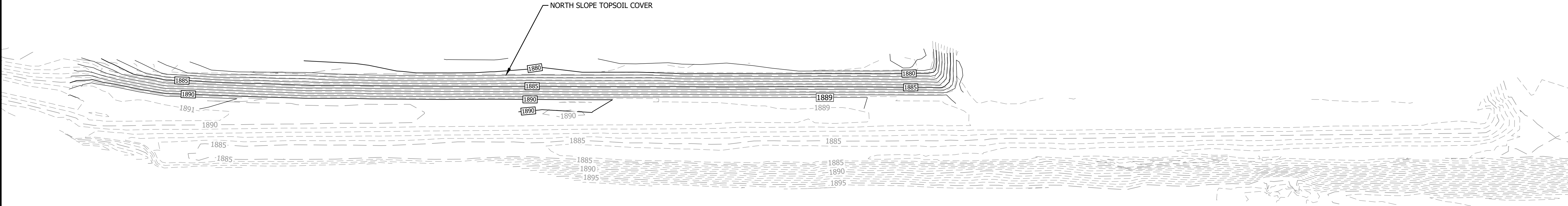
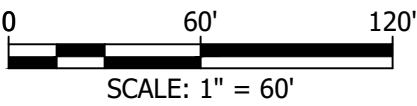
**SE16 NORTH SLOPE GROWTH MEDIUM
AND CONTACT WATER COLLECTION
CHANNEL PROTECTIVE COVER AS-BUILT**



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Last edit on: 12/16/2020 3:22 PM by: ARV01064 Drawing Name: F:\Proj\180001\18594\18594.014\AutoCad\Plan Set\18594.014 SE16 Topsoil Cover 10-17-2020.dwg Layout Name: SE16 TOPSOIL Plotted By: ARV01064 Plotted on: 12/16/2020 4:36:24 PM

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.



BARTLETT & WEST, INC. CERTIFIES THAT THE FINAL COVER OF GROWTH MEDIUM AND TOPSOIL THICKNESS MEET THE REQUIRED MINIMUM 36" COVER, AS STATED IN THE PROJECT SPECIFICATIONS

QUANTITIES	
ITEM	QUANTITY
TOPSOIL COVER	1,016 CY

Bartlett & West

3456 E CENTURY AVENUE - BISMARCK ND 58503
PHONE 701.258.1110 - FAX 701.258.1111
WWW.BARTLETTWEST.COM

SE16 NORTH SLOPE TOPSOIL AS-BUILT

NORTHERN IMPROVEMENT CO.
2020 PARTIAL FINAL COVER UPSTREAM RAISE 92
GREAT RIVER ENERGY, COAL CREEK STATION



DESIGNED BY:	ARV
DRAWN BY:	ARV
APPROVED BY:	KM
DESIGN PROJ:	18594.014
CONST PROJ:	18594.014
SCALE:	AS NOTED
DATE:	DEC. 2020

DRAWING NO: **C02**

SHEET NO: 2 of 6

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APPENDIX B

Visual Observation Checklist

INSPECTION CHECKLIST

Facility Name: Southeast Section 16 Landfill		
Owner and Address: Great River Energy – Coal Creek Station		
Purpose of Facility: CCR Storage and Disposal		
Legal: Section 16	Township: 145N	Range: 82W
County: McLean		
Inspected By: Craig Schuettpelz		Inspection Date: September 1, 2021
Weather: Partly cloudy, windy, 74°F		

ITEM	Y	N	N/A	REMARKS
1. Contact Water Controls				
a. Water level in contact water control area	X			Depth: 1.0 feet.
b. Sump & pump in good condition	X			
c. Containment controls working	X			
d. Ponding water outside of control area		X		
e. Erosion protection in control area	X			Minor erosion of fly ash and bottom ash protective cover layers. Small area of geomembrane exposed on floor of contact water collection area.
2. CCR Placement – Downstream Slope (no cover)				
a. Significant erosion		X		Minor erosion on north downstream slopes and CCR slope.
b. Cracking/settlement		X		
c. Seepage		X		
3. CCR Placement – Downstream Slope (with cover)				
a. Erosion/liner exposed	X			Minor erosion of temporary cover.
b. Rodent burrows	X			Small burrows in temporary cover.
c. Vegetation	X			Minor lack of vegetation on top of terrace channels.
d. Cracks/settlement/seepage/sloughing		X		Minor crack in temporary cover.
4. Perimeter Berm – Upstream slope				
a. Erosion (exposed liner)		X		
b. Vegetation		X		
c. Rodent burrows		X		
d. Seepage/sloughing/cracking/settlement		X		
5. Perimeter Berm – Crest				
a. Surfacing/Soil conditions	X			Gravel surfaced.
b. Comparable to design width	X			
c. Vegetation		X		
d. Rodent Burrows		X		
e. Exposed to heavy traffic		X		
f. Damage from vehicles/machinery	X			Minor rutting and erosion of ramp (southeast corner).
6. Perimeter Berm – Downstream Slope				
a. Erosion		X		Minor erosion on north slope.
b. Vegetation	X			Weedy vegetation on the north perimeter berm.
c. Rodent burrows	X			Small burrows.
d. Seepage/sloughing/cracking/settlement		X		
7. Perimeter Berm – Toe				
a. Erosion		X		
b. Vegetation	X			
c. Rodent burrows		X		
d. Seepage/sloughing/cracking/settlement		X		
e. Drainage conditions	X			

General Remarks: Generally good condition with limited maintenance required, such as filling in animal burrows, repairing erosion of CCR slopes and temporary cover, adding protective cover in the contact water collection area to cover the exposed liner, maintaining gravel roads, and re-seeding areas where final cover vegetation is sparse.

Name of Engineer (Engineer Firm):

Craig Schuettpelz, PE (Golder Associates USA Inc.)

Date: 09/01/2021

Signature:



APPENDIX C

Photographs



LEGEND



PHOTOGRAPH ID AND LOCATION

NOTE(S)

1. FOREGROUND AERIAL IMAGES FROM GREAT RIVER ENERGY, TAKEN IN 2021.
2. BACKGROUND AERIAL IMAGE FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURE AERIAL IMAGERY PROGRAM, TAKEN IN 2020.

**GREAT RIVER ENERGY - COAL CREEK STATION
2021 ANNUAL CCR FACILITY INSPECTION REPORT
SOUTHEAST 16 - PHOTOGRAPH LOCATIONS**

Southeast Section 16



Photograph 1 (Southeast perimeter, downchute)
Looking upslope, articulated concrete block in good condition. (IMGP7987.JPG)



Photograph 2 (Southeast perimeter downstream slope)
Small animal burrow. (IMGP7988.JPG)

Southeast Section 16



Photograph 3 (East CCR downstream slope with final cover)
East side of final cover slope, good condition. (IMGP7990.JPG)



Photograph 4 (East CCR downstream slope and crest)
Contact water separation berm in good condition. Wind blown ash on temporary cover slopes. (IMGP7992.JPG)

Southeast Section 16



Photograph 5 (Southeast 16 from east)
Active deposition area of Southeast 16, good condition. (IMG7999.JPG)



Photograph 6 (East perimeter access road)
Perimeter berm gravel road, good condition. (IMG8002.JPG)

Southeast Section 16



Photograph 7 (East CCR downstream slope, temporary cover)

Minor crack in temporary cover slope, fair vegetation on temporary cover downstream slope. (IMGP8003.JPG)



Photograph 8 (Contact water collection area)

Contact water collection area and sump, protection cover good condition. (IMGP8008.JPG)

Southeast Section 16



Photograph 9 (Contact water collection area)

Minor area of exposed geomembrane in contact water collection area, near articulated concrete block reinforcement. (IMGP8010.JPG)



Photograph 10 (North perimeter downstream slope)

Contact water collection area downstream slope, fair vegetation, mostly weeds. (IMGP8015.JPG)

Southeast Section 16



Photograph 11 (North perimeter downstream slope)
Minor erosion of the bottom ash upstream slope, no liner visible (typical of approximately 5 locations on north perimeter berm upstream slope). (IMGP8019.JPG)



Photograph 12 (North CCR downstream slope)
Culvert outlet to contact water collection area, armoring in good condition. (IMGP8021.JPG)

Southeast Section 16



Photograph 13 (North CCR downstream slope)
Minor erosion on slope reinforced with fly ash, fair condition. (IMGP8025.JPG)



Photograph 14 (Southeast 16 from north)
Active deposition area of Southeast 16 and culvert to north, good condition. (IMGP8027.JPG)

Southeast Section 16



Photograph 15 (Southeast 16 interior haul road)
Haul road to CCR and C&D disposal location in good condition. (IMGP8029.JPG)



Photograph 16 (Southeast 16 from north)
Minor erosion of fly ash at historic entrance to C&D disposal area. (IMGP8031.JPG)

Southeast Section 16



Photograph 17 (South CCR downstream slope and crest)
Contact water separation berm and temporary cover in good condition. (IMGP8036.JPG)



Photograph 18 (South perimeter downstream slope and toe)
Well vegetated original toe drain and drainage channel along toe. (IMGP8040.JPG)



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