



Closure Plan

J.H. CAMPBELL GENERATING FACILITY

DRY ASH LANDFILL CLOSURE PLAN

West Olive, Michigan

Pursuant to 40 CFR 257.102

Submitted To: Consumers Energy Company
1945 W. Parnall Road
Jackson, Michigan 49201

Submitted By: Golder Associates Inc.
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Lansing, Michigan 48906

October 2016

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CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.102(b)(4)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section 257.102 (40 CFR Part 257.102), I attest that this Closure Plan is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.102.

Golder Associates Inc.

Signature: Jeffrey R. Piaskowski

October 14, 2016
Date of Report Certification

Jeffrey R. Piaskowski, PE
Name

6201061033
Professional Engineer Certification Number





Table of Contents

CERTIFICATION..... C-1
Professional Engineer Certification Statement [40 CFR 257.102(b)(4)]..... C-1

1.0 INTRODUCTION..... 1

2.0 NARRATIVE DESCRIPTION [40 CFR 257.102(b)(1)(i-v)] 2

2.1 Dry Ash Landfill CCR Quantity [40 CFR 257.102(b)(1)(iv)] 2

2.2 Dry Ash Landfill Final Cover Area [40 CFR 257.102(b)(1)(v)] 2

2.3 Closure Construction Sequence [40 CFR 257.102(b)(1)(i,iii) and 40 CFR 257.102(d)(1)]..... 2

2.3.1 Final Cover System Design and Performance [40 CFR 257.102(b)(1)(iii) and 40 CFR 257.102(d)(3)] 2

2.3.2 Final Cover Construction [40 CFR 257.102(b)(1)(i)]..... 3

3.0 SCHEDULE [40 CFR 257.102(b)(1)(vi)] 4

3.1 Introduction..... 4

3.2 Closure Construction Schedule..... 4

3.3 Closure Deadline Extension [40 CFR 257.102(f)(2)] 5

4.0 REFERENCES..... 6

List of Tables

Table 1.0.1 Summary of Previous Closure Phases

Table 2.1.1 Dry Ash Landfill Estimated CCR Quantity

Table 3.2.1 Closure Schedule Production Estimate

Table 3.2.2 Conceptual Final Cover Construction Schedule Milestones

List of Appendices

Appendix A Landfill Closure Grading Plan



1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) (“CCR RCRA Rule”) to regulate the beneficial use and disposal of CCR materials generated at coal-fired electrical power generating complexes. In accordance with the CCR RCRA Rule, any CCR surface impoundment or CCR landfill that was actively receiving CCRs on the effective date of the CCR RCRA Rule (October 19, 2015) was deemed to be an “Existing CCR Unit” on that date and subject to self-implementing compliance standards and schedules. Consumers Energy Company (CEC) currently operates the Dry Ash Landfill CCR unit (Dry Ash Landfill) at the J.H. Campbell Generating Facility (JH Campbell). JH Campbell is located in West Olive, Michigan as presented on Sheet 1 – Title Sheet in Appendix A – Landfill Closure Grading Plan.

The Dry Ash Landfill was permitted as a Type III landfill by the Michigan Department of Natural Resources (MDNR) in 1993 and is licensed under State of Michigan Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 115). Construction began in 1997 and, to date, four cells (Cells 1 through 4) have been constructed. CCR is currently being placed in Cells 3 and 4. Cells 5 through 7 will be constructed in the future. Cells 1 and 2 and areas of Cell 3 have been closed in five closure phases occurring from 2006 through 2014 as summarized in Table 1.0.1 – Summary of Previous Closure Phases.

Table 1.0.1 – Summary of Previous Closure Phases

Phase	Year Completed	Areas Closed
Closure Phase I	2006	Northern area of Cells 1 and 2
Closure Phase II	2007	Southeast area of Cell 2 and northeast area of Cell 3
Closure Phase III	2009	East and southeast area of Cell 3
Closure Phase IV	2012	Southeast area of Cell 2 and central northeast area of Cell 3
Closure Phase V	2014	Southern area of Cell 2

This written closure plan is being generated pursuant to 40 CFR 257.102(a) and describes the steps necessary to close the JH Campbell Dry Ash Landfill consistent with recognized and generally accepted good engineering practices. This closure plan is being prepared with the assumption that the Dry Ash Landfill will not receive waste beyond December 31, 2040 when JH Campbell is estimated to be closed and decommissioned.



2.0 NARRATIVE DESCRIPTION [40 CFR 257.102(b)(1)(i,iii-v)]

The Dry Ash Landfill will be closed with CCR in place and capped with a final cover system. Design grades will be reached with construction of a 2.5-foot-thick final cover system designed with a minimum two percent slope to meet performance standard requirements per 40 CFR 257.102(d)(3)(ii). Details of the closure construction are provided in the following sections.

2.1 Dry Ash Landfill CCR Quantity [40 CFR 257.102(b)(1)(iv)]

The current Dry Ash Landfill total permitted landfill air space is 9,380,000 cy which, if fully utilized, may equal the maximum inventory of CCR ever on site over the life of the CCR unit.

2.2 Dry Ash Landfill Final Cover Area [40 CFR 257.102(b)(1)(v)]

For closure planning purposes as described in Section 3.2, the largest area of the CCR unit ever requiring a final cover would be 40 acres.

2.3 Closure Construction Sequence [40 CFR 257.102(b)(1)(i,iii) and 40 CFR 257.102(d)(1)]

The remaining active areas of the Dry Ash Landfill will continue to be closed in phases. Once an area has reached planned final grade, it will be closed with CCR in place and capped with a final cover system. Design and construction of the final cover system are discussed in the following sections.

2.3.1 Final Cover System Design and Performance [40 CFR 257.102(b)(1)(iii) and 40 CFR 257.102(d)(3)]

The final cover system will be 2.5-feet-thick and consist of a 40 mil linear low-density polyethylene (LLDPE) textured geomembrane (infiltration layer) overlain with an eight ounce per square yard nonwoven geotextile cushion. The geotextile cushion will be overlain with a two-foot-thick layer of fine to medium grained, well sorted sand (protective cover). The protective cover will be overlain with a six-inch-thick erosion layer. The erosion layer consists of topsoil, seed, fertilizer, and mulch in accordance with Michigan Department of Transportation (MDOT) Standard Specification 816 – Turf Establishment. Typical details of the final cover system are provided on Sheet 5 – Details in Appendix A.

Together, the final cover system is designed to:

- Provide a final cover permeability less than 1.0×10^{-5} centimeter per second (cm/sec)
- Control contaminated runoff
- Minimize the need for maintenance
- Control, minimize, or eliminate post-closure infiltration of liquids
- Minimize releases of CCR and leachate into ground and surface waters or the atmosphere
- Prevent the sloughing or movement of the liner



The system is designed with a minimum two percent slope on the top deck and 4H:1V side slopes with diversion berms to:

- Prevent/limit the future impoundment of water, sediment, and slurry
- Minimize erosion
- Prevent/control the release of waste
- Limit the effects of settlement/subsidence

2.3.2 Final Cover Construction [40 CFR 257.102(b)(1)(i)]

The Dry Ash Landfill will be filled to permitted grade with CCR as presented on Sheet 2 – Top of Ash in Appendix A. Once CCR has been placed to design grades, the final cover system described in Section 2.3.1 will be constructed and tested to confirm it meets the requirements of the designed final cover.



3.0 SCHEDULE [40 CFR 257.102(b)(1)(vi)]

3.1 Introduction

This Closure Plan was prepared assuming the Dry Ash Landfill at JH Campbell will continue to receive CCR through 2040 when the generating facility has been closed and decommissioned. In order to close the Dry Ash Landfill during a typical summer construction season and within the six month timeframe required by 40 CFR 257.102(f)(1)(i), it is assumed for the purpose of this closure plan, that the Dry Ash Landfill will receive its final receipt of waste on April 1, 2040 and initiate closure of remaining unclosed areas by May 1, 2040.

Additionally, it is assumed that active areas of the Dry Ash Landfill will continue to be closed sequentially as they reach permitted grades and that a maximum area of 40 acres will remain to be covered at final closure. In accordance with 40 CFR 257.102(f)(1)(i) and Part 115 R 299.4317, the closure activities are expected to be completed within six months of the notification for intent to initiate closure.

3.2 Closure Construction Schedule

The closure construction schedule is developed assuming that the last active portion of the Dry Ash Landfill will not be in excess of 40 acres. Table 3.2.1 – Closure Schedule Production Estimate indicates that 40 acres could be effectively closed within six months as required by 40 CFR 257.102(f)(1)(i).

Table 3.2.1 – Closure Schedule Production Estimate

Closure Component	Quantity	Units	Construction Rate	Rate Units	Required Time in Days
40-mil LLDPE geomembrane (infiltration layer)	1,750,000	square feet	45,000	square feet per day	39
24-inch-thick sand layer (protective cover)	130,000	cubic yards	5,000	cubic yards per day	26
6-inch-thick topsoil (erosion layer)	32,500	cubic yards	5,000	cubic yards per day	7
Seed, fertilizer, mulch (erosion layer)	1,750,000	square feet	300,000	square feet per day	5
Workdays Required =					77

It is anticipated that closure construction will begin on or before May 1, 2040 in order to comply with the closure schedule. Conservatively assuming a start to finish construction schedule, the final cover construction will take approximately 16 weeks. Using these assumptions results in completion of the final cover construction on August 19, 2040. Table 3.2.2 – Conceptual Final Cover Construction Schedule



Milestones contains a list of milestone dates that were developed as part of the closure construction schedule to demonstrate that closure will be completed within the self-implementing closure schedule per 40 CFR 257.102(f)(1)(i).

Table 3.2.2 – Conceptual Final Cover Construction Schedule Milestones

Closure Component	Start Date	End Date
Monitor groundwater	January 1, 2016	June 1, 2040
Notification of closure	NA	May 1, 2040
40-mil LLDPE geomembrane (infiltration layer)	May 2, 2040	June 27, 2040
24-inch-thick sand layer (protective cover)	June 28, 2040	August 2, 2040
6-inch-thick topsoil (erosion layer)	August 3, 2040	August 13, 2040
Seed, fertilizer, mulch (erosion layer)	August 14, 2040	August 20, 2040
Closure activities complete	NA	August 20, 2040
Certified closure report	NA	December 31, 2040

3.3 Closure Deadline Extension [40 CFR 257.102(f)(2)]

As previously indicated in Section 3.1, closure of existing CCR landfills must be completed within six months of initiating closure in accordance with 40 CFR 257.102(f)(1)(i). However, a deadline extension can be obtained as outlined in 40 CFR 257.102(f)(2) if completion of closure is not feasible within six months (e.g., shortened construction season, significant weather delays, time required for dewatering CCR, delays due to state or local permitting or approval, etc.). An extension must include a narrative description that demonstrates closure is not feasible in the required timeframe in accordance with 40 CFR 257.102(f)(2)(i, iii). The closure deadline for the Dry Ash Landfill may be extended up to two years in one-year increments per 40 CFR 257.102(f)(2)(ii)(A).



4.0 REFERENCES

“Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments,” Title 40 – Protection of the Environment Part 257 – Criteria for Classification of Solid Waste Disposal Facilities and Practices Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.

**APPENDIX A
LANDFILL CLOSURE GRADING PLAN**

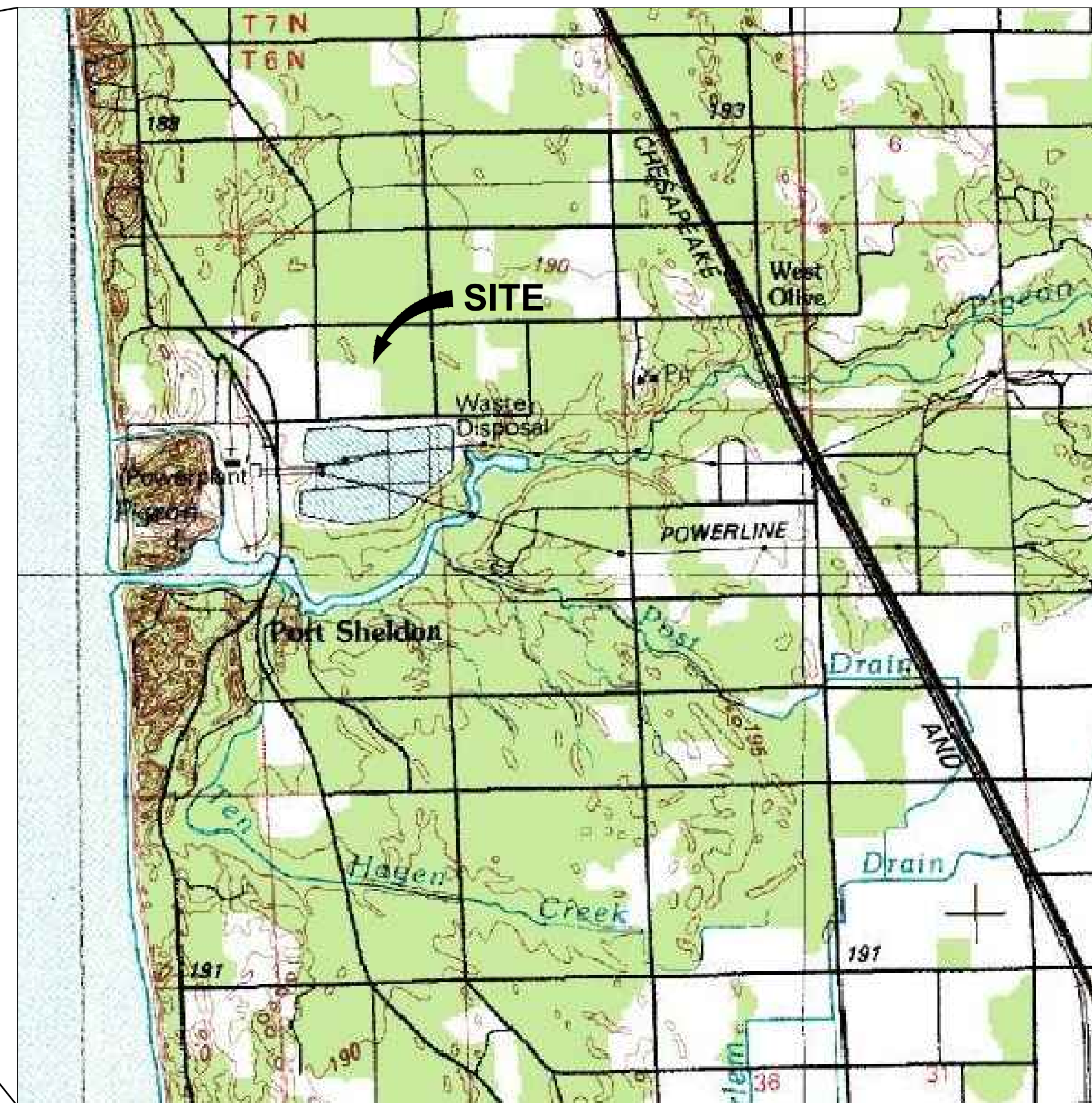
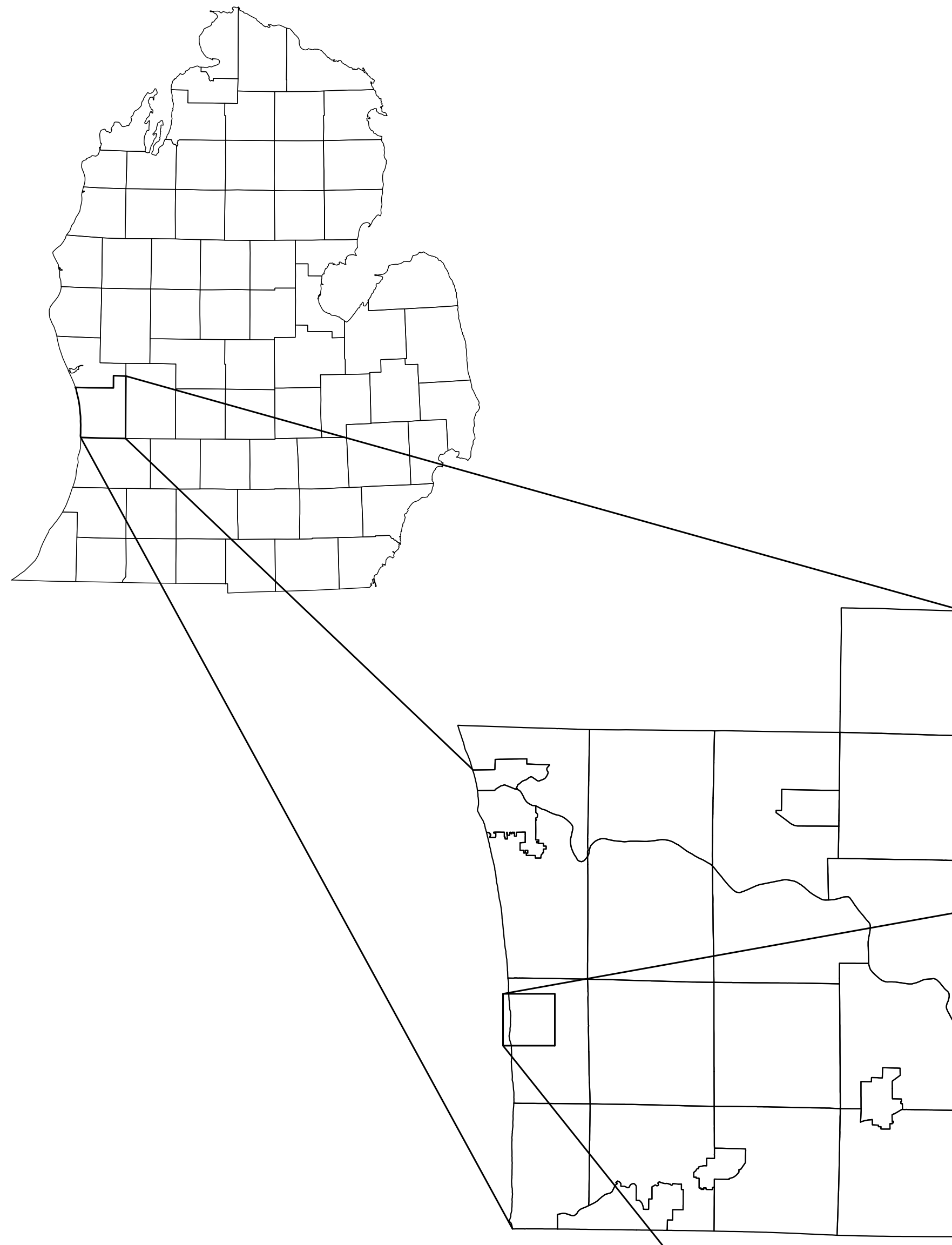
CONSUMERS ENERGY COMPANY

LANDFILL CLOSURE PLAN

J.H. CAMPBELL ASH STORAGE FACILITY

PREPARED BY:
Engineering & Environmental Solutions, LLC
PROJECT NO: 094-16-004

AUGUST 2016



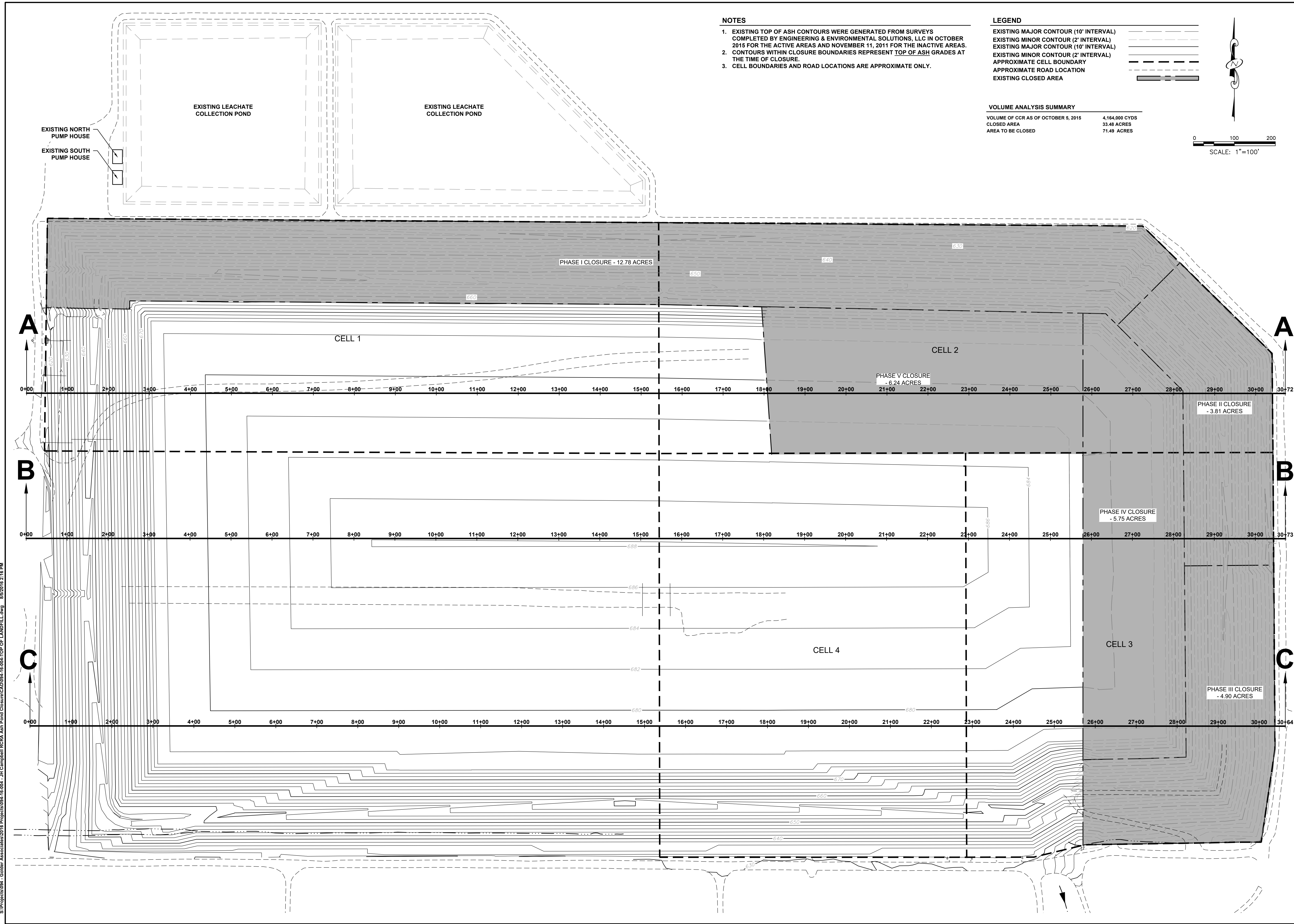
WEST OLIVE, MICHIGAN
SECTIONS 10 & 11, T. 6 N., R. 16 W.
PORT SHELDON TOWNSHIP
OTTAWA COUNTY, MICHIGAN

SHEET INDEX

- 1 TITLE SHEET
- 2 TOP OF ASH
- 3 CROSS SECTIONS A-A' & B-B'
- 4 CROSS SECTIONS C-C'
- 5 DETAILS



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NOTES

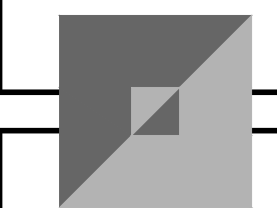
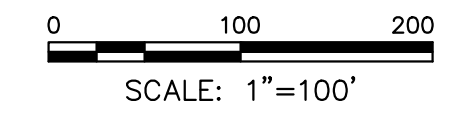
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- CONTOURS WITHIN CLOSURE BOUNDARIES REPRESENT TOP OF ASH GRADES AT THE TIME OF CLOSURE.
- CELL BOUNDARIES AND ROAD LOCATIONS ARE APPROXIMATE ONLY.

LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- APPROXIMATE ROAD LOCATION
- EXISTING CLOSED AREA

VOLUME ANALYSIS SUMMARY

VOLUME OF CCR AS OF OCTOBER 5, 2015	4,164,000 CYDS
CLOSED AREA	33.48 ACRES
AREA TO BE CLOSED	71.49 ACRES



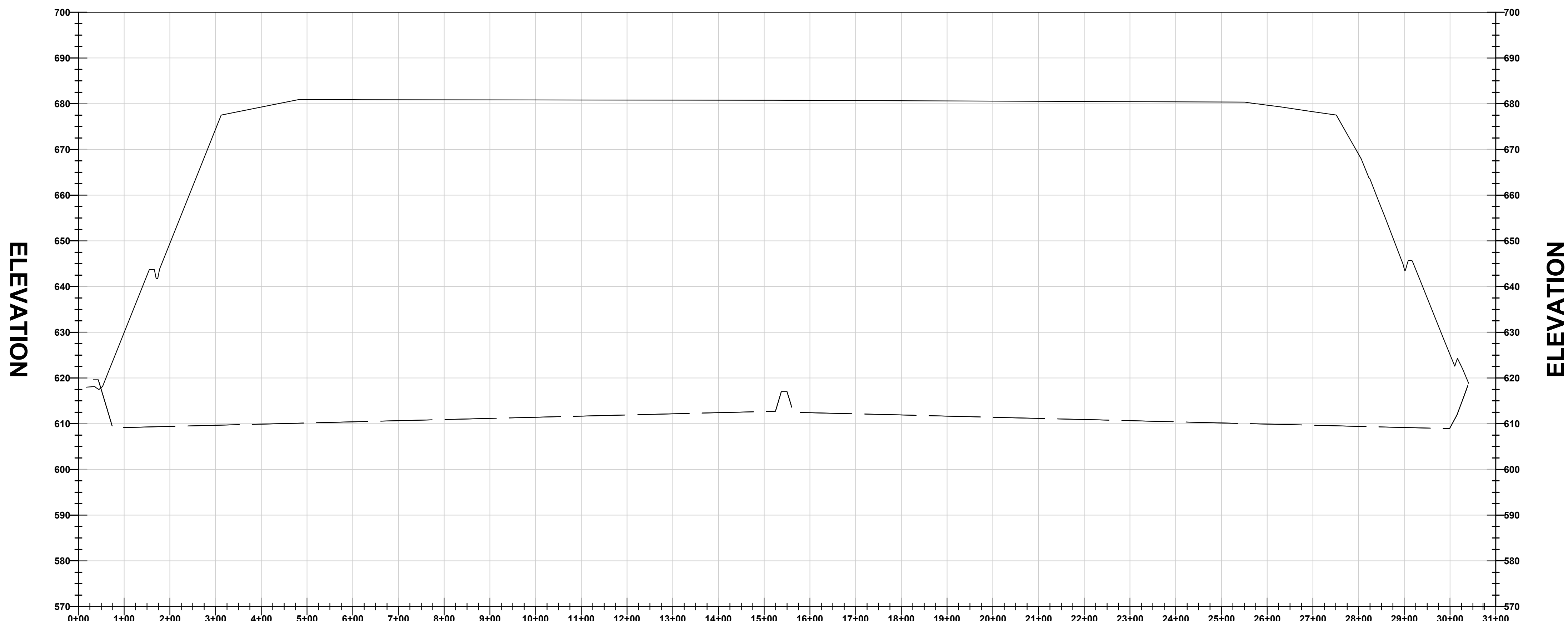
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	08-05-2016	ISSUED FOR INTERNAL REVIEW

DESIGNED BY: ...
 DRAWN BY: ARM
 CHECKED BY: BAL
 PROJECT NO: 094-16-004
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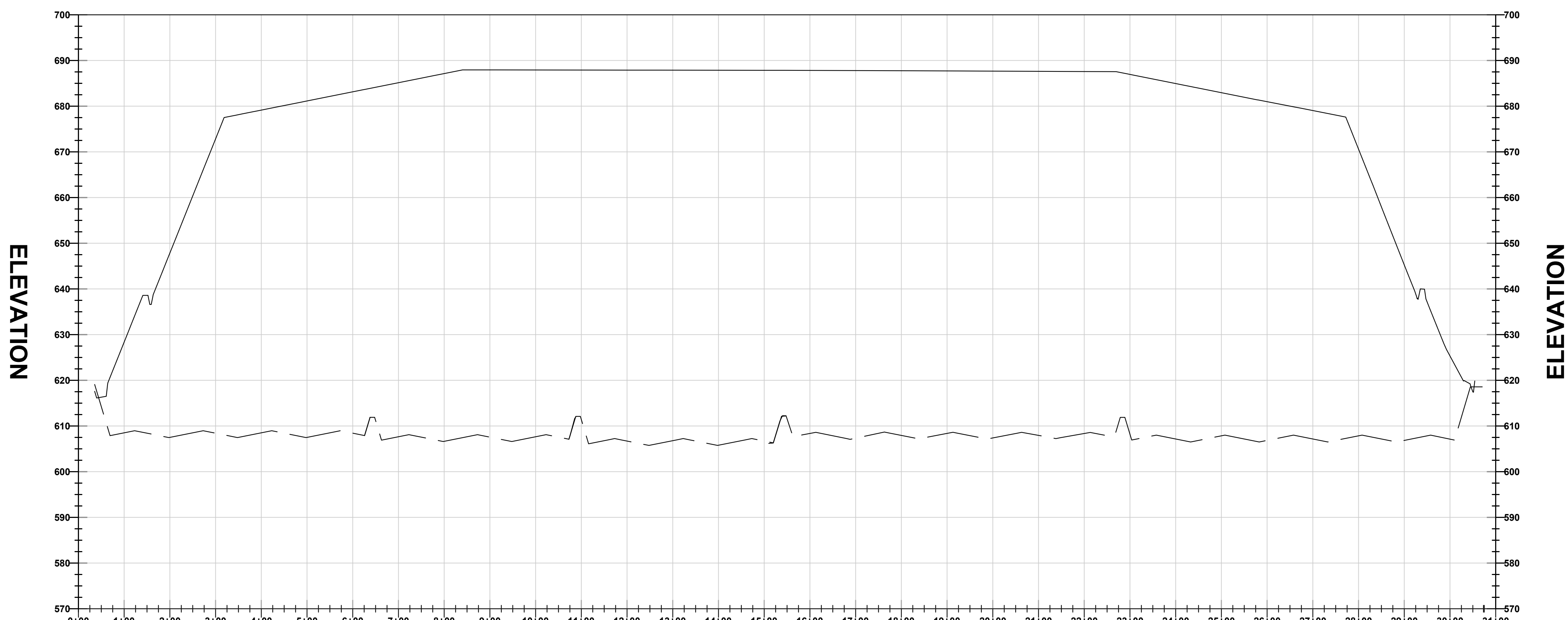
TOP OF ASH

CROSS SECTION A-A'

LEGEND
 PERMITTED TOP OF ASH _____
 PERMITTED SUBGRADE - - - - -

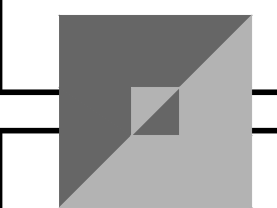


CROSS SECTION B-B'



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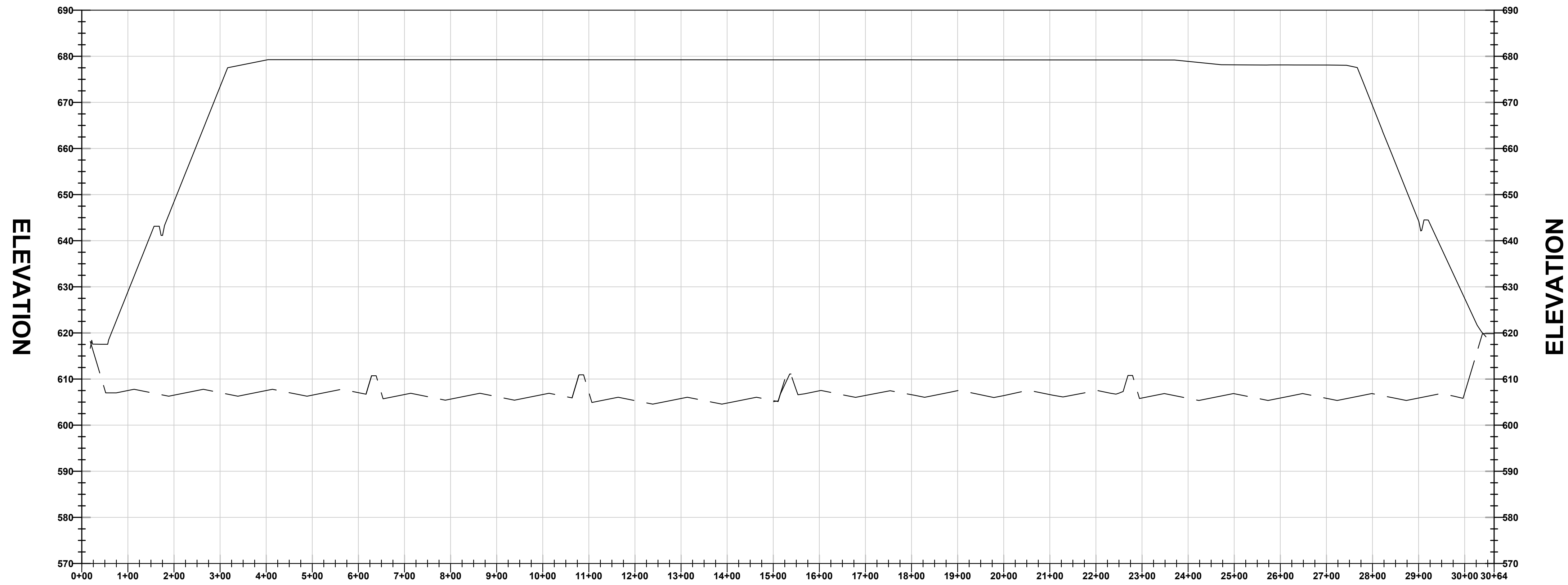
CROSS SECTIONS A-A' & B-B'

SHEET 3 OF 5

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LEGEND
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 PERMITTED SUBGRADE _____

CROSS SECTION C-C'



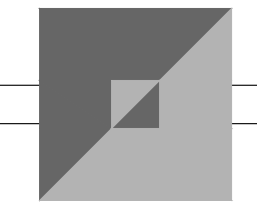
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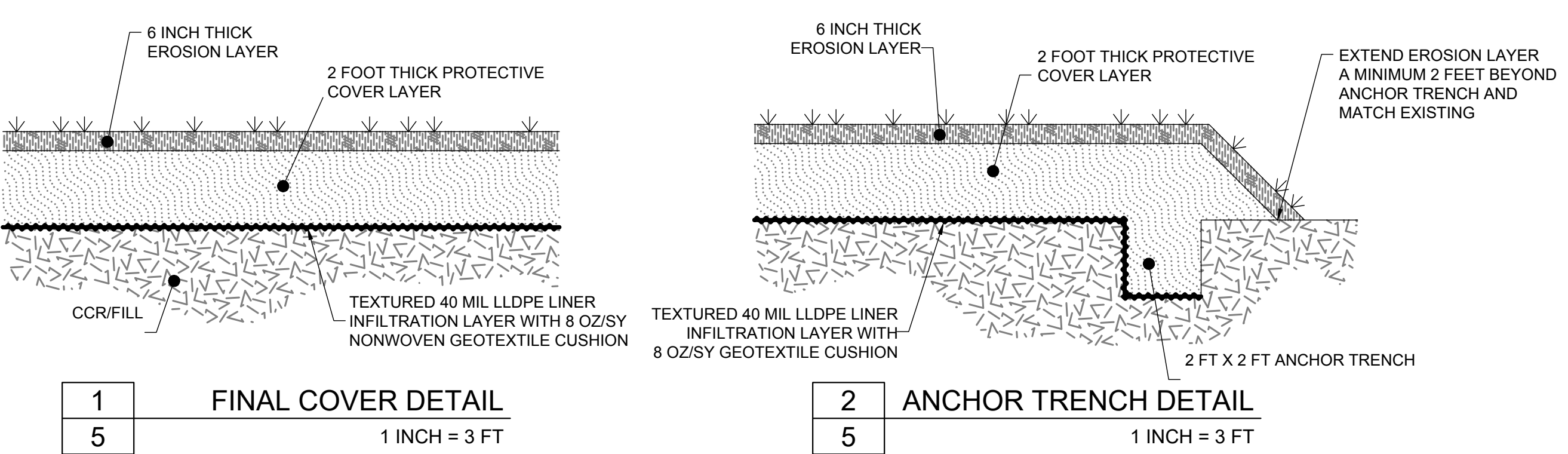


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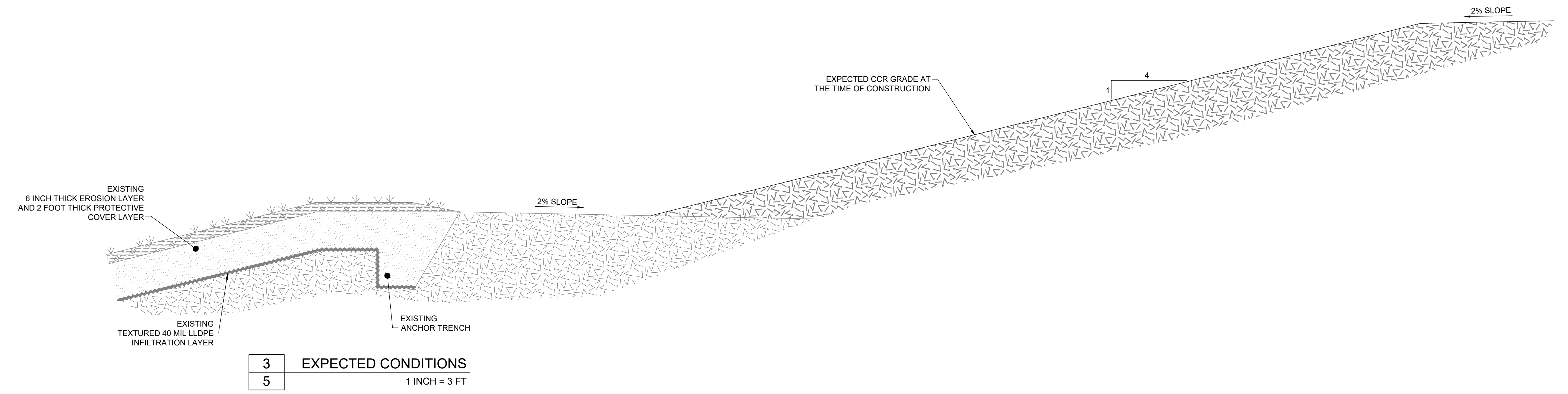
DETAILS

SHEET 5 OF 5

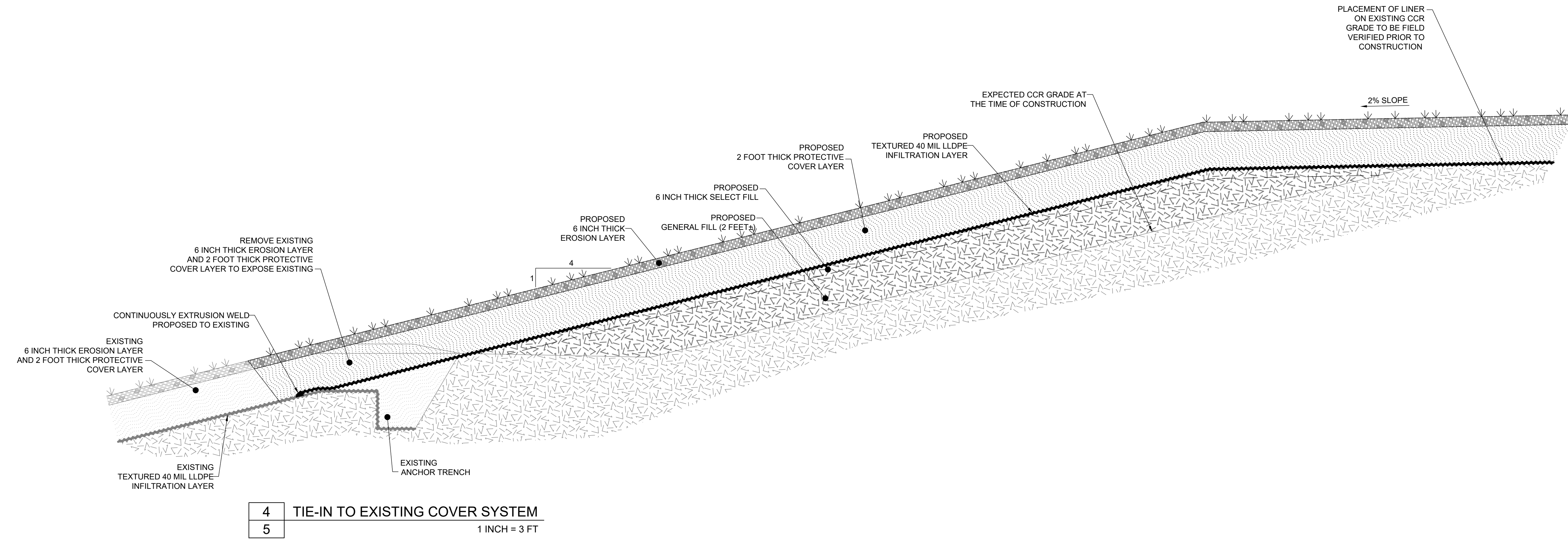


1 FINAL COVER DETAIL
 5 1 INCH = 3 FT

2 ANCHOR TRENCH DETAIL
 5 1 INCH = 3 FT



3 EXPECTED CONDITIONS
 5 1 INCH = 3 FT



4 TIE-IN TO EXISTING COVER SYSTEM
 5 1 INCH = 3 FT

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