



LINER SYSTEM CERTIFICATION REPORT

GRAND HAVEN BOARD OF LIGHT AND POWER

J.B. SIMS GENERATING STATION

Documentation of Liner Construction

Pursuant to 40 CFR 257.71

Unit 3 East and West Ash Pond Surface
Impoundments



Submitted To: Grand Haven Board of Light and Power
17000 Eaton Drive
Grand Haven, Michigan 49417

Prepared By: Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, Michigan 48906

April 2017

Project No. 1775416





April 2017

C-1

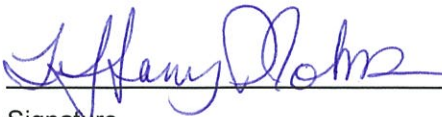
J.B. Sims Documentation
of Liner Construction -
1775416

CERTIFICATION

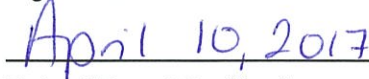
Professional Engineer Certification Statement [40 CFR 257.71(b)]

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 257.71 (40 CFR Part 257.71), I attest that this Documentation of Liner Construction report 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 257.71.

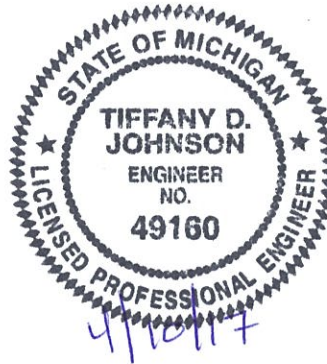
Golder Associates Inc.



Signature



Date of Report Certification



Tiffany D. Johnson, P.E.

Name

6201049160

Michigan P.E. #



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1. 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. Section 257.71 of the CCR RCRA Rule requires the owner or operator of an existing CCR surface impoundment to document whether or not the unit was constructed with a liner system meeting criteria outlined in Section 257.71(a)(1). According to 257.71(b), the documentation must be certified accurate by a qualified professional engineer in the State of Michigan.

Golder Associates Inc. (Golder) is submitting this report to certify that a liner constructed per the requirements of 40 CFR 257.71, exists beneath the Unit 3 East and West Bottom Ash Pond surface impoundments at the Grand Haven Board of Light and Power (GHBLP) J.B. Sims Generating Station (JBSGS, Site) located on Harbor Island, Grand Haven, Michigan.

The regulatory requirements are included below:

40 CFR 257.71(a)(1) - No later than October 17, 2016, the owner or operator of an existing CCR surface impoundment must document whether or not such unit was constructed with any one of the following:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} centimeters per second (cm/sec);
- A composite liner that meets the requirements of § 257.70(b); or
- An alternative composite liner that meets the requirements of § 257.70(c).
- 257.71(a)(2) - The hydraulic conductivity of the compacted soil must be determined using recognized and generally accepted methods.
- 257.71(a)(3) - An existing CCR surface impoundment is considered to be an existing unlined CCR surface impoundment if either:
 - The owner or operator of the CCR unit determines that the CCR unit is not constructed with a liner that meets the requirements of paragraphs (a)(1)(i), (ii), or (iii) of this section; or
 - The owner or operator of the CCR unit fails to document whether the CCR unit was constructed with a liner that meets the requirements of paragraphs (a)(1)(i), (ii), or (iii) of this section.
- 257.71(a)(4) - All existing unlined CCR surface impoundments are subject to the requirements of § 257.101(a).
- 257.71(b) - The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer attesting that the documentation as to whether a CCR unit meets the requirements of paragraph (a) of this section is accurate.
- 257.71(c) - The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the Internet requirements specified in § 257.107(f).



2. HISTORICAL DOCUMENTATION

Golder performed a review of the following historic documentation relative to the Unit 3 East and West Bottom Ash Pond surface impoundments:

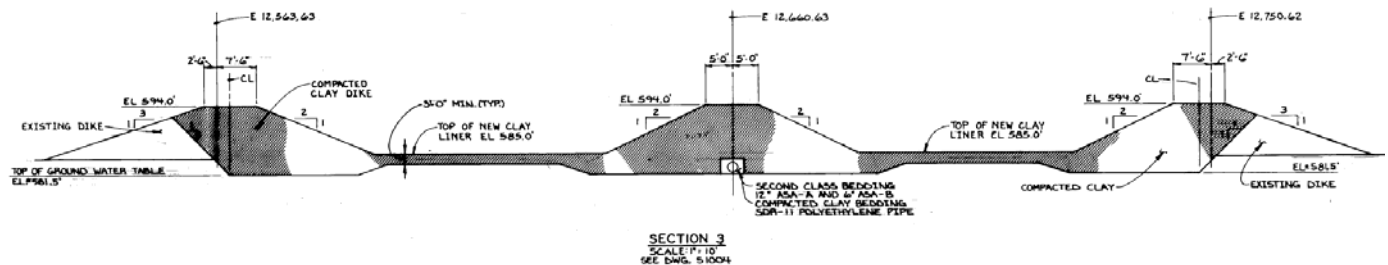
- City of Grand Haven, Michigan Board of Light and Power J.B. Sims Station, Unit 3 Ash Pond Construction Report (Black & Veatch, 1983)
- DRAFT - Coal Combustion Residue Impoundment, Round 12 - Dam Assessment Report, JB Sims Power Plant (Site 04), East and West Bottom Ash Ponds, Grand Haven Board of Power and Light, Grand Haven, Michigan, Prepared for: United States Environmental Protection Agency Office of Resource Conservation and Recovery, Prepared by: Dewberry & Davis, LLC Fairfax, Virginia, Dated October 2012 (EPA, 2012)
- Final Report of Evaluation For Grand Haven Power Plant Ash Impoundment Grand Haven, Michigan (Soils & Structures, 2014)
- Annual Ash Impoundment Inspection Report (Soils & Structures, 2016)

The liner design criteria for existing CCR surface impoundments as described in 40 CFR 257.71 is as follows:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec as required in Section 257.71(a)(1)(i);
- A composite liner that meets the requirements of Section 257.70(b); or
- An alternative composite liner that meets the requirements of Section 257.70(c).

Evidence was found from review of the historic documentation that indicates the Unit 3 East and West Bottom Ash Pond surface impoundments were constructed with a 3-foot thick compacted clay liner system, see Figure 1-1, below.

Figure 1-1: Unit 3 East and West Bottom Ash Pond Liner Construction (From Black and Veatch, 1981)





According to the Black & Veatch construction report (Black & Veatch, 1983), the Unit 3 East and West Bottom Ash Pond surface impoundments were constructed with clay dikes and a 3-foot thick compacted clay bottom.

In the 2014 Soils & Structures subsurface investigation (Soils & Structures, 2014), a seven foot thick clay layer was encountered below the Unit 3 East and West Bottom Ash Pond surface impoundments. Of the seven feet of clay soil, 3 feet or more consists of compacted clay with a hydraulic conductivity of no more than 1×10^{-8} feet per second (3×10^{-7} cm/sec) (Soils & Structures, 2014).



3. LINER CONSTRUCTION

The Unit 3 East and West Bottom Ash Pond surface impoundments were designed in 1983 by Black & Veatch of Michigan. In 2014 a structural stability analysis of the impoundments was conducted by Soils & Structures Inc. of Muskegon, Michigan. The following sections summarize the impoundment construction.

3.1 J.B. Sims Station Unit 3 East and West Bottom Ash Pond Construction (Black & Veatch, 1983)

The Unit 3 East and West Bottom Ash Ponds were designed for temporary storage of bottom ash, pulverizer rejects, and various wastewaters generated from the generating facility.

According to the Black & Veatch Ash Pond Construction Report (Black & Veatch, 1983), the pond basin was designed and constructed with a clay liner 3 feet thick. The ponds were designed having a maximum depth of 9 feet, with clay perimeter dikes having a crest elevation of 594 feet and the pond bottoms recorded at 585 feet. Operating at a maximum suggested water surface elevation of 592 feet provided the ponds with 2 feet of freeboard. The storage volume of the ponds with the minimum 2 feet of freeboard were suggested to be 68,000 cubic feet and 77,000 cubic feet, for the eastern and western ponds respectively.

The interior dike separating the ponds into East and West was constructed with 2 horizontal to 1 vertical (2H: 1V) side slopes on both sides, and a 10 foot crest width. The exterior dikes to the west, east, and north were constructed with 2H: 1V interior slopes and 3H: 1V exterior slopes with a 10 foot wide crest. The interior of the northern dike was designed with a 3H: 1V slope and a 20 foot wide crest to facilitate ash hauling from the ponds.

3.2 Ash Impoundment Evaluation (Soils & Structures Inc., 2014)

At the time of investigation (Soils & Structures Inc., 2014), the Unit 3 East and West Bottom Ash Pond surface impoundments ranged from 4 feet to 6 feet in depth, and contained 1 foot to 2 feet of CCR. The exterior berms were reported to have a maximum slope 3H: 1V. A field investigation including soils borings and cone penetration tests was performed in the “corners” of the two impoundments. Testing was conducted to a depth of 25 feet below the ground surface.

Average clay permeability was approximated to be 1×10^{-8} feet per second based on the cone penetration testing results. The clay thickness at the bottom of the impoundment was approximated to be 3 feet or more.



4. DOCUMENTATION OF LINER SYSTEM CONSTRUCTION

The liner design criteria for existing CCR surface impoundments as described in 40 CFR 257.71 is as follows:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec as required in Section 257.71(a)(1)(i);
- A composite liner that meets the requirements of Section 257.70(b); or
- An alternative composite liner that meets the requirements of Section 257.70(c).

Evidence was found from review of the historic documentation that indicates the Unit 3 East and West Bottom Ash Pond surface impoundments were constructed with a minimum 3-foot thick compacted clay liner system and a permeability of 1×10^{-8} feet per second (or 3×10^{-7} cm/sec). Since the permeability of the compacted clay liner is greater than 1×10^{-7} cm/sec and the site cannot demonstrate that there is a composite liner present (i.e. a geomembrane liner in addition to a compacted clay liner), the Unit 3 East and West Bottom Ash Pond CCR units do not meet the liner design criteria in 40 CFR 257.71.

The GHBLP plans to construct a new liner system for the Unit 3 East and West Bottom Ash Ponds in 2017 that will meet the requirements of 40 CFR 257.71.



5. CONCLUSIONS AND SUMMARY

Based on the review of available historic documentation, Golder has determined a liner system exists beneath the Unit 3 East and West Bottom Ash Pond surface impoundments at the JB Sims Generation Station. The liner system does not currently meet the requirements set forth in 40 CFR 257.71(a)(1)(i) – (iii). This report must be placed in the facility's operating record in accordance with Section 257.105(f) and must be made available on the facility's publicly accessible internet site in accordance with Section 257.107(f).



6. REFERENCES

Soils & Structures. 2014. Final Report of Evaluation for Grand Haven Power Plant Ash Impoundment Grand Haven, Michigan.

Black & Veatch. 1983. City of Grand Haven, Michigan Board of Light and Power J.B. Sims Station, Unit 3 Ash Pond Construction Report.

Soils & Structures. 2016. Annual Ash Impoundment Inspection Report.

USEPA. 2012. DRAFT - Coal Combustion Residue Impoundment, Round 12 - Dam Assessment Report, JB Sims Power Plant (Site 04), East and West Bottom Ash Ponds, Grand Haven Board of Power and Light, Grand Haven, Michigan, Prepared for: United States Environmental Protection Agency Office of Resource Conservation and Recovery, Prepared by: Dewberry & Davis, LLC Fairfax, Virginia, Dated October 2012.

USEPA (Environmental Protection Agency). 2015. Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 40 CFR Part 257. Effective Date October 19, 2015.

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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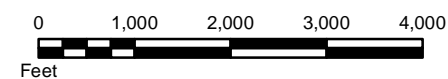
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FIGURES

PROJECT
CCR RULE COMPLIANCE

TITLE
SITE LOCATION MAP

CONSULTANT

YYYY-MM-DD 2017-03-20

PREPARED JJS

DESIGN JJS

REVIEW DMI

APPROVED



PROJECT No.
1775461

CONTROL
1775461A000-GIS.mxd

Rev.
0FIGURE
1



REFERENCE(S)

Service Layer Credits: Source: ESRI, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

CLIENT

GRAND HAVEN BOARD OF LIGHT AND POWER
HARBOR ISLAND DRIVE
GRAND HAVEN, MI

CONSULTANT



YYYY-MM-DD 2017-03-20

DESIGNED JJS

PREPARED JJS

REVIEWED DML

APPROVED TDJ

PROJECT

CCR RULE COMPLIANCE

TITLE

OVERALL SITE PLAN

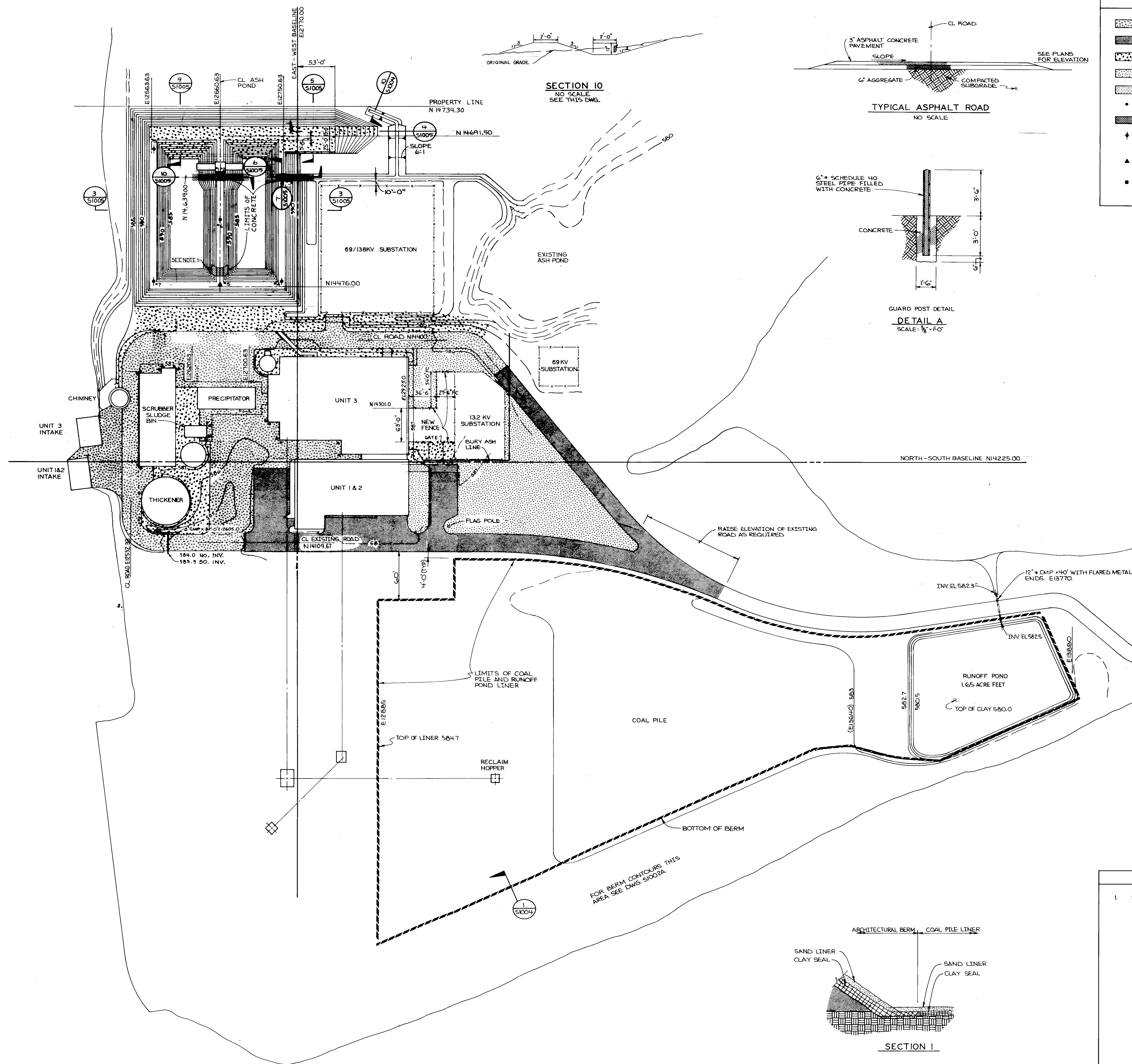
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


REV.

FIGURE
2

APPENDIX A
COPY OF BLACK & VEATCH - CITY OF GRAND HAVEN, MICHIGAN BOARD OF LIGHT
AND POWER J.B. SIMS STATION, UNIT 3 ASH POND CONSTRUCTION REPORT, 1983



LEGEND


	ADDITIONAL ASPHALT
	REMOVE EXISTING ASPHALT AND INSTALL NEW
	WHITE CRUSHED STONE
	NEW SEEDING
	NEW SIDEWALKS
•	CONCRETE FILLED PIPE FOR BUMPERS. PAINT YELLOW (SEE DETAIL A)
	CONCRETE
⬇	SETTLEMENT MONITORING POINTS- $1\frac{1}{2}$ " DIAMETER GALVANIZED PIPE SET IN CONCRETE.
▲	SETTLEMENT POINT ON TOP OF WYE OF BOTTOM ASH LINE.
■	SETTLEMENT POINT ON TOP OF TIMBER PIPE SUPPORT AT THE PAINTED NAIL.

[illegible][illegible]

I HEREBY CERTIFY THAT THIS DOCUMENT WAS
PREPARED BY ME OR UNDER MY DIRECT SUPER-
VISION AND THAT I AM A DULY REGISTERED PRO-
FESSIONAL ENGINEER UNDER THE LAWS OF THE
STATE OF MICHIGAN.
SIGNED Norman E. Halin
DATE _____ REG. NO. _____

STATE OF MICHIGAN
THOMAS E. KALIN
ENGINEER
No. 26965
REGISTERED PROFESSIONAL ENGINEER

BLACK & VEATCH
CONSULTING ENGINEERS

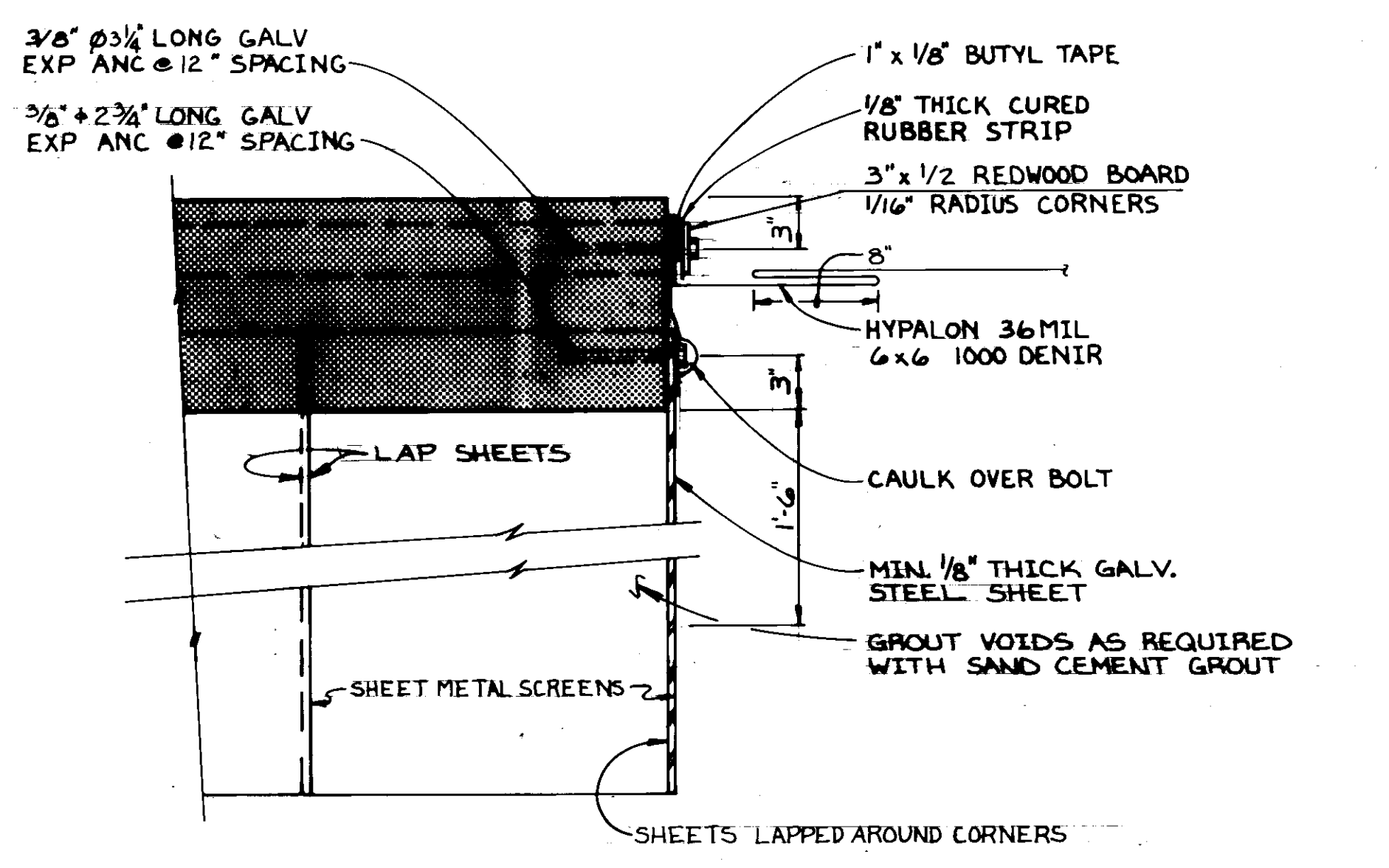
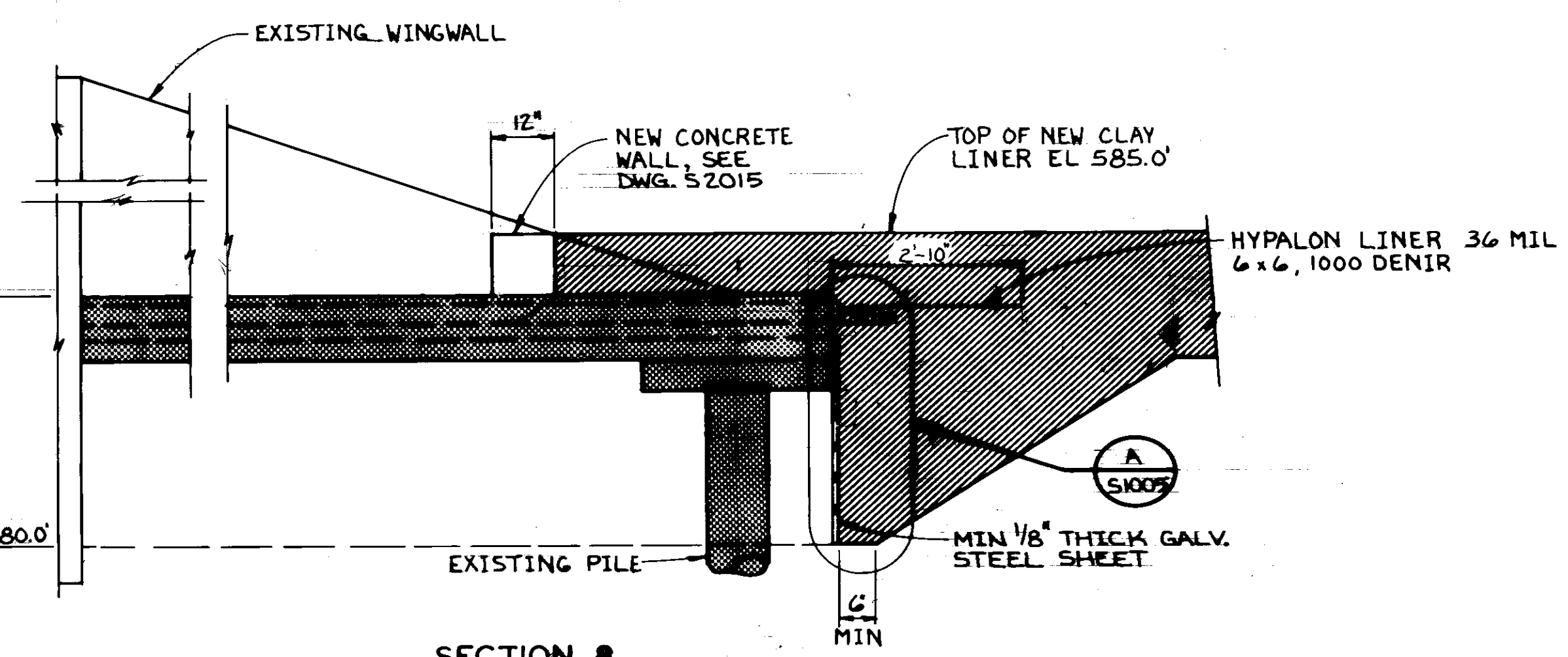
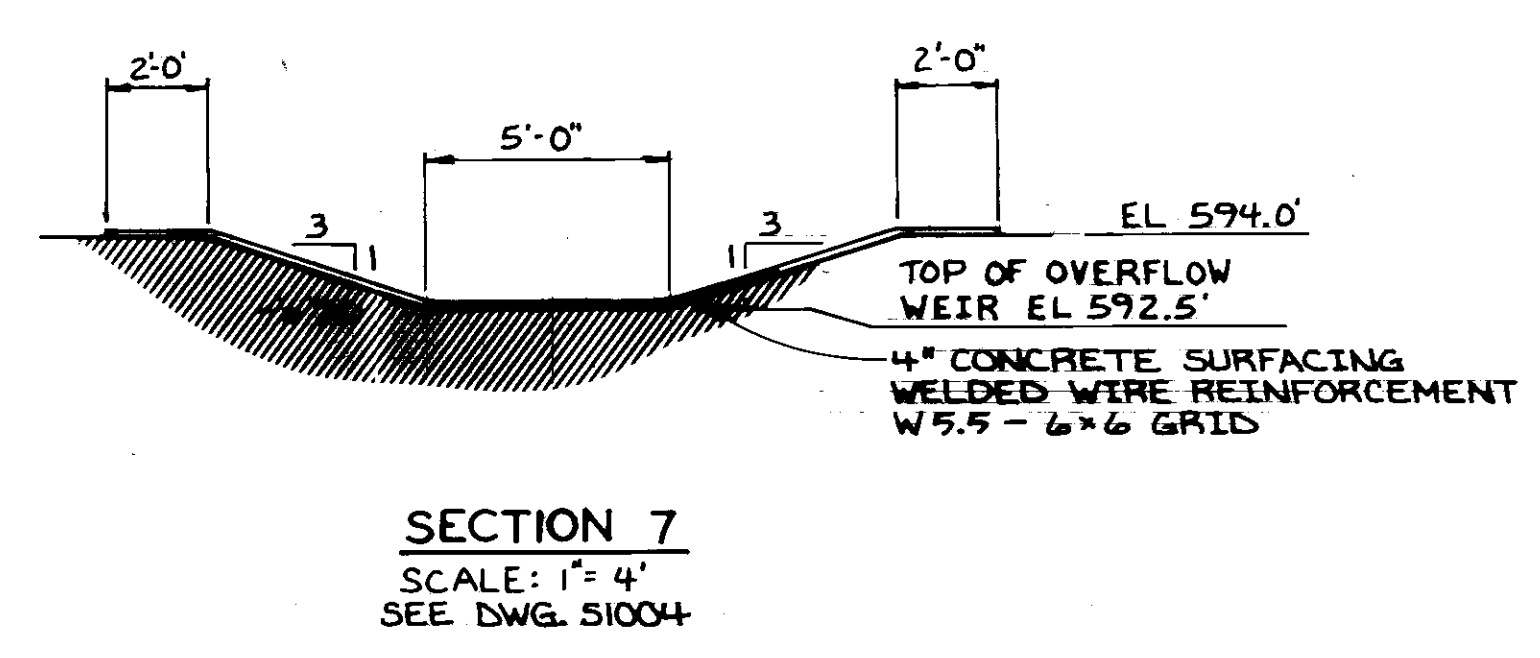
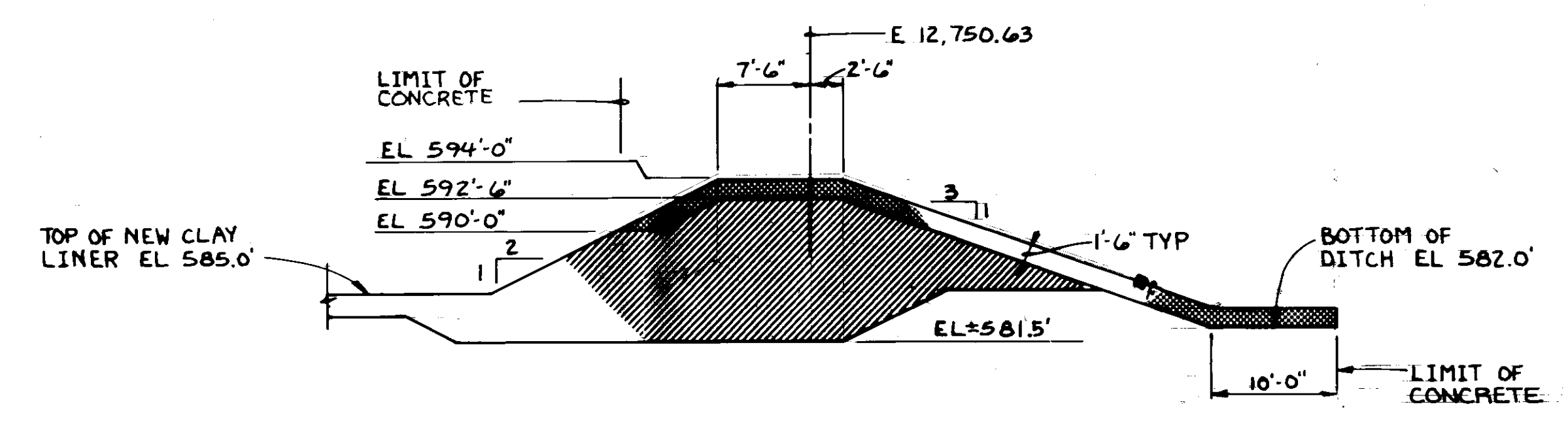
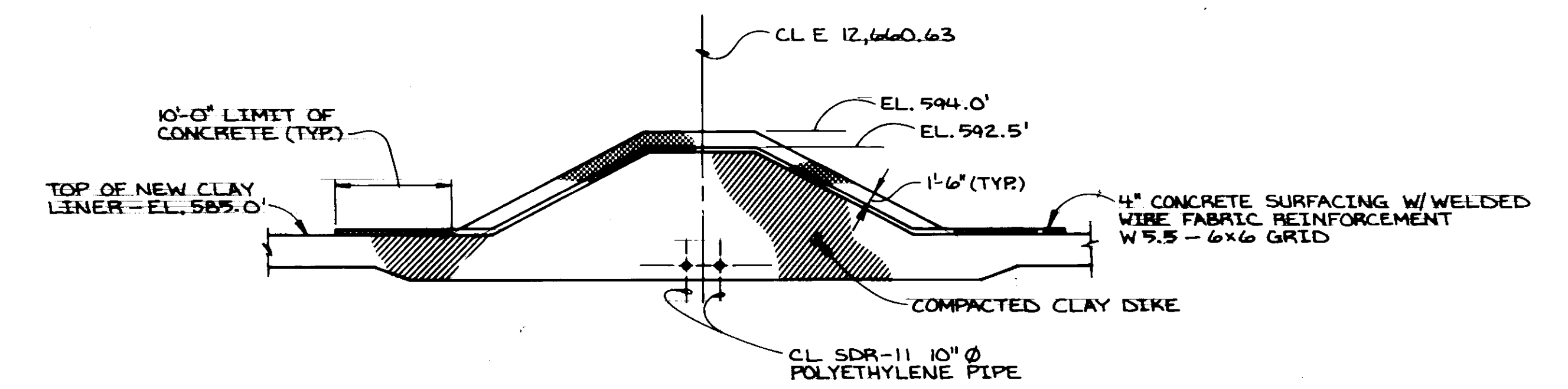
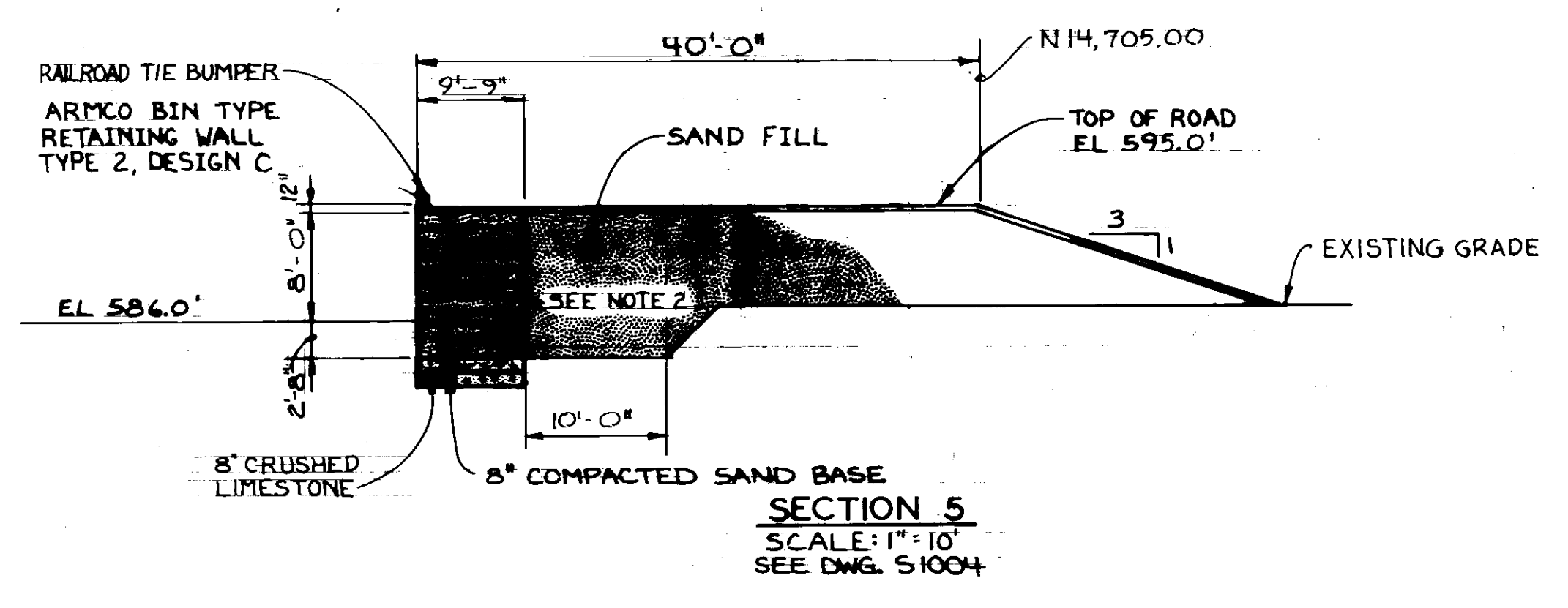
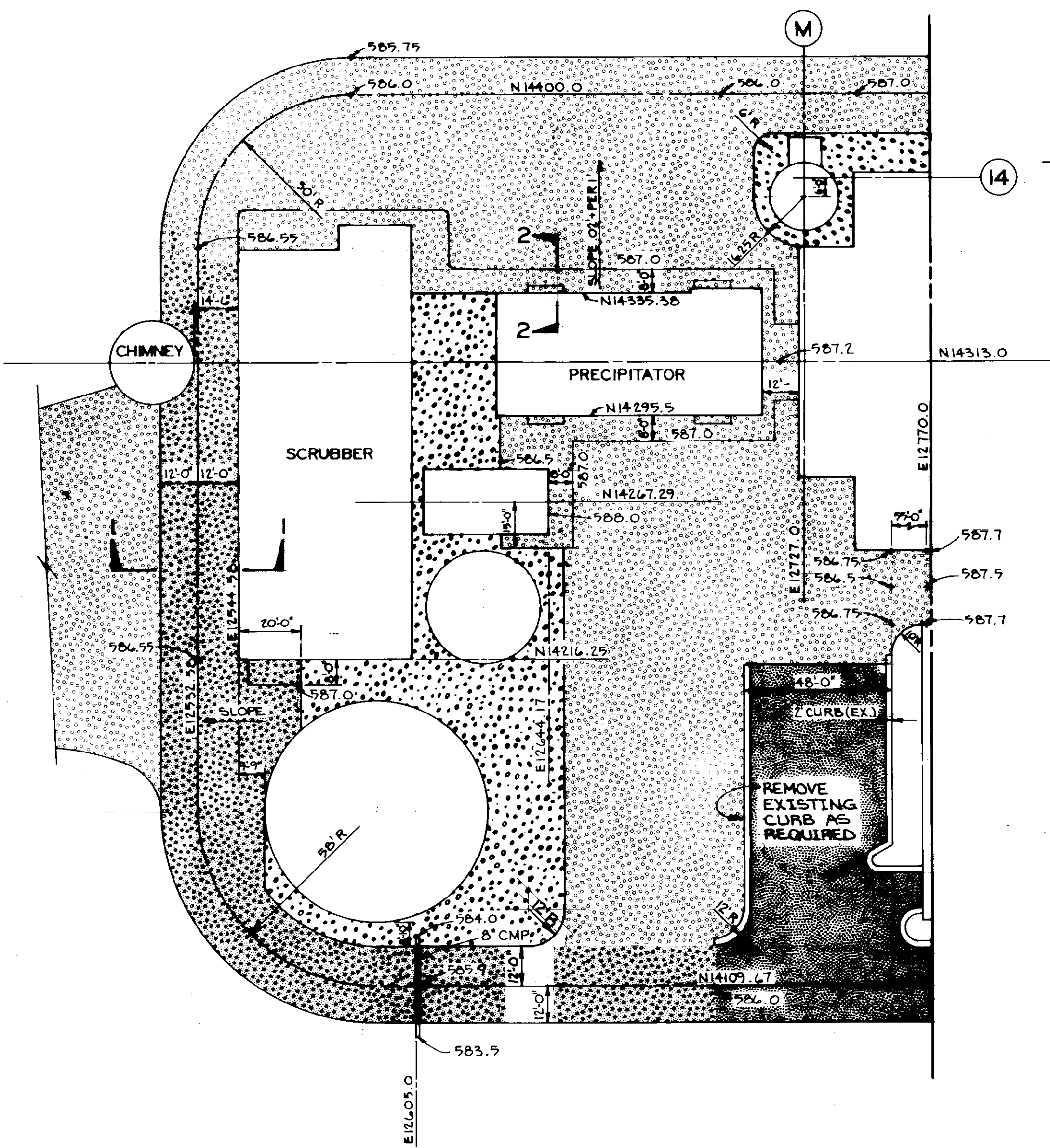
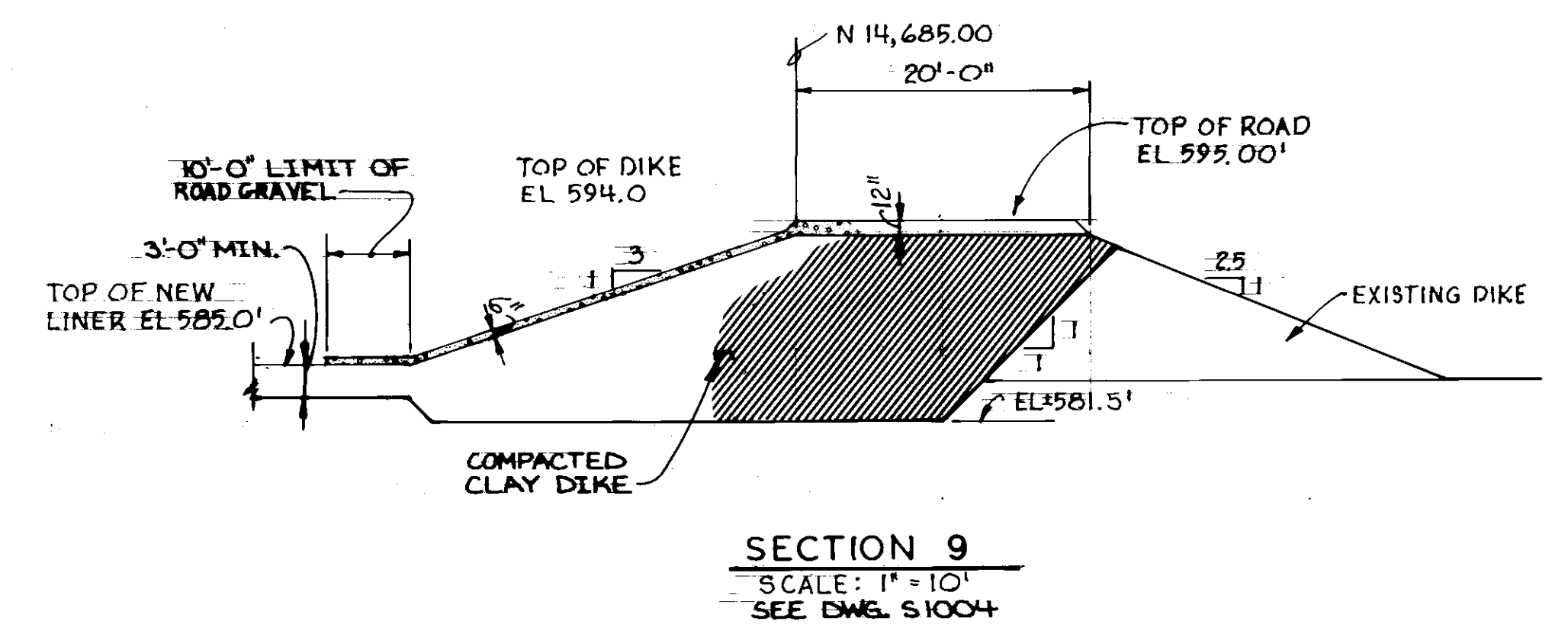
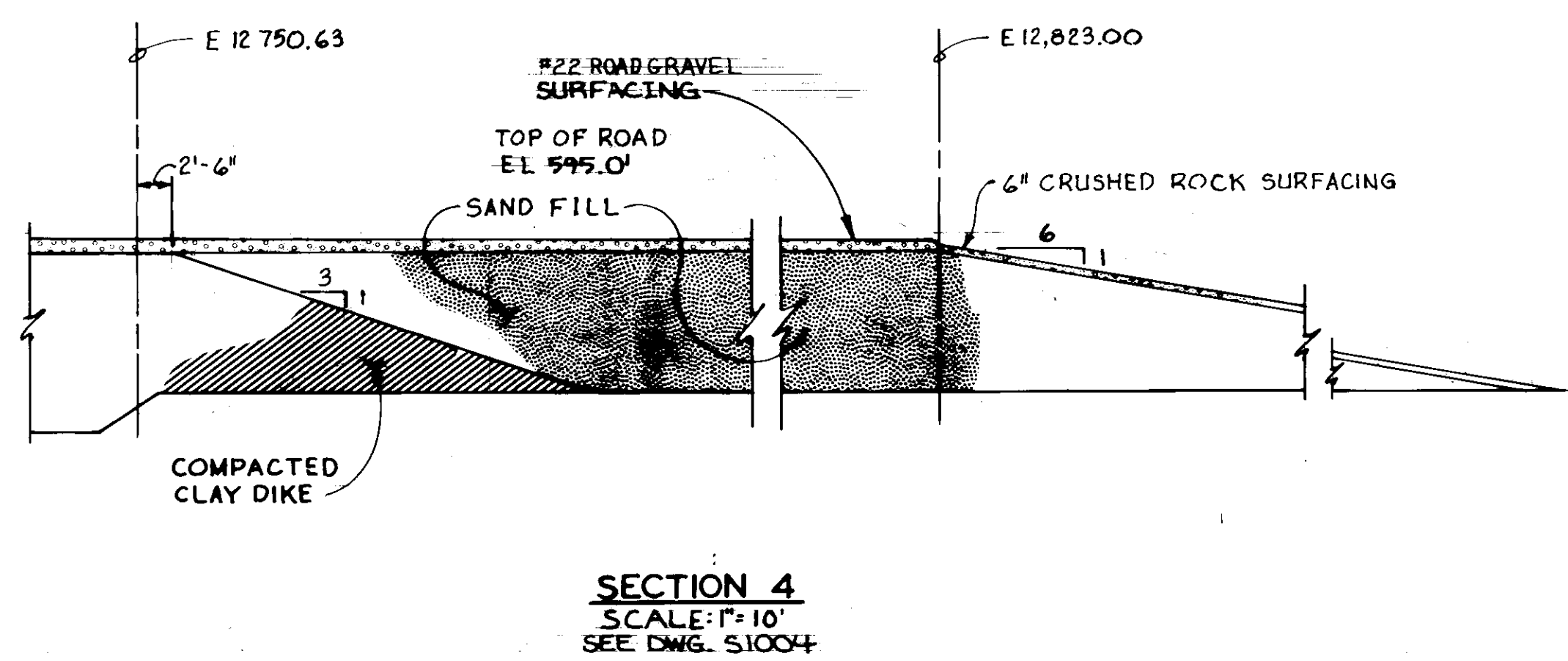
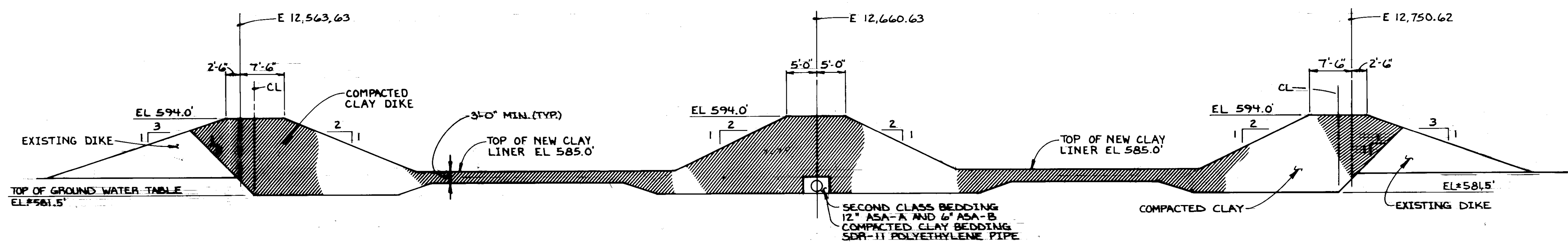
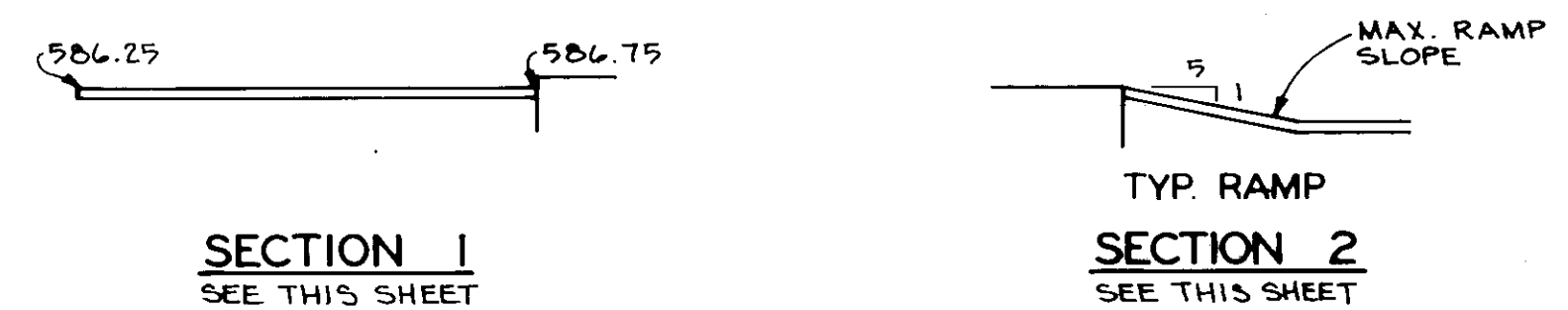
 PROJECT
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GRAND HAVEN BOARD OF LIGHT AND POWER J. B. SIMS STATION UNIT 3		DAY DWG NO. REV. 9
FINISH GRADING AND PAVING PLAN		S1004

B&V DWG NO. REV. 9

S1004

12/21/2014



NOTES

1. SEE DWG. S1004 FOR LEGEND.
2. PLACE TREYIRA GRADE 3135 GEOTEXTILE OVER INSIDE OF EXTERIOR WALL OF RETAINING WALL.