Sustainability in Action

January 30, 2025

Michael Smith
Project Manager
MC-124
Texas Commission on Environmental Quality
12100 Park 35 Circle
Austin, Texas 78753

Re: Response to Notice of Deficiency Letter – Limited Scope Major Permit Amendment Application
Southwest Landfill
Randall County, Texas
MSW Permit No.: 1663C
Tracking No. 29885599

Dear Mr. Smith:

On behalf of Southwest Landfill TX, LP, please find enclosed one original and three copies of the replacement pages for the referenced Limited Scope Major Permit Amendment application. The attached replacement pages were developed to incorporate comments included in your letter dated November 8, 2024.

The response letter contains each comment identified by the TCEQ (in bold) and a response to each.

1. Part III, Appendix IIIB.

   a. **Throughout. Identify which constituents in tables are provided at half the reporting level because they were non-detects during laboratory testing.**

Response:

   a. Table 2-2 in Appendix IIIB has been revised to specify which constituents are reported at half the reporting limits because they were non-detect during laboratory testing.

      The footnote 2 in Tables 4-1, 5-1, and 6-3 reference Table 2-2. Footnote 3 for Table 2-2 was updated to provide clarification of how the site specific leachate quality was selected.

b. Tables 2-2, 4-1, 5-1, and 6-3. Correct the page footers to reflect the first revision, October 2024. Additionally, reflect the revision date in response to this NOD if necessary.

Response:

b. The revision numbers for Tables 2-2, 4-1, 5-1, and 6-3 were revised to "Rev 1." The dates for Tables 2-2 and 6-3 were updated to reflect the second NOD revision date. Tables 4-1 and 5-1 were revised to reflect the October 2024 date.

c. Table 6-3. Correct the calculated Cp based on the site-specific concentration of arsenic in leachate provided during the first revision.

Response:

c. Table 6-3 was revised to reflect the correct Cp value of 2.3E-06 mg/L.

d. Table 6-4. Revise the initial contaminant concentrations and subsequent calculations to reflect TCEQ's historical guidance, TWC (1993). Explain which and how initial concentrations were selected for contaminants without TCEQ's historical guidance (1993).

Response:

d. The C_o values were updated in Table 6-4 to reflect the leachate quality information historically used for POC demonstrations in Texas as presented in Table 2-2. The subsequent calculations in Table 6-4 were revised to reflect the updated C_o values. Contaminants without any historical guidance were not calculated, which is consistent with recent POC demonstrations submitted to TCEQ.

After reviewing the 2018 POC demonstration, it was found that the MCL concentrations were inadvertently used as the initial concentrations (C_o) instead of the historical guidance concentrations in Tables 4-2 and 5-2. The subsequent calculations in these Tables were also revised.

2. Part III, Appendix IIIB, Section 6.

a. Identify the range of groundwater gradients observed in Stratum II and associated dilution attenuation factors for the proposed Subtitle D alternative liner design (ALD) based on groundwater contour maps that cover the entire 1663C facility.

Response:

a. A new section has been added to Appendix IIIB-D named "Additional Demonstrations" to evaluate the scenarios requested. In this section, a demonstration was performed to evaluate the DAF at minimum and maximum groundwater gradients, which shows that the demonstration is in compliance with the POC requirements specified in Title 30 TAC §330.331(a)(1).

b. Identify the range of hydraulic conductivities observed in Stratum II and associated dilution attenuation factors for the proposed Subtitle D ALD based on groundwater contour maps that cover the entire 1663C facility.

Response:

b. A new section has been added to Appendix IIIB-D named "Additional Demonstrations" to evaluate the scenarios requested. In this section, a demonstration was performed to evaluate the DAF at the minimum and maximum observed hydraulic conductivities in Stratum II. The results of this demonstration show that the demonstration is in compliance with the POC requirements specified in Title 30 TAC §330.331(a)(1).

c. Perform side gradient modeling for the proposed Subtitle D ALD because it was described on the figures for the proposed GCL overliner ALD and contributed to the GCL overliner ALD justification and approval. The presence of a groundwater gradient in one direction does not preclude contaminant diffusion in a transverse direction.

Response:

c. MW-21 was projected onto Section A to evaluate transverse contaminant diffusion in the alternative liner areas. Case I through IV in Appendix IIIB-D (Figures 3 through 6) have been updated to include the calculated DAF of MW-21. Additionally, the additional demonstrations presented in Appendix IIIB-D also calculated the DAF for MW-21. The results of this demonstration show that the demonstration is in compliance with the POC requirements specified in Title 30 TAC §330.331(a)(1).

Additionally, the $1.0x10^7$ DAF contour callout was updated to correct an inconsistency on Figures 4 and 6.

3. Part III, Appendix IIIB, Section 6.2. Perform non-HELP leachate infiltration rate calculations and identify the associated dilution attenuation factors for the proposed Subtitle D ALD because they were described in Appendix IIIB, Section 5.2 and Appendix

IIIB-C for the GCL overliner ALD and contributed to the GCL overliner ALD justification and approval. These calculations are described in TCEQ's historical guidance documents TWC (1993) and TNRCC (1998).

Response:

A new section has been added to Appendix IIIB-D named "Additional Demonstrations" to evaluate the scenarios requested. In this section, a demonstration was performed to evaluate the DAF, assuming that the alternative liner leachate collection system does not function as designed and allows a buildup of 12 inches of head on the alternative liner and overliner systems. The results of this demonstration show that the demonstration is in compliance with the POC requirements specified in Title 30 TAC §330.331.

4. Part III, Appendix IIIE, Geotechnical Report, Section 5.5.1.

   a. Revise the Rankine-Block analyses to consider sliding parallel to the current liner and proposed alternative liner. Include the factor of safety against sliding within the compacted clay liner or protective cover based on their peak undrained shear strength (1,000 psf cohesion and zero degrees of friction angle) and total stresses.

Response:

a. Numerous changes have been made to Appendix IIIE to address the comment, including adding stability analyses incorporating the total stress values referenced in the comment into interim, final cover, and overliner analyses. Note that the interim slope analysis also required (in order to meet the minimum factor of safety of 1.3 for total stress), reducing the maximum interim slope length from 590 feet to 575 feet in Appendix IIIE. We also have reduced the required minimum factor of safety for total stress in the interim condition from 1.5 (for long term stress conditions) to 1.3 (for short term stress conditions), consistent with other stability analyses and demonstrations prepared by WCG for multiple landfills in Texas. Components included in this response include Appendix IIIE text revisions (including Tables 5-3 and 5-4 as referenced in comment 4.b below) and Appendix IIIE-A revisions (which include revised input and output data tables, revised stability section figures, and updated XSTABL computer stability models incorporating the referenced total stress values). Overall, the included revisions demonstrate that the landfill is stable when total stress conditions are imposed on the translational block analyses.

b. Tables 5-3 and 5-4. Clarify which factors of safety were computed using peak or residual strengths and total or effective stresses.

Response:

b. Tables 5-3 and 5-4 have been updated with the new factors of safety derived in response to comment 4.a above, as well as providing clarification regarding the various stress conditions used in the analyses presented in the tables.

5. Part III, Appendix IIIE, Geotechnical Report, p IIIE-A-4-11. Provide a clean copy that include the revisions presented on the marked-up copy.

Response:

c. For clarity the previous redline strikeout version and a clean version of page IIIE-A-4-11 has been included in this response.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,

Brian Danko
Environmental Manager

Attachment: Limited Scope Major Permit Amendment Replacement Pages
(1 original and 3 copies)

cc: TCEQ Region 1
Kyle Gould, P.E., Weaver Consultants Group, LLC

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW–1663C

SECTION 305.62(j)(2)
LIMITED SCOPE MAJOR PERMIT AMENDMENT

ALTERNATIVE LINER DESIGN
SECTORS 17D THROUGH 29

Prepared for

Southwest Landfill TX, LP

June 2024
Revised October 2024

Revised January 2025

STATE OF TEXAS
KYLE D. GOULD
106018
LICENSED
PROFESSIONAL ENGINEER

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

01/30/2025

Project No. 0120-094-11-140

ATTACHMENT 1

SECTION 305.62(J)(2) LIMITED SCOPE MAJOR PERMIT AMENDMENT REPLACEMENT PAGES (REDLINE/STRIKEOUT VERSION)

Applicant Signature Page

Site Operator (Permittee or Registrant Name) or Authorized Signatory

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Brian Danko Title: Environmental Manager

Email Address: bdanko@republicservices.com

Signature: [signature] Date: 1/30/2025

Authorization by Facility Owner for Operator to Submit Application

To be completed by the facility owner if the application is submitted by an operator who is not the facility owner.

I am the owner of the facility that is the subject of this application, and authorize the operator, ______________________ to submit this application pursuant to 30 TAC 305.43(c).

Name: ______________________ Title: ______________________

Email Address: ______________________

Signature: ______________________ Date: __________

Notary

SUBSCRIBED AND SWORN to before me by the said Brian Danko

On this 30th day of January, 2025

My commission expires on the 11th day of August, 2026

Stacy M. Wilson

Notary Public in and for

Tarrant (notary's jurisdiction, including county and state)

Note: Application Must Bear Signature & Seal of Notary Public

NOTARY PUBLIC STATE OF TEXAS
STACY M. WILSON
Notary Public, State of Texas
Comm. Expires 08-11-2026
Notary ID 133903285

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663C

LIMITED SCOPE MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIB
OVERLINER POINT OF COMPLIANCE DEMONSTRATION

Prepared for

Southwest Landfill TX, LP

TCEQ Approved February 20, 2020

Revised January 2025

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

01/30/2025

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-094-11-140

This document is intended for permitting purposes only.

Table 2-2
Chemical Constituent Concentrations in Leachate

Constituent	MCL Listed in §330.331(a)(1) (mg/l)	Site Specific Leachate Quality[1, ~~2~~,3] (mg/l)	Leachate Quality Information Historically Used for POC Demonstrations in Texas (mg/l)	DAF Range (from Site Specific Data to Historically Used Data)[4]
Arsenic	0.05	0.0855	5.0	<1 to 100
Barium	1.0	7.450	100.0	7.45 to 100
Benzene[2]	0.005	0.0025	0.814	<1 to 163
Cadmium[2]	0.01	0.0001	1.0	<1 to 100
Carbon tetrachloride[2]	0.005	0.0025	0.5	<1 to 100
Chromium (hexavalent)	0.05	0.0126	5.0	<1 to 100
2,4-Dichlorophenoxy acetic acid[2]	0.1	0.0005	10.0	<1 to 100
1,4-Dichlorobenzene[2]	0.075	0.0025	7.5	<1 to 100
1,2-Dichloroethane[2]	0.005	0.0025	0.5	<1 to 100
1,1-Dichloroethylene[2]	0.007	0.0025	0.7	<1 to 100
Endrin[2]	0.0002	0.00005	0.05	<1 to 250
Fluoride	4	0.94		<1
Lindane[2]	0.004	0.000025	0.4	<1 to 100
Lead[2]	0.05	0.0025	5.0	<1 to 100
Mercury[2]	0.002	0.0001	0.2	<1 to 100
Methoxychlor[2]	0.1	0.00025		<1
Nitrate[2]	10	0.00005		<1
Selenium[2]	0.01	0.0005	1.0	<1 to 100
Silver[2]	0.05	0.00025	5.0	<1 to 100
Toxaphene[2]	0.005	0.0005	0.5	<1 to 100
1,1,1-Trichloroethane[2]	0.2	0.0025		<1
Trichloroethylene	0.005	0.0025	1.3	<1 to 260
2,4,5-Trichlorophenoxy acetic acid[2]	0.01	0.0005	1.0	1 to 100
Vinyl Chloride[2]	0.002	0.001	0.2	<1 to 100

1 Leachate concentrations obtained from historical leachate samples provided by the site.
2 For constituents not detected at reporting limits, one-half of the reporting limit is listed.
3 The constituents represent the highest values reported from laboratory testing from a leachate sample in June 2017 from the shared sump in Sectors 7 and 10 and annual historical leachate sampling for constituents tested. ~~The leachate sample was collected from the shared sump in Sectors 7 and 10.~~
4 This column illustrates the range of DAFs needed for each constituent.

Table 4-1
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2] (mg/l)	/	DAF[3]	$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	6.81E-06	=	0.0855	/	12,552	0.0056	0.05	Yes
Barium	0.07	1.16E-04	=	7.450	/	12,552	0.07	1.0	Yes
Benzene	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.005	Yes
Cadmium	0.001	7.97E-09	=	0.0001	/	12,552	0.001	0.01	Yes
Carbon tetrachloride	0.0025	1.99E-07	=	0.0025	/	12,552	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	1.0E-06	=	0.0126	/	12,552	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	3.98E-08	=	0.0005	/	12,552	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	1.99E-07	=	0.0025	/	12,552	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	1.99E-07	=	0.0025	/	12,552	0.0014	0.007	Yes
Endrin	0.00005	3.98E-09	=	0.00005	/	12,552	0.0001	0.0002	Yes
Fluoride	3.85	7.49E-05	=	0.94	/	12,552	3.85	4	Yes
Lindane	0.0005	1.99E-09	=	0.000025	/	12,552	0.0005	0.004	Yes
Lead	0.0075	1.99E-07	=	0.0025	/	12,552	0.0075	0.05	Yes
Mercury	0.0001	7.97E-09	=	0.0001	/	12,552	0.0001	0.002	Yes
Methoxychlor	0.00025	1.99E-08	=	0.00025	/	12,552	0.0003	0.1	Yes
Nitrate	3.6	3.98E-09	=	0.00005	/	12,552	3.6	10	Yes
Selenium	0.005	3.98E-08	=	0.0005	/	12,552	0.005	0.01	Yes
Silver	0.005	1.99E-08	=	0.00025	/	12,552	0.005	0.05	Yes
Toxaphene	0.0005	3.98E-08	=	0.0005	/	12,552	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.2	Yes
Trichloroethylene	0.0025	1.99E-07	=	0.0025	/	12,552	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	3.98E-08	=	0.0005	/	12,552	0.0005	0.01	Yes
Vinyl Chloride	0.001	7.97E-08	=	0.001	/	12,552	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.
2 Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
3 DAF value for Case II presented on Figure 3-7.

Table 4-2
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration [1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O [2]	/ DAF [3] (mg/l)	$C_{BG} + C_P = C_T$ [2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	4.0E-04	=	5.0	/12,552	0.006	0.05	Yes
Barium	0.07	8.0E-03	=	100.0	/12,552	0.078	1.0	Yes
Benzene	0.0005	6.5E-05	=	0.814	/12,552	0.001	0.005	Yes
Cadmium	0.001	8.0E-05	=	1.0	/12,552	0.001	0.01	Yes
Carbon tetrachloride	0.0025	4.0E-05	=	0.5	/12,552	0.003	0.005	Yes
Chromium (hexavalent)	0.010	4.0E-04	=	5.0	/12,552	0.010	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	8.0E-04	=	10.0	/12,552	0.091	0.1	Yes
1,4-Dichlorobenzene	0.001	6.0E-04	=	7.5	/12,552	0.002	0.075	Yes
1,2-Dichloroethane	0.0005	4.0E-05	=	0.5	/12,552	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	5.6E-05	=	0.7	/12,552	0.001	0.007	Yes
Endrin	0.00005	4.0E-06	=	0.05	/12,552	0.000	0.0002	Yes
Fluoride	3.85	--	=	--	/12,552	--	4	~~Yes~~ --
Lindane	0.0005	3.2E-05	=	0.4	/12,552	0.001	0.004	Yes
Lead	0.0075	4.0E-04	=	5.0	/12,552	0.008	0.05	Yes
Mercury	0.0001	1.6E-05	=	0.2	/12,552	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	--	/12,552	--	0.1	~~Yes~~ --
Nitrate[4]	3.6	--	=	--	/12,552	--	10	~~Yes~~ --
Selenium	0.005	8.0E-05	=	1.0	/12,552	0.005	0.01	Yes
Silver	0.005	4.0E-04	=	5.0	/12,552	0.005	0.05	Yes
Toxaphene	0.0005	4.0E-05	=	0.5	/12,552	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	--	/12,552	--	0.2	~~Yes~~ --
Trichloroethylene	0.0025	1.0E-04	=	1.3	/12,552	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	8.0E-05	=	1.0	/12,552	0.001	0.01	Yes
Vinyl Chloride	0.001	1.6E-05	=	0.2	/12,552	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.

2 C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

3 DAF value for Case II presented on Figure 3-7.

Table 5-1
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2]	/	DAF[3] (mg/l)	$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	8.81E-06	=	0.0855	/	9,702	0.0056	0.05	Yes
Barium	0.07	7.68E-04	=	7.450	/	9,702	0.07	1.0	Yes
Benzene	0.0005	2.58E-07	=	0.0025	/	9,702	0.0005	0.005	Yes
Cadmium	0.001	1.03E-08	=	0.0001	/	9,702	0.001	0.01	Yes
Carbon tetrachloride	0.0025	2.58E-07	=	0.0025	/	9,702	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	1.30E-06	=	0.0126	/	9,702	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	5.15E-08	=	0.0005	/	9,702	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	2.58E-07	=	0.0025	/	9,702	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	2.58E-07	=	0.0025	/	9,702	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	2.58E-07	=	0.0025	/	9,702	0.0014	0.007	Yes
Endrin	0.00005	5.15E-09	=	0.00005	/	9,702	0.0001	0.0002	Yes
Fluoride	3.85	9.69E-05	=	0.94	/	9,702	3.85	4	Yes
Lindane	0.0005	2.58E-09	=	0.000025	/	9,702	0.0005	0.004	Yes
Lead	0.0075	2.58E-07	=	0.0025	/	9,702	0.0075	0.05	Yes
Mercury	0.0001	1.03E-08	=	0.0001	/	9,702	0.0001	0.002	Yes
Methoxychlor	0.00025	2.58E-08	=	0.00025	/	9,702	0.0003	0.1	Yes
Nitrate	3.6	5.15E-09	=	0.00005	/	9,702	3.6	10	Yes
Selenium	0.005	5.15E-08	=	0.0005	/	9,702	0.005	0.01	Yes
Silver	0.005	2.58E-08	=	0.00025	/	9,702	0.005	0.05	Yes
Toxaphene	0.0005	5.15E-08	=	0.0005	/	9,702	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	2.58E-07	=	0.0025	/	9,702	0.0005	0.2	Yes
Trichloroethylene	0.0025	2.58E-07	=	0.0025	/	9,702	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	5.15E-08	=	0.0005	/	9,702	0.0005	0.01	Yes
Vinyl Chloride	0.001	1.03E-07	=	0.001	/	9,702	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.
2 Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
3 DAF value for Case II presented on Figure 3 in Appendix IIIB-C.

Table 5-2
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O[2] (mg/l)	/ DAF[3]	$C_{BG} + C_P = C_T$[2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	5.2E-04	=	5.0	/ 9,702	0.006	0.05	Yes
Barium	0.07	1.0E-02	=	100.0	/ 9,702	0.080	1.0	Yes
Benzene	0.0005	8.4E-05	=	0.814	/ 9,702	0.001	0.005	Yes
Cadmium	0.001	1.0E-04	=	1.0	/ 9,702	0.001	0.01	Yes
Carbon tetrachloride	0.0025	5.2E-05	=	0.5	/ 9,702	0.003	0.005	Yes
Chromium (hexavalent)	0.010	5.2E-04	=	5.0	/ 9,702	0.011	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	1.0E-03	=	10.0	/ 9,702	0.091	0.1	Yes
1,4-Dichlorobenzene	0.001	7.7E-04	=	7.5	/ 9,702	0.002	0.075	Yes
1,2-Dichloroethane	0.0005	5.2E-05	=	0.5	/ 9,702	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	7.2E-05	=	0.7	/ 9,702	0.001	0.007	Yes
Endrin	0.00005	5.2E-06	=	0.05	/ 9,702	0.000	0.0002	Yes
Fluoride	3.85	--	=	--	/ 9,702	--	4	~~Yes~~--
Lindane	0.0005	4.1E-05	=	0.4	/ 9,702	0.001	0.004	Yes
Lead	0.0075	5.2E-04	=	5.0	/ 9,702	0.008	0.05	Yes
Mercury	0.0001	2.1E-05	=	0.2	/ 9,702	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	--	/ 9,702	--	0.1	~~Yes~~--
Nitrate[4]	3.6	--	=	--	/ 9,702	--	10	~~Yes~~--
Selenium	0.005	1.0E-04	=	1.0	/ 9,702	0.005	0.01	Yes
Silver	0.005	5.2E-04	=	5.0	/ 9,702	0.006	0.05	Yes
Toxaphene	0.0005	5.2E-05	=	0.5	/ 9,702	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	--	/ 9,702	--	0.2	~~Yes~~--
Trichloroethylene	0.0025	1.3E-04	=	1.3	/ 9,702	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	1.0E-04	=	1.0	/ 9,702	0.001	0.01	Yes
Vinyl Chloride	0.001	2.1E-05	=	0.2	/ 9,702	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.

2 C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

3 DAF value for Case II presented on Figure 3 in Appendix IIIB-C.

Table 6-3
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2] / DAF[3] (mg/l)	$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	2.3E-05~~6~~	=	0.0855 / 3,656	0.0056	0.05	Yes
Barium	0.07	2.0E-03	=	7.450 / 3,656	0.07	1.0	Yes
Benzene	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.005	Yes
Cadmium	0.001	2.7E-08	=	0.0001 / 3,656	0.001	0.01	Yes
Carbon tetrachloride	0.0025	6.8E-07	=	0.0025 / 3,656	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	3.4E-06	=	0.0126 / 3,656	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	1.4E-07	=	0.0005 / 3,656	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	6.8E-07	=	0.0025 / 3,656	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	6.8E-07	=	0.0025 / 3,656	0.0014	0.007	Yes
Endrin	0.00005	1.4E-08	=	0.00005 / 3,656	0.0001	0.0002	Yes
Fluoride	3.85	2.6E-04	=	0.94 / 3,656	3.85	4	Yes
Lindane	0.0005	6.8E-09	=	0.000025 / 3,656	0.0005	0.004	Yes
Lead	0.0075	6.8E-07	=	0.0025 / 3,656	0.0075	0.05	Yes
Mercury	0.0001	2.7E-08	=	0.0001 / 3,656	0.0001	0.002	Yes
Methoxychlor	0.00025	6.8E-08	=	0.00025 / 3,656	0.0003	0.1	Yes
Nitrate	3.6	1.4E-08	=	0.00005 / 3,656	3.6	10	Yes
Selenium	0.005	1.4E-07	=	0.0005 / 3,656	0.005	0.01	Yes
Silver	0.005	6.8E-08	=	0.00025 / 3,656	0.005	0.05	Yes
Toxaphene	0.0005	1.4E-07	=	0.0005 / 3,656	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.2	Yes
Trichloroethylene	0.0025	6.8E-07	=	0.0025 / 3,656	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	1.4E-07	=	0.0005 / 3,656	0.0005	0.01	Yes
Vinyl Chloride	0.001	2.7E-07	=	0.001 / 3,656	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.
2 Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
3 DAF value for Case II presented on Figure 6 in Appendix IIIB-D.

Table 6-4
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O[2] (mg/l)	/ DAF[3]	C_{BG} + C_P = C_T[2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	1.4E-03	=	5.0	/ 3,656	0.007	0.05	Yes
Barium	0.07	2.7E-02	=	100.0	/ 3,656	0.097	1.0	Yes
Benzene	0.0005	2.2E-04	=	0.814	/ 3,656	0.001	0.005	Yes
Cadmium	0.001	2.7E-04	=	1.0	/ 3,656	0.001	0.01	Yes
Carbon tetrachloride	0.0025	1.4E-04	=	0.5	/ 3,656	0.003	0.005	Yes
Chromium (hexavalent)	0.010	1.4E-03	=	5.0	/ 3,656	0.011	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	2.7E-03	=	10.0	/ 3,656	0.093	0.1	Yes
1,4-Dichlorobenzene	0.001	2.1E-03	=	7.5	/ 3,656	0.003	0.075	Yes
1,2-Dichloroethane	0.0005	1.4E-04	=	0.5	/ 3,656	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	1.9E-04	=	0.7	/ 3,656	0.002	0.007	Yes
Endrin	0.00005	1.4E-05	=	0.1	/ 3,656	0.000	0.0002	Yes
Fluoride	3.85	--	=	--	/ 3,656	--	4	~~Yes~~--
Lindane	0.0005	1.1E-04	=	0.4	/ 3,656	0.001	0.004	Yes
Lead	0.0075	1.4E-03	=	5.0	/ 3,656	0.009	0.05	Yes
Mercury	0.0001	5.5E-05	=	0.2	/ 3,656	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	--	/ 3,656	--	0.1	~~Yes~~--
Nitrate[4]	3.6	--	=	--	/ 3,656	--	10	~~Yes~~--
Selenium	0.005	2.7E-04	=	1.0	/ 3,656	0.005	0.01	Yes
Silver	0.005	1.4E-03	=	5.0	/ 3,656	0.006	0.05	Yes
Toxaphene	0.0005	1.4E-04	=	0.5	/ 3,656	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	--	/ 3,656	--	0.2	~~Yes~~--
Trichloroethylene	0.0025	3.6E-04	=	1.3	/ 3,656	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	2.7E-04	=	1.0	/ 3,656	0.001	0.01	Yes
Vinyl Chloride	0.001	5.5E-05	=	0.2	/ 3,656	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.

2 C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

3 DAF value for Case II presented on Figure 6 in Appendix IIIB-D.

APPENDIX IIIB-D

ALTERNATIVE LINER POINT OF COMPLIANCE DEMONSTRATION

Includes pages IIIB-D-1 through IIIB-D-64~~1~~

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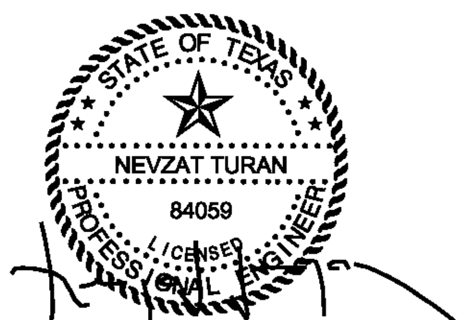
CONTENTS



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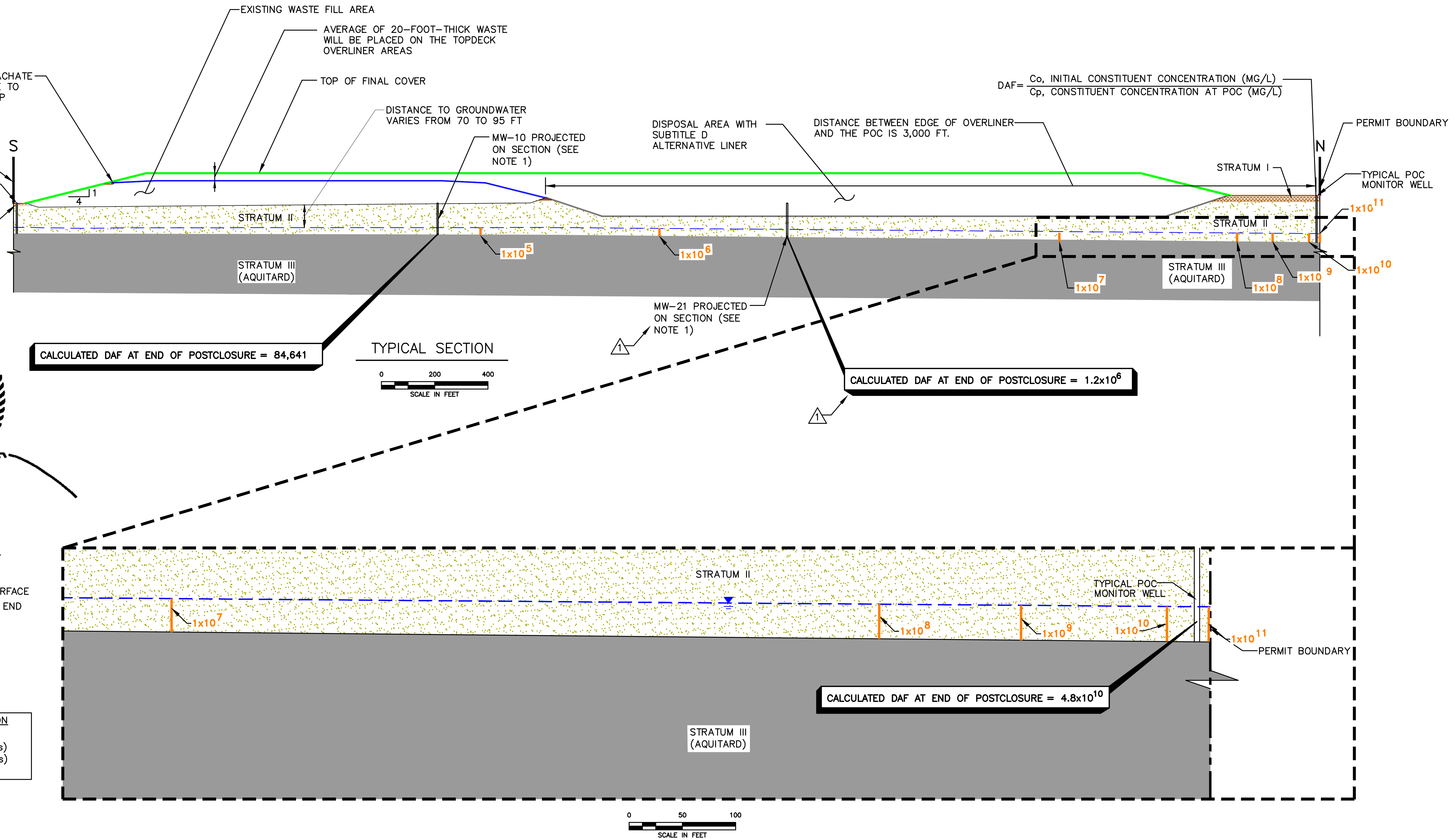
HELP MODEL ANALYSIS



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LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- GROUNDWATER SURFACE
- 1x10^6 DAF CONTOUR AT END OF POSTCLOSURE

SUBSURFACE SOILS INFORMATION
STRATUM II
(HORIZ. $K_{MAX}=2.08\times10^{-3}$ cm/s)
(VERT. $K_{MAX}=2.08\times10^{-3}$ cm/s)
STRATUM III (AQUITARD)

NOTE 2

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

1 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. ADDED MW-21.
2. UPDATED NOTE 1.

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 05/2024
FILE: 0120-094-11
CAD: FIG 3-TYP SECTION.dwg

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: KDG

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	01/2025	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
CASE I – NORTH

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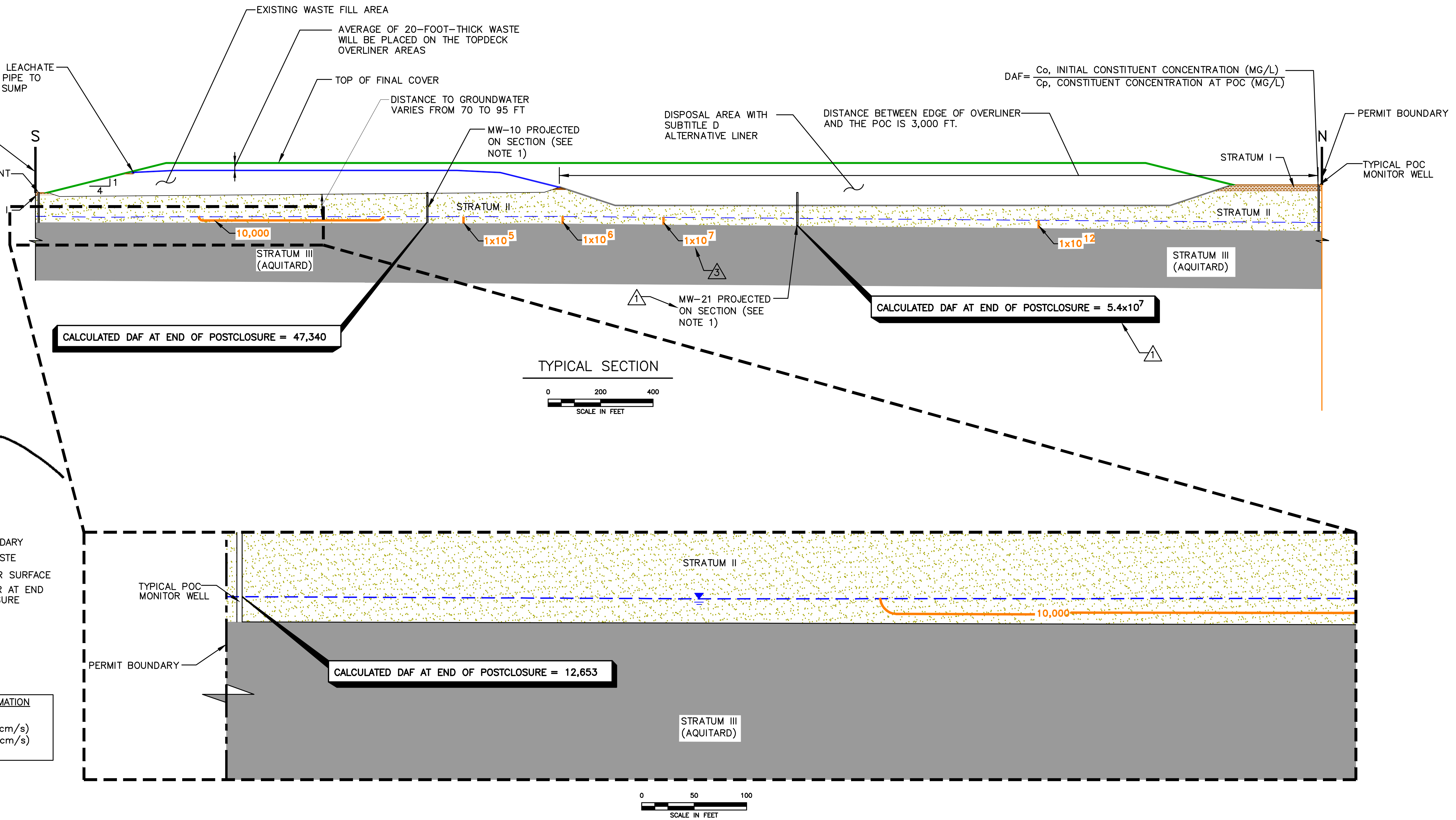
FIGURE 3

SHEET IIIB-D-4



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LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- GROUNDWATER SURFACE
- 10,000 DAF CONTOUR AT END OF POSTCLOSURE

SUBSURFACE SOILS INFORMATION
STRATUM II
(HORIZ. K_{MAX}=2.08x10^{-3} cm/s)
(VERT. K_{MAX}=2.08x10^{-3} cm/s)
STRATUM III (AQUITARD)

NOTE 2

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

1 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. ADDED MW-21.
2. UPDATED NOTE 1.
3. UPDATED DAF CONTOUR.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 05/2024
FILE: 0120-094-11
CAD: FIG 3-7-TYP SECTION.dwg

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: KDG

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CASE II

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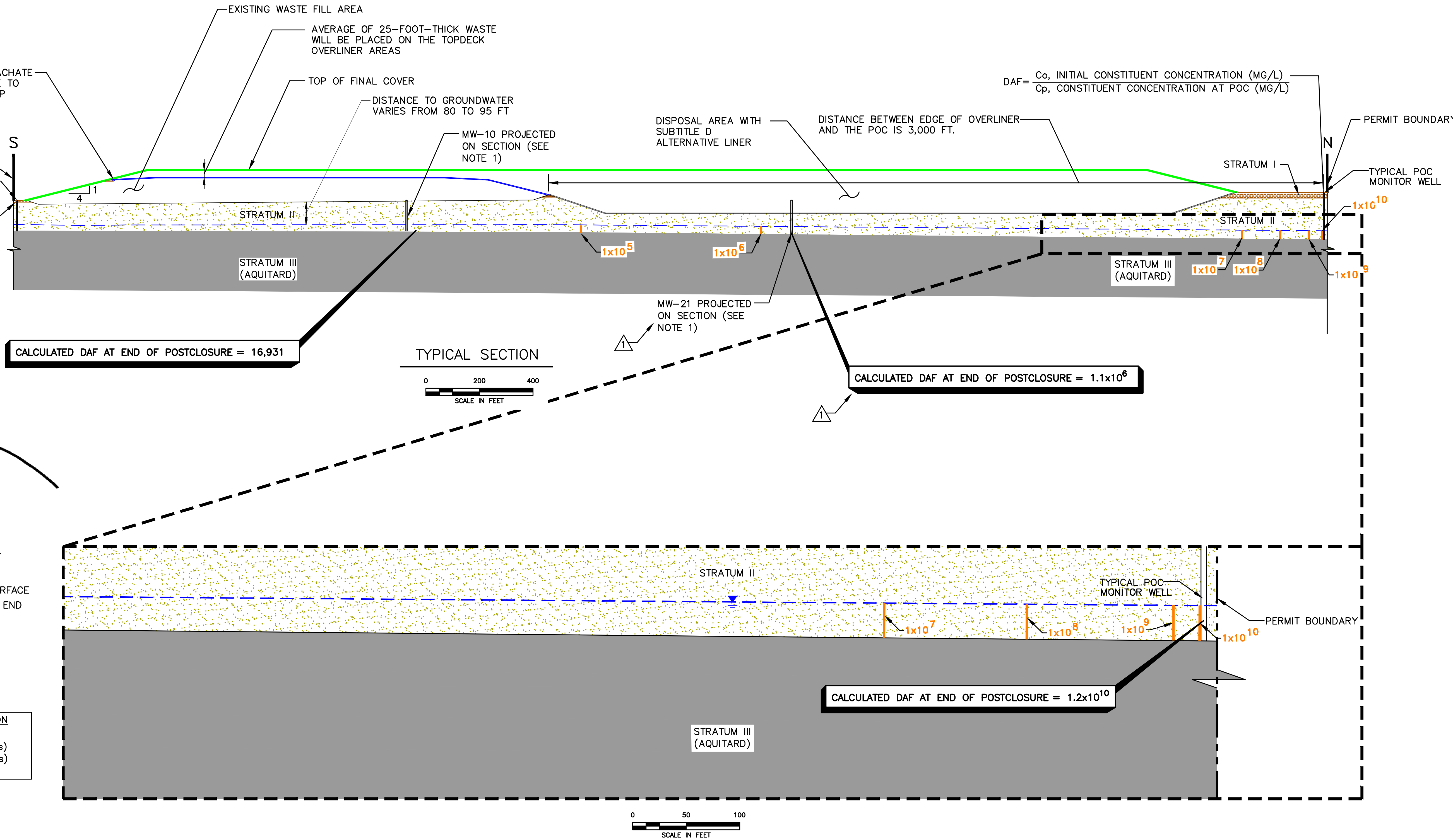
FIGURE 4

SHEET IIIB-D-5



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84059
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01/30/2025

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- GROUNDWATER SURFACE
- $1x10^6$ DAF CONTOUR AT END OF POSTCLOSURE

SUBSURFACE SOILS INFORMATION
STRATUM II
(HORIZ. K_{MAX}=2.08x10^{-3} cm/s)
(VERT. K_{MAX}=2.08x10^{-3} cm/s)
STRATUM III (AQUITARD)

NOTE

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

1 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. ADDED MW-21.
2. UPDATED NOTE 1.

SHEET IIIB-D-6

- [ ] DRAFT
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DATE: 05/2024
FILE: 0120-094-11
CAD: FIG 5-TYP SECTION.dwg

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: KDG

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NO.	DATE	DESCRIPTION
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MAJOR PERMIT AMENDMENT
CASE III

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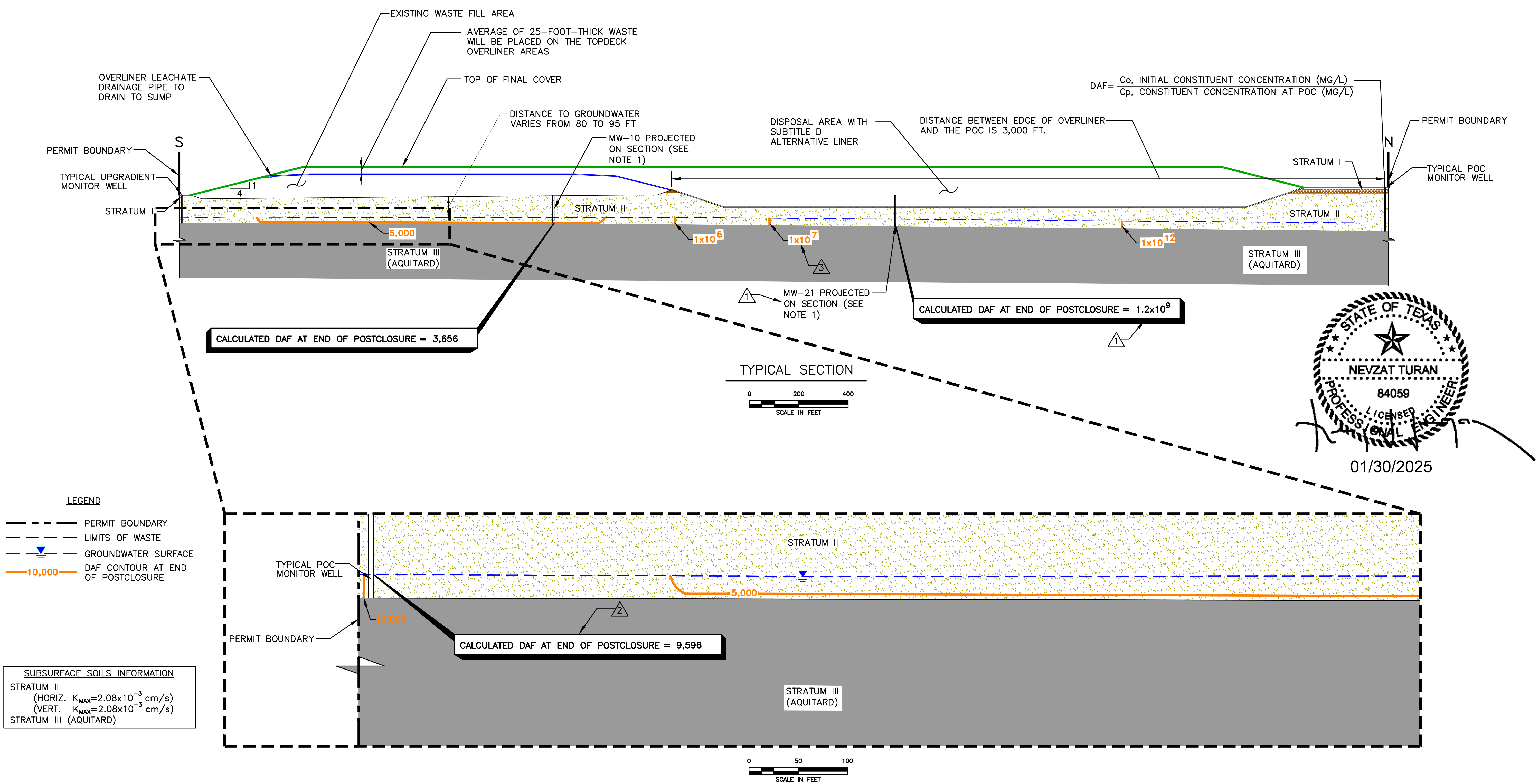
FIGURE 5

O:\0120\94\LSMPA 2024\PART III\IIIB\FIG 5-TYPICAL SECTION.dwg, byoung, 1:2



NOTE

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

1 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. ADDED MW-21.
2. UPDATED NOTE 1.
3. UPDATED DAF CONTOUR.

SHEET IIIB-D-7

☐ DRAFT ☒ FOR PERMITTING PURPOSES ONLY ☐ ISSUED FOR CONSTRUCTION	PREPARED FOR SOUTHWEST LANDFILL TX, LP		MAJOR PERMIT AMENDMENT CASE IV
DATE: 05/2024 FILE: 0120-094-11 CAD: FIG 6-TYP SECTION.dwg	DRAWN BY: JDW DESIGN BY: BPY REVIEWED BY: KDG	REVISIONS NO. 1 · DATE 01/2025 · DESCRIPTION SEE LIST OF REVISIONS	SOUTHWEST LANDFILL RANDALL COUNTY, TEXAS
Weaver Consultants Group TBPE REGISTRATION NO. F-3727			WWW.WCGRP.COM · FIGURE 6

O:\0120\94\LSMPA 2024\PART III\IIIB\FIG 6-TYPICAL SECTION.dwg, byoung, 1:2

ADDITIONAL DEMONSTRATIONS

ADDITIONAL DEMONSTRATIONS

The purpose of modeling the following additional demonstrations is to evaluate the alternative liner POC demonstrations shown in Figures 3 through 6 under various conditions, that includes varying groundwater gradients, minimum and maximum observed hydraulic conductivities, and assuming that the alternative liner leachate collection system does not function as designed allowing a buildup of 12 inches of head on the liner system.

Groundwater Gradients Demonstration

The groundwater elevation maps from the semi-annual groundwater reports, provided by Hydrex Environmental from June 2020 through June 2024, were analyzed to assess changes in groundwater gradients over time. The groundwater gradients vary from 0.0053 ft/ft to 0.0056 ft/ft along Section A, which is shown on Figure 3-2 in Appendix IIIB. The Case III model presented on Figure 5 in Appendix IIIB-D was chosen for this evaluation as the demonstration represents the lowest DAF under expected groundwater flow conditions (i.e., groundwater flow toward north). Case III was run with a gradient of 0.0058 which represents the maximum gradient observed. An additional run with a gradient of 0.0052 was run to represent the minimum gradient. The results are presented in Table 1 below which show the design is complainant with §330.311(a)(1).

Table 1
Groundwater Gradients Demonstration Results

Case	Groundwater Gradient (ft/ft)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case III	0.0058	16,031	260	Yes
	0.0052	12,704	260	Yes

[1] For each model, the groundwater well with the lowest calculated DAF is shown in the table.

Additionally, the Case IV model presented on Figure 6 in Appendix IIID artificially reverses the groundwater flow to the south using a conservative gradient of 0.0029. This condition results in a DAF of 3,656 which is presented on Figure 6 in Appendix IIIB-D.

Hydraulic Conductivity Demonstration

The minimum and maximum observed hydraulic conductivities in Stratum II were analyzed to assess the impacts of hydraulic conductivity on the modeled concentrations. As shown in Tables 4-3 and 4-4 in Appendix IIIG, the maximum hydraulic conductivity is 2.08×10^{-3} cm/s while the minimum is 2.45×10^{-5} cm/s within Stratum II. Case III, presented in Figure 5 in Appendix IIIB-D, was chosen for this evaluation. The results are presented in Table 2 below which show the design is complainant with §330.311(a)(1).

Table 2
Minimum and Maximum observed Hydraulic conductivity Demonstration Results

Case	Hydraulic Conductivity (cm/sec)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case III	2.08×10^{-3}	16,031	260	Yes
	2.45×10^{-5}	20,666	260	Yes

[1] For each model, the groundwater well with the lowest calculated DAF is shown in the table.

Non-functioning Leachate Collection System Demonstration

This demonstration modifies Case IV in Appendix IIIB-D to assume that the alternative liner leachate collection system does not function as designed and allows a buildup of 12 inches of head on the alternative liner and overliner systems, which will increase the percolation rate in these areas. The assumed leakage through the overliner calculations on Page IIIB-C-1 was applied to the alternative liner areas. The calculation assumes 12 inches of head on the liner and 4 defects per acre for a resulting percolation of 0.066 mm/yr. The results are presented in Table 3 below which show the design is complainant with §330.311(a)(1).

Table 3
Non-functioning Leachate Collection System Demonstration Results

Case	Percolation[2] (mm/yr)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case IV	0.066	1,466	260	Yes

1 For each model, the groundwater well with the lowest calculated DAF is shown in the table.
2 The percolation is applied to both overliner and alternative liner areas.

Summary

Therefore, the demonstration supports the fact that the site design is in compliance with the POC requirements specified in Title 30 TAC §330.331.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663C

LIMITED SCOPE MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN

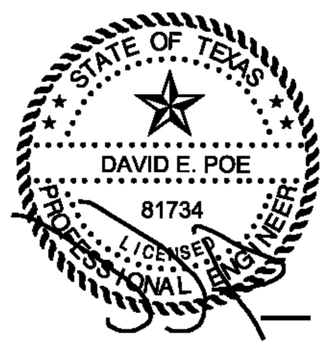
APPENDIX IIIE

Prepared for

Southwest Landfill TX, LP

TCEQ Approved February 20, 2020

Revised February 2025



01/30/2025

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-094-11-140

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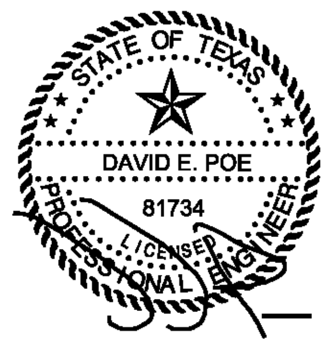
CONTENTS (Continued)



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TABLES

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2. Simplified Bishop Method – This method uses the method of slices to discretize the soil mass for determining the factor of safety.

In general, the stability of various critical sections were analyzed under static condition for short-term (excavation and construction) and long-term (after construction) safety. The slope stability analyses are provided in Appendix IIIE-A. The stability of the various liner and final cover configurations with the geosynthetic components were also evaluated by using infinite slope stability analysis (refer to Appendix IIIE-A).

The stability analysis has been developed using demonstrations showing that, for each analyzed section, the forces resisting movement of the slopes are higher than the forces that potentially create movement. Therefore, the ratio of forces resisting movement to the forces potentially creating movement is defined as the factor of safety (FS). When the FS is equal to or greater than 1.0, it means that the slope is stable. In the slope stability analysis a factor of safety greater than 1.0 is desired. The FS value is increased for the increased uncertainty for the system analyzed. A factor of safety of 1.5 has been used for slopes that will stay in place long term, including interim and final cover configurations subjected to effective (rotational failure) and peak (translational or block failure) conditions. A factor of safety of 1.3 is acceptable for total stress conditions that will be in place for a short period of time such that pore pressures cannot fully dissipate and including both interim and final conditions. A factor of safety of 1.1 is acceptable for analyses performed incorporating residual stress.

5.2 Sections Selected for Analysis

Slope stability analyses were performed on critical sections to evaluate the stability of the excavation, interim fill, overliner, and final cover configuration slopes. The geometries of the slopes analyzed were determined by reviewing the proposed excavation plan and final contour plan. The evaluation locations were selected to analyze critical slopes consisting of profiles that include the landfill configuration as well as natural materials at the toe and below the landfill excavation. The interim fill slope was analyzed using an assumed profile as discussed in Section 4.3. Figures showing the location of the cross sections are included in Appendix IIIE-A (refer to Appendix IIIE-A-1 for the excavation slope stability analysis, Appendix IIIE-A-2 for the interim condition slope stability analysis, and Appendix IIIE-A-3 for the final landfill slopes stability analysis, including overliner stability analysis).

5.3 Configurations Analyzed

The excavation, interim, overliner, and final landfill configurations were modeled to represent critical slope conditions, and the analysis was performed using circular and block failure surfaces. The maximum final fill and overliner slopes will be 4 horizontal to 1 vertical (4H:1V), while interim slopes, liner slopes, and excavation slopes will be as steep as 3H:1V. The excavation, liner, and interim fill slopes were analyzed with a slope angle of 3H:1V and a 4H:1V final side slope was used to evaluate final cover and overliner. A copy of the top of liner plan and final completion plan showing the locations of the cross sections selected for analysis are included in Appendix IIIE-A. Additionally, the configurations analyzed are graphically illustrated in Appendix IIIE-A. The interim condition was analyzed considering a 3H:1V slope with a horizontal length of approximately ~~590~~575 feet. If the horizontal length of actual interim slopes longer than ~~590~~575 feet is developed during site operations, an additional analysis will be completed at that time and maintained in the Site Operating Record.

5.4 Input Parameters

The cross sections for slope stability analysis were developed from the proposed excavation plan and the landfill completion plan (see Drawings A.1 and A.5 in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details). The soil parameters were selected based on a review of the boring logs and laboratory test results from the subsurface investigation studies at the site and upon engineering judgment and experience with similar materials. The groundwater surface indicated in the analysis is obtained from Appendix IIIG-Geology Report (Figure IIIG-D-14) and represents the highest measured groundwater levels. Table 5-1 summarizes the unit weights and strength parameters used for the stability analyses for the evaluated landfill slopes (excavation, interim, overliner, and final cover slopes).

Table 5-1 (Continued)
Summary of Material Weight and Strength Parameters Used in the Slope Stability Analysis

Strength Parameters – Solid Waste

Material Strength Parameters: Cohesion (lb/ft²)	Friction Angle (degrees)	Unit Weight (lb/ft³)	Interface Strength Parameters: Adhesion (lb/ft²)	Friction Angle (degrees)
288	23	59	Interface strength parameters are not applicable to the solid waste layer because the interface between the waste and final cover and overliner systems is not a critical interface.	

Comments: See comments listed under Solid Waste above.

Strength Parameters – Liner System

Material	Cohesion (lb/ft²)	Friction Angle (degrees)	Unit Weight (lb/ft³)	Interface	Adhesion (lb/ft²)	Friction Angle (degrees)
Protective Cover			120	Floor Grades	0	22
Effective Stress	100	16				
Total Stress	1,000	0				
Liner System (Typical)			120	3H:1V Sideslope	100	16
Effective Stress	100	16				
Total Stress	1,000	0				
Liner System (Translational Block Analysis)				Peak Stress		
				Floor Grades	188	11
				3H:1V Sideslope	200	15
				Residual Stress		
				Floor Grades	188	9
				3H:1V Sideslope	80	10
				Total Stress		
				Floor Grades	1000	0
				3H:1V Sideslope	1000	0

Comments:

The liner system includes a 2-foot-thick compacted clay (compacted clay is 3 feet thick for the Class 1 liner) layer, 60-mil geomembrane (smooth geomembrane on the floor of the landfill and textured on the 3H:1V sideslopes), drainage geocomposite (single-sided on floor grades and double-sided on 3H:IV sideslopes), and a 2-foot-thick protective cover soil layer. This system is modeled as two layers for the global stability analysis: the 3-foot-thick compacted clay liner and the soil protective cover. In addition, both a translational and an infinite stability analysis were performed to establish the minimum interface strength requirements for each layer of the liner system. The minimum interface strength requirements are specified in Appendix IIID.

For the rotational global stability analysis, the liner system is modeled as two layers: the compacted clay liner and the soil protective cover layer. The two geosynthetic layers are not included in the global analysis because they provide a negligible contribution to the forces that are resisting movement. The strength values selected for the liner system represent strength values typically used in the industry and these same strength values have been used in various permit applications approved by TCEQ. Duncan and Wright (2005) provides a comprehensive discussion regarding strength parameters for a liner system. In Chapter 5 – Shear Strengths of Soil and Municipal Solid Waste, a significant amount of data are presented and evaluated for compacted clay liners. The results indicate that the lowest cohesion value for compacted cohesive soils is 9 kPa (187 lb/ft²) and the lowest reported friction angle value is 19 degrees. Therefore, selected values of 100 lb/ft² for cohesion and 16 degrees of friction angle conservatively represent the liner system. Soil properties used in the slope stability analysis are subject to verification at the time of each liner construction. Section 2.4.3 in Appendix IIID – LQCP includes the material strength tests required for soil used for liner construction. Protective cover and compacted clay liner soil unit weight values are based on experience with liner system construction. The global stability analysis is included in Appendices IIIE-A-1 and IIIE-A-3.

The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure by Duncan, Buchianani, and De Wet for the liner system, was developed to show that certain landfill components that are placed on top of each other, such as a geomembrane and compacted clay layer will not experience sliding failure due to the lack of strength between these components. The interface strength values presented in this table represent compacted clay liner internal on the sideslopes, and smooth geomembrane and compacted clay liner interface on floor grades. These strength values represent the interfaces with the lowest strength at the floor and sideslopes (refer to Appendix IIIE-A-4 for the complete evaluation of interfaces that will occur for the liner system 3H:1V sideslope and the bottom liner interface strength value is obtained from the document referenced in this paragraph). The strength parameters were developed using materials from Geosynthetic Research Institute (GRI) publications (e.g., "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces" by George R. Koerner, GRI, Folsom, PA, June 14, 2005). Although the strength parameters (i.e., adhesion and interface friction) used for the application were selected based on published data, it should be noted that these strength parameters will also be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIID). As noted in Appendix IIID, Table 6-1, the strength parameters listed are for the interfaces with the lowest strength parameters to provide for a conservative design.

The translational slope stability analysis was performed using simplified Janbu Method using the Rankine Blocks. This analysis is similar to the interface slope stability analysis discussed above. The purpose of this analysis is to test the critical interfaces under a variety of loading conditions (refer to Appendices IIIE-A-1, IIIE-A-2, and IIIE-A-3 for more information – i.e., the loading conditions reflect different landfill configurations). XSTABL is also used for this analysis. However, for the translational analysis, the liner system strength parameters are modified to reflect the interface strength parameters. The translational stability analysis uses modified liner system strength parameters to reflect the interface strength parameters. As noted above, these strength parameters will also be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design.

[1] Liners on the sideslopes and floor grades are listed separately due to different strength characteristics for clay/smooth geomembrane and clay/textured geomembrane interfaces. The overliner was modeled with clay/textured geomembrane interface for sideslope and top deck areas.

Table 5-3
Summary of Slope Stability Analysis for
Intermediate Cover Slopes

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated[1, 2]		Factor of Safety Acceptable	
		Peak / Effective Stress	**Residual / Total Stress**	**Peak / Effective**	**Residual / Total**
		1.5	**~~1.5~~ 1.1/1.3**		
Interim Fill Slope A-1	Bishop-Circular	~~1.56~~1.60 (effect)	~~1.60~~1.56 (total)	YES	YES
Interim Fill Slope A-2	Rankine-Block	~~1.42~~1.53 (peak)	~~1.42~~1.44 (residual)	YES	YES
Interim Fill Slope A-2	Rankine-Block	--	1.30 (total)	YES	YES

[1] Factor of Safety for temporary slopes is 1.5.
[2] Block analysis performed for peak and residual stresses.
[3] Recommended Minimum Factor of Safety for stability analysis using peak stress is 1.5 and residual stress is 1.1.
[4] Interim slope stability analyses were developed for the 2025 LSMPA to incorporate a revised maximum horizontal length of slope of 575 feet at a 3H:1V maximum outer slope.

Computer-generated slope stability analysis output is included in Appendix IIIE-A. As shown in Table 5-2, the minimum calculated factor of safety for excavation, liner, and interim slopes is 1.56, which is an acceptable factor of safety recommended for short-term slope stability. Long-term landfill slope stability has been estimated for the closed (final cover and overliner) condition. The minimum calculated factor of safety for the closed condition is 1.61, which is higher than the recommended factor of safety of 1.5 for long-term slope stability.

5.5.2 Infinite Slope Stability Analysis

Infinite slope stability analysis for the liner and final cover systems has been included in this design in addition to block method analysis (i.e., Rankine Block) discussed in the previous section. The infinite liner and overliner stability analyses address anchor trench design, stability of cover and drainage material on anchored geosynthetics, and shear forces within the liner system. The infinite final cover slope stability analysis addresses the shear forces within the final cover system. These calculations are presented in Appendix IIIE-A-4. As demonstrated in Appendix IIIE-A-4, the liner and cover systems are structurally stable using the strength parameters, which will be verified during each construction event. Prior to each construction event for liner, overliner, and final cover, the POR will perform interface strength testing using the actual material that will be used for each construction event.

Table 5-4
Summary of Slope Stability Analysis for the Final Landfill Configuration

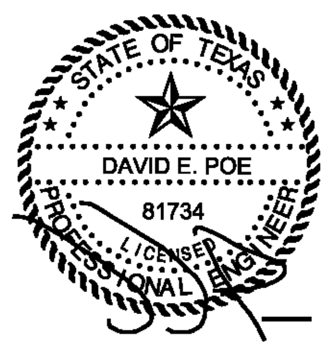
Slope Designation	Method of Analysis	Minimum Factor of Safety Generated[1,2]		Acceptable Factor of Safety	
		Total / Effective Stress	Residual / Total Stress	Peak / Effective	Residual / Total
Final Cover Slope A-1	Bishop-Circular	2.43 (effect)	2.38 (total)	YES	YES
Final Cover Slope A-2	Rankine-Block[3]	2.23 (peak)	2.09 (residual)	YES	YES
Final Cover Slope A-2	Rankine-Block[3]	--	2.05 (total)	YES	YES
Final Cover Slope B-1	Bishop-Circular	2.26 (effect)	2.27 (total)	YES	YES
Final Cover Slope B-2	Rankine-Block	2.67 (peak)	2.55 (residual)	YES	YES
Final Cover Slope B-2	Rankine-Block	--	2.81 (total)	YES	YES
Final Cover Slope C-1	Bishop-Circular	2.62 (effect)	2.69 (total)	YES	YES
Final Cover Slope C-2	Rankine-Block	4.05 (peak)	3.96 (residual)	YES	YES
Final Cover Slope C-2	Rankine-Block	--	3.86 (total)	YES	YES
Final Cover Slope D-1	Bishop-Circular	2.62 (effect)	2.71 (total)	YES	YES
Final Cover Slope D-2	Rankine-Block	3.1 (peak)	2.71 (residual)	YES	YES
Final Cover Slope D-2	Rankine-Block	--	2.79 (total)	YES	YES
Overliner Slope A-1	Bishop-Circular	2.61 (effect)	2.71 (total)	YES	YES
Overliner Slope A-2	Rankine-Block	2.17 (peak)	1.72 (residual)	YES	YES
Overliner Slope A-2	Rankine-Block	--	2.39 (total)	YES	YES
Overliner Slope B-1	Bishop-Circular	2.35 (effect)	2.35 (total)	YES	YES
Overliner Slope B-2	Rankine-Block	3.27 (peak)	3.06 (residual)	YES	YES
Overliner Slope B-2	Rankine-Block	--	3.49 (total)	YES	YES
Overliner Slope C-1	Bishop-Circular	2.55 (effect)	2.56 (total)	YES	YES
Overliner Slope C-2	Rankine-Block	2.05(residual)	1.61 (residual)	YES	YES
Overliner Slope C-2	Rankine-Block	--	2.26 (total)	YES	YES
Overliner Slope D-1	Rankine-Block	6.19 (residual)	4.41 (residual)	YES	YES
Overliner Slope D-1	Rankine-Block	--	15.5 (total)	YES	YES

1 Recommended Minimum Factor of Safety for long term stability analysis using effective stress is 1.5 and short term stability analysis using total stress is 1.3.
2 Recommended Minimum Factor of Safety for stability analysis using peak stress is 1.5 and residual stress is 1.1.
3 Rankine Block analysis uses interface strength values where applicable.

APPENDIX IIIE-A

SLOPE STABILITY ANALYSIS

Includes page IIIE-A-1

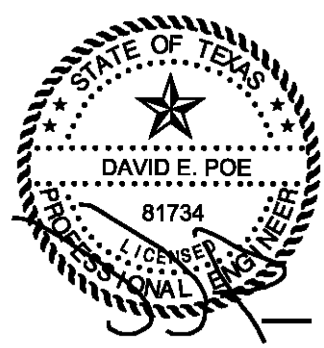


01/30/2025

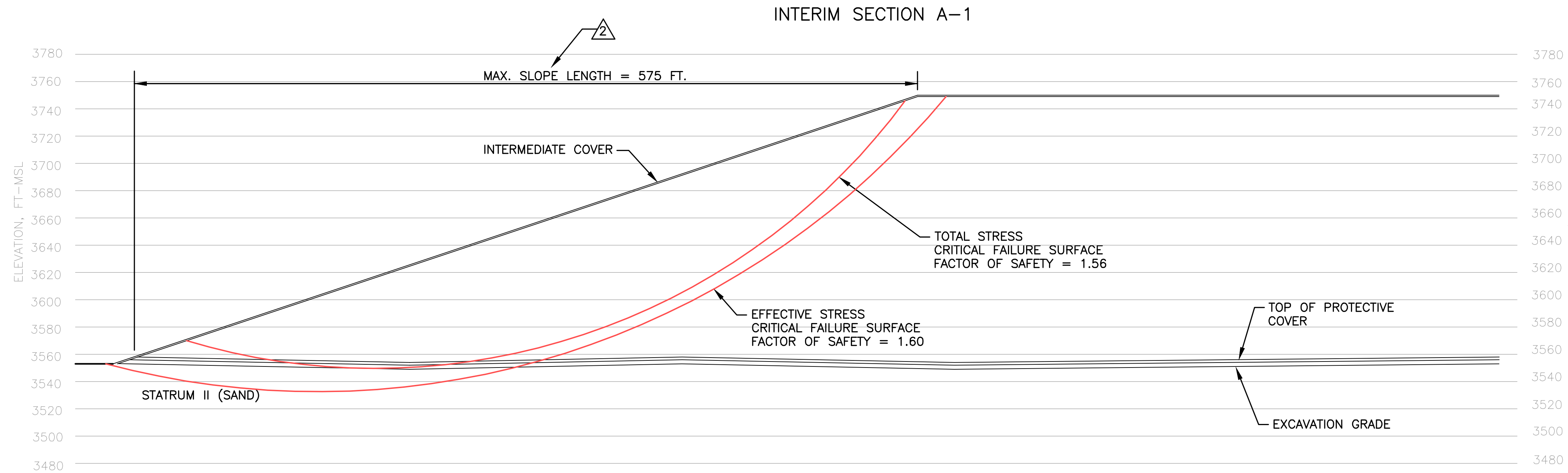
APPENDIX IIIE-A-2

INTERIM LANDFILL CONFIGURATION STABILITY ANALYSIS

Includes pages IIIE-A-2-1 through IIIE-A-2-~~39~~49



01/30/2025



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IIIE–A–2–3 IIIE–A–2–4
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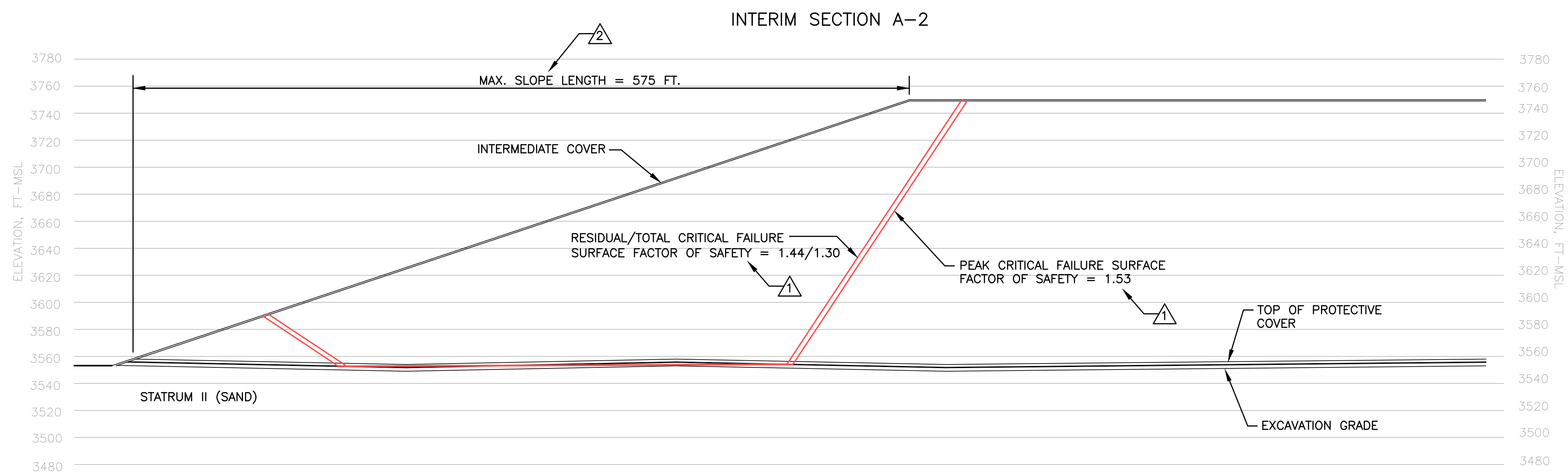
SCALE IN FEET

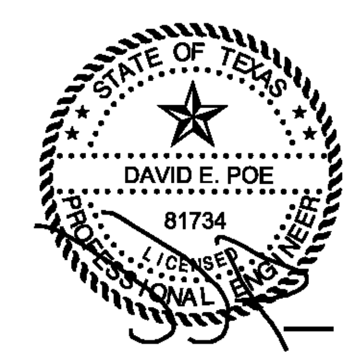


1 INDICATES REVISION (SEE LIST OF REVISIONS)

SECTION
A–2 TRANSLATIONAL
A
IIIE–A–2–3 IIIE–A–2–4
0 50 100
SCALE IN FEET

LIST OF REVISIONS:

1. UPDATED BLOCK ANALYSIS FACTORS OF SAFETY.
2. ADDED MAX. SLOPE LENGTH.



01/30/2025

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 11/2017
FILE: 0120–094–11
CAD: IIA–E–A–2–4 SECTIONS.dwg

DRAWN BY: JDW
DESIGN BY: CCH
REVIEWED BY: DEP

Weaver Consultants Group
TBPE REGISTRATION NO. F–3727

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	05/2024	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
SLOPE STABILITY
INTERIM COVER SECTION A–A

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

WWW.WCGRP.COM

SHEET IIIE–A–2–4

O:\0120\94\LSMPA 2024\PART III\IIIE\A\IIIE–A–2–4 SECTIONS.dwg, byoung, 1:2

Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIE-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Stratum I (Clay)	122.5	--
Stratum I (Caliche)	121.9	--
Stratum II (Sand)	122.5	127.0
Stratum III (Shale)	138.4	139.0

The strength parameters for the in-situ soils were selected based on the following:

Stratum I (Clay and Caliche)

A triaxial shear tests was performed on Stratum I samples which resulted in cohesion and friction angle values listed in the table below. The values in the table will be used for both Clay and Caliche. Moist unit weight and saturated unit weight values are calculated from the dry unit weight, the moisture content, and the void ratio obtained from the triaxial shear test. These unit weight values conservatively compare to the average obtained from all laboratory testing performed on the material.

	Total Stress		Effective Stress	
	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-5	100	26.0	100	27.1

Stratum II (Sand)

Triaxial shear tests and direct shear tests were performed on the Stratum II (sand) samples which resulted in cohesion and friction angle values listed in the table below. Stratum II is modeled using a cohesion of 1,200 psf and a friction angle of 26.7° conservatively. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-3	1620 (total)	40.9 (total)	3020 (effective)	35.0 (effective)
Direct Shear Test WB-121	900 (residual)	26.9 (residual)	1200 (peak)	26.7 (peak)

Stratum III (Shale)

The slope stability analysis indicates no failure surface through this stratum as the top of this stratum is located a minimum of 74 feet below the elevation of the deepest excavation. The laboratory testing for shear strength is reported on page IIIE-18.

Material	Effective Stress		Total Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Stratum I (Clay)	100	26	100	27.1
Stratum I (Caliche)	100	26	100	27.1
Stratum II (Sand)	1,200	26.7	1,200	26.7
Stratum III (Shale)	500	33	5,000	0

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Clay Liner(1)	120	100	16
Protective Cover	120	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees (effective stress) and a cohesion of 1,000 psf and internal friction angle of 0 degrees (total stress) is used for the clay liner for simplified Bishop Method of the slope stability analysis.
2. For translational (block) stability analysis, the strength parameters of the weakest interface were used to model the liner. The values used for the interim slope stability analysis are highlighted in the table below titled "Minimum Required Interface Strength Values". Note that both total and residual stress analyses were performed for the translational analyses.

Solid waste data used in this analysis are listed below.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	59	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1,400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^{o}$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^{o}$ c = 460 psf (22 kPa) to $\phi = 39,^{o}$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^{o}$ to $43,^{o}$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIM.

Factor of Safety Summary for Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Total	Effective	Total	Effective	Total	Effective
Interim A-1	Bishop-Circular	~~1.56~~ 1.56	~~1.60~~ 1.60	1.5	~~1.5~~ 1.3	YES	YES

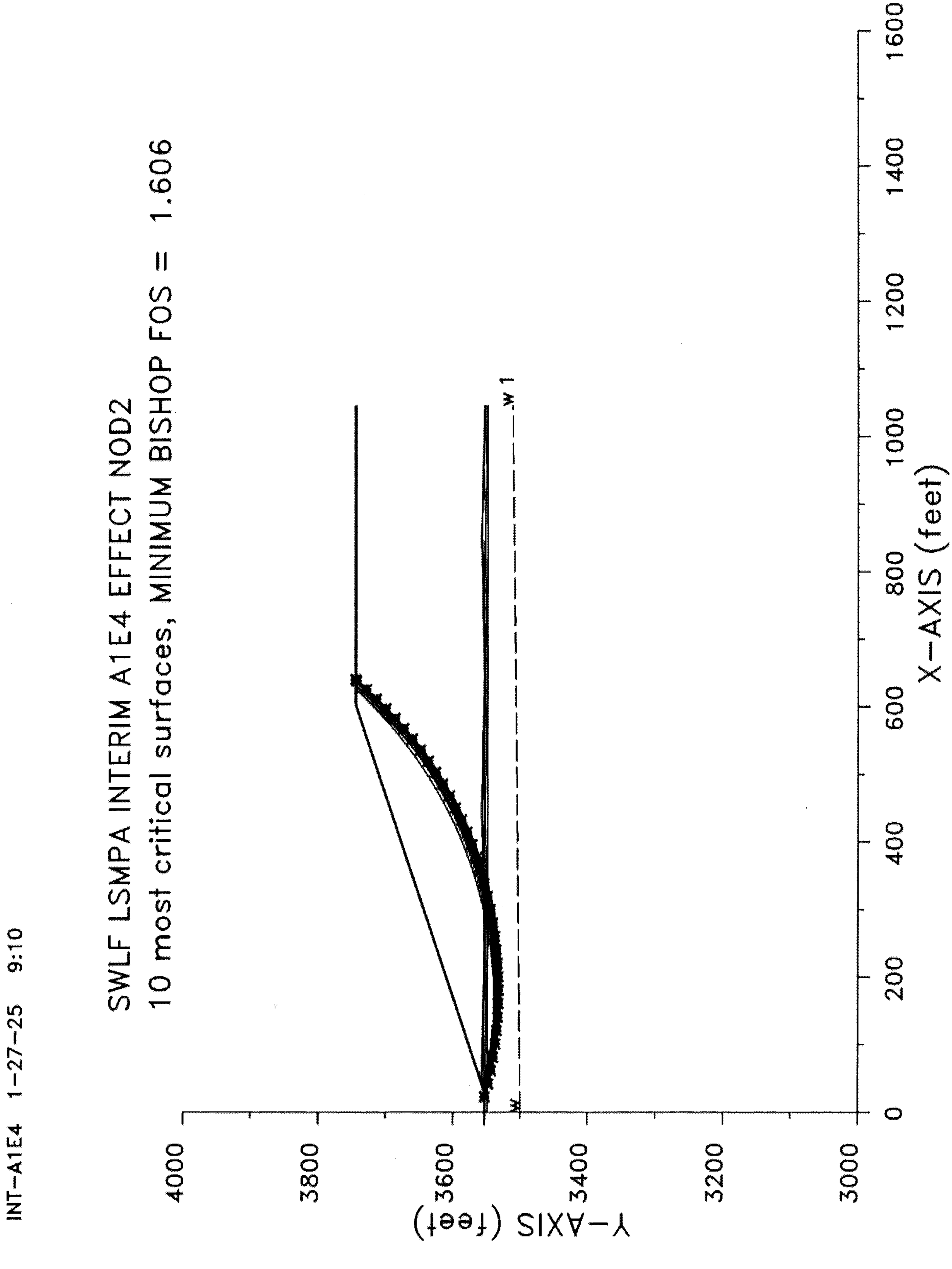
Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual/Total	Peak	Residual/ Total	Peak	Residual/ Total
Interm A-2	Rankine-Block	~~1.52~~ 1.53	~~1.42~~ 1.44 (Residual) 1.30 (Total)	1.5	1.1/1.3	YES	YES

Minimum Required Interface Strength Parameters

Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner	Protective Cover/Geocomposite	100	18	80	14
Liner (Note 1, 3)	***Geonet/Smooth Geomembrane***	***188***	***11***	***188***	***9***
Liner (Note 3)	Geonet/Textured Geomembrane	0	13	0	10
Liner	Geocomposite/Textured Geomembrane	100	21	80	10
Liner	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner (Note 2)	***Textured Geomembrane/Clay Liner***	***200***	***15***	***80***	***10***
Liner	Clay Internal	100	16	100	12
Liner	Smooth Geomembrane/Geosynthetic Clay Liner	100	16	80	10
Liner	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Liner	Geosynthetic Clay Liner Internal	100	24	380	11
Liner/Protective Cover (Note 4)	***Clay Internal/Protective Cover (Total Stress)***	***--***	***--***	***1000 (Total Only)***	***0 (Total Only)***

1. Interface parameters used for translational block analysis of cell floor.
2. Interface parameters used for translational block analysis of cell sideslope (3H:1V typical).
3. Interface parameters derived from GRI Report #30 (Ref. 5).
4. Total stress values assumed for both rotational and translational analysis of interim conditions. Effective, peak and residual stresses also analyzed.

SLOPE STABILITY XSTABL OUTPUT FILES


INT-A1E4 1-27-25 9:10
SWLF LSMPA INTERIM A1E4 EFFECT NOD2
10 most critical surfaces, MINIMUM BISHOP FOS = 1.606
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X-AXIS (feet)
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3800
3600
3400
3200
3000
0
200
400
600
800
1000
1200
1400
1600
W1

XSTABL File: INT-A1E4   1-27-25   9:10

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*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2013      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*           All Rights Reserved         *
*                                       *
* Ver. 5.209                96 - 2083   *
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Problem Description : SWLF LSMPA INTERIM A1E4 EFFECT NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

21 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	39.7	3556.0	4
3	39.7	3556.0	45.6	3558.0	3
4	45.6	3558.0	603.0	3744.0	5
5	603.0	3744.0	1045.6	3744.0	5
6	45.6	3558.0	245.6	3554.0	3
7	245.6	3554.0	445.6	3558.0	3

8	445.6	3558.0	645.6	3554.0	3
9	645.6	3554.0	845.6	3558.0	3
10	845.6	3558.0	1045.6	3554.0	3
11	39.7	3556.0	245.6	3552.0	4
12	245.6	3552.0	445.6	3556.0	4
13	445.6	3556.0	645.6	3552.0	4
14	645.6	3552.0	845.6	3556.0	4
15	845.6	3558.0	1045.6	3552.0	4
16	30.9	3553.1	245.6	3549.1	1
17	245.6	3549.1	445.6	3553.1	1
18	445.6	3553.1	645.6	3549.1	1
19	645.6	3549.1	845.6	3553.1	1
20	845.6	3553.1	1045.6	3549.1	1
21	.0	3549.0	1045.6	3549.0	2

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = 20.0 ft
and x = 40.0 ft

Each surface terminates between x = 620.0 ft
and x = 640.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

20.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 36 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	22.22	3553.14
2	41.62	3548.28
3	61.17	3544.07
4	80.85	3540.50
5	100.64	3537.58
6	120.51	3535.32
7	140.45	3533.72
8	160.42	3532.77
9	180.42	3532.48
10	200.42	3532.86
11	220.39	3533.89
12	240.32	3535.58
13	260.18	3537.93
14	279.96	3540.93
15	299.62	3544.58
16	319.15	3548.88
17	338.53	3553.82
18	357.74	3559.40
19	376.75	3565.61
20	395.55	3572.44
21	414.11	3579.89
22	432.41	3587.94
23	450.44	3596.60
24	468.18	3605.85
25	485.60	3615.67
26	502.68	3626.07
27	519.42	3637.02
28	535.78	3648.52
29	551.76	3660.56
30	567.32	3673.11
31	582.47	3686.17
32	597.18	3699.72
33	611.43	3713.76
34	625.21	3728.25
35	638.51	3743.19
36	640.01	3745.00

**** Simplified BISHOP FOS = 1.606 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A1E4 EFFECT NOD2

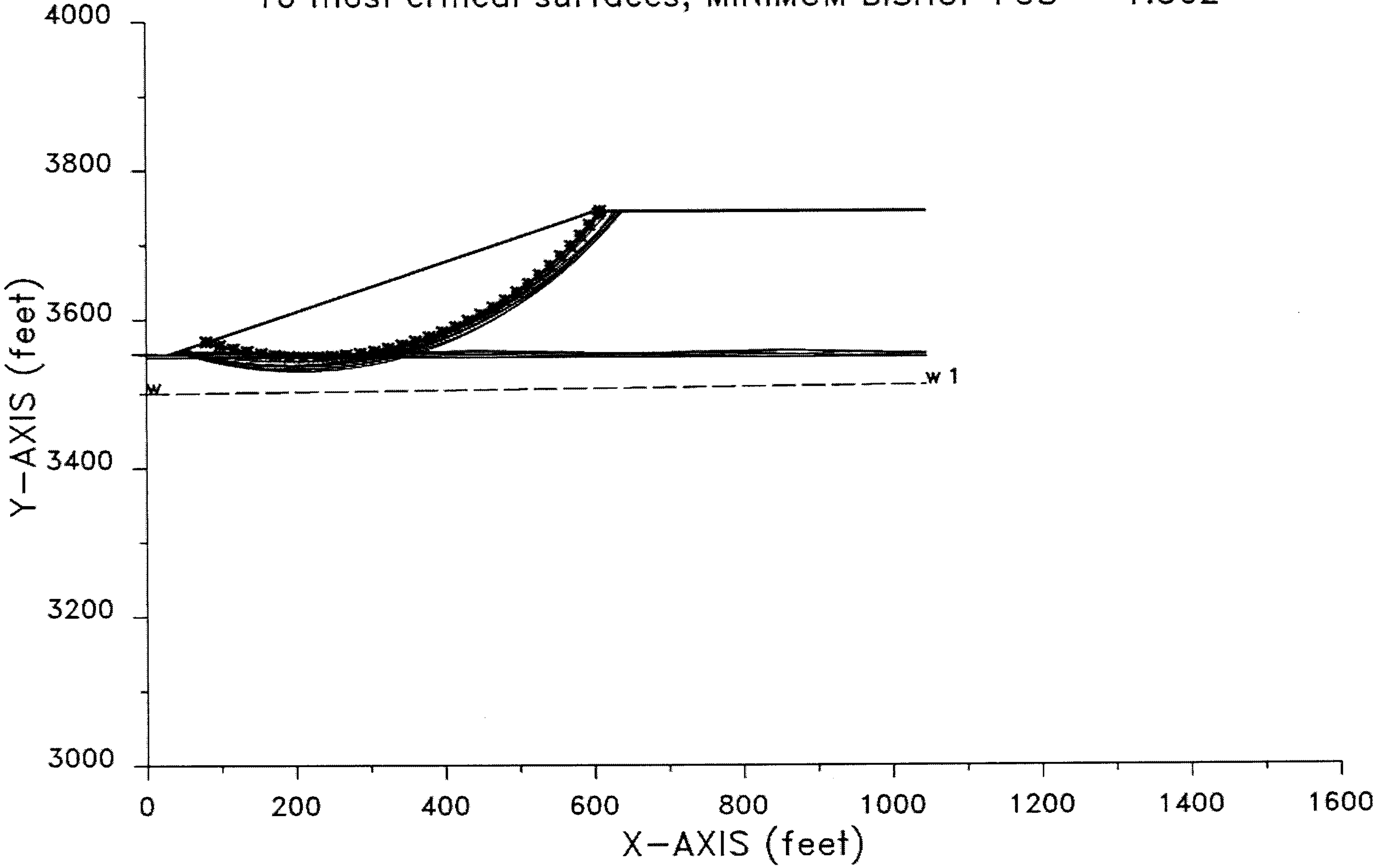
	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.606	179.15	4138.74	606.26	22.22	640.01	7.213E+08
2.	1.607	173.62	4120.47	587.74	20.00	625.82	6.664E+08
3.	1.607	170.34	4159.63	623.80	24.44	636.27	7.056E+08
4.	1.607	180.17	4111.68	580.44	22.22	630.02	6.797E+08
5.	1.610	158.67	4171.98	632.80	26.67	625.73	6.621E+08
6.	1.610	189.09	4124.46	589.13	35.56	639.58	6.852E+08
7.	1.610	184.55	4110.81	580.81	22.22	635.65	7.029E+08
8.	1.612	170.56	4155.96	617.70	31.11	631.76	6.730E+08
9.	1.612	187.92	4128.90	591.83	37.78	638.21	6.737E+08
10.	1.612	186.89	4110.01	581.32	20.00	639.25	7.215E+08

* * * END OF FILE * * *

INT-A1T4 1-27-25 9:14

SWLF LSMPA INTERIM A1T4 TOTAL NOD2

10 most critical surfaces, MINIMUM BISHOP FOS = 1.562



XSTABL File: INT-A1T4   1-27-25   9:14

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******************************************
*              X S T A B L               *
*                                        *
*        Slope Stability Analysis        *
*               using the                *
*            Method of Slices            *
*                                        *
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*  Ver. 5.209                96 - 2083   *
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```

Problem Description : SWLF LSMPA INTERIM A1T4 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES

----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

21 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	39.7	3556.0	4
3	39.7	3556.0	45.6	3558.0	3
4	45.6	3558.0	603.0	3744.0	5
5	603.0	3744.0	1045.6	3744.0	5
6	45.6	3558.0	245.6	3554.0	3
7	245.6	3554.0	445.6	3558.0	3

8	445.6	3558.0	645.6	3554.0	3
9	645.6	3554.0	845.6	3558.0	3
10	845.6	3558.0	1045.6	3554.0	3
11	39.7	3556.0	245.6	3552.0	4
12	245.6	3552.0	445.6	3556.0	4
13	445.6	3556.0	645.6	3552.0	4
14	645.6	3552.0	845.6	3556.0	4
15	845.6	3558.0	1045.6	3552.0	4
16	30.9	3553.1	245.6	3549.1	1
17	245.6	3549.1	445.6	3553.1	1
18	445.6	3553.1	645.6	3549.1	1
19	645.6	3549.1	845.6	3553.1	1
20	845.6	3553.1	1045.6	3549.1	1
21	.0	3549.0	1045.6	3549.0	2

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3500.00
2	1045.60	3511.60

```
A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     40.0 ft
                              and  x =     80.0 ft


Each surface terminates between   x =    600.0 ft
                             and   x =    640.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   19.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=    -5.0 degrees


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
```

```
************************************************************************

    --------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    --------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 33 coordinate points

           Point      x-surf       y-surf
            No.        (ft)         (ft)

             1         80.00      3570.52
             2         98.29      3565.39
             3        116.78      3560.98
             4        135.42      3557.30
             5        154.18      3554.35
             6        173.06      3552.14
             7        192.00      3550.66
             8        210.98      3549.93
             9        229.98      3549.94
            10        248.97      3550.70
            11        267.91      3552.20
            12        286.78      3554.44
            13        305.54      3557.41
            14        324.18      3561.12
            15        342.65      3565.55
            16        360.94      3570.70
            17        379.01      3576.57
            18        396.84      3583.14
            19        414.40      3590.40
            20        431.66      3598.34
            21        448.60      3606.95
            22        465.18      3616.22
            23        481.40      3626.12
            24        497.21      3636.66
            25        512.59      3647.81
            26        527.53      3659.55
            27        542.00      3671.86
            28        555.98      3684.74
            29        569.44      3698.15
            30        582.36      3712.07
```

31	594.73	3726.49
32	606.53	3741.39
33	609.17	3745.00

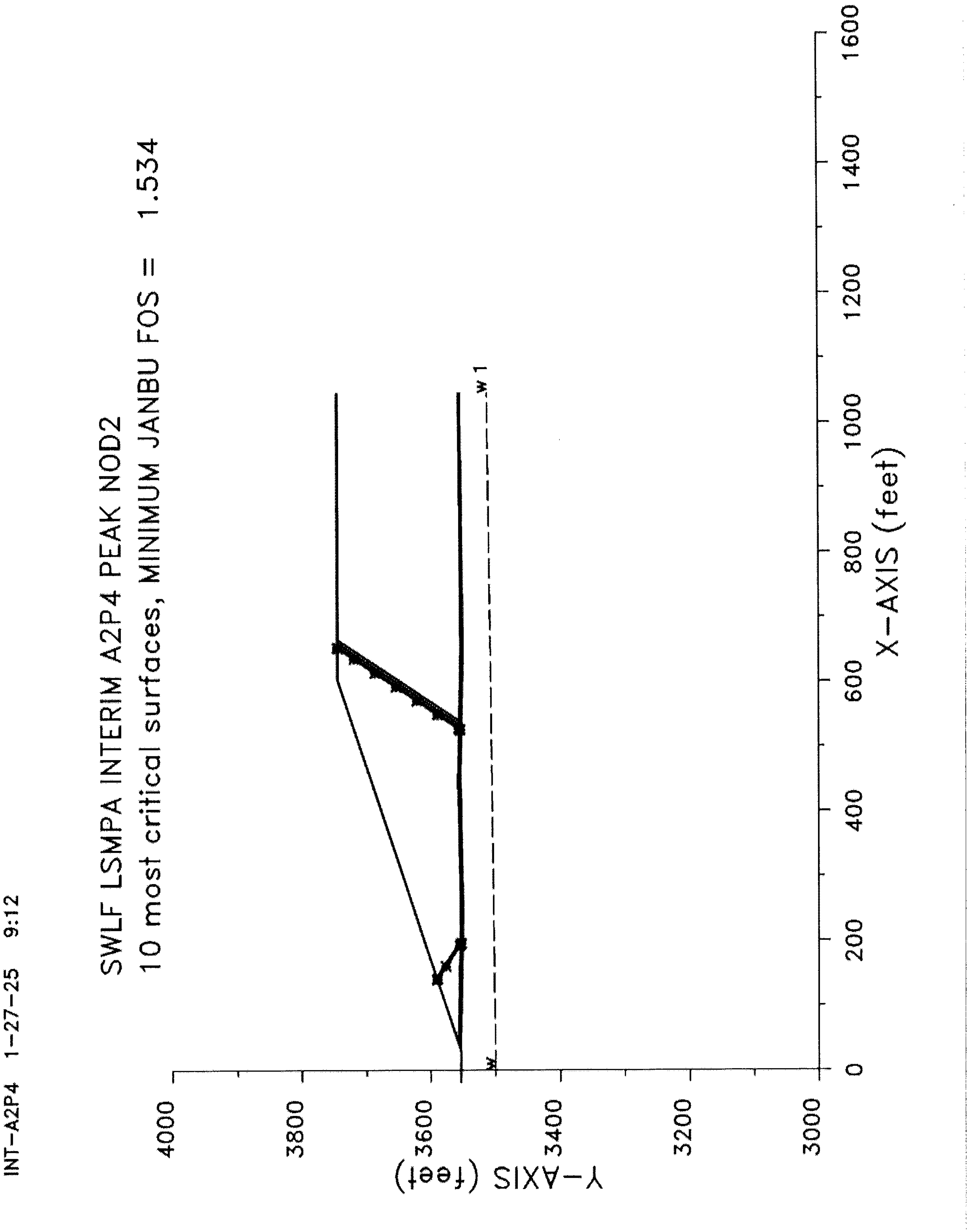
**** Simplified BISHOP FOS = 1.562 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A1T4 TOTAL NOD2

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.562	220.15	4035.20	485.35	80.00	609.17	4.326E+08
2.	1.592	215.90	4103.50	552.58	75.56	636.31	5.443E+08
3.	1.606	198.89	4089.32	552.68	44.44	631.07	6.198E+08
4.	1.609	195.19	4121.61	582.79	44.44	639.95	6.567E+08
5.	1.609	192.75	4082.62	544.55	44.44	620.02	5.800E+08
6.	1.611	200.56	4093.37	559.72	40.00	638.58	6.632E+08
7.	1.613	183.30	4085.71	547.62	40.00	611.90	5.645E+08
8.	1.616	197.00	4045.96	513.38	40.00	612.95	5.672E+08
9.	1.616	205.58	4052.51	522.28	40.00	627.68	6.217E+08
10.	1.619	187.51	4136.41	592.71	48.89	632.52	6.215E+08

* * * END OF FILE * * *


INT-A2P4 1-27-25 9:12
SWLF LSMPA INTERIM A2P4 PEAK NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 1.534
W1
W
Y-AXIS (feet)
4000
3800
3600
3400
3200
3000
X-AXIS (feet)
0
200
400
600
800
1000
1200
1400
1600

XSTABL File: INT-A2P4   1-27-25   9:12

```
****************************************
*              X S T A B L             *
*                                      *
*        Slope Stability Analysis      *
*              using the               *
*           Method of Slices           *
*                                      *
*        Copyright (C) 1992 - 2013     *
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*        Moscow, ID 83843, U.S.A.      *
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*                                      *
*  Ver. 5.209                96 - 2083 *
****************************************
```

Problem Description : SWLF LSMPA INTERIM A2P4 PEAK NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters

----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	188.0	11.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	188.0	11.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****

PHREATIC SURFACE,

****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.33	3590.32

2	140.29	3589.60
3	159.94	3576.59
4	192.46	3555.06
5	195.19	3553.00
6	195.67	3552.61
7	525.18	3553.94
8	525.56	3554.40
9	527.05	3556.37
10	548.57	3588.89
11	570.10	3621.41
12	591.62	3653.94
13	613.15	3686.46
14	634.67	3718.98
15	651.23	3744.00
16	651.99	3745.00

** Corrected JANBU FOS = 1.534 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.14	3590.26
2	140.11	3589.54
3	159.66	3576.59
4	192.18	3555.07
5	194.91	3553.01
6	195.43	3552.58
7	531.98	3554.10
8	532.12	3554.27
9	533.60	3556.24
10	555.13	3588.76
11	576.65	3621.28
12	598.18	3653.80
13	619.70	3686.33
14	641.23	3718.85
15	657.88	3744.00
16	658.63	3745.00

** Corrected JANBU FOS = 1.538 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.94	3590.86

2	141.90	3590.13
3	162.44	3576.54
4	194.96	3555.01
5	197.69	3552.96
6	198.15	3552.58
7	527.55	3554.09
8	527.77	3554.36
9	529.25	3556.33
10	550.78	3588.85
11	572.30	3621.37
12	593.83	3653.89
13	615.35	3686.41
14	636.88	3718.93
15	653.47	3744.00
16	654.22	3745.00

** Corrected JANBU FOS = 1.539 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.02	3590.22
2	139.99	3589.50
3	159.47	3576.60
4	191.99	3555.07
5	194.72	3553.01
6	195.07	3552.73
7	531.99	3553.85
8	532.33	3554.27
9	533.82	3556.24
10	555.34	3588.76
11	576.87	3621.28
12	598.39	3653.80
13	619.92	3686.32
14	641.44	3718.84
15	658.10	3744.00
16	658.85	3745.00

** Corrected JANBU FOS = 1.540 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.77	3591.14

2	142.73	3590.41
3	163.73	3576.51
4	196.25	3554.99
5	198.98	3552.93
6	199.41	3552.57
7	528.78	3553.98
8	529.07	3554.33
9	530.55	3556.30
10	552.08	3588.82
11	573.60	3621.34
12	595.13	3653.87
13	616.66	3686.39
14	638.18	3718.91
15	654.79	3744.00
16	655.54	3745.00

** Corrected JANBU FOS = 1.541 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.54	3591.39
2	143.50	3590.67
3	164.92	3576.49
4	197.44	3554.96
5	200.17	3552.91
6	200.72	3552.45
7	536.86	3553.77
8	537.19	3554.17
9	538.67	3556.14
10	560.20	3588.66
11	581.73	3621.18
12	603.25	3653.70
13	624.78	3686.22
14	646.30	3718.75
15	663.02	3744.00
16	663.77	3745.00

** Corrected JANBU FOS = 1.542 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.25	3591.63

2	144.21	3590.91
3	166.03	3576.47
4	198.55	3554.94
5	201.28	3552.88
6	201.79	3552.47
7	527.63	3554.30
8	527.68	3554.36
9	529.17	3556.33
10	550.69	3588.85
11	572.22	3621.37
12	593.74	3653.89
13	615.27	3686.41
14	636.79	3718.94
15	653.38	3744.00
16	654.14	3745.00

** Corrected JANBU FOS = 1.543 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.42	3591.69
2	144.38	3590.96
3	166.28	3576.46
4	198.81	3554.94
5	201.54	3552.88
6	201.98	3552.51
7	527.94	3554.18
8	528.08	3554.35
9	529.56	3556.32
10	551.09	3588.84
11	572.62	3621.36
12	594.14	3653.89
13	615.67	3686.41
14	637.19	3718.93
15	653.79	3744.00
16	654.54	3745.00

** Corrected JANBU FOS = 1.543 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.29	3590.98

2	142.25	3590.25
3	162.99	3576.53
4	195.51	3555.00
5	198.24	3552.94
6	198.64	3552.62
7	533.30	3553.96
8	533.53	3554.24
9	535.01	3556.21
10	556.54	3588.73
11	578.06	3621.25
12	599.59	3653.78
13	621.11	3686.30
14	642.64	3718.82
15	659.31	3744.00
16	660.06	3745.00

** Corrected JANBU FOS = 1.544 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.93	3591.52
2	143.89	3590.80
3	165.53	3576.48
4	198.05	3554.95
5	200.78	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.12	3554.13
9	540.60	3556.10
10	562.13	3588.62
11	583.66	3621.14
12	605.18	3653.66
13	626.71	3686.19
14	648.23	3718.71
15	664.97	3744.00
16	665.73	3745.00

** Corrected JANBU FOS = 1.544 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2P4 PEAK NOD2

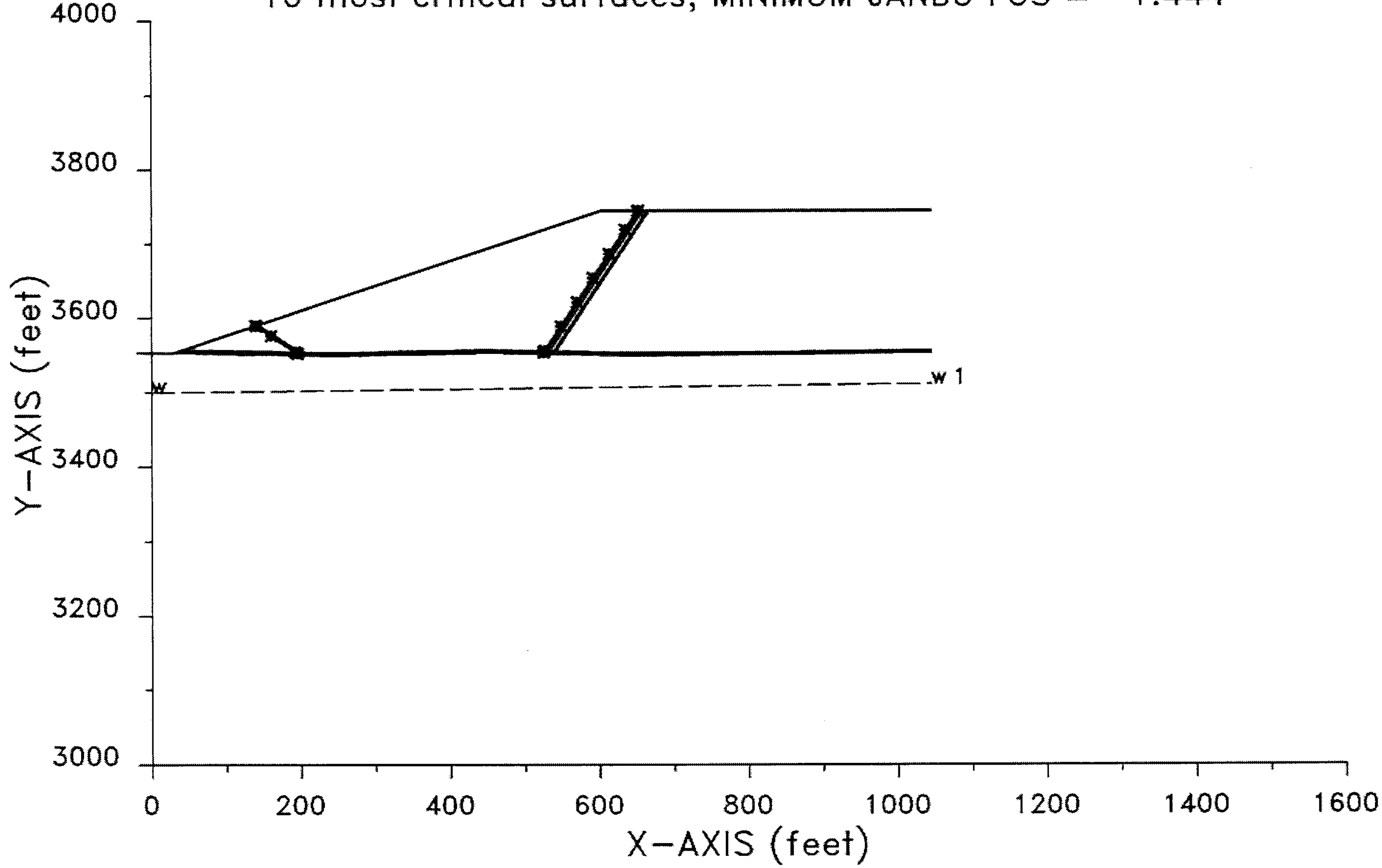
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.534	1.084	139.33	651.99	9.994E+05
2.	1.538	1.084	139.14	658.63	1.019E+06
3.	1.539	1.084	140.94	654.22	1.006E+06
4.	1.540	1.084	139.02	658.85	1.022E+06
5.	1.541	1.084	141.77	655.54	1.009E+06
6.	1.542	1.084	142.54	663.77	1.029E+06
7.	1.543	1.084	143.25	654.14	1.003E+06
8.	1.543	1.084	143.42	654.54	1.005E+06
9.	1.544	1.084	141.29	660.06	1.024E+06
10.	1.544	1.084	142.93	665.73	1.035E+06

* * * END OF FILE * * *

INT-A2R4 1-27-25 9:15

SWLF LSMPA INTERIM A2T4 RESID NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 1.444



XSTABL File: INT-A2R4   1-27-25   9:15

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*              X S T A B L               *
*                                        *
*        Slope Stability Analysis        *
*               using the                *
*            Method of Slices            *
*                                        *
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*                                        *
*  Ver. 5.209                96 - 2083   *
******************************************
```

Problem Description : SWLF LSMPA INTERIM A2T4 RESID NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters
----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	188.0	9.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	188.0	9.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is   39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.34	3590.32

2	140.30	3589.60
3	159.96	3576.59
4	192.48	3555.06
5	195.21	3553.00
6	195.67	3552.61
7	525.18	3553.94
8	525.57	3554.40
9	527.06	3556.37
10	548.58	3588.89
11	570.11	3621.41
12	591.64	3653.94
13	613.16	3686.46
14	634.69	3718.98
15	651.25	3744.00
16	652.00	3745.00

** Corrected JANBU FOS = 1.444 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.55	3591.40
2	143.51	3590.67
3	164.94	3576.49
4	197.46	3554.96
5	200.19	3552.91
6	200.72	3552.45
7	536.86	3553.77
8	537.20	3554.17
9	538.69	3556.14
10	560.21	3588.66
11	581.74	3621.18
12	603.26	3653.70
13	624.79	3686.22
14	646.31	3718.75
15	663.03	3744.00
16	663.78	3745.00

** Corrected JANBU FOS = 1.445 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.94	3591.53

2	143.90	3590.80
3	165.55	3576.48
4	198.07	3554.95
5	200.80	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.13	3554.13
9	540.62	3556.10
10	562.14	3588.62
11	583.67	3621.14
12	605.19	3653.66
13	626.72	3686.19
14	648.25	3718.71
15	664.99	3744.00
16	665.74	3745.00

** Corrected JANBU FOS = 1.446 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.16	3590.26
2	140.12	3589.54
3	159.68	3576.59
4	192.20	3555.07
5	194.93	3553.01
6	195.43	3552.58
7	531.98	3554.10
8	532.12	3554.27
9	533.61	3556.24
10	555.13	3588.76
11	576.66	3621.28
12	598.18	3653.80
13	619.71	3686.33
14	641.24	3718.85
15	657.88	3744.00
16	658.64	3745.00

** Corrected JANBU FOS = 1.446 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.01	3591.55

2	143.97	3590.83
3	165.65	3576.47
4	198.18	3554.95
5	200.91	3552.89
6	201.43	3552.44
7	540.76	3553.85
8	540.97	3554.09
9	542.45	3556.06
10	563.98	3588.58
11	585.51	3621.11
12	607.03	3653.63
13	628.56	3686.15
14	650.08	3718.67
15	666.85	3744.00
16	667.60	3745.00

** Corrected JANBU FOS = 1.448 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.95	3590.86
2	141.91	3590.14
3	162.45	3576.54
4	194.97	3555.01
5	197.70	3552.95
6	198.15	3552.58
7	527.55	3554.09
8	527.77	3554.36
9	529.26	3556.33
10	550.78	3588.85
11	572.31	3621.37
12	593.83	3653.89
13	615.36	3686.41
14	636.89	3718.93
15	653.48	3744.00
16	654.23	3745.00

** Corrected JANBU FOS = 1.449 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.78	3591.14

2	142.74	3590.41
3	163.74	3576.51
4	196.26	3554.99
5	198.99	3552.93
6	199.41	3552.57
7	528.78	3553.98
8	529.08	3554.33
9	530.56	3556.30
10	552.09	3588.82
11	573.62	3621.34
12	595.14	3653.87
13	616.67	3686.39
14	638.19	3718.91
15	654.80	3744.00
16	655.55	3745.00

** Corrected JANBU FOS = 1.449 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.63	3591.09
2	142.59	3590.36
3	163.51	3576.52
4	196.03	3554.99
5	198.76	3552.93
6	199.20	3552.56
7	540.79	3553.75
8	541.08	3554.09
9	542.56	3556.06
10	564.09	3588.58
11	585.61	3621.10
12	607.14	3653.63
13	628.66	3686.15
14	650.19	3718.67
15	666.96	3744.00
16	667.71	3745.00

** Corrected JANBU FOS = 1.450 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.03	3590.22

2	139.99	3589.50
3	159.48	3576.60
4	192.01	3555.07
5	194.74	3553.01
6	195.07	3552.73
7	531.99	3553.85
8	532.34	3554.27
9	533.83	3556.24
10	555.35	3588.76
11	576.88	3621.28
12	598.41	3653.80
13	619.93	3686.32
14	641.46	3718.84
15	658.11	3744.00
16	658.86	3745.00

** Corrected JANBU FOS = 1.450 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.97	3590.53
2	140.93	3589.81
3	160.94	3576.57
4	193.46	3555.04
5	196.19	3552.98
6	196.65	3552.59
7	539.65	3554.01
8	539.74	3554.12
9	541.23	3556.09
10	562.75	3588.61
11	584.28	3621.13
12	605.80	3653.65
13	627.33	3686.17
14	648.85	3718.69
15	665.60	3744.00
16	666.36	3745.00

** Corrected JANBU FOS = 1.451 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2T4 RESID NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.444	1.084	139.34	652.00	9.268E+05
2.	1.445	1.084	142.55	663.78	9.492E+05
3.	1.446	1.084	142.94	665.74	9.538E+05
4.	1.446	1.084	139.16	658.64	9.442E+05
5.	1.448	1.084	143.01	667.60	9.589E+05
6.	1.449	1.084	140.95	654.23	9.329E+05
7.	1.449	1.084	141.78	655.55	9.350E+05
8.	1.450	1.084	141.63	667.71	9.632E+05
9.	1.450	1.084	139.03	658.86	9.484E+05
10.	1.451	1.084	139.97	666.36	9.630E+05

* * * END OF FILE * * *

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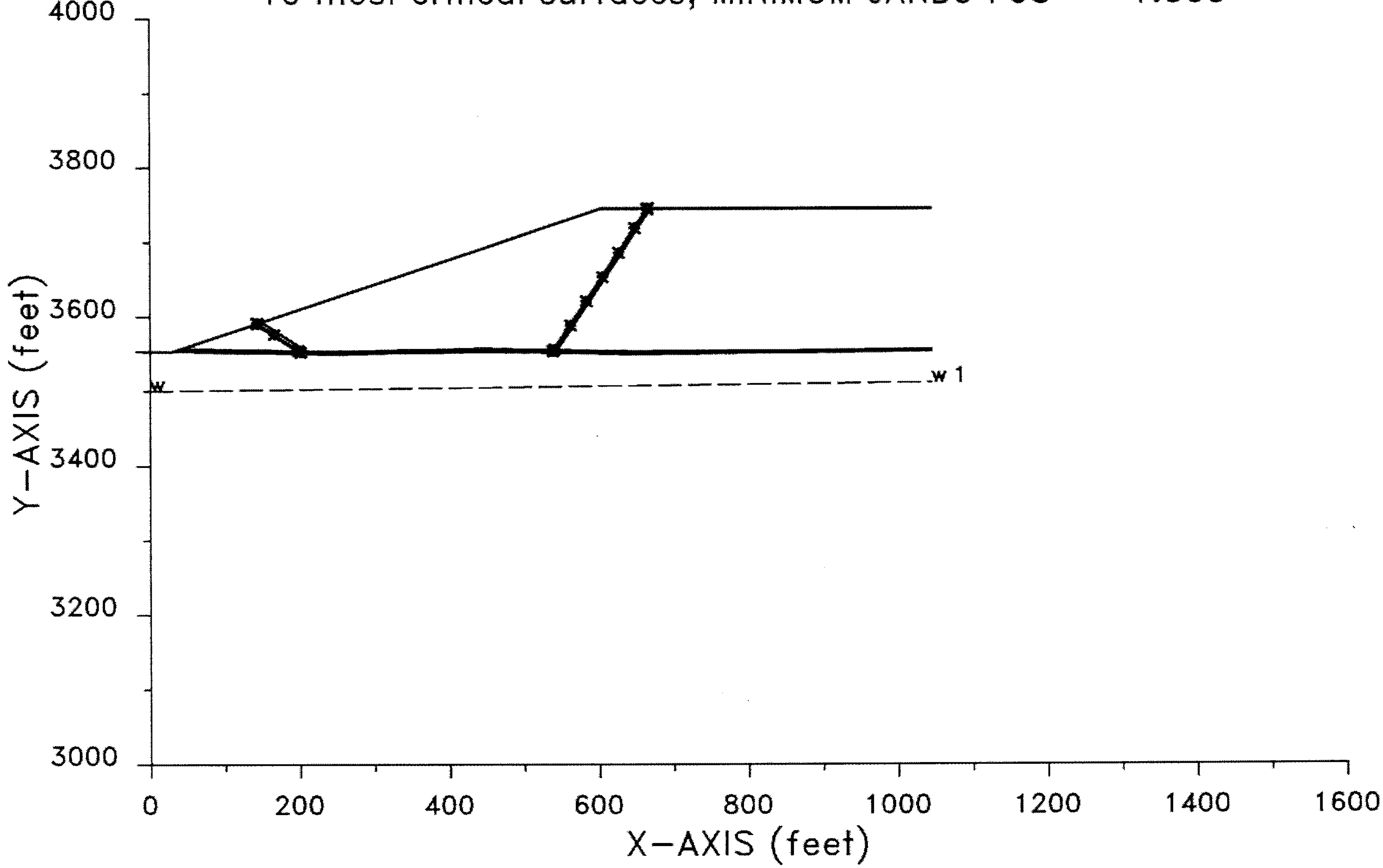
SWLF LSMPA INTERIM A2T4 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 1.305



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Problem Description : SWLF LSMPA INTERIM A2T4 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters

----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water =   62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.99	3591.54

2	143.95	3590.82
3	165.62	3576.47
4	198.15	3554.95
5	200.88	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.20	3554.13
9	540.68	3556.10
10	562.21	3588.62
11	583.73	3621.14
12	605.26	3653.66
13	626.78	3686.18
14	648.31	3718.71
15	665.05	3744.00
16	665.81	3745.00

** Corrected JANBU FOS = 1.305 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.60	3591.41
2	143.56	3590.69
3	165.02	3576.49
4	197.54	3554.96
5	200.27	3552.90
6	200.72	3552.45
7	536.86	3553.77
8	537.26	3554.17
9	538.74	3556.14
10	560.27	3588.66
11	581.79	3621.18
12	603.32	3653.70
13	624.85	3686.22
14	646.37	3718.74
15	663.09	3744.00
16	663.84	3745.00

** Corrected JANBU FOS = 1.306 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	148.74	3593.46

2	149.71	3592.74
3	174.55	3576.30
4	207.07	3554.77
5	209.80	3552.71
6	210.24	3552.27
7	542.57	3553.65
8	542.97	3554.05
9	544.45	3556.02
10	565.98	3588.54
11	587.50	3621.07
12	609.03	3653.59
13	630.55	3686.11
14	652.08	3718.63
15	668.87	3744.00
16	669.63	3745.00

** Corrected JANBU FOS = 1.306 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.06	3591.57
2	144.02	3590.84
3	165.73	3576.47
4	198.25	3554.95
5	200.98	3552.89
6	201.43	3552.44
7	540.76	3553.85
8	541.00	3554.09
9	542.49	3556.06
10	564.02	3588.58
11	585.54	3621.11
12	607.07	3653.63
13	628.59	3686.15
14	650.12	3718.67
15	666.88	3744.00
16	667.64	3745.00

** Corrected JANBU FOS = 1.307 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	149.52	3593.72

2	150.48	3593.00
3	175.75	3576.27
4	208.27	3554.75
5	211.00	3552.69
6	211.46	3552.23
7	542.38	3553.88
8	542.55	3554.06
9	544.04	3556.03
10	565.56	3588.55
11	587.09	3621.07
12	608.62	3653.60
13	630.14	3686.12
14	651.67	3718.64
15	668.45	3744.00
16	669.21	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.67	3591.10
2	142.63	3590.38
3	163.57	3576.52
4	196.09	3554.99
5	198.82	3552.93
6	199.20	3552.56
7	540.79	3553.75
8	541.13	3554.09
9	542.61	3556.06
10	564.14	3588.58
11	585.66	3621.10
12	607.19	3653.62
13	628.71	3686.15
14	650.24	3718.67
15	667.01	3744.00
16	667.76	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	148.58	3593.41

2	149.54	3592.68
3	174.29	3576.30
4	206.81	3554.78
5	209.54	3552.72
6	209.97	3552.29
7	543.00	3553.79
8	543.25	3554.05
9	544.74	3556.02
10	566.26	3588.54
11	587.79	3621.06
12	609.32	3653.58
13	630.84	3686.10
14	652.37	3718.62
15	669.16	3744.00
16	669.92	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 15 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	150.25	3593.97
2	151.21	3593.24
3	176.88	3576.25
4	209.40	3554.72
5	212.13	3552.67
6	212.59	3552.20
7	544.07	3554.03
8	545.55	3556.00
9	567.08	3588.52
10	588.60	3621.04
11	610.13	3653.57
12	631.65	3686.09
13	653.18	3718.61
14	669.98	3744.00
15	670.74	3745.00

** Corrected JANBU FOS = 1.310 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.01	3590.55
2	140.97	3589.83

3	161.00	3576.57
4	193.53	3555.04
5	196.26	3552.98
6	196.65	3552.59
7	539.65	3554.01
8	539.76	3554.12
9	541.24	3556.09
10	562.77	3588.61
11	584.29	3621.13
12	605.82	3653.65
13	627.34	3686.17
14	648.87	3718.69
15	665.62	3744.00
16	666.37	3745.00

** Corrected JANBU FOS = 1.312 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	149.60	3593.75
2	150.56	3593.02
3	175.87	3576.27
4	208.39	3554.74
5	211.12	3552.69
6	211.44	3552.37
7	542.06	3553.63
8	542.50	3554.06
9	543.98	3556.03
10	565.51	3588.55
11	587.04	3621.08
12	608.56	3653.60
13	630.09	3686.12
14	651.61	3718.64
15	668.40	3744.00
16	669.15	3745.00

** Corrected JANBU FOS = 1.313 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2T4 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.305	1.084	142.99	665.81	8.383E+05
2.	1.306	1.084	142.60	663.84	8.359E+05
3.	1.306	1.084	148.74	669.63	8.362E+05
4.	1.307	1.084	143.06	667.64	8.423E+05
5.	1.308	1.084	149.52	669.21	8.355E+05
6.	1.308	1.084	141.67	667.76	8.462E+05
7.	1.308	1.084	148.58	669.92	8.386E+05
8.	1.310	1.084	150.25	670.74	8.378E+05
9.	1.312	1.084	140.01	666.37	8.486E+05
10.	1.313	1.084	149.60	669.15	8.392E+05

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APPENDIX IIIE-A-3

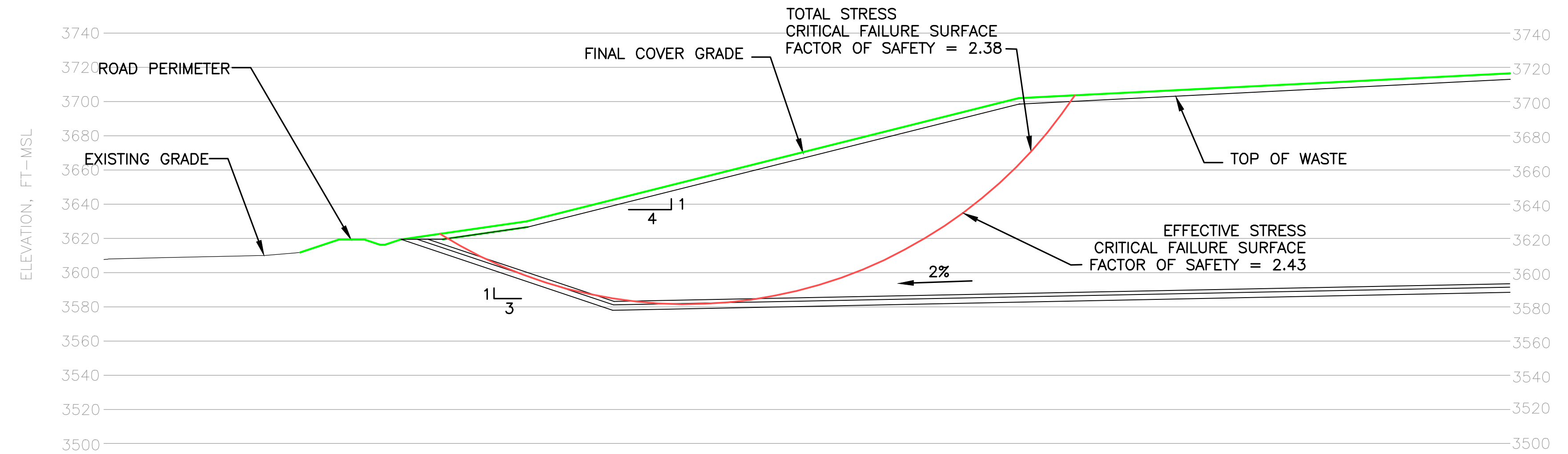
OVERLINER AND FINAL LANDFILL CONFIGURATION STABILITY ANALYSIS

Includes pages IIIE-A-3-1 through IIIE-A-3-~~221~~306

STATE OF TEXAS
DAVID E. POE
81734
LICENSED
PROFESSIONAL ENGINEER

01/30/2025

FINAL COVER SECTION A–1



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IIIE–A–3–3 IIIE–A–3–5
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SCALE IN FEET

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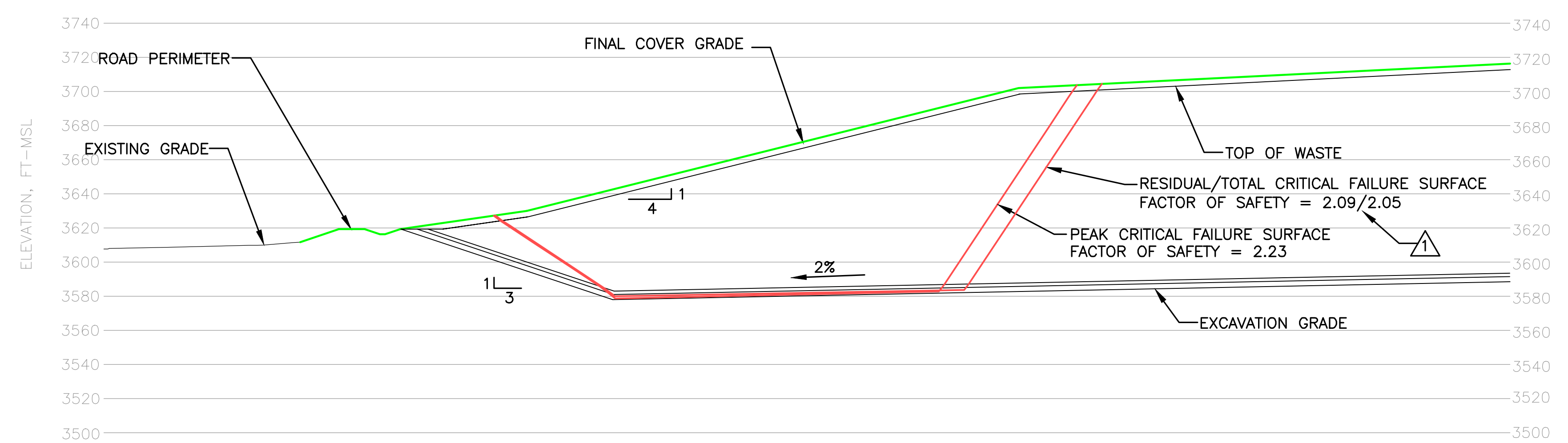

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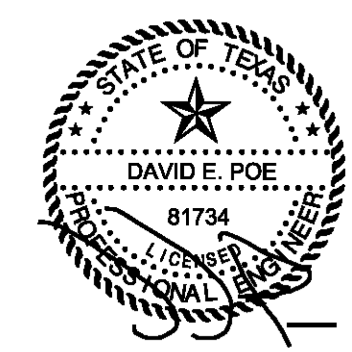

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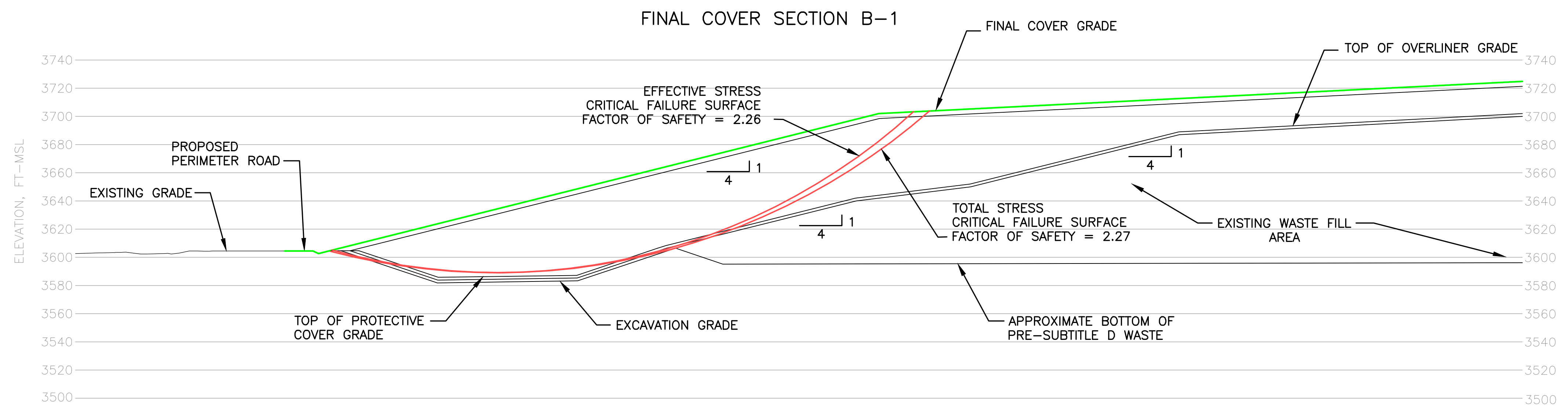
FINAL COVER SECTION B-1



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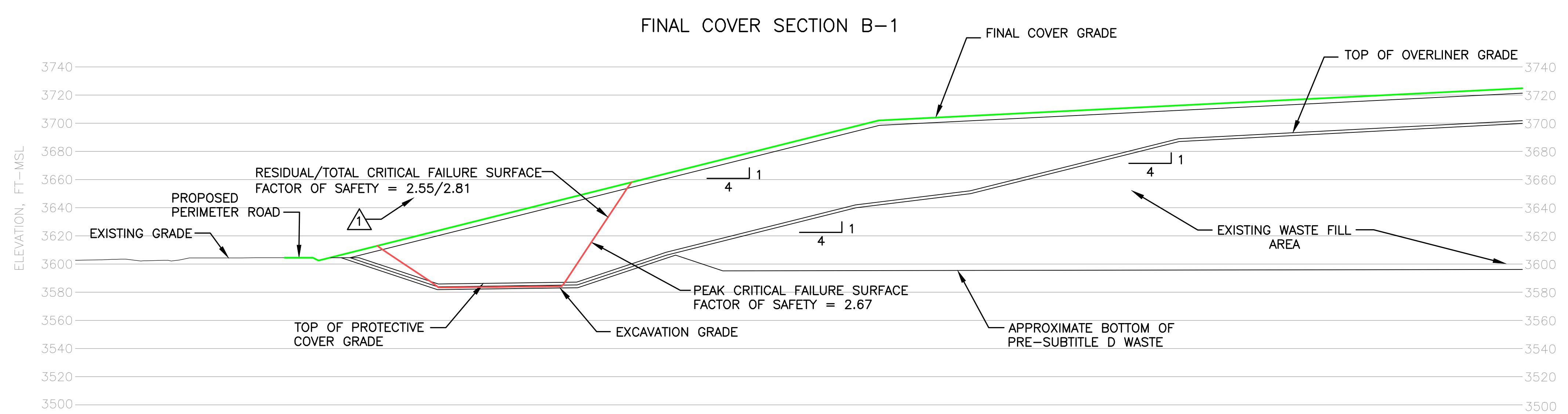

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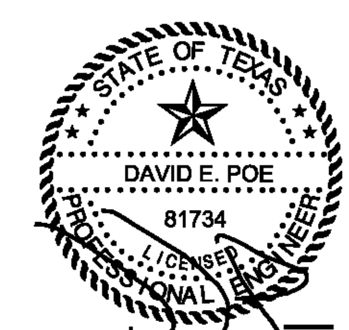

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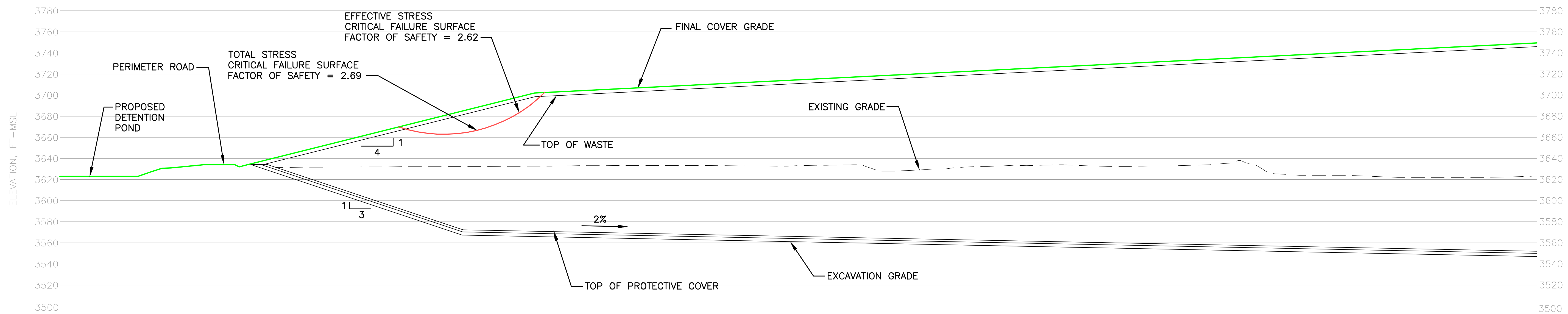
FINAL COVER SECTION C–1



SECTION C–1 ROTATIONAL (C; IIIE–A–3–3; IIIE–A–3–7)

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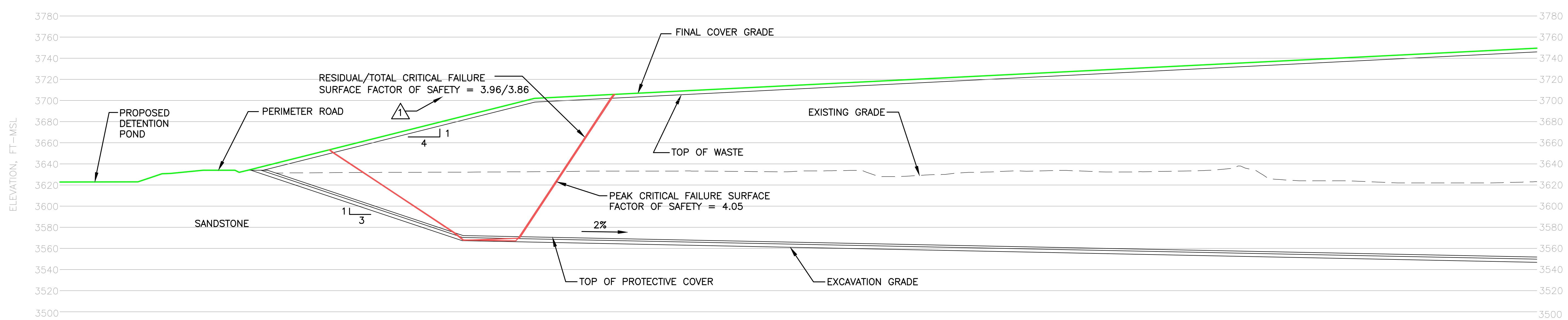
FINAL COVER SECTION C–2



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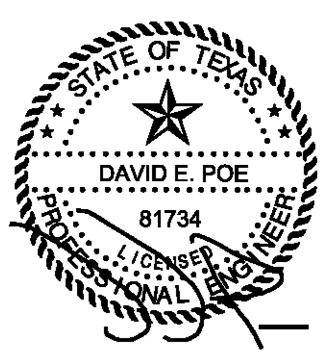

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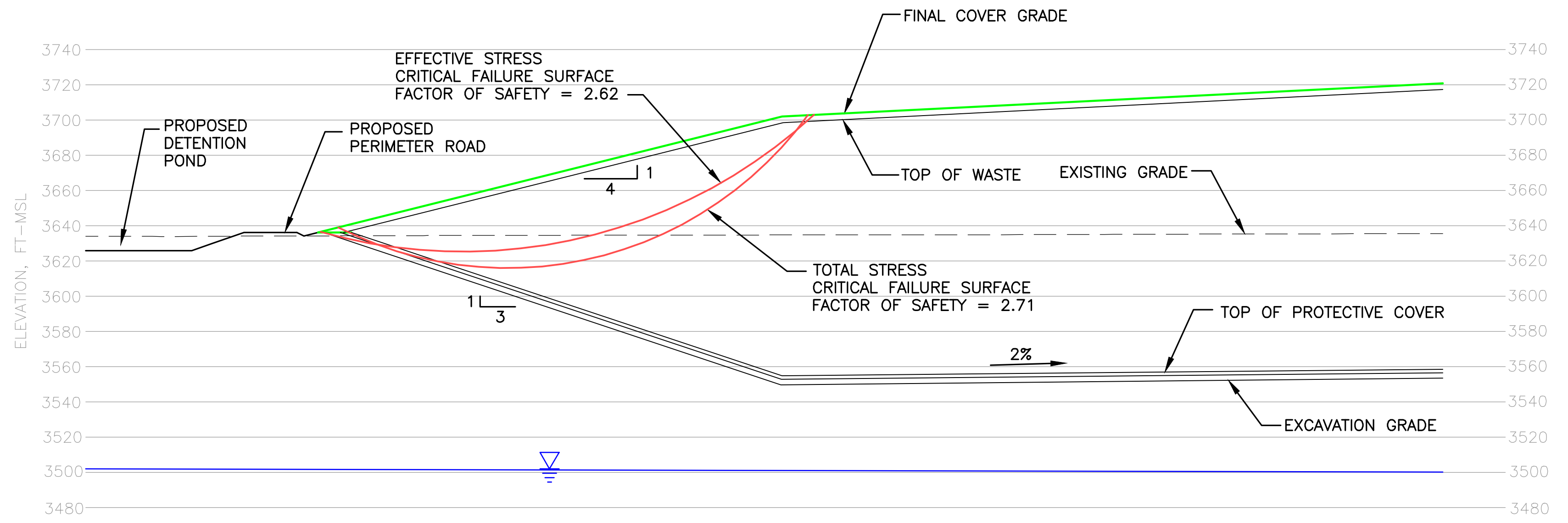
FINAL COVER SECTION D-1



SECTION D-1 ROTATIONAL

D IIIE-A-3-3 IIIE-A-3-8

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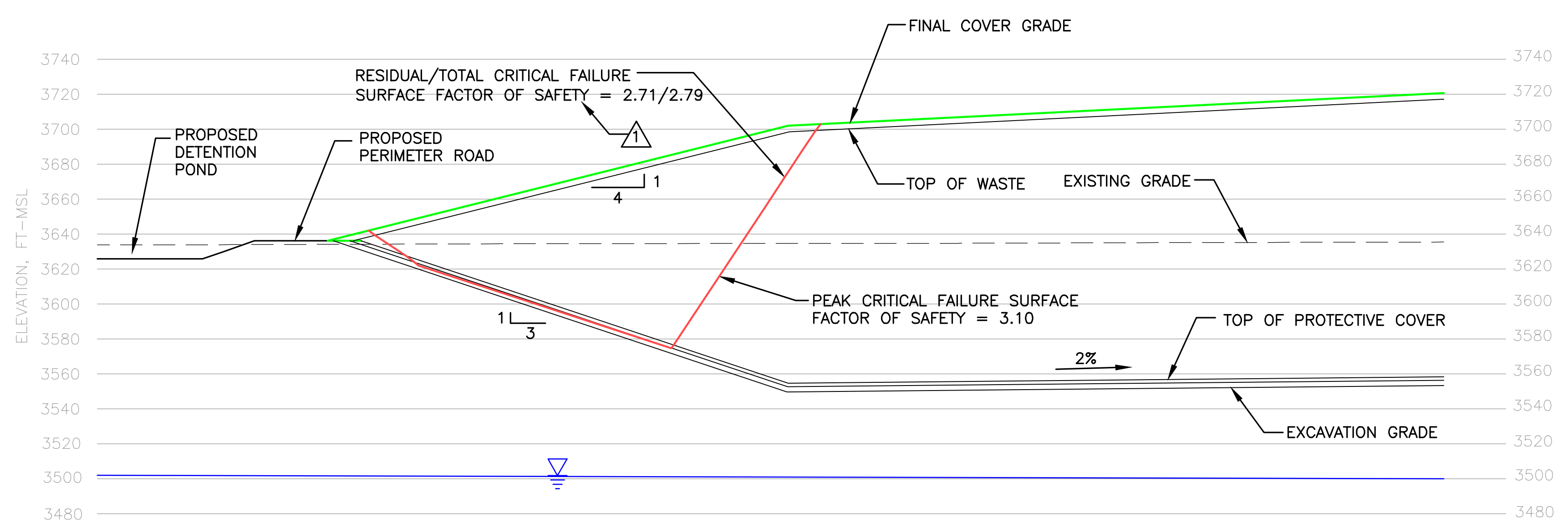
FINAL COVER SECTION D-2



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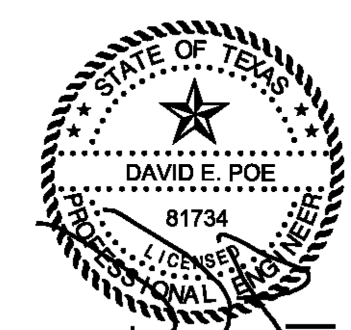

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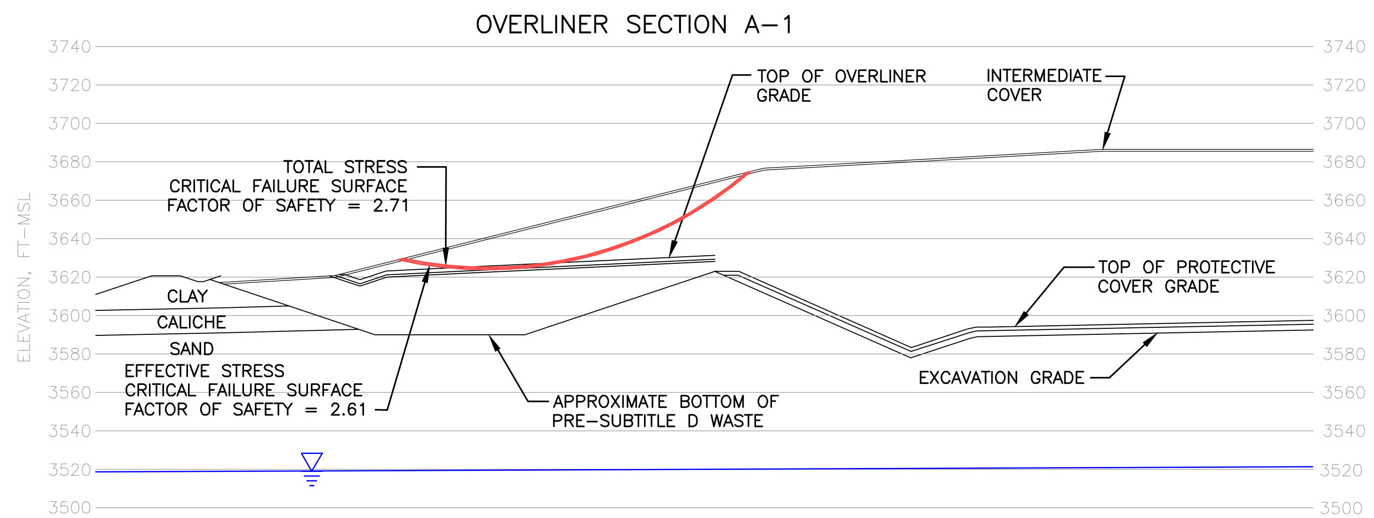

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A

IIIE–A–3–4 IIIE–A–3–9

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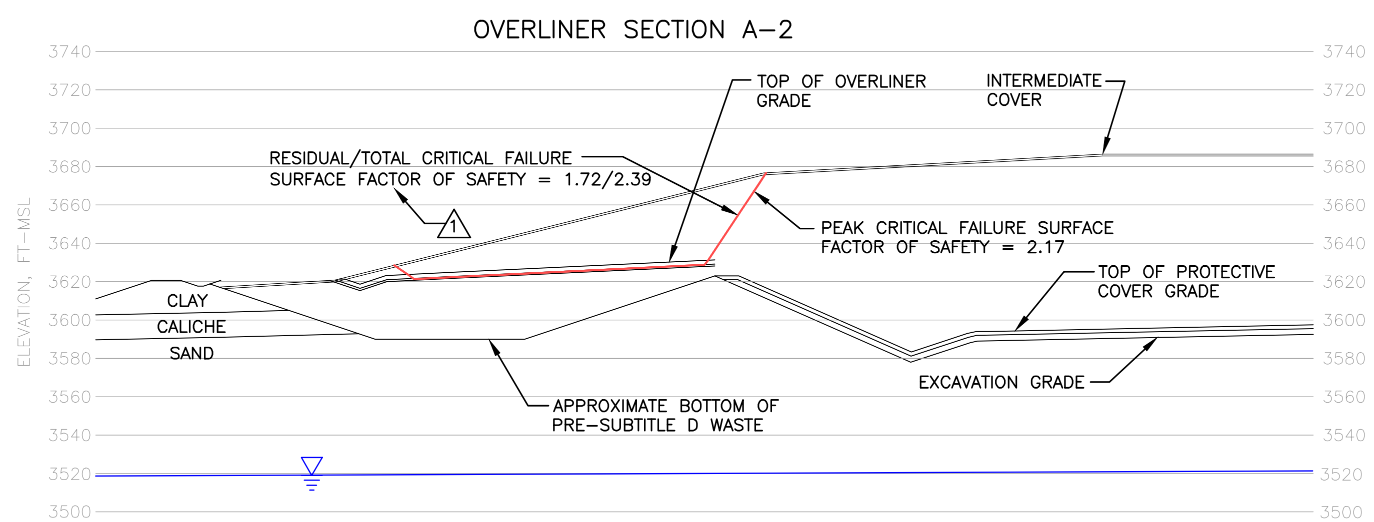
SCALE IN FEET



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A

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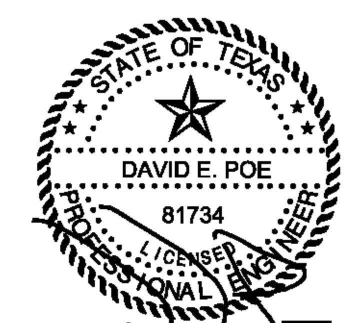

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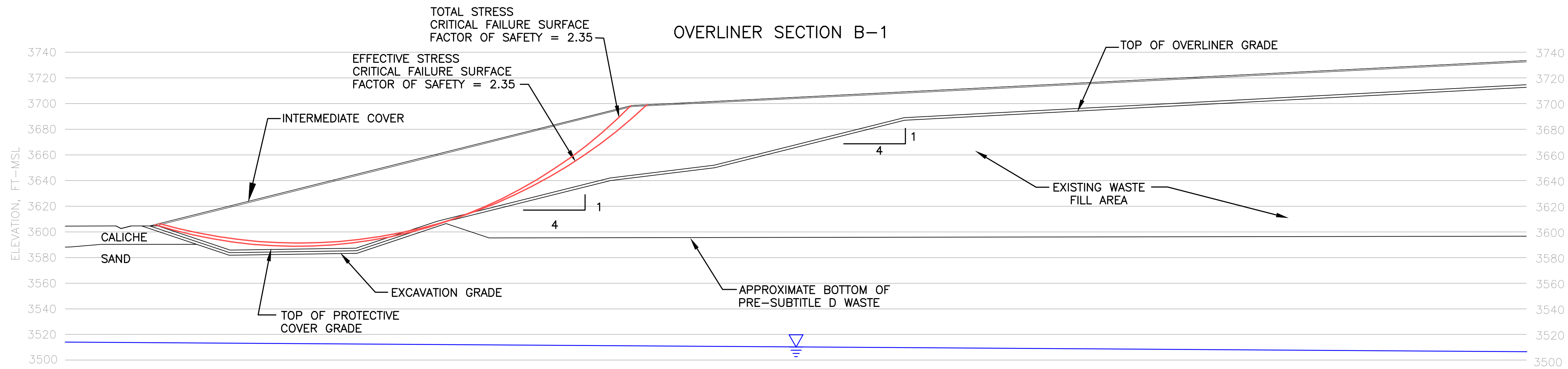

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B–1 ROTATIONAL

B
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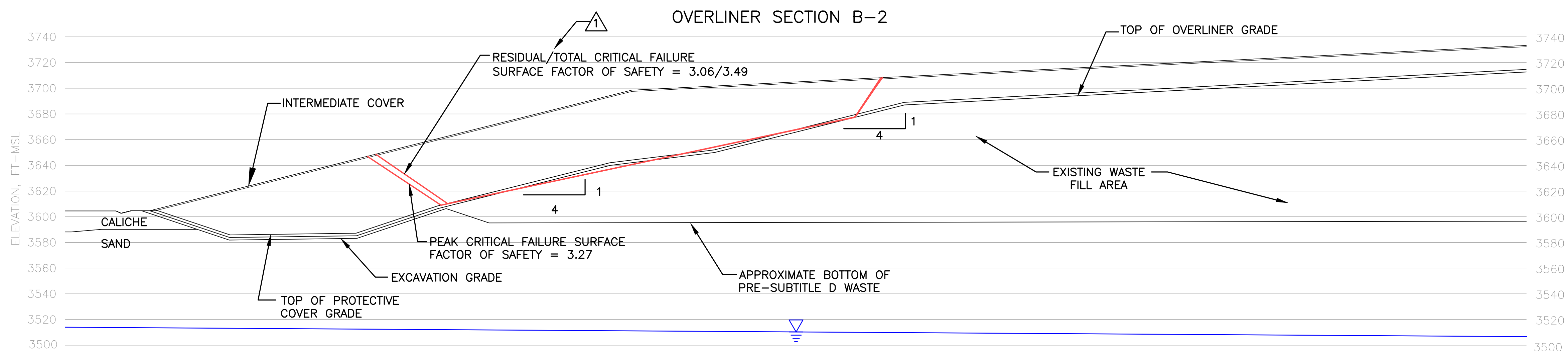
0 50 100
SCALE IN FEET



SECTION
B–2 TRANSLATIONAL

B
IIIE–A–3–4 IIIE–A–3–10

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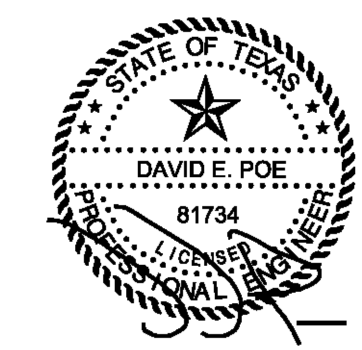

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SHEET IIIE–A–3–10

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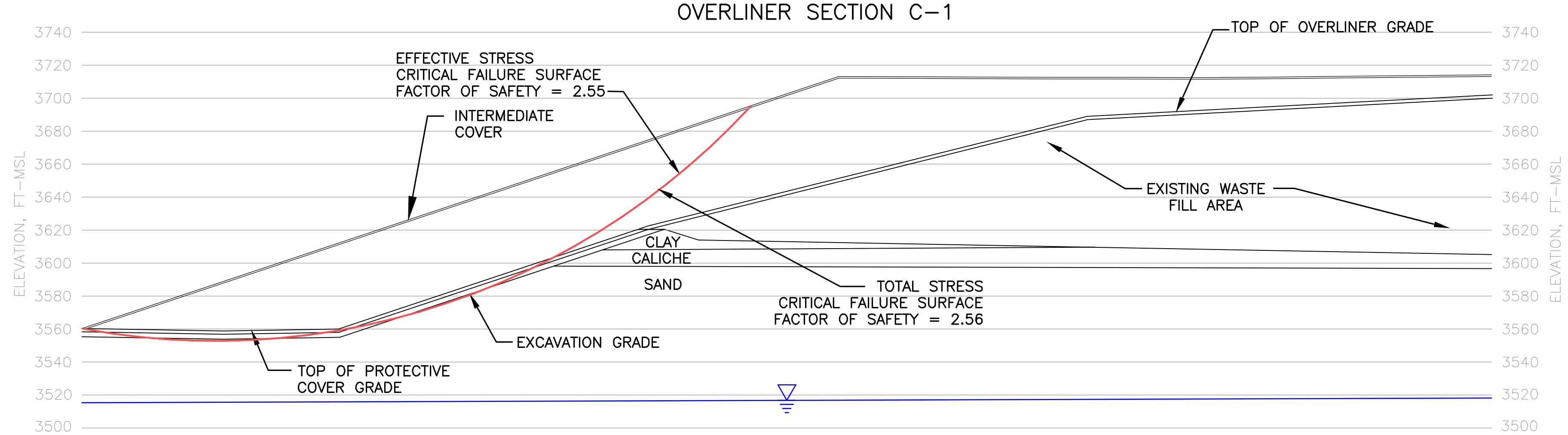
OVERLINER SECTION C-1



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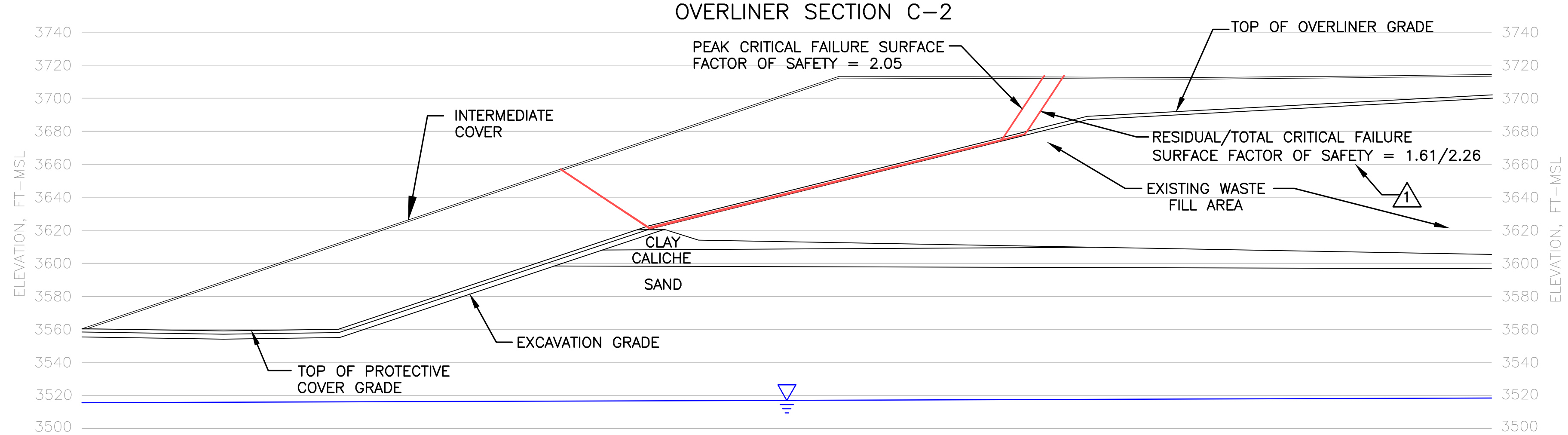
C-1 ROTATIONAL
C
IIIE-A-3-4 IIIE-A-3-11

0 50 100
SCALE IN FEET

OVERLINER SECTION C-2



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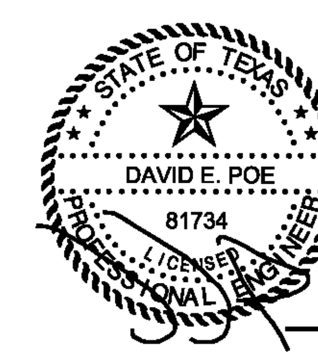

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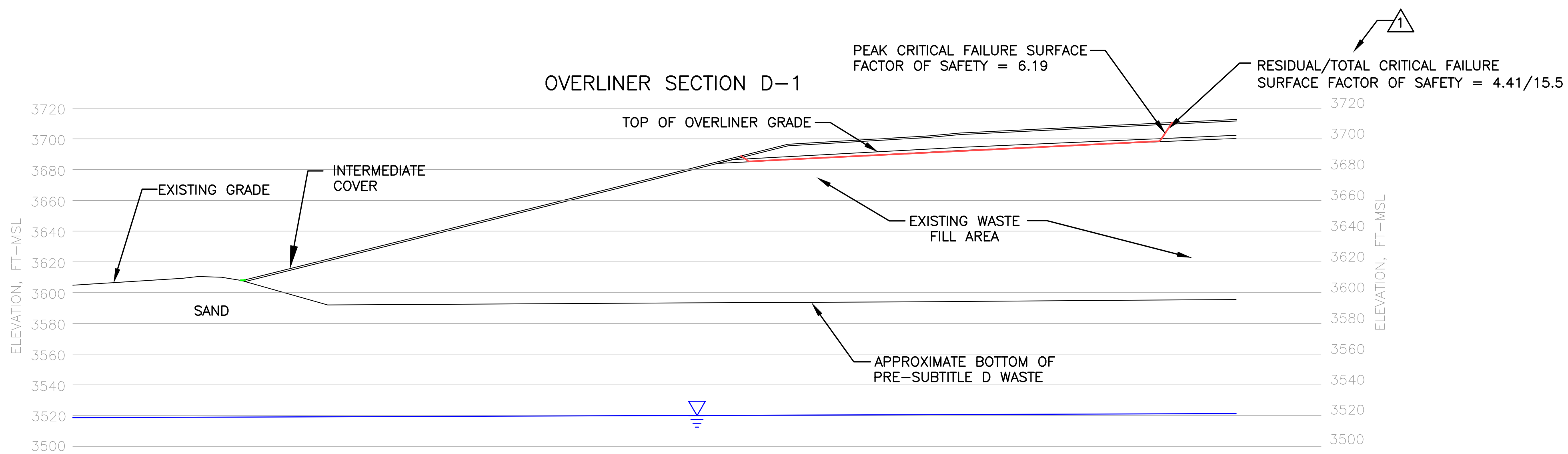

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IIIE−A−3−4 IIIE−A−3−12

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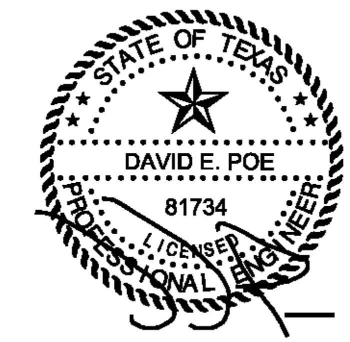

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Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIE-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Stratum I (Clay)	122.5	--
Stratum I (Caliche)	121.9	--
Stratum II (Sand)	122.5	127.0
Stratum III (Shale)	138.4	139.0

The strength parameters for the in-situ soils were selected based on the following:

Stratum I (Clay and Caliche)

A triaxial shear test was performed on Stratum I samples which resulted in cohesion and friction angle values listed in the table below. The values in the table will be used for both Clay and Caliche. Moist unit weight and saturated unit weight values are calculated from the dry unit weight, the moisture content, and the void ratio obtained from the triaxial shear test. These unit weight values conservatively compare to the average obtained from all laboratory testing performed on the material.

	Total Stress		Effective Stress	
	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-5	100	26.0	100	27.1

Stratum II (Sand)

A triaxial shear tests and direct shear tests were performed on the Stratum II (sand) samples which resulted in cohesion and friction angle values listed in the table below. Stratum II is modeled using a cohesion of 1,200 psf and a friction angle of 26.7° conservatively. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-3	1620 (total)	40.9 (total)	3020 (effective)	35.0 (effective)
Direct Shear Test WB-121	900 (residual)	26.9 (residual)	1200 (peak)	26.7 (peak)

Shale

The slope stability analysis indicate no failure surface through this stratum as the top of this stratum is located minimum of 74 feet below the elevation of the deepest excavation. The laboratory testing for shear strength is reported on page IIIE-18.

Material	Effective Stress		Total Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Stratum I (Clay)	100	26	100	27.1
Stratum I (Caliche)	100	26	100	27.1
Stratum II (Sand)	1,200	26.7	1,200	26.7
Stratum III (Shale)	500	33	5,000	0

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Final Cover System	116	100	16
Clay Liner(1)	120	100	16
Protective Cover	120	100	16
Overliner Protective Cover(2)	120	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees (effective stress) and a cohesion of 1,000 psf and internal friction angle of 0 degrees (total stress) is used for the clay liner for simplified Bishop Method of the slope stability analysis.

2. For translational (block) stability analysis, the strength parameters of the weakest interface were used to model the liner. The values used for the final slope stability analysis are highlighted in the table below titled "Minimum Required Interface Strength Values"Note that both total and residual stress analyses were performed for the translational analyses.

3. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the overliner for Simplified Bishop method of the slope stability analysis. For global translational stability analysis, the strength parameters of the weakest interface were used to model the overliner. For peak values, an adhesion of 100 psf and an interface friction angle of 18 degrees (textured geomembrane/GCL) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 8 degrees (smooth geomembrane/GCL) is used.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	59	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^{o}$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^{o}$ c = 460 psf (22 kPa) to $\phi = 39,^{o}$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^{o}$ to $43,^{o}$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIM.

Factor of Safety Summary for Long-Term Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress
Final Cover A-1	Bishop-Circular	2.43	2.38	1.5	1.3 ~~1.5~~	YES	YES
Final Cover B-1	Bishop-Circular	2.26	2.27	1.5	1.3 ~~1.5~~	YES	YES
Final Cover C-1	Bishop-Circular	2.62	2.69	1.5	1.3 ~~1.5~~	YES	YES
Final Cover D-1	Bishop-Circular	2.62	2.71	1.5	1.3 ~~1.5~~	YES	YES
Overliner A-1	Bishop-Circular	2.61	2.71	1.5	1.3 ~~1.5~~	YES	YES
Overliner B-1	Bishop-Circular	2.35	2.35	1.5	1.3 ~~1.5~~	YES	YES
Overliner C-1	Bishop-Circular	2.55	2.56	1.5	1.3 ~~1.5~~	YES	YES

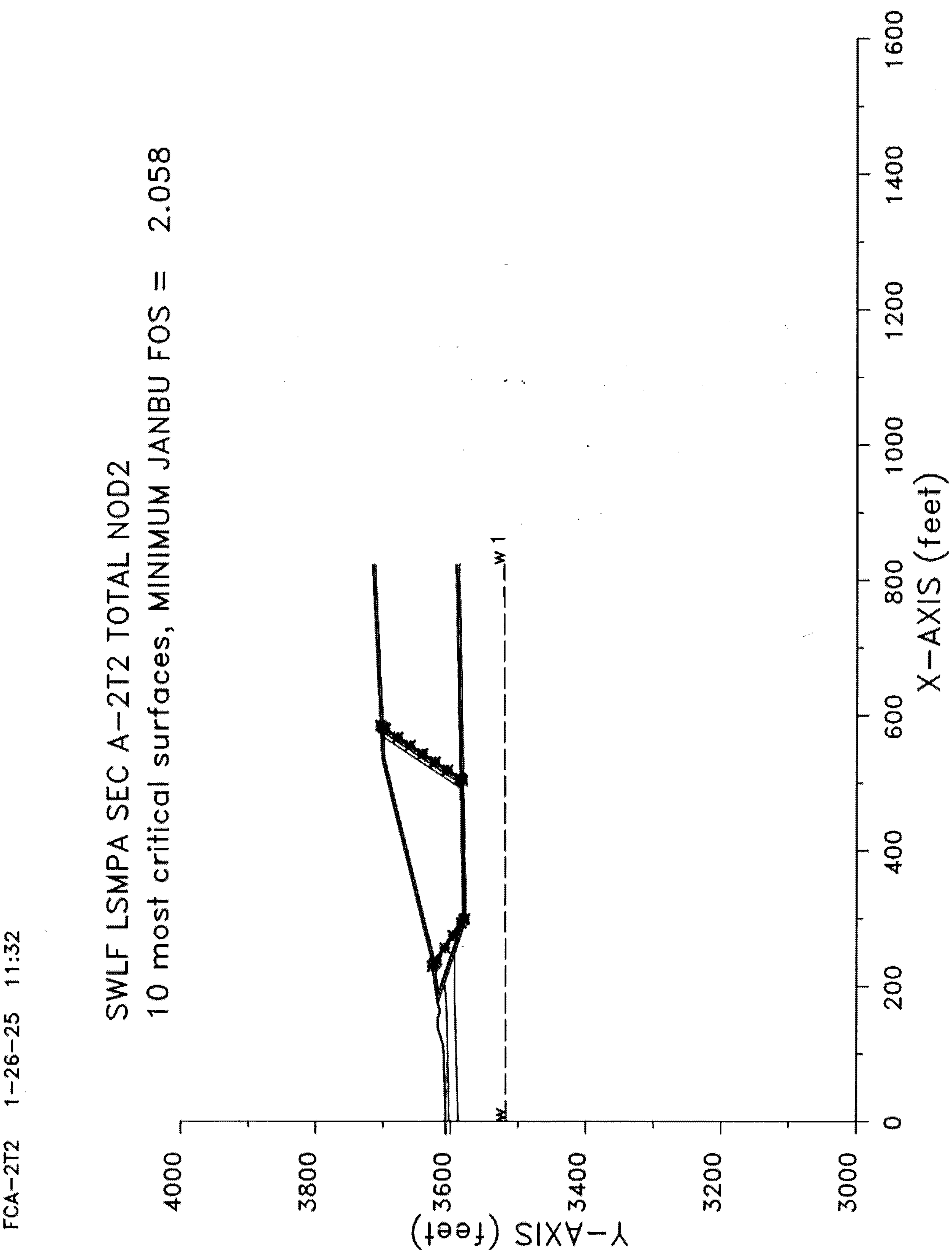
Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual/ Total	Peak	Residual/ Total	Peak	Residual
Final Cover A-2	Rankine-Block	2.23	2.09/2.05	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Final Cover B-2	Rankine-Block	2.67	2.55/2.81	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Final Cover C-2	Rankine-Block	4.05	3.96/3.86	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Final Cover D-3	Rankine-Block	3.10	2.71/2.79	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Overliner A-2	Rankine-Block	2.17	1.72/2.39	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Overliner B-2	Rankine-Block	3.27	3.06/3.49	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Overliner C-2	Rankine-Block	2.05	1.61/2.26	1.5	1.1 ~~1.0~~ / 1.3	YES	YES
Overliner D-1	Rankine-Block	6.19	4.41/15.5	1.5	1.1 ~~1.0~~ / 1.3	YES	YES

Minimum Required Interface Strength Parameters

Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner/Overliner/FC Systems	Protective Cover/Geocomposite	100	18	80	14
Liner/FC Systems (Notes 1, 3)	***Geonet/Smooth Geomembrane***	***188***	***11***	***188***	***9***
Liner/FC Systems (Note 3)	Geonet/Textured Geomembrane	0	13	0	10
Liner/Overliner/FC Systems	Geocomposite/Textured Geomembrane	100	21	80	10
Liner/FC Systems	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner/FC Systems (Note 2)	***Textured Geomembrane/Clay Liner***	***200***	***15***	***80***	***10***
Liner/Overliner Systems	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Liner/Protective Cover (Note 4)	***Clay Internal/Protective Cover (Total Stress)***	***--***	***--***	***1000 (Total Only)***	***0 (Total Only)***

1. Interface parameters used for translational block analysis of cell floor.
2. Interface parameters used for translational block analysis of cell sideslope (3H:1V typical).
3. Interface parameters derived from GRI Report #30 (Ref. 5).
4. Total stress values assumed for both rotational and translational anlaysis of final cover conditions. Effective, peak and residual stresses also analyzed.

ADDITIONAL TRANSITIONAL (BLOCK) STABILITY ANALYSES INCORPORATING TOTAL STRESS PARAMETERS


FCA-2T2 1-26-25 11:32
SWLF LSMPA SEC A-2T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 2.058
Y-AXIS (feet)
X-AXIS (feet)
4000
3800
3600
3400
3200
3000
0
200
400
600
800
1000
1200
1400
1600
W1

XSTABL File: FCA-2T2   1-26-25   11:32

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*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
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*****************************************
```

Problem Description : SWLF LSMPA SEC A-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3607.6	93.9	3610.0	1
2	93.9	3610.0	114.9	3611.7	1
3	114.9	3611.7	137.6	3619.3	1
4	137.6	3619.3	152.6	3619.3	1
5	152.6	3619.3	161.6	3616.3	1
6	161.6	3616.3	164.6	3616.3	1
7	164.6	3616.3	173.6	3619.3	1
8	173.6	3619.3	173.9	3619.4	1
9	173.9	3619.4	247.6	3630.0	5
10	247.6	3630.0	535.6	3702.0	5
11	535.6	3702.0	823.4	3716.4	5

18 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	173.9	3619.4	183.4	3619.4	8
2	183.4	3619.4	189.7	3619.4	7
3	189.7	3619.4	198.4	3619.4	6
4	198.4	3619.4	248.3	3626.5	6
5	248.3	3626.5	536.1	3698.5	6
6	536.1	3698.5	823.4	3712.9	6
7	189.7	3619.4	298.7	3583.0	7
8	298.7	3583.0	823.3	3593.5	7
9	183.4	3619.4	298.4	3581.0	8
10	298.4	3581.0	823.4	3591.5	9
11	173.6	3619.3	204.4	3609.2	1
12	204.4	3609.2	248.4	3594.5	2
13	248.4	3594.5	298.0	3578.0	3
14	298.0	3578.0	823.4	3588.5	3
15	.0	3602.3	160.0	3606.0	2
16	160.0	3606.0	204.4	3609.2	2
17	.0	3589.3	181.6	3594.5	3
18	181.6	3594.5	248.4	3594.5	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	27.10	.000	.0	0
2	121.9	121.9	100.0	27.10	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	122.5	127.0	1200.0	26.70	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0
6	59.0	59.0	288.0	23.00	.000	.0	0
7	120.0	125.0	100.0	16.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.60
2	823.40	3522.00

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 22.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	298.8	3580.5	318.8	3580.9	5.0
2	488.8	3584.3	508.7	3584.7	5.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	229.33	3627.37
2	233.32	3624.37
3	237.86	3621.37
4	256.20	3609.22
5	274.55	3597.08
6	292.89	3584.94
7	297.90	3581.17
8	299.09	3579.98
9	503.71	3583.67
10	505.18	3585.14
11	506.71	3587.16
12	518.85	3605.51
13	530.99	3623.85
14	543.13	3642.20
15	555.28	3660.55
16	567.42	3678.89
17	579.56	3697.24
18	581.92	3700.80
19	584.68	3704.46

** Corrected JANBU FOS = 2.058 ** (Fo factor = 1.085)

Failure surface No. 2 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	229.08	3627.34
2	233.07	3624.33
3	237.24	3621.57
4	255.59	3609.43
5	273.93	3597.29
6	292.28	3585.14
7	297.28	3581.37
8	298.87	3579.78
9	495.76	3583.04
10	497.71	3584.99
11	499.23	3587.01
12	511.38	3605.36
13	523.52	3623.70
14	535.66	3642.05
15	547.81	3660.40
16	559.95	3678.74

17	572.09	3697.09
18	574.29	3700.41
19	577.05	3704.07

** Corrected JANBU FOS = 2.059 ** (Fo factor = 1.085)

Failure surface No. 3 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	228.81	3627.30
2	232.80	3624.29
3	236.58	3621.79
4	254.92	3609.65
5	273.27	3597.51
6	291.61	3585.37
7	296.62	3581.59
8	299.47	3578.74
9	488.98	3582.77
10	491.06	3584.85
11	492.59	3586.88
12	504.73	3605.23
13	516.88	3623.57
14	529.02	3641.92
15	541.16	3660.26
16	553.30	3678.61
17	565.45	3696.95
18	567.51	3700.07
19	570.27	3703.73

** Corrected JANBU FOS = 2.059 ** (Fo factor = 1.086)

Failure surface No. 4 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.74	3627.86
2	236.73	3624.85
3	244.89	3619.45
4	263.24	3607.31
5	281.58	3595.17
6	299.93	3583.02
7	302.50	3581.08
8	305.11	3578.48
9	502.48	3582.43
10	505.19	3585.14

11	506.72	3587.16
12	518.86	3605.51
13	531.00	3623.85
14	543.15	3642.20
15	555.29	3660.55
16	567.43	3678.89
17	579.57	3697.24
18	581.93	3700.80
19	584.69	3704.46

** Corrected JANBU FOS = 2.065 ** (Fo factor = 1.085)

Failure surface No. 5 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.09	3627.77
2	236.09	3624.76
3	244.13	3619.44
4	262.48	3607.29
5	280.82	3595.15
6	299.17	3583.01
7	301.75	3581.07
8	304.52	3578.29
9	500.60	3583.00
10	502.68	3585.09
11	504.21	3587.11
12	516.35	3605.46
13	528.50	3623.80
14	540.64	3642.15
15	552.78	3660.50
16	564.92	3678.84
17	577.07	3697.19
18	579.37	3700.67
19	582.13	3704.33

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 6 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	231.44	3627.68
2	235.43	3624.67
3	243.03	3619.64
4	261.37	3607.50

5	279.72	3595.36
6	298.06	3583.21
7	300.93	3581.05
8	303.00	3578.98
9	504.51	3583.50
10	506.17	3585.16
11	507.70	3587.18
12	519.84	3605.53
13	531.98	3623.87
14	544.12	3642.22
15	556.27	3660.56
16	568.41	3678.91
17	580.55	3697.26
18	582.93	3700.85
19	585.69	3704.51

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 7 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	230.34	3627.52
2	234.33	3624.51
3	240.32	3620.54
4	258.67	3608.40
5	277.02	3596.26
6	295.36	3584.11
7	299.47	3581.02
8	299.63	3580.86
9	501.23	3582.61
10	503.72	3585.11
11	505.25	3587.13
12	517.39	3605.48
13	529.53	3623.82
14	541.68	3642.17
15	553.82	3660.52
16	565.96	3678.86
17	578.10	3697.21
18	580.43	3700.72
19	583.19	3704.38

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 8 specified by 19 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	232.72	3627.86
2	236.71	3624.85
3	244.87	3619.45
4	263.21	3607.31
5	281.56	3595.17
6	299.90	3583.02
7	302.48	3581.08
8	305.23	3578.33
9	504.48	3584.46
10	505.16	3585.14
11	506.69	3587.16
12	518.83	3605.51
13	530.97	3623.85
14	543.12	3642.20
15	555.26	3660.54
16	567.40	3678.89
17	579.55	3697.24
18	581.90	3700.80
19	584.66	3704.45

** Corrected JANBU FOS = 2.076 ** (Fo factor = 1.085)

Failure surface No. 9 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.33	3627.80
2	236.32	3624.80
3	244.40	3619.44
4	262.75	3607.30
5	281.10	3595.16
6	299.44	3583.01
7	302.02	3581.07
8	302.39	3580.70
9	501.18	3582.25
10	504.04	3585.11
11	505.57	3587.14
12	517.71	3605.49
13	529.86	3623.83
14	542.00	3642.18
15	554.14	3660.52
16	566.28	3678.87
17	578.43	3697.21
18	580.76	3700.74
19	583.52	3704.40

** Corrected JANBU FOS = 2.078 ** (Fo factor = 1.085)

Failure surface No.10 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	231.40	3627.67
2	235.39	3624.66
3	242.93	3619.67
4	261.28	3607.53
5	279.62	3595.39
6	297.97	3583.24
7	300.88	3581.05
8	302.44	3579.49
9	497.06	3584.36
10	497.69	3584.99
11	499.21	3587.01
12	511.36	3605.36
13	523.50	3623.70
14	535.64	3642.05
15	547.78	3660.40
16	559.93	3678.74
17	572.07	3697.09
18	574.27	3700.41
19	577.03	3704.07

** Corrected JANBU FOS = 2.086 ** (Fo factor = 1.085)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC A-2T2 TOTAL NOD2

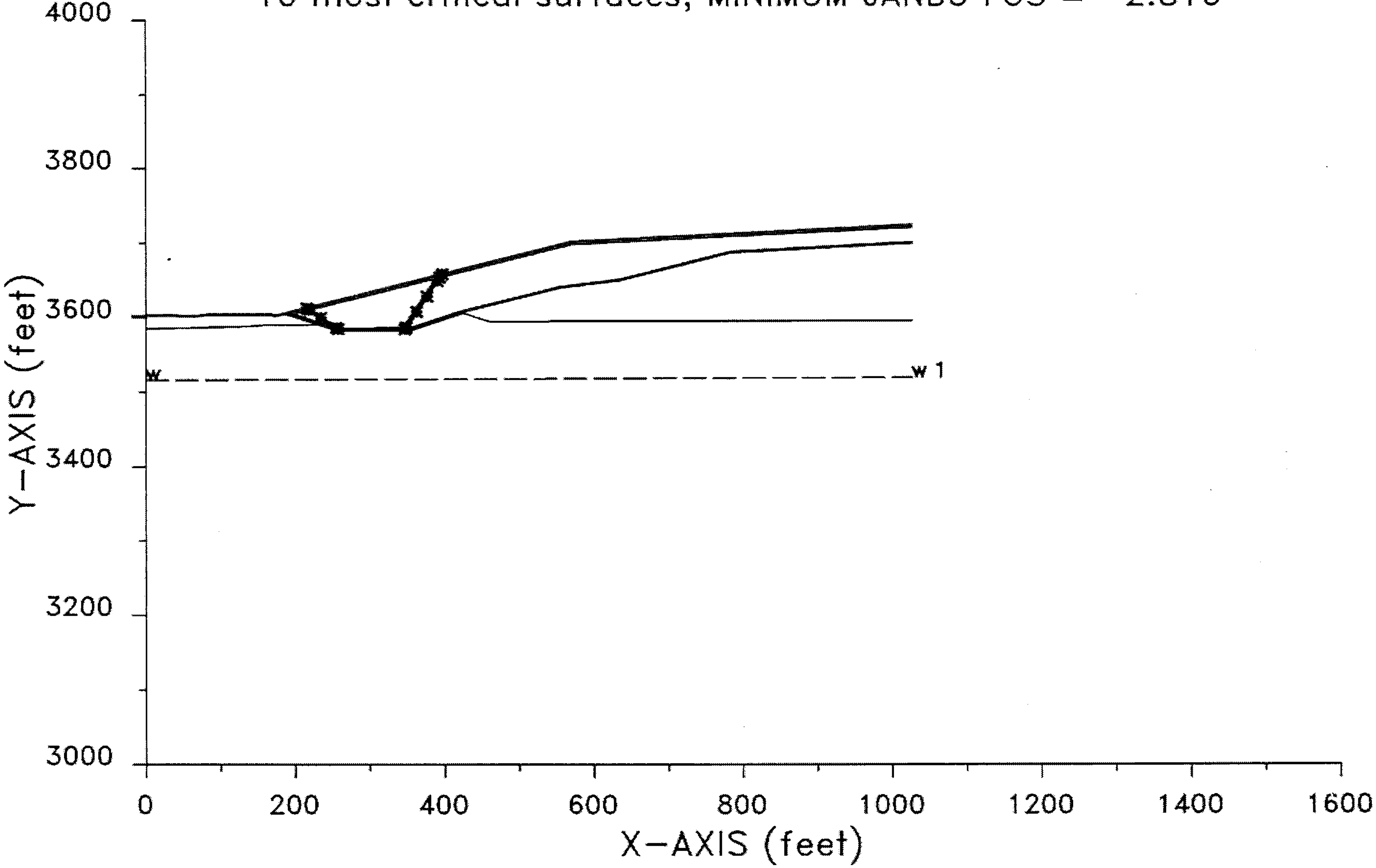
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.058	1.085	229.33	584.68	5.002E+05
2.	2.059	1.085	229.08	577.05	4.903E+05
3.	2.059	1.086	228.81	570.27	4.814E+05
4.	2.065	1.085	232.74	584.69	5.029E+05
5.	2.067	1.085	232.09	582.13	4.998E+05
6.	2.067	1.085	231.44	585.69	5.038E+05
7.	2.067	1.085	230.34	583.19	4.993E+05
8.	2.076	1.085	232.72	584.66	5.023E+05

9.	2.078	1.085	232.33	583.52	5.009E+05
10.	2.086	1.085	231.40	577.03	4.923E+05

* * * END OF FILE * * *

FCB–2T2 1–26–25 11:41

SWLF LSMPA SEC B–2T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 2.816



XSTABL File: FCB-2T2   1-26-25   11:41

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```

Problem Description : SWLF LSMPA SEC B-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

9 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3602.7	35.7	3603.6	1
2	35.7	3603.6	45.0	3602.4	1
3	45.0	3602.4	68.0	3602.2	1
4	68.0	3602.2	80.8	3604.4	1
5	80.8	3604.4	168.4	3604.5	1
6	168.4	3604.5	172.4	3602.6	1
7	172.4	3602.6	180.4	3604.6	1
8	180.4	3604.6	570.0	3702.0	4
9	570.0	3702.0	1026.7	3724.8	4

32 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	180.4	3604.6	188.4	3604.6	1

2	188.4	3604.6	194.8	3604.6	7
3	194.8	3604.6	194.9	3604.6	6
4	194.9	3604.6	570.5	3698.5	5
5	570.5	3698.5	1026.7	3721.3	5
6	194.9	3604.6	201.1	3604.6	6
7	201.1	3604.6	257.5	3585.8	6
8	257.5	3585.8	355.6	3587.2	6
9	355.6	3587.2	413.2	3606.4	6
10	413.2	3606.4	419.0	3608.3	9
11	419.0	3608.3	553.6	3642.0	9
12	553.6	3642.0	634.8	3652.0	9
13	634.8	3652.0	782.8	3689.0	9
14	782.8	3689.0	1026.7	3701.9	9
15	413.2	3606.4	419.5	3606.4	6
16	194.9	3604.6	257.2	3583.8	7
17	257.2	3583.8	356.0	3585.2	8
18	356.0	3585.2	419.5	3606.4	7
19	419.5	3606.4	553.9	3640.0	5
20	553.9	3640.0	635.1	3650.0	5
21	635.1	3650.0	783.1	3687.0	5
22	783.1	3687.0	1026.7	3699.9	5
23	419.5	3606.4	425.8	3606.4	7
24	188.4	3604.6	231.7	3590.2	1
25	231.7	3590.2	256.9	3581.8	2
26	256.9	3581.8	356.3	3583.2	2
27	356.3	3583.2	425.8	3606.4	2
28	425.8	3606.4	459.4	3595.2	2
29	459.4	3595.2	1026.7	3596.2	2
30	.0	3585.1	133.8	3588.2	2
31	133.8	3588.2	157.3	3590.2	2
32	157.3	3590.2	231.7	3590.2	2

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	121.9	121.9	100.0	26.00	.000	.0	0
2	122.5	127.0	1200.0	26.70	.000	.0	1
3	122.5	127.0	1200.0	26.70	.000	.0	0
4	116.0	120.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	100.0	16.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0

8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****

PHREATIC SURFACE,

****

Point No.	x-water (ft)	y-water (ft)
1	.00	3516.00
2	1026.70	3520.00

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 25.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	257.5	3583.8	267.5	3584.0	4.0

2	337.5	3584.6	347.5	3585.1	4.0

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.32	3613.33
2	218.93	3610.61
3	234.45	3600.33
4	255.30	3586.53
5	257.85	3584.61
6	347.00	3584.49
7	347.59	3585.08
8	349.12	3587.11
9	362.91	3607.95
10	376.71	3628.80
11	390.51	3649.65
12	393.57	3654.27
13	396.93	3658.73

** Corrected JANBU FOS = 2.816 ** (Fo factor = 1.088)

Failure surface No. 2 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.22	3613.05
2	217.83	3610.33
3	231.40	3601.35
4	252.25	3587.55
5	257.23	3583.80
6	257.64	3583.38
7	344.99	3584.23
8	345.82	3585.06
9	347.35	3587.08
10	361.14	3607.93

11	374.94	3628.78
12	388.74	3649.62
13	391.47	3653.74
14	394.83	3658.21

** Corrected JANBU FOS = 2.818 ** (Fo factor = 1.088)

Failure surface No. 3 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.95	3613.24
2	218.57	3610.52
3	233.45	3600.67
4	254.29	3586.87
5	258.34	3583.82
6	259.60	3582.56
7	345.39	3584.10
8	346.36	3585.06
9	347.89	3587.09
10	361.68	3607.94
11	375.48	3628.78
12	389.28	3649.63
13	392.11	3653.90
14	395.47	3658.37

** Corrected JANBU FOS = 2.819 ** (Fo factor = 1.088)

Failure surface No. 4 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.37	3613.34
2	218.98	3610.62
3	234.60	3600.28
4	255.44	3586.49
5	258.97	3583.83
6	260.65	3582.14
7	344.37	3583.22
8	346.21	3585.06
9	347.74	3587.09
10	361.54	3607.93
11	375.33	3628.78
12	389.13	3649.63
13	391.93	3653.86
14	395.30	3658.32

** Corrected JANBU FOS = 2.821 ** (Fo factor = 1.089)

Failure surface No. 5 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.90	3613.23
2	218.52	3610.50
3	233.31	3600.71
4	254.15	3586.92
5	257.92	3584.08
6	343.75	3583.36
7	345.43	3585.05
8	346.96	3587.08
9	360.76	3607.92
10	374.56	3628.77
11	388.35	3649.62
12	391.01	3653.63
13	394.37	3658.09

** Corrected JANBU FOS = 2.823 ** (Fo factor = 1.089)

Failure surface No. 6 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.08	3613.27
2	218.70	3610.55
3	233.81	3600.55
4	254.65	3586.75
5	258.54	3583.82
6	260.36	3582.00
7	343.43	3583.67
8	344.80	3585.04
9	346.33	3587.07
10	360.13	3607.91
11	373.92	3628.76
12	387.72	3649.61
13	390.26	3653.44
14	393.62	3657.91

** Corrected JANBU FOS = 2.833 ** (Fo factor = 1.089)

Failure surface No. 7 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	217.12	3613.78
2	220.73	3611.06
3	238.02	3599.62
4	258.86	3585.82
5	260.05	3584.93
6	346.19	3583.53
7	347.75	3585.08
8	349.27	3587.11
9	363.07	3607.96
10	376.87	3628.80
11	390.67	3649.65
12	393.76	3654.31
13	397.12	3658.78

** Corrected JANBU FOS = 2.838 ** (Fo factor = 1.089)

Failure surface No. 8 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.33	3613.33
2	218.94	3610.61
3	234.49	3600.32
4	255.34	3586.52
5	258.92	3583.82
6	260.72	3582.02
7	345.38	3584.87
8	345.57	3585.05
9	347.09	3587.08
10	360.89	3607.93
11	374.69	3628.77
12	388.49	3649.62
13	391.17	3653.67
14	394.53	3658.13

** Corrected JANBU FOS = 2.838 ** (Fo factor = 1.088)

Failure surface No. 9 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.67	3613.42

2	219.28	3610.70
3	235.44	3600.00
4	256.29	3586.20
5	259.30	3583.94
6	343.72	3583.07
7	345.70	3585.05
8	347.23	3587.08
9	361.03	3607.93
10	374.83	3628.77
11	388.63	3649.62
12	391.33	3653.71
13	394.70	3658.17

** Corrected JANBU FOS = 2.841 ** (Fo factor = 1.089)

Failure surface No.10 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.07	3613.02
2	217.68	3610.30
3	231.00	3601.48
4	251.85	3587.68
5	256.84	3583.92
6	257.54	3583.23
7	341.00	3583.65
8	342.35	3585.01
9	343.88	3587.03
10	357.68	3607.88
11	371.47	3628.73
12	385.27	3649.57
13	387.35	3652.71
14	390.72	3657.18

** Corrected JANBU FOS = 2.849 ** (Fo factor = 1.089)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC B-2T2 TOTAL NOD2

Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)

1.	2.816	1.088	215.32	396.93	2.137E+05
2.	2.818	1.088	214.22	394.83	2.132E+05
3.	2.819	1.088	214.95	395.47	2.145E+05
4.	2.821	1.089	215.37	395.30	2.149E+05
5.	2.823	1.089	214.90	394.37	2.116E+05
6.	2.833	1.089	215.08	393.62	2.127E+05
7.	2.838	1.089	217.12	397.12	2.135E+05
8.	2.838	1.088	215.33	394.53	2.134E+05
9.	2.841	1.089	215.67	394.70	2.132E+05
10.	2.849	1.089	214.07	390.72	2.083E+05

* * * END OF FILE * * *

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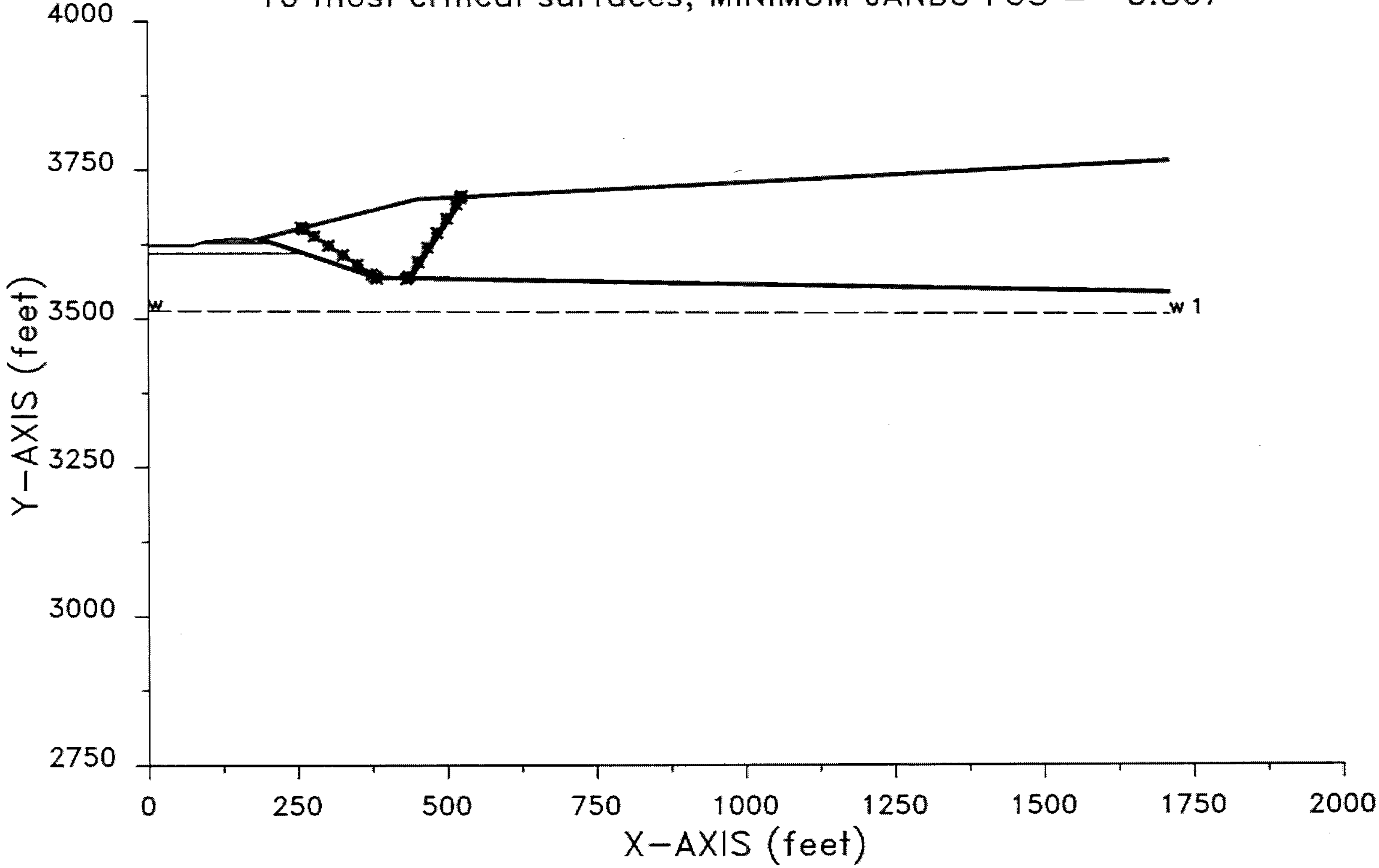
SWLF LSMPA SEC C-2T2 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 3.867



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*****************************************
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*              using the                *
*           Method of Slices            *
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*****************************************
```

Problem Description : SWLF LSMPA SEC C-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3622.9	73.9	3623.0	2
2	73.9	3623.0	74.8	3623.3	2
3	74.8	3623.3	88.3	3627.8	2
4	88.3	3627.8	96.8	3630.7	1
5	96.8	3630.7	105.2	3631.0	1
6	105.2	3631.0	136.0	3634.0	1
7	136.0	3634.0	166.0	3634.0	1
8	166.0	3634.0	170.0	3632.0	1
9	170.0	3632.0	178.4	3634.1	1
10	178.4	3634.1	450.0	3702.0	4
11	450.0	3702.0	1710.0	3765.0	4

16 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	178.3	3634.1	181.0	3634.1	1
2	181.0	3634.1	190.5	3634.1	7
3	190.5	3634.1	192.9	3634.1	6
4	192.9	3634.1	450.5	3698.5	5
5	450.5	3698.5	1710.0	3761.5	5
6	192.7	3634.1	196.9	3634.1	6
7	196.9	3634.1	382.2	3572.3	6
8	382.2	3572.3	1710.0	3545.7	6
9	190.5	3634.1	381.9	3570.3	7
10	381.9	3570.3	1710.0	3543.7	8
11	181.0	3634.1	199.8	3627.8	1
12	199.8	3627.8	253.3	3610.0	2
13	253.3	3610.0	381.4	3567.3	3
14	381.4	3567.3	1710.0	3540.7	3
15	88.3	3627.8	199.8	3627.8	2
16	.0	3610.0	253.3	3610.0	3

ISOTROPIC Soil Parameters

----

8 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	116.0	120.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	100.0	16.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****

PHREATIC SURFACE,

****

Point No.	x-water (ft)	y-water (ft)
1	.00	3514.00
2	1710.00	3506.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 29.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	382.2	3569.8	392.2	3569.6	5.0
2	432.2	3568.8	442.2	3568.6	5.0

```
*************************************************************
**     Factor of safety calculation for surface #    18    **
**     failed to converge within FIFTY iterations          **
**                                                         **
**    The last calculated value of the FOS was   4.1247    **
**    This will be ignored for final summary of results    **
*************************************************************
```

The trial failure surface in question is defined by the following 19 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	264.63	3655.66
2	268.24	3652.94
3	269.40	3652.17
4	293.58	3636.16
5	317.77	3620.16
6	341.95	3604.15
7	366.13	3588.14
8	390.31	3572.14
9	391.40	3571.32
10	432.32	3566.32
11	435.23	3569.23
12	436.72	3571.21
13	452.73	3595.39
14	468.73	3619.57
15	484.74	3643.76
16	500.74	3667.94
17	516.75	3692.12
18	523.39	3702.15
19	526.15	3705.81

```
************************************************************
**     Factor of safety calculation for surface #    23     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.3289     **
**    This will be ignored for final summary of results     **
************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	264.31	3655.58
2	267.93	3652.86
3	268.95	3652.18
4	293.14	3636.17
5	317.32	3620.16
6	341.50	3604.16
7	365.68	3588.15
8	389.87	3572.15
9	390.22	3571.88
10	432.90	3568.29
11	433.87	3569.26
12	435.36	3571.24
13	451.36	3595.42

```
        14         467.37      3619.60
        15         483.37      3643.78
        16         499.38      3667.97
        17         515.39      3692.15
        18         521.96      3702.07
        19         524.72      3705.74
```

```
**************************************************************
**      Factor of safety calculation for surface #    32     **
**      failed to converge within FIFTY iterations           **
**                                                           **
**     The last calculated value of the FOS was   4.5109     **
**     This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	265.21	3655.80
2	268.82	3653.08
3	270.22	3652.15
4	294.41	3636.15
5	318.59	3620.14
6	342.77	3604.13
7	366.95	3588.13
8	391.14	3572.12
9	391.75	3571.66
10	435.60	3568.63
11	436.18	3569.21
12	437.67	3571.19
13	453.68	3595.37
14	469.68	3619.55
15	485.69	3643.74
16	501.70	3667.92
17	517.70	3692.10
18	524.38	3702.20
19	527.14	3705.86

```
**************************************************************
**      Factor of safety calculation for surface #    67     **
**      failed to converge within FIFTY iterations           **
**                                                           **
**     The last calculated value of the FOS was   4.0711     **
**     This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	265.84	3655.96
2	269.45	3653.24
3	271.12	3652.13
4	295.30	3636.13
5	319.48	3620.12
6	343.67	3604.12
7	367.85	3588.11
8	392.03	3572.10
9	392.15	3572.02
10	440.54	3568.38
11	441.26	3569.11
12	442.75	3571.09
13	458.76	3595.27
14	474.77	3619.45
15	490.77	3643.63
16	506.78	3667.82
17	522.78	3692.00
18	529.71	3702.46
19	532.47	3706.12

```
**************************************************************
**     Factor of safety calculation for surface #    69     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   3.8621     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	264.50	3655.62
2	268.11	3652.90
3	269.21	3652.17
4	293.39	3636.17
5	317.58	3620.16
6	341.76	3604.15
7	365.94	3588.15
8	390.13	3572.14

9	391.64	3571.00
10	432.51	3567.65
11	434.11	3569.25
12	435.60	3571.23
13	451.61	3595.41
14	467.61	3619.60
15	483.62	3643.78
16	499.63	3667.96
17	515.63	3692.14
18	522.21	3702.09
19	524.97	3705.75

```
************************************************************
**     Factor of safety calculation for surface #    85    **
**     failed to converge within FIFTY iterations          **
**                                                         **
**    The last calculated value of the FOS was   3.9094    **
**    This will be ignored for final summary of results    **
************************************************************
```

The trial failure surface in question is
defined by the following 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	263.36	3655.34
2	266.97	3652.62
3	267.59	3652.20
4	291.78	3636.20
5	315.96	3620.19
6	340.14	3604.19
7	364.33	3588.18
8	388.51	3572.17
9	391.24	3570.11
10	391.55	3569.81
11	432.27	3567.50
12	434.03	3569.26
13	435.51	3571.23
14	451.52	3595.41
15	467.53	3619.60
16	483.53	3643.78
17	499.54	3667.96
18	515.55	3692.15
19	522.12	3702.08
20	524.88	3705.74

****

```
**     Factor of safety calculation for surface #    86     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.0808     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	264.71	3655.68
2	268.33	3652.96
3	269.52	3652.17
4	293.71	3636.16
5	317.89	3620.15
6	342.07	3604.15
7	366.25	3588.14
8	390.44	3572.14
9	391.94	3571.00
10	432.79	3566.53
11	435.49	3569.23
12	436.97	3571.20
13	452.98	3595.39
14	468.99	3619.57
15	484.99	3643.75
16	501.00	3667.93
17	517.01	3692.12
18	523.65	3702.16
19	526.41	3705.82

```
**************************************************************
**     Factor of safety calculation for surface #    92     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.1527     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	265.73	3655.93
2	269.34	3653.21

3	270.96	3652.14
4	295.14	3636.13
5	319.32	3620.12
6	343.51	3604.12
7	367.69	3588.11
8	391.87	3572.11
9	391.96	3572.04
10	433.59	3569.61
11	434.82	3571.25
12	450.83	3595.43
13	466.83	3619.61
14	482.84	3643.79
15	498.85	3667.98
16	514.85	3692.16
17	521.40	3702.05
18	524.16	3705.71

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.12	3653.53
2	259.73	3650.81
3	277.70	3638.91
4	301.89	3622.91
5	326.07	3606.90
6	350.25	3590.90
7	374.44	3574.89
8	379.44	3571.12
9	382.54	3568.02
10	432.29	3567.27
11	434.28	3569.25
12	435.76	3571.23
13	451.77	3595.41
14	467.78	3619.59
15	483.78	3643.77
16	499.79	3667.96
17	515.80	3692.14

18	522.38	3702.10
19	525.14	3705.76

** Corrected JANBU FOS = 3.867 ** (Fo factor = 1.085)

Failure surface No. 2 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.53	3653.63
2	260.15	3650.91
3	278.85	3638.53
4	303.03	3622.53
5	327.21	3606.52
6	351.39	3590.52
7	375.58	3574.51
8	380.58	3570.74
9	382.24	3569.08
10	435.70	3567.33
11	437.55	3569.19
12	439.04	3571.16
13	455.05	3595.34
14	471.06	3619.53
15	487.06	3643.71
16	503.07	3667.89
17	519.07	3692.07
18	525.82	3702.27
19	528.58	3705.93

** Corrected JANBU FOS = 3.879 ** (Fo factor = 1.086)

Failure surface No. 3 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.69	3653.67
2	260.31	3650.95
3	279.29	3638.39
4	303.47	3622.38
5	327.66	3606.37
6	351.84	3590.37
7	376.02	3574.36
8	381.02	3570.59
9	382.34	3569.27
10	439.69	3567.72
11	441.09	3569.11

12	442.58	3571.09
13	458.58	3595.27
14	474.59	3619.46
15	490.60	3643.64
16	506.60	3667.82
17	522.61	3692.00
18	529.52	3702.45
19	532.28	3706.11

** Corrected JANBU FOS = 3.880 ** (Fo factor = 1.086)

Failure surface No. 4 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.17	3653.79
2	260.79	3651.07
3	280.63	3637.94
4	304.81	3621.93
5	328.99	3605.93
6	353.17	3589.92
7	377.36	3573.92
8	382.16	3570.29
9	384.30	3568.16
10	440.09	3567.52
11	441.67	3569.10
12	443.16	3571.08
13	459.17	3595.26
14	475.18	3619.44
15	491.18	3643.63
16	507.19	3667.81
17	523.19	3691.99
18	530.14	3702.48
19	532.90	3706.14

** Corrected JANBU FOS = 3.899 ** (Fo factor = 1.086)

Failure surface No. 5 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.19	3653.80
2	260.80	3651.08
3	280.67	3637.92
4	304.85	3621.92
5	329.04	3605.91

6	353.22	3589.91
7	377.40	3573.90
8	382.19	3570.29
9	385.06	3567.42
10	438.13	3567.15
11	440.12	3569.13
12	441.60	3571.11
13	457.61	3595.29
14	473.62	3619.48
15	489.62	3643.66
16	505.63	3667.84
17	521.64	3692.02
18	528.51	3702.40
19	531.26	3706.06

** Corrected JANBU FOS = 3.901 ** (Fo factor = 1.086)

Failure surface No. 6 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.49	3653.87
2	261.10	3651.15
3	281.49	3637.65
4	305.67	3621.64
5	329.86	3605.64
6	354.04	3589.63
7	378.22	3573.63
8	382.66	3570.28
9	385.35	3567.59
10	439.07	3566.51
11	441.66	3569.10
12	443.15	3571.08
13	459.16	3595.26
14	475.16	3619.44
15	491.17	3643.63
16	507.18	3667.81
17	523.18	3691.99
18	530.13	3702.48
19	532.89	3706.14

** Corrected JANBU FOS = 3.908 ** (Fo factor = 1.086)

Failure surface No. 7 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)

1	257.36	3653.84
2	260.97	3651.12
3	281.15	3637.77
4	305.33	3621.76
5	329.51	3605.75
6	353.69	3589.75
7	377.88	3573.74
8	382.46	3570.29
9	382.62	3570.13
10	438.45	3566.74
11	440.83	3569.12
12	442.31	3571.10
13	458.32	3595.28
14	474.33	3619.46
15	490.33	3643.64
16	506.34	3667.83
17	522.35	3692.01
18	529.25	3702.44
19	532.01	3706.10

** Corrected JANBU FOS = 3.909 ** (Fo factor = 1.086)

Failure surface No. 8 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	255.90	3653.47
2	259.51	3650.75
3	277.09	3639.12
4	301.27	3623.11
5	325.45	3607.11
6	349.63	3591.10
7	373.82	3575.10
8	378.82	3571.33
9	382.41	3567.73
10	435.69	3569.78
11	436.77	3571.21
12	452.77	3595.39
13	468.78	3619.57
14	484.78	3643.75
15	500.79	3667.94
16	516.80	3692.12
17	523.43	3702.15
18	526.19	3705.81

** Corrected JANBU FOS = 3.910 ** (Fo factor = 1.086)

Failure surface No. 9 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.88	3653.72
2	260.49	3651.00
3	279.80	3638.21
4	303.99	3622.21
5	328.17	3606.20
6	352.35	3590.20
7	376.54	3574.19
8	381.54	3570.42
9	383.77	3568.18
10	433.47	3569.07
11	433.67	3569.26
12	435.15	3571.24
13	451.16	3595.42
14	467.17	3619.60
15	483.17	3643.79
16	499.18	3667.97
17	515.19	3692.15
18	521.75	3702.06
19	524.51	3705.73

** Corrected JANBU FOS = 3.910 ** (Fo factor = 1.086)

Failure surface No.10 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.43	3653.86
2	261.04	3651.14
3	281.33	3637.70
4	305.52	3621.70
5	329.70	3605.69
6	353.88	3589.69
7	378.06	3573.68
8	382.57	3570.29
9	385.42	3567.44
10	440.08	3568.48
11	440.72	3569.12
12	442.21	3571.10
13	458.21	3595.28
14	474.22	3619.46
15	490.23	3643.65
16	506.23	3667.83

17	522.24	3692.01
18	529.14	3702.43
19	531.90	3706.09

** Corrected JANBU FOS = 3.912 ** (Fo factor = 1.086)

```
*******************************************************************
**                                                               **
**  Out of the    100 surfaces generated and analyzed by XSTABL, **
**        8 surfaces were found to have MISLEADING FOS values.   **
**                                                               **
*******************************************************************
```

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC C-2T2 TOTAL NOD2

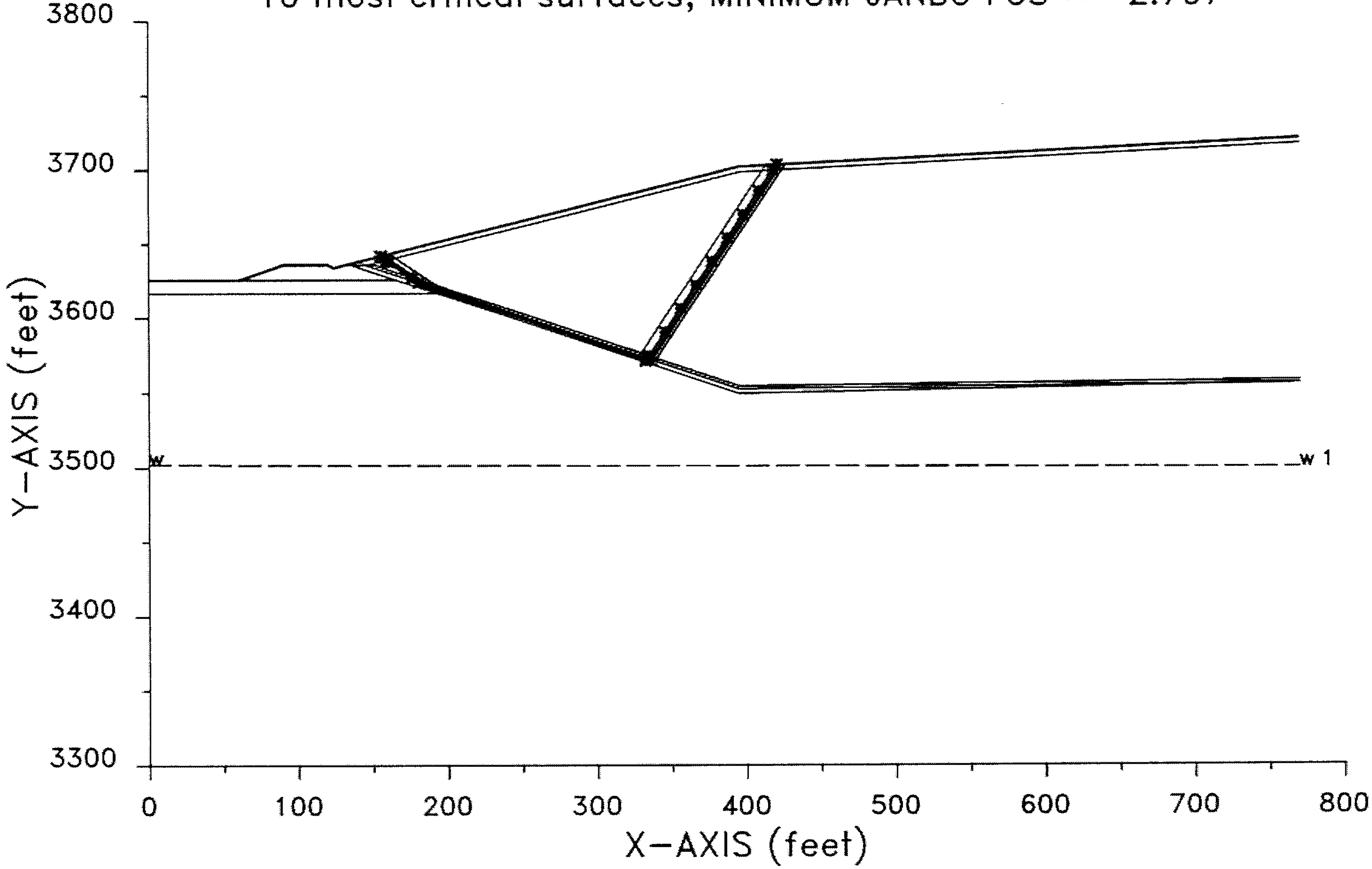
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	3.867	1.085	256.12	525.14	6.139E+05
2.	3.879	1.086	256.53	528.58	6.197E+05
3.	3.880	1.086	256.69	532.28	6.249E+05
4.	3.899	1.086	257.17	532.90	6.280E+05
5.	3.901	1.086	257.19	531.26	6.264E+05
6.	3.908	1.086	257.49	532.89	6.294E+05
7.	3.909	1.086	257.36	532.01	6.270E+05
8.	3.910	1.086	255.90	526.19	6.256E+05
9.	3.910	1.086	256.88	524.51	6.156E+05
10.	3.912	1.086	257.43	531.90	6.273E+05

* * * END OF FILE * * *

FCD-2T2 1-26-25 11:54

SWLF LSMPA SEC D-2T2 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 2.797



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```

Problem Description : SWLF LSMPA SEC D-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3625.9	60.2	3625.9	2
2	60.2	3625.9	60.3	3625.9	2
3	60.3	3625.9	89.9	3636.2	1
4	89.9	3636.2	119.9	3636.2	1
5	119.9	3636.2	123.9	3634.2	1
6	123.9	3634.2	132.0	3636.2	1
7	132.0	3636.2	395.2	3702.0	5
8	395.2	3702.0	770.1	3720.7	5

18 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	131.9	3636.2	135.1	3636.2	1
2	135.1	3636.2	144.6	3636.2	8

3	144.6	3636.2	146.5	3636.2	7
4	146.5	3636.2	395.7	3698.5	6
5	395.7	3698.5	770.1	3717.2	6
6	146.3	3636.2	150.9	3636.2	7
7	150.9	3636.2	395.2	3554.7	7
8	395.2	3554.7	770.1	3558.5	7
9	144.6	3636.2	394.9	3552.7	8
10	394.9	3552.7	770.1	3556.5	9
11	135.1	3636.2	165.9	3625.9	1
12	165.9	3625.9	192.9	3616.9	2
13	192.9	3616.9	363.7	3560.1	3
14	363.7	3560.1	393.7	3550.1	4
15	393.7	3550.1	394.4	3549.7	3
16	394.4	3549.7	770.1	3556.5	3
17	60.3	3625.9	165.9	3625.9	2
18	.0	3616.9	192.9	3616.9	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	122.5	127.0	1200.0	26.70	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0
6	59.0	59.0	288.0	23.00	.000	.0	0
7	120.0	125.0	100.0	16.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3502.00
2	770.10	3500.10

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 19.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	180.0	3624.4	200.0	3617.7	5.0
2	320.0	3577.7	340.0	3571.0	5.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.35	3642.04
2	158.97	3639.32
3	160.81	3638.09
4	176.66	3627.61
5	180.83	3624.46
6	332.49	3571.58
7	333.95	3573.03
8	335.21	3574.71
9	345.70	3590.56
10	356.18	3606.40
11	366.67	3622.24
12	377.16	3638.09
13	387.64	3653.93
14	398.13	3669.78
15	408.62	3685.62
16	417.88	3699.61
17	420.64	3703.27

** Corrected JANBU FOS = 2.797 ** (Fo factor = 1.088)

Failure surface No. 2 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.58	3641.84
2	158.19	3639.12
3	158.66	3638.81
4	174.51	3628.32
5	179.51	3624.55
6	180.29	3623.78
7	334.98	3571.75
8	335.69	3572.45
9	336.95	3574.13
10	347.44	3589.98
11	357.93	3605.82
12	368.41	3621.66
13	378.90	3637.51
14	389.39	3653.35
15	399.87	3669.19
16	410.36	3685.04
17	420.08	3699.72
18	422.84	3703.38

** Corrected JANBU FOS = 2.822 ** (Fo factor = 1.088)

Failure surface No. 3 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	156.16	3642.24
2	159.77	3639.52
3	163.05	3637.35
4	178.90	3626.86
5	183.59	3623.32
6	332.44	3571.23
7	334.17	3572.96
8	335.43	3574.64
9	345.92	3590.48
10	356.41	3606.33
11	366.89	3622.17
12	377.38	3638.01
13	387.87	3653.86
14	398.35	3669.70
15	408.84	3685.54
16	418.16	3699.62
17	420.92	3703.28

** Corrected JANBU FOS = 2.824 ** (Fo factor = 1.088)

Failure surface No. 4 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.75	3642.64
2	161.36	3639.91
3	167.46	3635.88
4	183.30	3625.39
5	185.09	3624.04
6	337.38	3569.99
7	338.80	3571.41
8	340.07	3573.09
9	350.56	3588.94
10	361.04	3604.78
11	371.53	3620.62
12	382.02	3636.47
13	392.50	3652.31
14	402.99	3668.15
15	413.48	3684.00
16	423.96	3699.84
17	424.01	3699.91
18	426.77	3703.57

** Corrected JANBU FOS = 2.826 ** (Fo factor = 1.088)

Failure surface No. 5 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.43	3643.56
2	165.04	3640.83
3	177.68	3632.47
4	193.53	3621.98
5	198.52	3618.22
6	336.70	3572.04
7	336.76	3572.10
8	338.02	3573.78
9	348.51	3589.62
10	358.99	3605.46
11	369.48	3621.31
12	379.97	3637.15
13	390.45	3652.99
14	400.94	3668.84
15	411.43	3684.68
16	421.42	3699.78
17	424.18	3703.45

** Corrected JANBU FOS = 2.829 ** (Fo factor = 1.088)

Failure surface No. 6 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.48	3642.07
2	159.10	3639.35
3	161.17	3637.97
4	177.02	3627.49
5	182.02	3623.72
6	183.64	3622.10
7	328.30	3574.81
8	328.38	3574.89
9	329.64	3576.57
10	340.13	3592.41
11	350.62	3608.26
12	361.10	3624.10
13	371.59	3639.94
14	382.08	3655.79
15	392.56	3671.63

16	403.05	3687.48
17	410.85	3699.26
18	413.61	3702.92

** Corrected JANBU FOS = 2.830 ** (Fo factor = 1.088)

Failure surface No. 7 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.83	3642.16
2	159.44	3639.44
3	162.14	3637.65
4	177.98	3627.17
5	182.98	3623.40
6	186.43	3619.95
7	335.76	3572.26
8	335.89	3572.39
9	337.15	3574.07
10	347.64	3589.91
11	358.13	3605.75
12	368.61	3621.60
13	379.10	3637.44
14	389.59	3653.28
15	400.07	3669.13
16	410.56	3684.97
17	420.33	3699.73
18	423.09	3703.39

** Corrected JANBU FOS = 2.831 ** (Fo factor = 1.088)

Failure surface No. 8 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.40	3642.05
2	159.02	3639.33
3	160.95	3638.05
4	176.80	3627.56
5	181.80	3623.79
6	184.20	3621.39
7	335.79	3571.29
8	336.63	3572.14
9	337.90	3573.82
10	348.39	3589.66
11	358.87	3605.50

12	369.36	3621.35
13	379.85	3637.19
14	390.33	3653.03
15	400.82	3668.88
16	411.31	3684.72
17	421.27	3699.78
18	424.03	3703.44

** Corrected JANBU FOS = 2.835 ** (Fo factor = 1.088)

Failure surface No. 9 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.18	3642.49
2	160.79	3639.77
3	165.88	3636.41
4	181.72	3625.92
5	186.72	3622.15
6	187.91	3620.96
7	333.02	3571.97
8	334.05	3573.00
9	335.32	3574.68
10	345.80	3590.52
11	356.29	3606.37
12	366.78	3622.21
13	377.26	3638.05
14	387.75	3653.90
15	398.24	3669.74
16	408.72	3685.58
17	418.01	3699.61
18	420.77	3703.28

** Corrected JANBU FOS = 2.837 ** (Fo factor = 1.088)

Failure surface No.10 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.28	3643.52
2	164.89	3640.80
3	177.28	3632.60
4	193.12	3622.11
5	198.10	3618.36
6	338.24	3570.90
7	338.77	3571.43

8	340.03	3573.10
9	350.52	3588.95
10	361.01	3604.79
11	371.49	3620.64
12	381.98	3636.48
13	392.47	3652.32
14	402.95	3668.17
15	413.44	3684.01
16	423.93	3699.85
17	423.97	3699.91
18	426.72	3703.57

** Corrected JANBU FOS = 2.840 ** (Fo factor = 1.088)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC D-2T2 TOTAL NOD2

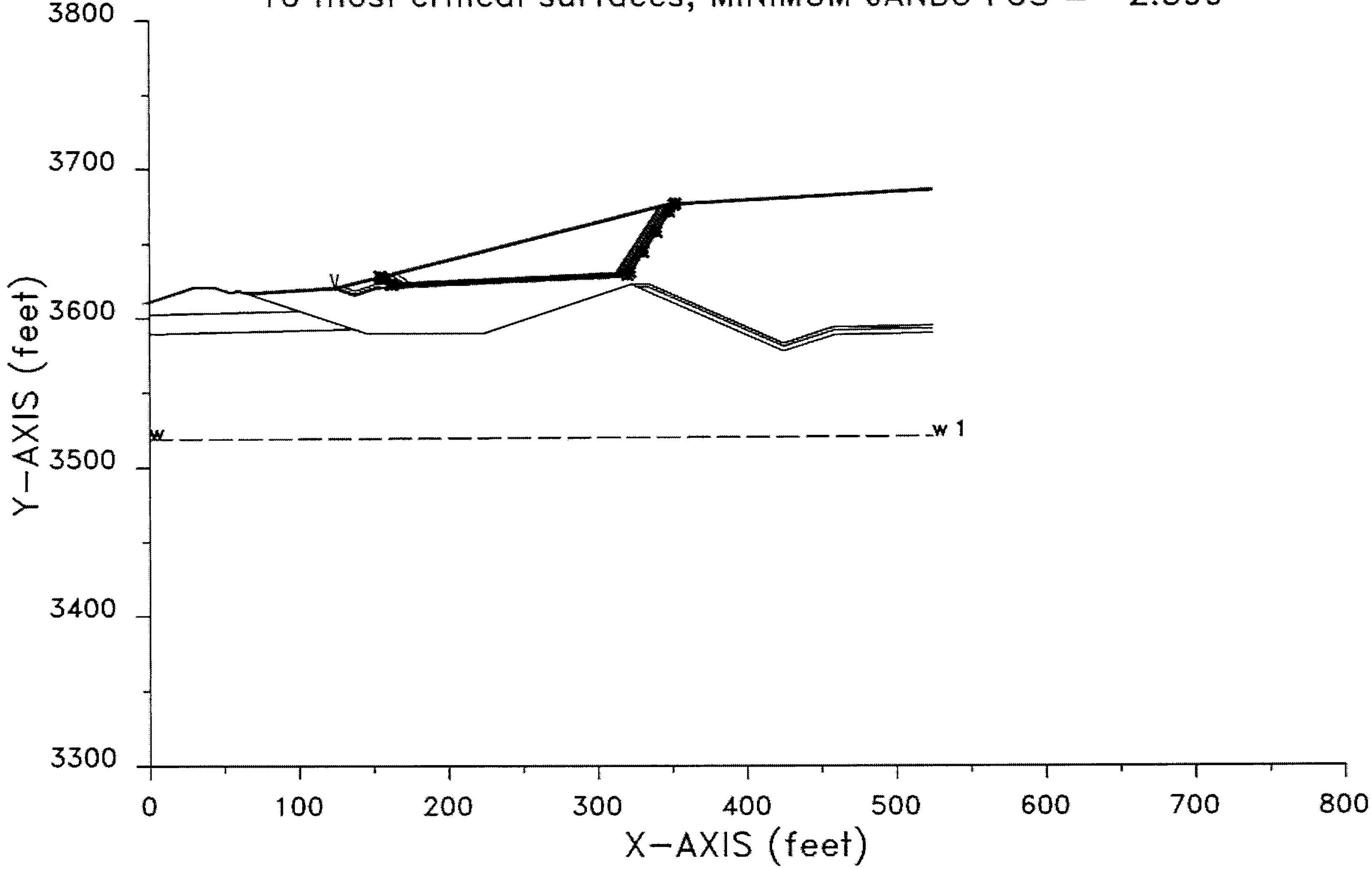
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.797	1.088	155.35	420.64	4.044E+05
2.	2.822	1.088	154.58	422.84	4.157E+05
3.	2.824	1.088	156.16	420.92	4.087E+05
4.	2.826	1.088	157.75	426.77	4.227E+05
5.	2.829	1.088	161.43	424.18	4.141E+05
6.	2.830	1.088	155.48	413.61	3.941E+05
7.	2.831	1.088	155.83	423.09	4.156E+05
8.	2.835	1.088	155.40	424.03	4.184E+05
9.	2.837	1.088	157.18	420.77	4.101E+05
10.	2.840	1.088	161.28	426.72	4.214E+05

* * * END OF FILE * * *

OL-A1T2 1-26-25 13:29

SWLF LSMPA OL SEC A-A1T2 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 2.399



XSTABL File: OL-A1T2   1-26-25   13:29

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*            Method of Slices            *
*                                        *
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Problem Description : SWLF LSMPA OL SEC A-A1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3611.0	29.1	3620.7	1
2	29.1	3620.7	44.1	3620.7	1
3	44.1	3620.7	53.1	3617.7	1
4	53.1	3617.7	56.1	3617.7	1
5	56.1	3617.7	59.3	3618.8	1
6	59.3	3618.8	64.1	3617.1	1
7	64.1	3617.1	121.7	3620.6	4
8	121.7	3620.6	124.6	3620.8	8
9	124.6	3620.8	126.5	3621.3	5
10	126.5	3621.3	347.7	3676.6	4
11	347.7	3676.6	524.5	3686.5	4

42 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	126.5	3621.3	129.7	3621.3	5
2	129.7	3621.3	130.3	3621.2	5
3	124.6	3620.8	126.4	3630.2	8
4	121.7	3630.2	124.2	3619.8	9
5	66.7	3616.3	124.2	3619.8	9
6	124.2	3619.8	124.8	3619.8	8
7	124.8	3619.8	126.4	3620.2	8
8	126.4	3620.2	130.3	3621.2	5
9	130.3	3621.2	347.9	3675.6	9
10	347.9	3675.6	524.5	3685.5	9
11	130.3	3621.2	137.7	3618.7	5
12	137.7	3618.7	151.1	3623.1	5
13	151.1	3623.1	188.2	3625.0	5
14	188.2	3625.0	322.5	3631.3	5
15	126.4	3620.2	137.7	3616.5	8
16	137.7	3616.5	151.5	3621.1	8
17	151.5	3621.1	188.3	3622.9	8
18	188.3	3622.9	322.5	3629.2	8
19	124.2	3619.8	137.7	3615.3	9
20	137.7	3615.3	151.7	3620.0	9
21	151.7	3620.0	188.3	3621.8	9
22	188.3	3621.8	322.5	3628.1	9
23	66.7	3616.3	100.8	3604.9	1
24	100.8	3604.9	137.0	3592.8	2
25	137.0	3592.8	145.5	3590.0	3
26	145.5	3590.0	223.5	3590.0	3
27	223.5	3590.0	322.5	3623.0	3
28	322.5	3623.0	334.9	3623.0	5
29	334.9	3623.0	424.8	3583.3	5
30	424.8	3583.3	454.0	3592.9	5
31	454.0	3592.9	458.6	3594.0	5
32	458.6	3594.0	524.5	3595.2	5
33	322.5	3623.0	327.0	3621.0	3
34	327.0	3621.0	334.5	3621.0	6
35	334.5	3621.0	424.7	3581.2	6
36	424.7	3581.2	458.8	3592.0	7
37	458.8	3592.0	524.5	3593.3	7
38	327.0	3621.0	424.5	3578.0	3
39	424.5	3578.0	459.2	3589.0	3
40	459.2	3589.0	524.5	3590.3	3
41	.0	3602.6	100.8	3604.9	2
42	.0	3589.6	137.0	3592.8	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	116.0	120.0	100.0	16.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.70
2	524.50	3520.80

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 16.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	161.6	3622.1	181.6	3623.1	3.2
2	301.4	3628.7	321.4	3629.7	3.2

****

-- WARNING -- WARNING -- WARNING -- WARNING -- (# 48)

****

Negative effective stresses were calculated at the base of a slice. This warning is usually reported for cases where slices have low self weight and a relatively high "c" shear strength parameter. In such cases, this effect can only be eliminated by reducing the "c" value.

****

USER SELECTED option for unrestricted values of strength

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.33	3628.26
2	155.38	3627.47
3	161.19	3623.62
4	162.31	3622.78
5	320.40	3629.18
6	321.98	3631.28

7	330.81	3644.62
8	339.64	3657.96
9	348.47	3671.30
10	351.45	3675.80
11	352.24	3676.85

** Corrected JANBU FOS = 2.399 ** (Fo factor = 1.070)

Failure surface No. 2 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	156.22	3628.73
2	157.26	3627.94
3	163.61	3623.74
4	163.65	3623.71
5	318.78	3630.21
6	319.50	3631.16
7	328.33	3644.50
8	337.16	3657.84
9	345.99	3671.19
10	348.95	3675.66
11	349.74	3676.71

** Corrected JANBU FOS = 2.409 ** (Fo factor = 1.070)

Failure surface No. 3 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.51	3629.05
2	158.56	3628.26
3	165.26	3623.83
4	167.12	3622.43
5	318.21	3630.56
6	318.63	3631.12
7	327.46	3644.46
8	336.29	3657.80
9	345.12	3671.15
10	348.08	3675.61
11	348.87	3676.67

** Corrected JANBU FOS = 2.410 ** (Fo factor = 1.070)

Failure surface No. 4 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.47	3628.29
2	155.51	3627.50
3	161.37	3623.63
4	163.45	3622.06
5	314.06	3630.45
6	314.41	3630.92
7	323.24	3644.26
8	332.07	3657.60
9	340.90	3670.95
10	343.20	3674.43
11	344.18	3675.72

** Corrected JANBU FOS = 2.414 ** (Fo factor = 1.069)

Failure surface No. 5 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	158.15	3629.21
2	159.20	3628.42
3	166.08	3623.87
4	167.25	3622.99
5	317.26	3629.48
6	318.49	3631.11
7	327.33	3644.45
8	336.16	3657.80
9	344.99	3671.14
10	347.94	3675.60
11	348.74	3676.66

** Corrected JANBU FOS = 2.426 ** (Fo factor = 1.071)

Failure surface No. 6 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.94	3628.66
2	156.98	3627.87
3	163.25	3623.72
4	164.38	3622.87
5	312.66	3630.77
6	312.71	3630.84

7	321.54	3644.18
8	330.37	3657.53
9	339.20	3670.87
10	341.23	3673.93
11	342.21	3675.23

** Corrected JANBU FOS = 2.427 ** (Fo factor = 1.069)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.27	3628.24
2	155.32	3627.45
3	161.12	3623.61
4	161.82	3623.08
5	311.69	3629.90
6	312.39	3630.83
7	321.22	3644.17
8	330.05	3657.51
9	338.88	3670.85
10	340.86	3673.84
11	341.84	3675.13

** Corrected JANBU FOS = 2.431 ** (Fo factor = 1.070)

Failure surface No. 8 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.87	3629.14
2	158.91	3628.35
3	165.72	3623.85
4	165.76	3623.82
5	315.59	3629.91
6	316.42	3631.01
7	325.25	3644.36
8	334.08	3657.70
9	342.91	3671.04
10	345.54	3675.01
11	346.52	3676.30

** Corrected JANBU FOS = 2.432 ** (Fo factor = 1.070)

Failure surface No. 9 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	164.89	3630.90
2	165.94	3630.11
3	174.70	3624.31
4	175.50	3623.71
5	320.59	3630.58
6	321.08	3631.23
7	329.91	3644.58
8	338.74	3657.92
9	347.58	3671.26
10	350.55	3675.75
11	351.34	3676.80

** Corrected JANBU FOS = 2.435 ** (Fo factor = 1.071)

Failure surface No.10 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.39	3630.02
2	162.44	3629.23
3	170.23	3624.08
4	172.25	3622.55
5	315.86	3629.47
6	317.05	3631.04
7	325.88	3644.39
8	334.71	3657.73
9	343.54	3671.07
10	346.27	3675.19
11	347.24	3676.49

** Corrected JANBU FOS = 2.445 ** (Fo factor = 1.072)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC A-A1T2 TOTAL NOD2

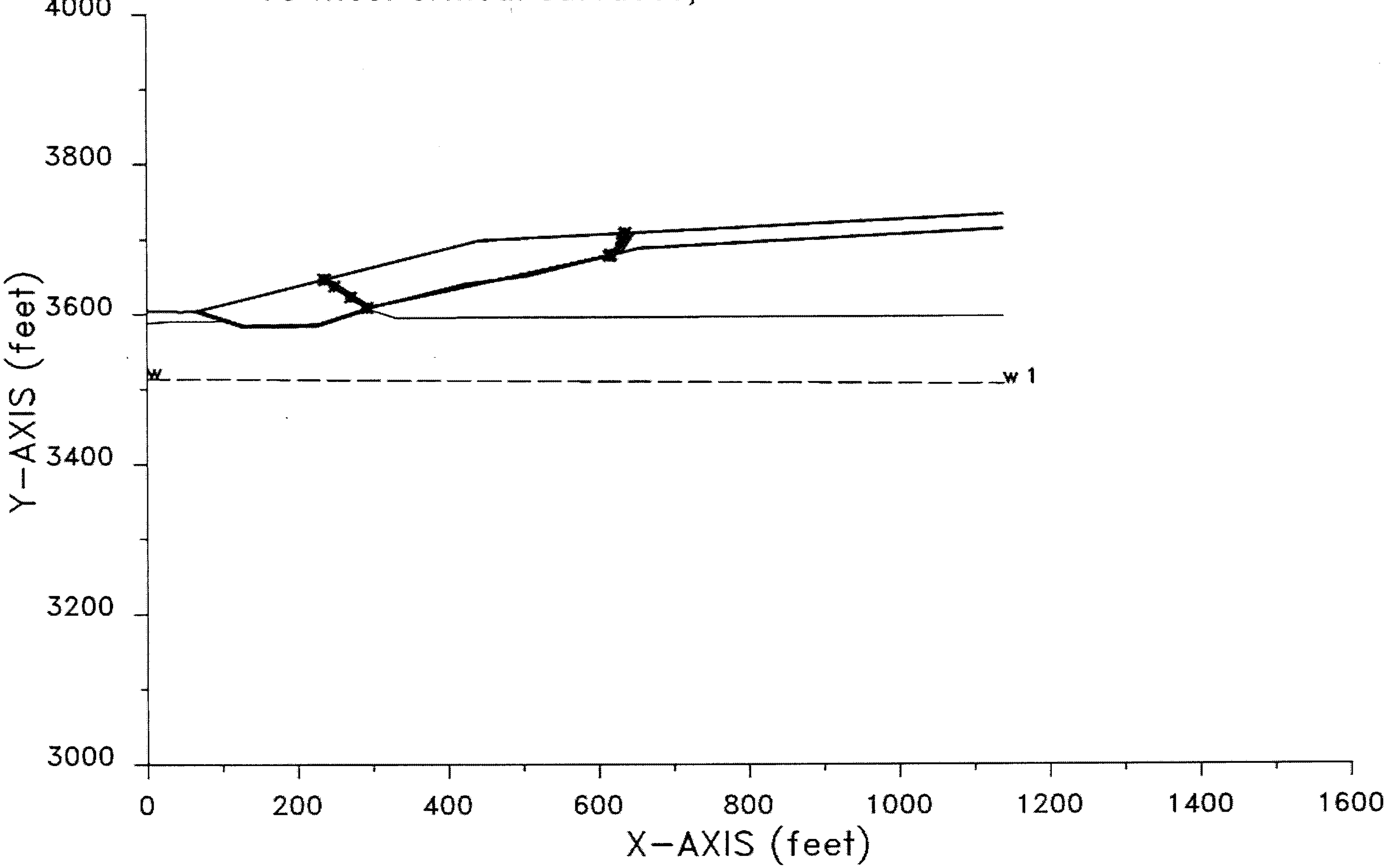
Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)

1.	2.399	1.070	154.33	352.24	1.264E+05
2.	2.409	1.070	156.22	349.74	1.180E+05
3.	2.410	1.070	157.51	348.87	1.197E+05
4.	2.414	1.069	154.47	344.18	1.160E+05
5.	2.426	1.071	158.15	348.74	1.210E+05
6.	2.427	1.069	155.94	342.21	1.109E+05
7.	2.431	1.070	154.27	341.84	1.123E+05
8.	2.432	1.070	157.87	346.52	1.151E+05
9.	2.435	1.071	164.89	351.34	1.190E+05
10.	2.445	1.072	161.39	347.24	1.205E+05

* * * END OF FILE * * *

OL-B1T2 1-26-25 13:33

SWLF LSMPA OL SEC B-B1T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 3.496



XSTABL File: OL-B1T2   1-26-25   13:33

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*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
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*            Method of Slices           *
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* Ver. 5.209                96 - 2083   *
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Problem Description : SWLF LSMPA OL SEC B-B1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3604.5	39.4	3604.5	1
2	39.4	3604.5	43.4	3602.6	1
3	43.4	3602.6	51.4	3604.6	1
4	51.4	3604.6	59.4	3604.6	1
5	59.4	3604.6	65.7	3604.6	6
6	65.7	3604.6	65.8	3604.6	5
7	65.8	3604.6	441.6	3698.5	9
8	441.6	3698.5	1138.7	3733.4	9

27 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	65.8	3604.6	70.0	3604.6	5
2	70.0	3604.6	441.6	3697.5	4

3	441.6	3697.5	1138.7	3732.4	4
4	70.0	3604.6	72.1	3604.6	5
5	72.1	3604.6	128.5	3585.8	5
6	128.5	3585.8	226.6	3587.2	5
7	226.6	3587.2	284.2	3606.4	5
8	284.2	3606.4	289.9	3608.3	8
9	289.9	3608.3	424.5	3642.0	8
10	424.5	3642.0	505.7	3652.0	8
11	505.7	3652.0	653.8	3689.0	8
12	653.8	3689.0	1138.6	3714.7	8
13	65.7	3604.6	128.2	3583.8	6
14	128.2	3583.8	226.9	3585.2	7
15	226.9	3585.2	290.5	3606.4	6
16	290.5	3606.4	424.9	3640.0	4
17	424.9	3640.0	506.1	3650.0	4
18	506.1	3650.0	654.1	3687.0	4
19	654.1	3687.0	1138.7	3712.7	4
20	59.4	3604.6	102.7	3590.2	1
21	102.7	3590.2	127.9	3581.8	2
22	127.9	3581.8	227.3	3583.2	2
23	227.3	3583.2	296.8	3606.4	2
24	296.8	3606.4	330.3	3595.2	2
25	330.3	3595.2	1138.7	3596.6	2
26	.0	3588.1	28.3	3590.2	2
27	28.3	3590.2	102.7	3590.2	2

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	121.9	121.9	100.0	26.00	.000	.0	0
2	122.5	127.0	1200.0	26.70	.000	.0	1
3	122.5	127.0	1200.0	26.70	.000	.0	0
4	59.0	59.0	288.0	23.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3514.00
2	1139.10	3506.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 26.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	290.2	3607.3	309.6	3612.2	2.0
2	615.0	3678.3	634.4	3683.1	2.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	235.61	3647.03
2	236.63	3646.26
3	249.50	3637.74
4	271.18	3623.39
5	292.86	3609.04
6	292.95	3608.94
7	615.05	3677.57
8	617.38	3679.90
9	631.73	3701.58
10	635.45	3707.21
11	636.24	3708.24

** Corrected JANBU FOS = 3.496 ** (Fo factor = 1.048)

Failure surface No. 2 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	240.62	3648.28
2	241.64	3647.51
3	254.50	3639.00
4	276.19	3624.64
5	297.87	3610.29
6	297.91	3610.25
7	615.34	3677.43
8	617.95	3680.04
9	632.31	3701.73
10	635.95	3707.23
11	636.73	3708.27

** Corrected JANBU FOS = 3.526 ** (Fo factor = 1.048)

Failure surface No. 3 specified by 11 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	237.05	3647.39
2	238.07	3646.62
3	250.94	3638.10
4	272.62	3623.75
5	294.30	3609.40
6	294.51	3609.19
7	617.04	3679.29
8	617.74	3679.99
9	632.09	3701.67
10	635.77	3707.22
11	636.55	3708.26

** Corrected JANBU FOS = 3.529 ** (Fo factor = 1.048)

Failure surface No. 4 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	234.83	3646.84
2	235.86	3646.06
3	248.72	3637.55
4	270.40	3623.20
5	292.09	3608.85
6	292.19	3608.74
7	631.86	3682.87
8	632.72	3683.73
9	647.07	3705.42
10	648.70	3707.87
11	649.48	3708.91

** Corrected JANBU FOS = 3.531 ** (Fo factor = 1.047)

Failure surface No. 5 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.79	3646.32
2	233.81	3645.55
3	246.68	3637.04
4	268.36	3622.69
5	290.04	3608.34
6	290.42	3607.96
7	624.98	3681.20
8	625.79	3682.00

9	640.14	3703.68
10	642.71	3707.57
11	643.49	3708.61

** Corrected JANBU FOS = 3.532 ** (Fo factor = 1.047)

Failure surface No. 6 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	236.62	3647.28
2	237.64	3646.51
3	250.51	3637.99
4	272.19	3623.64
5	293.87	3609.29
6	294.03	3609.13
7	621.01	3679.91
8	622.21	3681.11
9	636.56	3702.79
10	639.62	3707.41
11	640.40	3708.45

** Corrected JANBU FOS = 3.533 ** (Fo factor = 1.048)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	236.88	3647.35
2	237.91	3646.58
3	250.77	3638.06
4	272.45	3623.71
5	294.14	3609.36
6	294.23	3609.26
7	628.76	3682.02
8	629.73	3682.99
9	644.08	3704.67
10	646.11	3707.74
11	646.90	3708.78

** Corrected JANBU FOS = 3.542 ** (Fo factor = 1.047)

Failure surface No. 8 specified by 11 coordinate points

Point	x-surf	y-surf

No.	(ft)	(ft)
1	235.11	3646.90
2	236.13	3646.13
3	249.00	3637.62
4	270.68	3623.27
5	292.36	3608.92
6	292.90	3608.38
7	625.92	3681.95
8	626.04	3682.06
9	640.39	3703.75
10	642.93	3707.58
11	643.71	3708.62

** Corrected JANBU FOS = 3.556 ** (Fo factor = 1.048)

Failure surface No. 9 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	241.37	3648.47
2	242.39	3647.70
3	255.26	3639.18
4	276.94	3624.83
5	298.62	3610.48
6	298.78	3610.32
7	623.57	3681.20
8	623.91	3681.53
9	638.26	3703.21
10	641.09	3707.49
11	641.87	3708.53

** Corrected JANBU FOS = 3.561 ** (Fo factor = 1.048)

Failure surface No.10 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	241.46	3648.49
2	242.48	3647.72
3	255.35	3639.21
4	277.03	3624.86
5	298.71	3610.51
6	299.03	3610.18
7	616.17	3677.71
8	618.69	3680.23

9	633.04	3701.91
10	636.58	3707.26
11	637.37	3708.30

** Corrected JANBU FOS = 3.562 ** (Fo factor = 1.049)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC B-B1T2 TOTAL NOD2

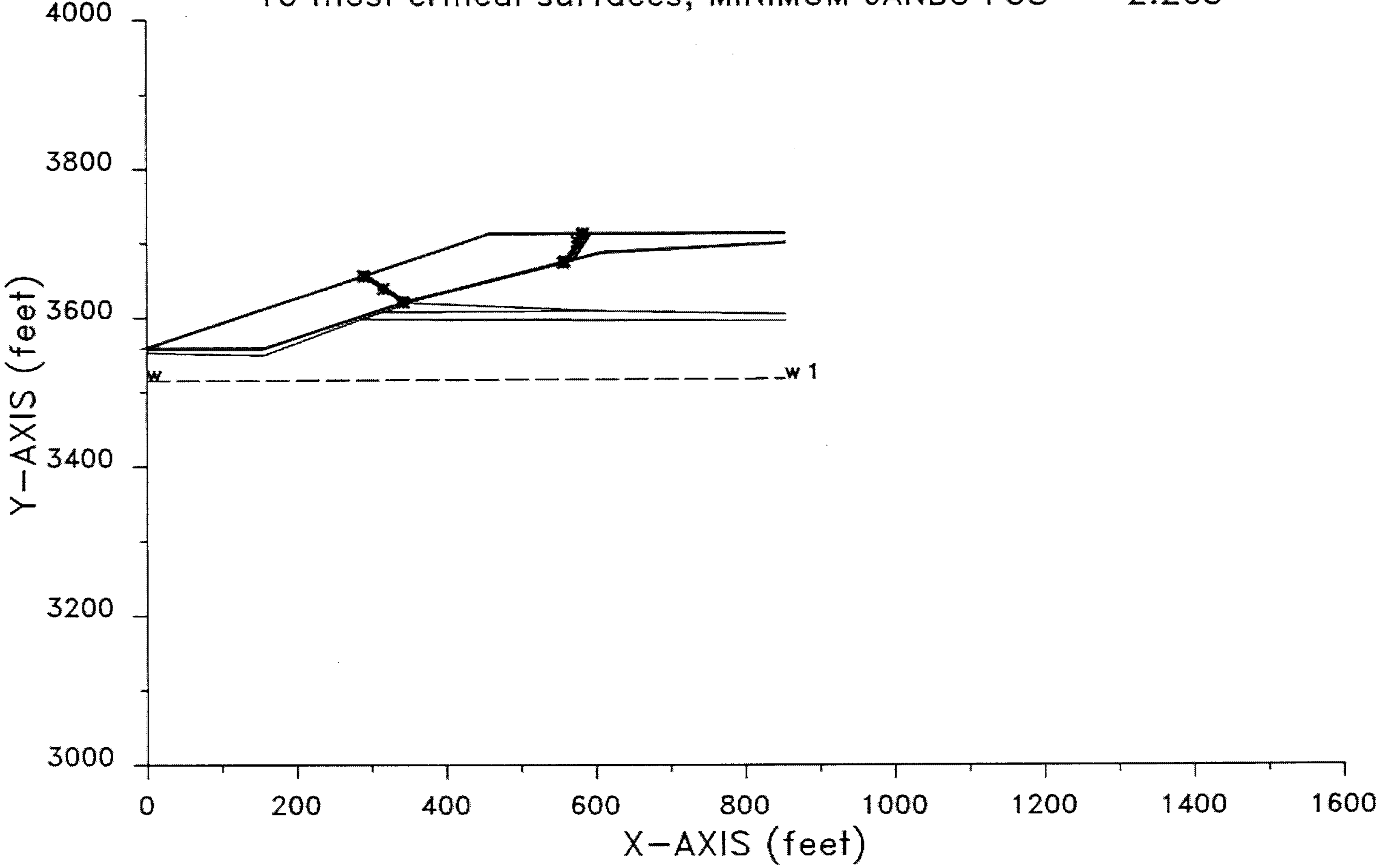
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	3.496	1.048	235.61	636.24	5.416E+05
2.	3.526	1.048	240.62	636.73	5.326E+05
3.	3.529	1.048	237.05	636.55	5.381E+05
4.	3.531	1.047	234.83	649.48	5.491E+05
5.	3.532	1.047	232.79	643.49	5.556E+05
6.	3.533	1.048	236.62	640.40	5.425E+05
7.	3.542	1.047	236.88	646.90	5.442E+05
8.	3.556	1.048	235.11	643.71	5.523E+05
9.	3.561	1.048	241.37	641.87	5.309E+05
10.	3.562	1.049	241.46	637.37	5.380E+05

* * * END OF FILE * * *

OL-C1T2 1-26-25 13:35

SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 2.263



XSTABL File: OL-C1T2   1-26-25   13:35

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*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*              using the                *
*            Method of Slices           *
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Problem Description : SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

2 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3560.3	458.7	3713.2	9
2	458.7	3713.2	853.9	3714.2	9

20 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3560.3	3.0	3560.3	5
2	3.0	3560.3	458.4	3712.1	4
3	458.4	3712.1	853.9	3713.2	4
4	3.0	3560.3	155.3	3560.0	5
5	155.3	3560.0	336.9	3620.0	8
6	336.9	3620.0	342.8	3622.4	8
7	342.8	3622.4	609.0	3689.0	8
8	609.0	3689.0	854.4	3702.0	8

9	.0	3558.3	155.7	3558.0	7
10	155.7	3558.0	343.3	3620.5	6
11	343.3	3620.5	609.3	3687.0	4
12	609.3	3687.0	853.9	3700.0	4
13	.0	3553.3	156.2	3550.0	3
14	156.2	3550.0	285.8	3598.2	3
15	285.8	3598.2	315.2	3608.0	2
16	315.2	3608.0	352.7	3620.5	1
17	352.7	3620.5	613.6	3609.6	1
18	613.6	3609.6	853.9	3605.3	2
19	315.2	3608.0	613.6	3609.6	2
20	285.8	3598.2	854.0	3596.7	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	59.0	59.0	288.0	23.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3515.40
2	853.90	3518.20

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 31.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	343.0	3621.5	362.4	3626.3	2.0
2	556.4	3674.8	575.9	3679.7	2.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.01	3656.97

2	290.93	3656.28
3	316.53	3639.34
4	342.38	3622.23
5	343.65	3620.95
6	556.58	3674.23
7	558.78	3676.44
8	575.89	3702.29
9	582.62	3712.45
10	583.42	3713.52

** Corrected JANBU FOS = 2.263 ** (Fo factor = 1.060)

Failure surface No. 2 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	289.78	3656.89
2	290.70	3656.20
3	316.31	3639.25
4	342.16	3622.14
5	343.07	3621.23
6	563.22	3675.95
7	565.34	3678.08
8	582.45	3703.93
9	588.10	3712.46
10	588.91	3713.53

** Corrected JANBU FOS = 2.295 ** (Fo factor = 1.059)

Failure surface No. 3 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	289.70	3656.87
2	290.62	3656.17
3	316.23	3639.22
4	342.08	3622.11
5	343.42	3620.78
6	563.20	3676.93
7	564.02	3677.75
8	581.13	3703.60
9	587.00	3712.46
10	587.80	3713.53

** Corrected JANBU FOS = 2.297 ** (Fo factor = 1.059)

Failure surface No. 4 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	292.28	3657.73
2	293.20	3657.03
3	318.93	3640.00
4	344.78	3622.89
5	346.05	3621.62
6	558.88	3675.54
7	560.11	3676.77
8	577.22	3702.62
9	583.73	3712.45
10	584.53	3713.52

** Corrected JANBU FOS = 2.309 ** (Fo factor = 1.060)

Failure surface No. 5 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	293.46	3658.12
2	294.38	3657.43
3	320.21	3640.33
4	346.06	3623.22
5	347.28	3622.00
6	560.08	3675.47
7	561.81	3677.19
8	578.92	3703.04
9	585.15	3712.45
10	585.96	3713.52

** Corrected JANBU FOS = 2.318 ** (Fo factor = 1.060)

Failure surface No. 6 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.04	3656.98
2	290.96	3656.29
3	316.55	3639.35
4	342.40	3622.24
5	343.28	3621.36
6	571.01	3678.10

7	572.87	3679.96
8	589.98	3705.81
9	594.40	3712.48
10	595.20	3713.55

** Corrected JANBU FOS = 2.327 ** (Fo factor = 1.058)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	294.35	3658.42
2	295.27	3657.72
3	295.33	3657.68
4	321.18	3640.57
5	347.03	3623.46
6	348.55	3621.94
7	567.96	3677.09
8	570.15	3679.28
9	587.26	3705.13
10	592.12	3712.47
11	592.93	3713.54

** Corrected JANBU FOS = 2.328 ** (Fo factor = 1.059)

Failure surface No. 8 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.79	3657.23
2	291.71	3656.54
3	317.30	3639.60
4	343.15	3622.49
5	343.81	3621.84
6	568.58	3677.09
7	570.98	3679.49
8	588.09	3705.34
9	592.81	3712.47
10	593.62	3713.54

** Corrected JANBU FOS = 2.330 ** (Fo factor = 1.058)

Failure surface No. 9 specified by 10 coordinate points

Point	x-surf	y-surf

No.	(ft)	(ft)
1	292.86	3657.92
2	293.78	3657.23
3	319.57	3640.16
4	345.42	3623.05
5	346.53	3621.94
6	564.49	3676.79
7	565.92	3678.22
8	583.03	3704.07
9	588.59	3712.46
10	589.39	3713.53

** Corrected JANBU FOS = 2.334 ** (Fo factor = 1.059)

Failure surface No.10 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.90	3657.27
2	291.82	3656.57
3	317.42	3639.63
4	343.27	3622.52
5	344.60	3621.18
6	570.68	3678.90
7	571.37	3679.59
8	588.48	3705.44
9	593.14	3712.47
10	593.94	3713.54

** Corrected JANBU FOS = 2.336 ** (Fo factor = 1.058)

The following is a summary of the TEN most critical surfaces

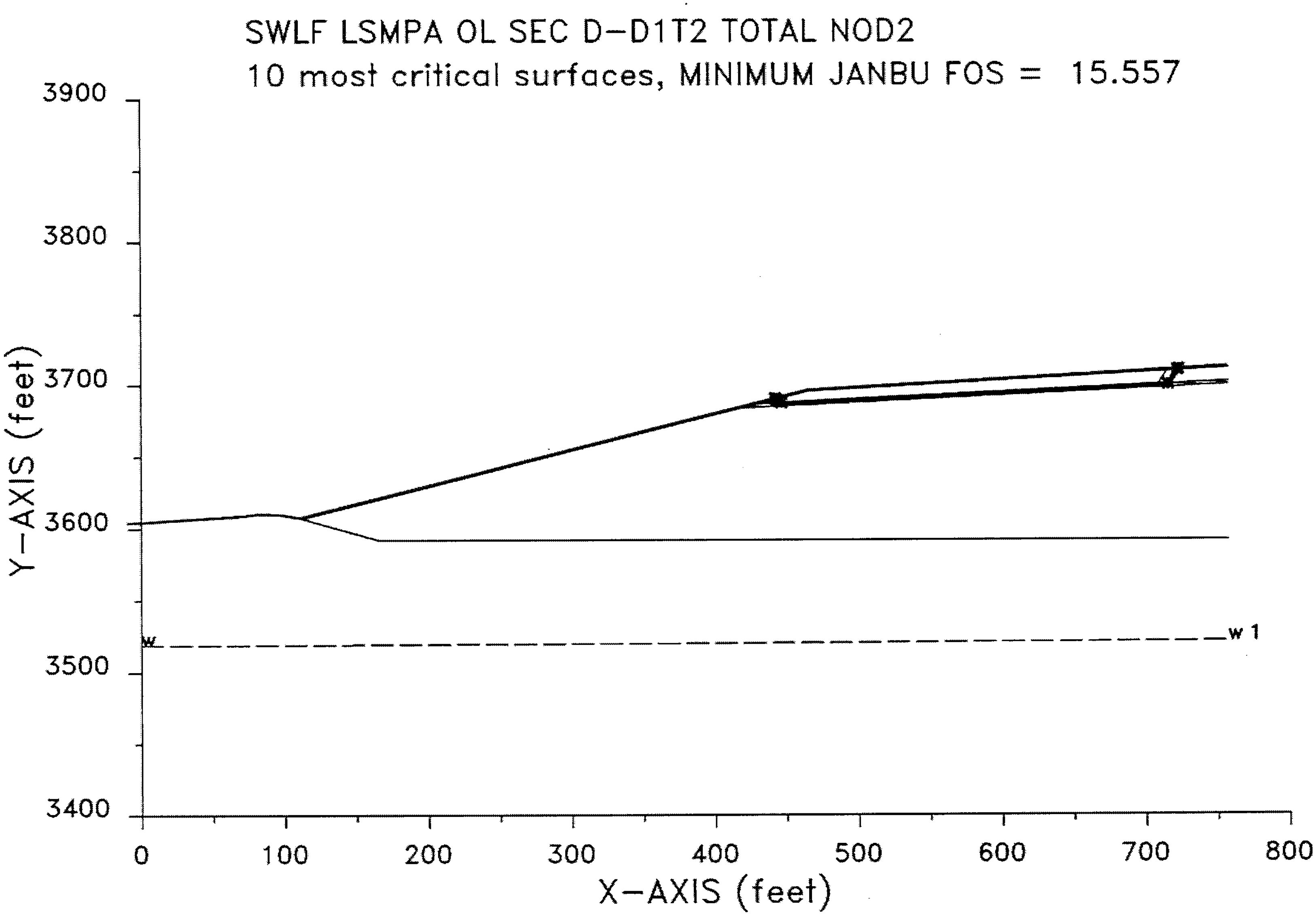
Problem Description : SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.263	1.060	290.01	583.42	3.205E+05
2.	2.295	1.059	289.78	588.91	3.253E+05
3.	2.297	1.059	289.70	587.80	3.244E+05
4.	2.309	1.060	292.28	584.53	3.190E+05

5.	2.318	1.060	293.46	585.96	3.192E+05
6.	2.327	1.058	290.04	595.20	3.306E+05
7.	2.328	1.059	294.35	592.93	3.250E+05
8.	2.330	1.058	290.79	593.62	3.283E+05
9.	2.334	1.059	292.86	589.39	3.227E+05
10.	2.336	1.058	290.90	593.94	3.286E+05

* * * END OF FILE * * *

OL-D1T2 1-26-25 13:36



XSTABL File: OL-D1T2   1-26-25   13:36

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****************************************
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```

Problem Description : SWLF LSMPA OL SEC D-D1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

7 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3604.7	71.6	3609.2	1
2	71.6	3609.2	81.9	3610.5	1
3	81.9	3610.5	97.0	3610.0	1
4	97.0	3610.0	109.3	3607.9	1
5	109.3	3607.9	111.3	3608.0	5
6	111.3	3608.0	465.3	3696.5	5
7	465.3	3696.5	757.0	3712.7	5

9 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	109.3	3607.9	112.4	3607.2	1
2	112.4	3607.2	419.2	3683.9	3
3	419.2	3683.9	429.4	3686.5	4

4	429.4	3686.5	465.8	3695.6	3
5	465.8	3695.6	757.5	3711.7	3
6	429.4	3686.5	757.5	3702.2	4
7	419.2	3683.9	757.2	3700.2	3
8	109.3	3607.9	165.8	3592.0	1
9	165.8	3592.0	757.2	3592.0	1

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	122.5	127.0	1200.0	26.70	.000	.0	0
3	59.0	59.0	288.0	23.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.60
2	757.20	3521.30

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

```
The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.

  100 trial surfaces will be generated and analyzed.

  2 boxes specified for generation of central block base

* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     22.0 ft

Box          x-left      y-left     x-right     y-right       Width
no.           (ft)        (ft)        (ft)        (ft)         (ft)

 1           439.5      3686.0       449.4      3686.6          2.0
 2           707.2      3699.1       717.2      3699.5          2.0

*************************************************************
**      Factor of safety calculation for surface #     1    **
**      failed to converge within FIFTY iterations          **
**                                                          **
**     The last calculated value of the FOS was  21.8099    **
**     This will be ignored for final summary of results    **
*************************************************************

The trial failure surface in question is
defined by the following  8 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          435.62      3689.08
         2          436.64      3688.31
         3          438.71      3686.95
         4          440.32      3685.34
         5          714.52      3699.90
         6          714.78      3700.16
         7          721.09      3709.69
         8          721.89      3710.75

*************************************************************
**      Factor of safety calculation for surface #     2    **
```

2	439.78	3689.10
3	442.74	3687.14
4	443.45	3686.43
5	712.61	3699.94
6	712.73	3700.06
7	719.04	3709.58
8	719.83	3710.64

```
**********************************************************
**    Factor of safety calculation for surface #   100   **
**    failed to converge within FIFTY iterations         **
**                                                       **
**   The last calculated value of the FOS was  24.6188   **
**   This will be ignored for final summary of results   **
**********************************************************
```

The trial failure surface in question is
defined by the following 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	442.13	3690.71
2	443.15	3689.94
3	447.07	3687.35
4	447.43	3686.99
5	714.54	3699.69
6	715.02	3700.17
7	721.33	3709.70
8	722.13	3710.76

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 7 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	441.79	3690.62
2	442.82	3689.85

3	446.51	3687.41
4	715.76	3700.20
5	715.77	3700.20
6	722.09	3709.75
7	722.88	3710.81

** Corrected JANBU FOS = 15.557 ** (Fo factor = 1.017)

Failure surface No. 2 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.33	3689.51
2	438.35	3688.74
3	440.90	3687.05
4	442.62	3685.33
5	714.07	3698.52
6	715.76	3700.20
7	722.08	3709.74
8	722.88	3710.80

** Corrected JANBU FOS = 20.443 ** (Fo factor = 1.019)

Failure surface No. 3 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.05	3689.44
2	438.07	3688.67
3	440.54	3687.03
4	442.33	3685.24
5	713.13	3698.72
6	714.55	3700.14
7	720.86	3709.68
8	721.66	3710.74

** Corrected JANBU FOS = 20.596 ** (Fo factor = 1.019)

Failure surface No. 4 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	435.24	3688.99
2	436.27	3688.22

3	438.22	3686.92
4	439.83	3685.31
5	707.29	3698.49
6	708.66	3699.86
7	714.94	3709.35
8	715.74	3710.41

** Corrected JANBU FOS = 20.802 ** (Fo factor = 1.019)

Failure surface No. 5 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	440.79	3690.37
2	441.81	3689.60
3	445.35	3687.26
4	447.04	3685.57
5	715.98	3698.72
6	717.55	3700.29
7	723.88	3709.84
8	724.68	3710.91

** Corrected JANBU FOS = 20.895 ** (Fo factor = 1.019)

Failure surface No. 6 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	435.62	3689.08
2	436.64	3688.31
3	438.71	3686.95
4	440.32	3685.34
5	714.52	3699.90
6	714.78	3700.16
7	721.09	3709.69
8	721.89	3710.75

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No. 7 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	443.42	3691.03

2	444.45	3690.26
3	448.73	3687.43
4	448.85	3687.31
5	716.60	3699.25
6	717.65	3700.29
7	723.97	3709.85
8	724.77	3710.91

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.019)

Failure surface No. 8 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.68	3689.60
2	438.71	3688.83
3	441.36	3687.07
4	442.23	3686.20
5	715.60	3700.08
6	715.73	3700.20
7	722.05	3709.74
8	722.84	3710.80

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No. 9 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	441.72	3690.60
2	442.74	3689.83
3	446.54	3687.32
4	447.97	3685.88
5	715.98	3700.12
6	716.07	3700.22
7	722.39	3709.76
8	723.19	3710.82

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No.10 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)

1	441.45	3690.54
2	442.47	3689.77
3	446.20	3687.30
4	447.37	3686.13
5	715.50	3699.52
6	716.20	3700.22
7	722.52	3709.77
8	723.32	3710.83

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.018)

```
*******************************************************************
**                                                               **
**  Out of the    100 surfaces generated and analyzed by XSTABL, **
**       95 surfaces were found to have MISLEADING FOS values.   **
**                                                               **
*******************************************************************
```

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC D-D1T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	15.557	1.017	441.79	722.88	1.590E+05
2.	20.443	1.019	437.33	722.88	2.831E+05
3.	20.596	1.019	437.05	721.66	2.821E+05
4.	20.802	1.019	435.24	715.74	2.782E+05
5.	20.895	1.019	440.79	724.68	2.808E+05
6.	500.000	1.017	435.62	721.89	2.835E+05
7.	500.000	1.019	443.42	724.77	2.770E+05
8.	500.000	1.017	437.68	722.84	2.817E+05
9.	500.000	1.017	441.72	723.19	2.777E+05
10.	500.000	1.018	441.45	723.32	2.782E+05

* * * END OF FILE * * *

APPENDIX IIIE-A-4

INFINITE SLOPE STABILITY ANALYSIS

Includes pages IIIE-A-4-1 through IIIE-A-4-13

STATE OF TEXAS
DAVID E. POE
81734
LICENSED
PROFESSIONAL ENGINEER

01/30/2025

SOUTHWEST LANDFILL
0120-094-11-107-11
APPENDIX IIIE-A-4
INFINITE SLOPE STABILITY ANALYSIS SUMMARY

Component/Interface	Strength Parameters: Cohesion/Adhesion (psf)		Strength Parameters: Friction Angle (deg)		H (ft)	γ (pcf)	β (deg)	T (ft)	r_u	b	A	B	Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
	Peak	Residual	Peak	Residual									Peak	Residual	Peak	Residual	Peak	Residual
Liner System (3H:1V Maximum Slope)																		
Composite Liner																		
Protective Cover/Geocomposite	100	80	18	14	2	120	18.43	0	0.00	3.0	1.0	3.3	2.35	1.85	1.5	1.0	YES	YES
Geocomposite/Textured Geomembrane	100	80	21	10	2	120	18.43	0	0.00	3.0	1.0	3.3	2.53	1.63	1.5	1.0	YES	YES
Textured Geomembrane/Clay Liner	200	80	15	10	2	120	18.43	0	0.00	3.0	1.0	3.3	3.55	1.63	1.5	1.0	YES	YES
Clay Liner/Subgrade (Note 1)	200	100	18	12	2	120	18.43	0	0.00	3.0	1.0	3.3	3.72	2.01	1.5	1.0	YES	YES
Clay Liner Internal	100	-	16	-	2	120	18.43	0	0.00	3.0	1.0	3.3	2.24	-	1.5	-	YES	-
Textured Geomembrane / Geosynthetic Clay Liner	100	0	18	0	2	120	18.43	0	0.00	3.0	1.0	3.3	2.35	-	1.5	-	YES	-
Geosynthetic Clay Liner Internal	100	-	24	-	2	120	18.43	0	0.00	3.0	1.0	3.3	2.71	-	1.5	-	YES	-
Geosynthetic Clay Liner/Subgrade	100	80	25	12	2	120	18.43	0	0.00	3.0	1.0	3.3	2.77	1.74	1.5	1.0	YES	YES
Overliner System (25 Percent Maximum Slope)																		
Protective Cover/Geocomposite	100	80	18	14	2	120	11.31	0	0.00	5.0	1.0	5.3	3.83	3.01	1.5	1.0	YES	YES
Geocomposite/Textured Geomembrane	100	80	21	10	2	120	11.31	0	0.00	5.0	1.0	5.3	4.13	2.65	1.5	1.0	YES	YES
Textured Geomembrane/ Geosynthetic Clay Liner	100	80	18	10	2	120	11.31	0	0.00	5.0	1.0	5.3	3.83	2.65	1.5	1.0	YES	YES
Geosynthetic Clay Liner Internal	100	-	24	-	2	120	11.31	0	0.00	5.0	1.0	5.3	4.43	-	1.5	-	YES	-
Geosynthetic Clay Liner/Subgrade	100	100	25	12	2	120	11.31	0	0.00	5.0	1.0	5.3	4.54	3.27	1.5	1.0	YES	YES

Notes

1. Clay liner to subgrade interface assumes that clay is founded on granular or sandy soils. In the event clay liner is founded on predominantly clayey soil, the interface for infinite slope stability analysis would be represented by the "Clay Liner Internal" analysis above.

ATTACHMENT 2

SECTION 305.62(J)(2) LIMITED SCOPE MAJOR PERMIT AMENDMENT REPLACEMENT PAGES (CLEAN VERSION)

THIS ATTACHMENT INCLUDES ONLY CLEAN VERSIONS OF THE PAGES WITH REDLINE/STRIKEOUT INCLUDED IN ATTACHMENT 1.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663C

LIMITED SCOPE MAJOR PERMIT AMENDMENT APPLICATION

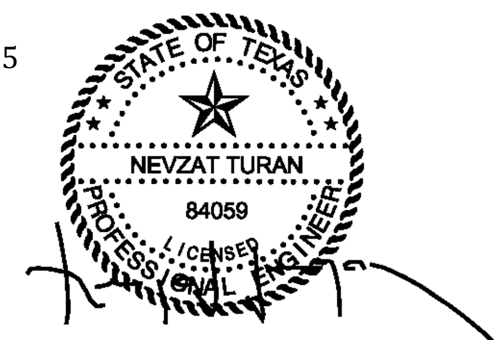
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIB
OVERLINER POINT OF COMPLIANCE DEMONSTRATION

Prepared for

Southwest Landfill TX, LP

TCEQ Approved February 20, 2020

Revised January 2025



01/30/2025

Weaver Consultants Group, LLC
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Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0120-094-11-140

This document is intended for permitting purposes only.

Table 2-2
Chemical Constituent Concentrations in Leachate

Constituent	MCL Listed in §330.331(a)(1) (mg/l)	Site Specific Leachate Quality[1, 3] (mg/l)	Leachate Quality Information Historically Used for POC Demonstrations in Texas (mg/l)	DAF Range (from Site Specific Data to Historically Used Data)[4]
Arsenic	0.05	0.0855	5.0	<1 to 100
Barium	1.0	7.450	100.0	7.45 to 100
Benzene[2]	0.005	0.0025	0.814	<1 to 163
Cadmium[2]	0.01	0.0001	1.0	<1 to 100
Carbon tetrachloride[2]	0.005	0.0025	0.5	<1 to 100
Chromium (hexavalent)	0.05	0.0126	5.0	<1 to 100
2,4-Dichlorophenoxy acetic acid[2]	0.1	0.0005	10.0	<1 to 100
1,4-Dichlorobenzene[2]	0.075	0.0025	7.5	<1 to 100
1,2-Dichloroethane[2]	0.005	0.0025	0.5	<1 to 100
1,1-Dichloroethylene[2]	0.007	0.0025	0.7	<1 to 100
Endrin[2]	0.0002	0.00005	0.05	<1 to 250
Fluoride	4	0.94		<1
Lindane[2]	0.004	0.000025	0.4	<1 to 100
Lead[2]	0.05	0.0025	5.0	<1 to 100
Mercury[2]	0.002	0.0001	0.2	<1 to 100
Methoxychlor[2]	0.1	0.00025		<1
Nitrate[2]	10	0.00005		<1
Selenium[2]	0.01	0.0005	1.0	<1 to 100
Silver[2]	0.05	0.00025	5.0	<1 to 100
Toxaphene[2]	0.005	0.0005	0.5	<1 to 100
1,1,1-Trichloroethane[2]	0.2	0.0025		<1
Trichloroethylene	0.005	0.0025	1.3	<1 to 260
2,4,5-Trichlorophenoxy acetic acid[2]	0.01	0.0005	1.0	1 to 100
Vinyl Chloride[2]	0.002	0.001	0.2	<1 to 100

1 Leachate concentrations obtained from historical leachate samples provided by the site.
2 For constituents not detected at reporting limits, one-half of the reporting limit is listed.
3 The constituents represent the highest values reported from laboratory testing from a leachate sample in June 2017 from the shared sump in Sectors 7 and 10 and annual historical leachate sampling for constituents tested.
4 This column illustrates the range of DAFs needed for each constituent.

Table 4-1
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2] / DAF[3] (mg/l)			$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	6.81E-06	=	0.0855	/	12,552	0.0056	0.05	Yes
Barium	0.07	1.16E-04	=	7.450	/	12,552	0.07	1.0	Yes
Benzene	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.005	Yes
Cadmium	0.001	7.97E-09	=	0.0001	/	12,552	0.001	0.01	Yes
Carbon tetrachloride	0.0025	1.99E-07	=	0.0025	/	12,552	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	1.0E-06	=	0.0126	/	12,552	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	3.98E-08	=	0.0005	/	12,552	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	1.99E-07	=	0.0025	/	12,552	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	1.99E-07	=	0.0025	/	12,552	0.0014	0.007	Yes
Endrin	0.00005	3.98E-09	=	0.00005	/	12,552	0.0001	0.0002	Yes
Fluoride	3.85	7.49E-05	=	0.94	/	12,552	3.85	4	Yes
Lindane	0.0005	1.99E-09	=	0.000025	/	12,552	0.0005	0.004	Yes
Lead	0.0075	1.99E-07	=	0.0025	/	12,552	0.0075	0.05	Yes
Mercury	0.0001	7.97E-09	=	0.0001	/	12,552	0.0001	0.002	Yes
Methoxychlor	0.00025	1.99E-08	=	0.00025	/	12,552	0.0003	0.1	Yes
Nitrate	3.6	3.98E-09	=	0.00005	/	12,552	3.6	10	Yes
Selenium	0.005	3.98E-08	=	0.0005	/	12,552	0.005	0.01	Yes
Silver	0.005	1.99E-08	=	0.00025	/	12,552	0.005	0.05	Yes
Toxaphene	0.0005	3.98E-08	=	0.0005	/	12,552	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	1.99E-07	=	0.0025	/	12,552	0.0005	0.2	Yes
Trichloroethylene	0.0025	1.99E-07	=	0.0025	/	12,552	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	3.98E-08	=	0.0005	/	12,552	0.0005	0.01	Yes
Vinyl Chloride	0.001	7.97E-08	=	0.001	/	12,552	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.
2 Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
3 DAF value for Case II presented on Figure 3-7.

Table 4-2
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O[2] / DAF[3] (mg/l)		C_{BG} + C_P = C_T[2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	4.0E-04	=	5.0	/12,552	0.006	0.05	Yes
Barium	0.07	8.0E-03	=	100.0	/12,552	0.078	1.0	Yes
Benzene	0.0005	6.5E-05	=	0.814	/12,552	0.001	0.005	Yes
Cadmium	0.001	8.0E-05	=	1.0	/12,552	0.001	0.01	Yes
Carbon tetrachloride	0.0025	4.0E-05	=	0.5	/12,552	0.003	0.005	Yes
Chromium (hexavalent)	0.010	4.0E-04	=	5.0	/12,552	0.010	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	8.0E-04	=	10.0	/12,552	0.091	0.1	Yes
1,4-Dichlorobenzene	0.001	6.0E-04	=	7.5	/12,552	0.002	0.075	Yes
1,2-Dichloroethane	0.0005	4.0E-05	=	0.5	/12,552	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	5.6E-05	=	0.7	/12,552	0.001	0.007	Yes
Endrin	0.00005	4.0E-06	=	0.05	/12,552	0.000	0.0002	Yes
Fluoride	3.85	--	=	--	/12,552	--	4	--
Lindane	0.0005	3.2E-05	=	0.4	/12,552	0.001	0.004	Yes
Lead	0.0075	4.0E-04	=	5.0	/12,552	0.008	0.05	Yes
Mercury	0.0001	1.6E-05	=	0.2	/12,552	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	--	/12,552	--	0.1	--
Nitrate[4]	3.6	--	=	--	/12,552	--	10	--
Selenium	0.005	8.0E-05	=	1.0	/12,552	0.005	0.01	Yes
Silver	0.005	4.0E-04	=	5.0	/12,552	0.005	0.05	Yes
Toxaphene	0.0005	4.0E-05	=	0.5	/12,552	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	--	/12,552	--	0.2	--
Trichloroethylene	0.0025	1.0E-04	=	1.3	/12,552	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	8.0E-05	=	1.0	/12,552	0.001	0.01	Yes
Vinyl Chloride	0.001	1.6E-05	=	0.2	/12,552	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.

2 C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

3 DAF value for Case II presented on Figure 3-7.

Table 5-1
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2] / DAF[3] (mg/l)	$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	8.81E-06	=	0.0855 / 9,702	0.0056	0.05	Yes
Barium	0.07	7.68E-04	=	7.450 / 9,702	0.07	1.0	Yes
Benzene	0.0005	2.58E-07	=	0.0025 / 9,702	0.0005	0.005	Yes
Cadmium	0.001	1.03E-08	=	0.0001 / 9,702	0.001	0.01	Yes
Carbon tetrachloride	0.0025	2.58E-07	=	0.0025 / 9,702	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	1.30E-06	=	0.0126 / 9,702	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	5.15E-08	=	0.0005 / 9,702	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	2.58E-07	=	0.0025 / 9,702	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	2.58E-07	=	0.0025 / 9,702	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	2.58E-07	=	0.0025 / 9,702	0.0014	0.007	Yes
Endrin	0.00005	5.15E-09	=	0.00005 / 9,702	0.0001	0.0002	Yes
Fluoride	3.85	9.69E-05	=	0.94 / 9,702	3.85	4	Yes
Lindane	0.0005	2.58E-09	=	0.000025 / 9,702	0.0005	0.004	Yes
Lead	0.0075	2.58E-07	=	0.0025 / 9,702	0.0075	0.05	Yes
Mercury	0.0001	1.03E-08	=	0.0001 / 9,702	0.0001	0.002	Yes
Methoxychlor	0.00025	2.58E-08	=	0.00025 / 9,702	0.0003	0.1	Yes
Nitrate	3.6	5.15E-09	=	0.00005 / 9,702	3.6	10	Yes
Selenium	0.005	5.15E-08	=	0.0005 / 9,702	0.005	0.01	Yes
Silver	0.005	2.58E-08	=	0.00025 / 9,702	0.005	0.05	Yes
Toxaphene	0.0005	5.15E-08	=	0.0005 / 9,702	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	2.58E-07	=	0.0025 / 9,702	0.0005	0.2	Yes
Trichloroethylene	0.0025	2.58E-07	=	0.0025 / 9,702	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	5.15E-08	=	0.0005 / 9,702	0.0005	0.01	Yes
Vinyl Chloride	0.001	1.03E-07	=	0.001 / 9,702	0.001	0.002	Yes

[1] Background concentrations have been obtained from Table 1-1.
[2] Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
[3] DAF value for Case II presented on Figure 3 in Appendix IIIB-C.

Table 5-2
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O[2] / DAF[3] (mg/l)	$C_{BG} + C_P = C_T$[2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	5.2E-04	=	5.0 / 9,702	0.006	0.05	Yes
Barium	0.07	1.0E-02	=	100.0 / 9,702	0.080	1.0	Yes
Benzene	0.0005	8.4E-05	=	0.814 / 9,702	0.001	0.005	Yes
Cadmium	0.001	1.0E-04	=	1.0 / 9,702	0.001	0.01	Yes
Carbon tetrachloride	0.0025	5.2E-05	=	0.5 / 9,702	0.003	0.005	Yes
Chromium (hexavalent)	0.010	5.2E-04	=	5.0 / 9,702	0.011	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	1.0E-03	=	10.0 / 9,702	0.091	0.1	Yes
1,4-Dichlorobenzene	0.001	7.7E-04	=	7.5 / 9,702	0.002	0.075	Yes
1,2-Dichloroethane	0.0005	5.2E-05	=	0.5 / 9,702	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	7.2E-05	=	0.7 / 9,702	0.001	0.007	Yes
Endrin	0.00005	5.2E-06	=	0.05 / 9,702	0.000	0.0002	Yes
Fluoride	3.85	--	=	-- / 9,702	--	4	--
Lindane	0.0005	4.1E-05	=	0.4 / 9,702	0.001	0.004	Yes
Lead	0.0075	5.2E-04	=	5.0 / 9,702	0.008	0.05	Yes
Mercury	0.0001	2.1E-05	=	0.2 / 9,702	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	-- / 9,702	--	0.1	--
Nitrate[4]	3.6	--	=	-- / 9,702	--	10	--
Selenium	0.005	1.0E-04	=	1.0 / 9,702	0.005	0.01	Yes
Silver	0.005	5.2E-04	=	5.0 / 9,702	0.006	0.05	Yes
Toxaphene	0.0005	5.2E-05	=	0.5 / 9,702	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	-- / 9,702	--	0.2	--
Trichloroethylene	0.0025	1.3E-04	=	1.3 / 9,702	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	1.0E-04	=	1.0 / 9,702	0.001	0.01	Yes
Vinyl Chloride	0.001	2.1E-05	=	0.2 / 9,702	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.

2 C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

3 DAF value for Case II presented on Figure 3 in Appendix IIIB-C.

Table 6-3
Summary of Constituent Levels at the POC
(Using Site Specific Leachate Data)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC due to Estimated Leachate Percolation)	=	C_O[2] / DAF[3] (mg/l)	$C_{BG} + C_P = C_T$ at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	2.3E-05	=	0.0855 / 3,656	0.0056	0.05	Yes
Barium	0.07	2.0E-03	=	7.450 / 3,656	0.07	1.0	Yes
Benzene	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.005	Yes
Cadmium	0.001	2.7E-08	=	0.0001 / 3,656	0.001	0.01	Yes
Carbon tetrachloride	0.0025	6.8E-07	=	0.0025 / 3,656	0.0025	0.005	Yes
Chromium (hexavalent)	0.010	3.4E-06	=	0.0126 / 3,656	0.01	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	1.4E-07	=	0.0005 / 3,656	0.09	0.1	Yes
1,4-Dichlorobenzene	0.001	6.8E-07	=	0.0025 / 3,656	0.001	0.075	Yes
1,2-Dichloroethane	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.005	Yes
1,1-Dichloroethylene	0.0014	6.8E-07	=	0.0025 / 3,656	0.0014	0.007	Yes
Endrin	0.00005	1.4E-08	=	0.00005 / 3,656	0.0001	0.0002	Yes
Fluoride	3.85	2.6E-04	=	0.94 / 3,656	3.85	4	Yes
Lindane	0.0005	6.8E-09	=	0.000025 / 3,656	0.0005	0.004	Yes
Lead	0.0075	6.8E-07	=	0.0025 / 3,656	0.0075	0.05	Yes
Mercury	0.0001	2.7E-08	=	0.0001 / 3,656	0.0001	0.002	Yes
Methoxychlor	0.00025	6.8E-08	=	0.00025 / 3,656	0.0003	0.1	Yes
Nitrate	3.6	1.4E-08	=	0.00005 / 3,656	3.6	10	Yes
Selenium	0.005	1.4E-07	=	0.0005 / 3,656	0.005	0.01	Yes
Silver	0.005	6.8E-08	=	0.00025 / 3,656	0.005	0.05	Yes
Toxaphene	0.0005	1.4E-07	=	0.0005 / 3,656	0.0005	0.005	Yes
1,1,1-Trichloroethane	0.0005	6.8E-07	=	0.0025 / 3,656	0.0005	0.2	Yes
Trichloroethylene	0.0025	6.8E-07	=	0.0025 / 3,656	0.0025	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	1.4E-07	=	0.0005 / 3,656	0.0005	0.01	Yes
Vinyl Chloride	0.001	2.7E-07	=	0.001 / 3,656	0.001	0.002	Yes

1 Background concentrations have been obtained from Table 1-1.
2 Leachate concentrations (C_0, Site Specific Concentrations) represent levels obtained from the leachate sample analysis results provided in Table 2-2.
3 DAF value for Case II presented on Figure 6 in Appendix IIIB-D.

Table 6-4
Summary of Constituent Levels at the POC
(Using Historical Guidance Information)

Constituent	C_{BG}, Background Concentration[1] (mg/l)	C_P (mg/l) (Constituent Concentration at the POC)	=	C_O[2]	/	DAF[3] (mg/l)	$C_{BG} + C_P = C_T$[2] at POC (mg/l)	MCL (mg/l) Listed in §330.331(a)(1)	C_T at POC < MCL
Arsenic	0.0056	1.4E-03	=	5.0	/	3,656	0.007	0.05	Yes
Barium	0.07	2.7E-02	=	100.0	/	3,656	0.097	1.0	Yes
Benzene	0.0005	2.2E-04	=	0.814	/	3,656	0.001	0.005	Yes
Cadmium	0.001	2.7E-04	=	1.0	/	3,656	0.001	0.01	Yes
Carbon tetrachloride	0.0025	1.4E-04	=	0.5	/	3,656	0.003	0.005	Yes
Chromium (hexavalent)	0.010	1.4E-03	=	5.0	/	3,656	0.011	0.05	Yes
2,4-Dichlorophenoxy acetic acid	0.09	2.7E-03	=	10.0	/	3,656	0.093	0.1	Yes
1,4-Dichlorobenzene	0.001	2.1E-03	=	7.5	/	3,656	0.003	0.075	Yes
1,2-Dichloroethane	0.0005	1.4E-04	=	0.5	/	3,656	0.001	0.005	Yes
1-1-Dichloroethylene	0.0014	1.9E-04	=	0.7	/	3,656	0.002	0.007	Yes
Endrin	0.00005	1.4E-05	=	0.1	/	3,656	0.000	0.0002	Yes
Fluoride	3.85	--	=	--	/	3,656	--	4	--
Lindane	0.0005	1.1E-04	=	0.4	/	3,656	0.001	0.004	Yes
Lead	0.0075	1.4E-03	=	5.0	/	3,656	0.009	0.05	Yes
Mercury	0.0001	5.5E-05	=	0.2	/	3,656	0.000	0.002	Yes
Methoxychlor[4]	0.00025	--	=	--	/	3,656	--	0.1	--
Nitrate[4]	3.6	--	=	--	/	3,656	--	10	--
Selenium	0.005	2.7E-04	=	1.0	/	3,656	0.005	0.01	Yes
Silver	0.005	1.4E-03	=	5.0	/	3,656	0.006	0.05	Yes
Toxaphene	0.0005	1.4E-04	=	0.5	/	3,656	0.001	0.005	Yes
1,1,1-Trichloroethane[4]	0.0005	--	=	--	/	3,656	--	0.2	--
Trichloroethylene	0.0025	3.6E-04	=	1.3	/	3,656	0.003	0.005	Yes
2,4,5-Trichlorophenoxy acetic acid	0.0005	2.7E-04	=	1.0	/	3,656	0.001	0.01	Yes
Vinyl Chloride	0.001	5.5E-05	=	0.2	/	3,656	0.001	0.002	Yes

[1] Background concentrations have been obtained from Table 1-1.

[2] C_P represents chemical concentrations estimated by the fate and transport model or the POC. Initial concentrations, C_O, has been reproduced from historical standard information utilized by TCEQ as discussed in Section 1.3. Total concentration for each constituent at the POC is the sum of C_P and the background concentration, C_{BG}.

[3] DAF value for Case II presented on Figure 6 in Appendix IIIB-D.

CONTENTS

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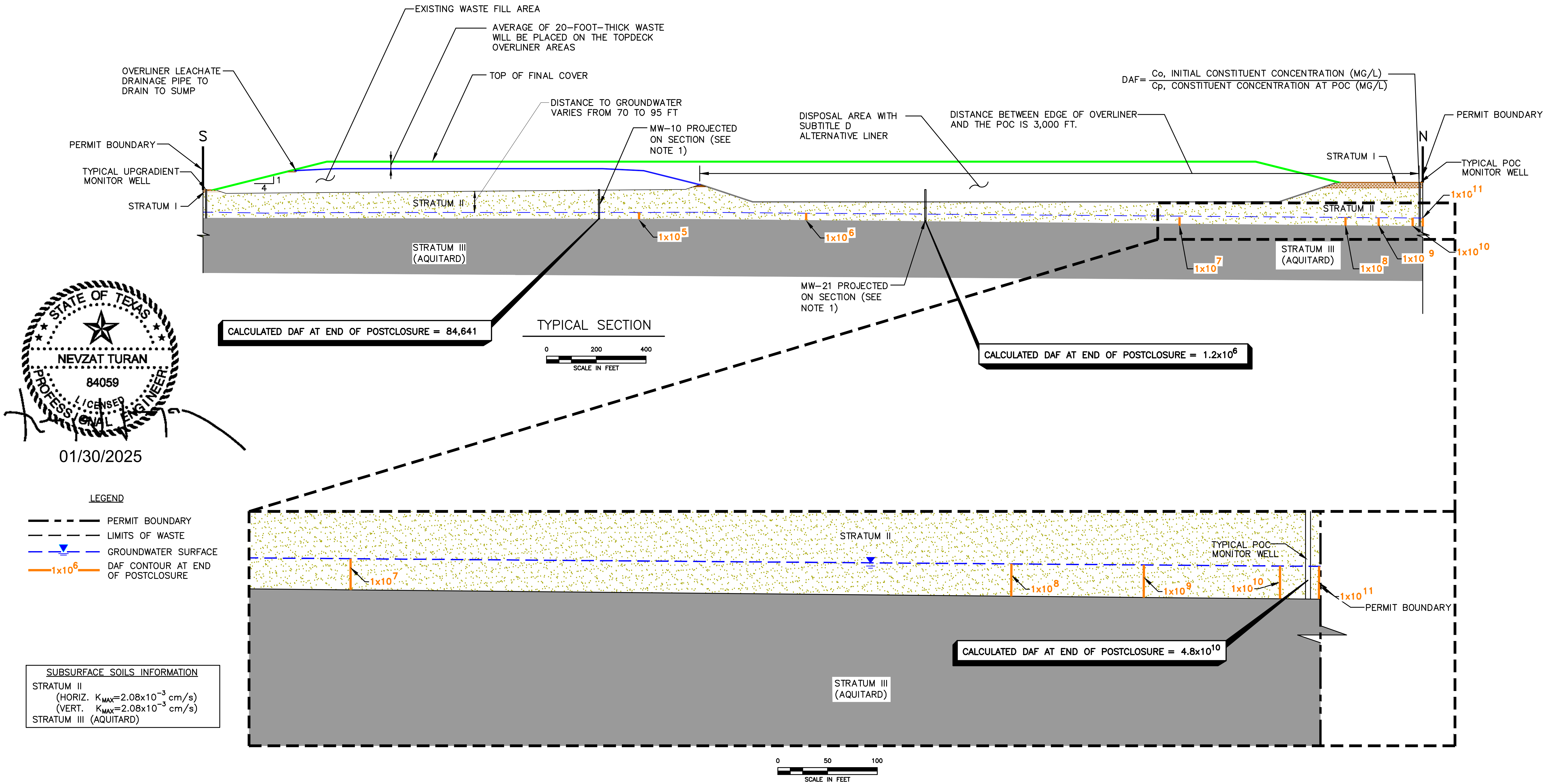

NOTE

1. MW–10 AND MW–21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO–DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW–10 AND MW–21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO–DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW–10 AND MW–21.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 05/2024
FILE: 0120–094–11
CAD: FIG 3–TYP SECTION.dwg

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: KDG

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CASE I – NORTH

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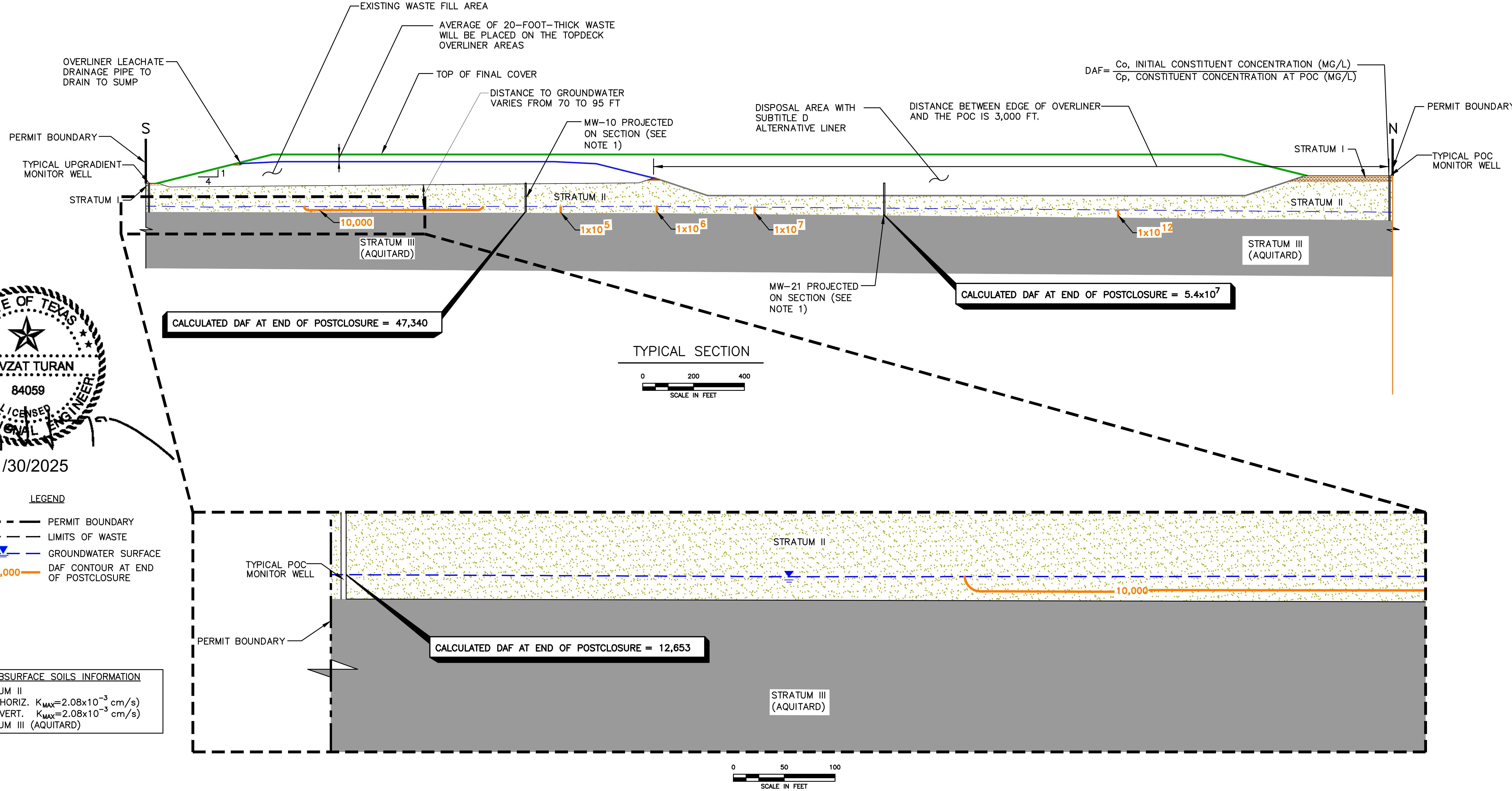
FIGURE 3

SHEET IIIB–D–4



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LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- GROUNDWATER SURFACE
- 10,000 DAF CONTOUR AT END OF POSTCLOSURE

SUBSURFACE SOILS INFORMATION

STRATUM II
(HORIZ. $K_{MAX}=2.08x10^{-3}$ cm/s)
(VERT. $K_{MAX}=2.08x10^{-3}$ cm/s)
STRATUM III (AQUITARD)

NOTE

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

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DATE: 05/2024
FILE: 0120-094-11
CAD: FIG 3-7-TYP SECTION.dwg

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DESIGN BY: BPY
REVIEWED BY: KDG

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MAJOR PERMIT AMENDMENT
CASE II

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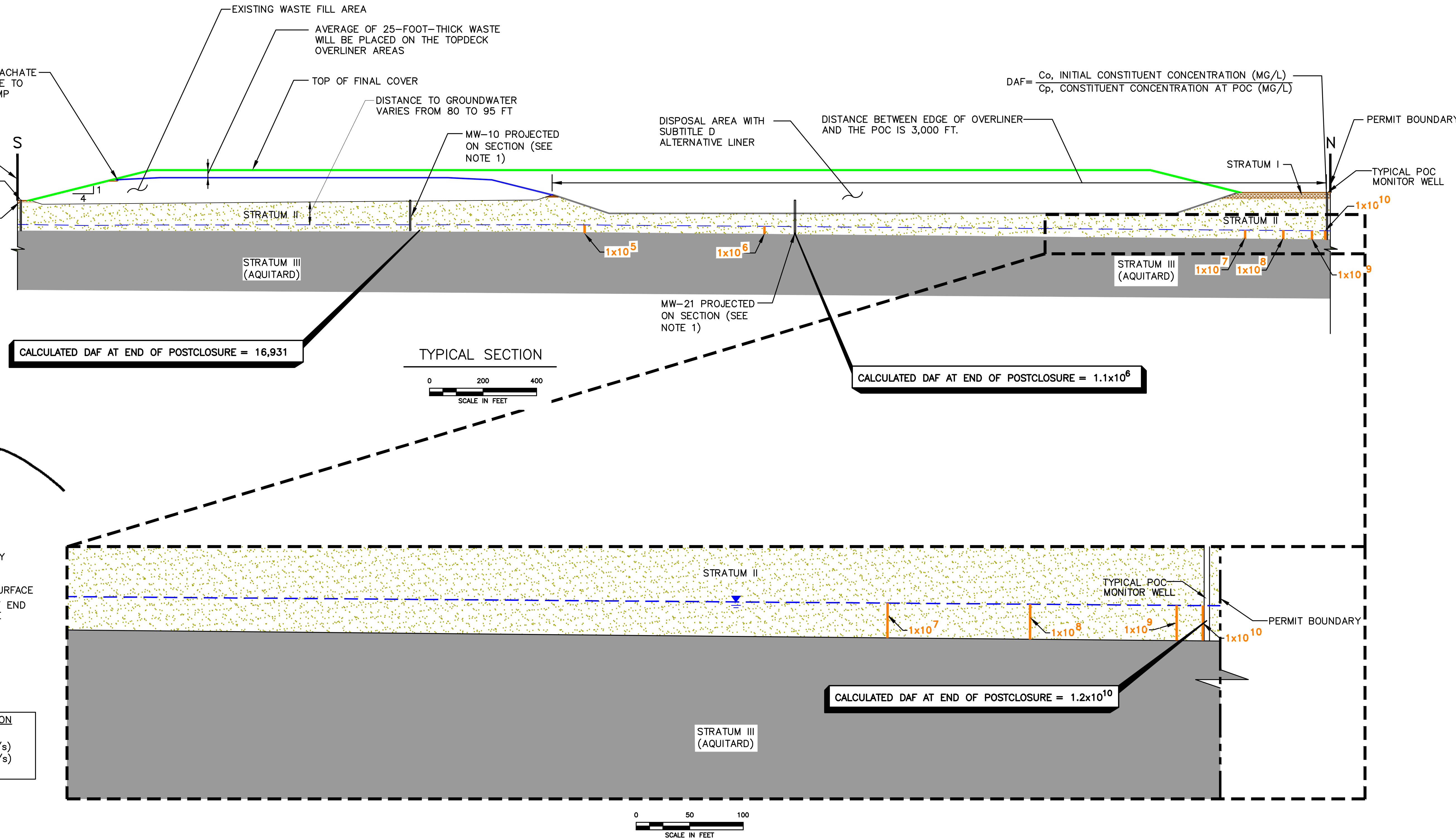
FIGURE 4

SHEET IIIB-D-5

O:\0120\94\LSMPA 2024\PART III\IIIB\CLEAN\FIG 4-TYPICAL SECTION.dwg, byoung, 1:2



STATE OF TEXAS
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84059
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01/30/2025

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- GROUNDWATER SURFACE
- $1x10^6$ DAF CONTOUR AT END OF POSTCLOSURE

SUBSURFACE SOILS INFORMATION
STRATUM II
(HORIZ. $K_{MAX}=2.08x10^{-3}$ cm/s)
(VERT. $K_{MAX}=2.08x10^{-3}$ cm/s)
STRATUM III (AQUITARD)

NOTE

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

SHEET IIIB-D-6

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DATE: 05/2024
FILE: 0120-094-11
CAD: FIG 5-TYP SECTION.dwg

DRAWN BY: JDW
DESIGN BY: BPY
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MAJOR PERMIT AMENDMENT
CASE III

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

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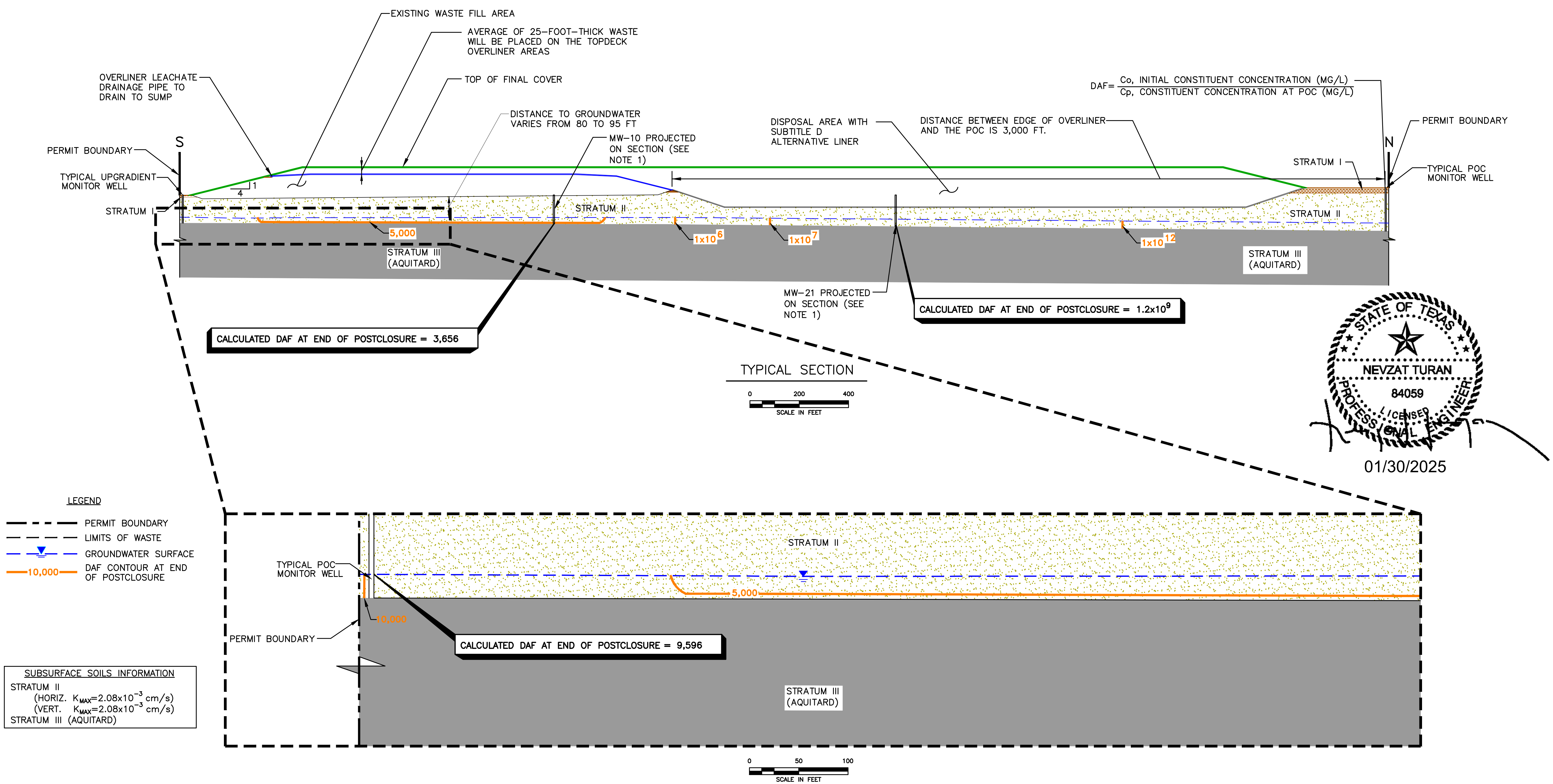
FIGURE 5

O:\0120\94\LSMPA 2024\PART III\IIIB\CLEAN\FIG 5-TYPICAL SECTION.dwg, byoung, 1:2



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NOTE

1. MW-10 AND MW-21 ARE SIDE GRADIENT MONITOR WELLS. THIS TWO-DIMENSIONAL MODELING SECTION HAS BEEN DEVELOPED FOR THE HIGHEST GROUNDWATER GRADIENT. MODEL DEMONSTRATION FOR MW-10 AND MW-21 AT THE PROJECTED LOCATION IS CONSERVATIVE AS THE TWO-DIMENSIONAL MODELING SECTION REPRESENTS A HIGHER GROUNDWATER GRADIENT AS OPPOSED TO THE GRADIENT OF GROUNDWATER BETWEEN THE OVERLINER AREA AND THE ACTUAL LOCATION OF MW-10 AND MW-21.

☐ DRAFT ☒ FOR PERMITTING PURPOSES ONLY ☐ ISSUED FOR CONSTRUCTION	PREPARED FOR SOUTHWEST LANDFILL TX, LP	MAJOR PERMIT AMENDMENT CASE IV
DATE: 05/2024 FILE: 0120-094-11 CAD: FIG 6-TYP SECTION.dwg DRAWN BY: JDW DESIGN BY: BPY REVIEWED BY: KDG	REVISIONS NO. 1 — DATE 01/2025 — DESCRIPTION LSMPA	SOUTHWEST LANDFILL RANDALL COUNTY, TEXAS
Weaver Consultants Group TBPE REGISTRATION NO. F-3727		WWW.WCGRP.COM — FIGURE 6

SHEET IIIB-D-7

ADDITIONAL DEMONSTRATIONS

ADDITIONAL DEMONSTRATIONS

The purpose of modeling the following additional demonstrations is to evaluate the alternative liner POC demonstrations shown in Figures 3 through 6 under various conditions, that includes varying groundwater gradients, minimum and maximum observed hydraulic conductivities, and assuming that the alternative liner leachate collection system does not function as designed allowing a buildup of 12 inches of head on the liner system.

Groundwater Gradients Demonstration

The groundwater elevation maps from the semi-annual groundwater reports, provided by Hydrex Environmental from June 2020 through June 2024, were analyzed to assess changes in groundwater gradients over time. The groundwater gradients vary from 0.0053 ft/ft to 0.0056 ft/ft along Section A, which is shown on Figure 3-2 in Appendix IIIB. The Case III model presented on Figure 5 in Appendix IIIB-D was chosen for this evaluation as the demonstration represents the lowest DAF under expected groundwater flow conditions (i.e., groundwater flow toward north). Case III was run with a gradient of 0.0058 which represents the maximum gradient observed. An additional run with a gradient of 0.0052 was run to represent the minimum gradient. The results are presented in Table 1 below which show the design is complainant with §330.311(a)(1).

Table 1
Groundwater Gradients Demonstration Results

Case	Groundwater Gradient (ft/ft)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case III	0.0058	16,031	260	Yes
	0.0052	12,704	260	Yes

[1] For each model, the groundwater well with the lowest calculated DAF is shown in the table.

Additionally, the Case IV model presented on Figure 6 in Appendix IIID artificially reverses the groundwater flow to the south using a conservative gradient of 0.0029. This condition results in a DAF of 3,656 which is presented on Figure 6 in Appendix IIIB-D.

Hydraulic Conductivity Demonstration

The minimum and maximum observed hydraulic conductivities in Stratum II were analyzed to assess the impacts of hydraulic conductivity on the modeled concentrations. As shown in Tables 4-3 and 4-4 in Appendix IIIG, the maximum hydraulic conductivity is 2.08×10^{-3} cm/s while the minimum is 2.45×10^{-5} cm/s within Stratum II. Case III, presented in Figure 5 in Appendix IIIB-D, was chosen for this evaluation. The results are presented in Table 2 below which show the design is complainant with §330.311(a)(1).

Table 2
Minimum and Maximum observed Hydraulic conductivity Demonstration Results

Case	Hydraulic Conductivity (cm/sec)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case III	2.08×10^{-3}	16,031	260	Yes
	2.45×10^{-5}	20,666	260	Yes

[1] For each model, the groundwater well with the lowest calculated DAF is shown in the table.

Non-functioning Leachate Collection System Demonstration

This demonstration modifies Case IV in Appendix IIIB-D to assume that the alternative liner leachate collection system does not function as designed and allows a buildup of 12 inches of head on the alternative liner and overliner systems, which will increase the percolation rate in these areas. The assumed leakage through the overliner calculations on Page IIIB-C-1 was applied to the alternative liner areas. The calculation assumes 12 inches of head on the liner and 4 defects per acre for a resulting percolation of 0.066 mm/yr. The results are presented in Table 3 below which show the design is complainant with §330.311(a)(1).

Table 3
Non-functioning Leachate Collection System Demonstration Results

Case	Percolation[2] (mm/yr)	Calculated DAF[1]	Minimum Required DAF	Design Compliant with §330.331(a)(1)
Case IV	0.066	1,466	260	Yes

1 For each model, the groundwater well with the lowest calculated DAF is shown in the table.
2 The percolation is applied to both overliner and alternative liner areas.

Summary

Therefore, the demonstration supports the fact that the site design is in compliance with the POC requirements specified in Title 30 TAC §330.331.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663C

LIMITED SCOPE MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIE

Prepared for

Southwest Landfill TX, LP

TCEQ Approved February 20, 2020

Revised February 202

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01/30/2025

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WCG Project No. 0120-094-11-140

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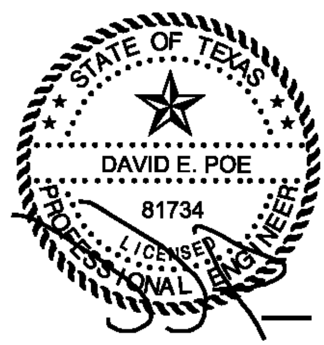
CONTENTS (Continued)



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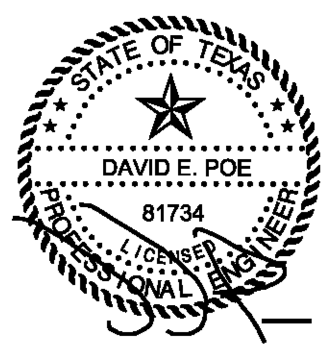
TABLES



01/30/2025

2. Simplified Bishop Method – This method uses the method of slices to discretize the soil mass for determining the factor of safety.

In general, the stability of various critical sections were analyzed under static condition for short-term (excavation and construction) and long-term (after construction) safety. The slope stability analyses are provided in Appendix IIIE-A. The stability of the various liner and final cover configurations with the geosynthetic components were also evaluated by using infinite slope stability analysis (refer to Appendix IIIE-A).

The stability analysis has been developed using demonstrations showing that, for each analyzed section, the forces resisting movement of the slopes are higher than the forces that potentially create movement. Therefore, the ratio of forces resisting movement to the forces potentially creating movement is defined as the factor of safety (FS). When the FS is equal to or greater than 1.0, it means that the slope is stable. In the slope stability analysis a factor of safety greater than 1.0 is desired. The FS value is increased for the increased uncertainty for the system analyzed. A factor of safety of 1.5 has been used for slopes that will stay in place long term, including interim and final cover configurations subjected to effective (rotational failure) and peak (translational or block failure) conditions. A factor of safety of 1.3 is acceptable for total stress conditions that will be in place for a short period of time such that pore pressures cannot fully dissipate and including both interim and final conditions. A factor of safety of 1.1 is acceptable for analyses performed incorporating residual stress.

5.2 Sections Selected for Analysis

Slope stability analyses were performed on critical sections to evaluate the stability of the excavation, interim fill, overliner, and final cover configuration slopes. The geometries of the slopes analyzed were determined by reviewing the proposed excavation plan and final contour plan. The evaluation locations were selected to analyze critical slopes consisting of profiles that include the landfill configuration as well as natural materials at the toe and below the landfill excavation. The interim fill slope was analyzed using an assumed profile as discussed in Section 4.3. Figures showing the location of the cross sections are included in Appendix IIIE-A (refer to Appendix IIIE-A-1 for the excavation slope stability analysis, Appendix IIIE-A-2 for the interim condition slope stability analysis, and Appendix IIIE-A-3 for the final landfill slopes stability analysis, including overliner stability analysis).

5.3 Configurations Analyzed

The excavation, interim, overliner, and final landfill configurations were modeled to represent critical slope conditions, and the analysis was performed using circular and block failure surfaces. The maximum final fill and overliner slopes will be 4 horizontal to 1 vertical (4H:1V), while interim slopes, liner slopes, and excavation slopes will be as steep as 3H:1V. The excavation, liner, and interim fill slopes were analyzed with a slope angle of 3H:1V and a 4H:1V final side slope was used to evaluate final cover and overliner. A copy of the top of liner plan and final completion plan showing the locations of the cross sections selected for analysis are included in Appendix IIIE-A. Additionally, the configurations analyzed are graphically illustrated in Appendix IIIE-A. The interim condition was analyzed considering a 3H:1V slope with a horizontal length of approximately 575 feet. If the horizontal length of actual interim slopes longer than 575 feet is developed during site operations, an additional analysis will be completed at that time and maintained in the Site Operating Record.

5.4 Input Parameters

The cross sections for slope stability analysis were developed from the proposed excavation plan and the landfill completion plan (see Drawings A.1 and A.5 in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details). The soil parameters were selected based on a review of the boring logs and laboratory test results from the subsurface investigation studies at the site and upon engineering judgment and experience with similar materials. The groundwater surface indicated in the analysis is obtained from Appendix IIIG-Geology Report (Figure IIIG-D-14) and represents the highest measured groundwater levels. Table 5-1 summarizes the unit weights and strength parameters used for the stability analyses for the evaluated landfill slopes (excavation, interim, overliner, and final cover slopes).

Table 5-1 (Continued)
Summary of Material Weight and Strength Parameters Used in the Slope Stability Analysis

Strength Parameters — Solid Waste

Material Strength Parameters			Interface Strength Parameters		Comments
Cohesion (lb/ft^2)	Friction Angle (degrees)	Unit Weight (lb/ft^3)	Adhesion (lb/ft^2)	Friction Angle (degrees)	
288	23	59	Interface strength parameters are not applicable to the solid waste layer because the interface between the waste and final cover and overliner systems is not a critical interface.		See comments listed under Solid Waste above.

Strength Parameters — Liner System

	Material Strength Parameters			Interface Strength Parameters		
	Cohesion (lb/ft^2)	Friction Angle (degrees)	Unit Weight (lb/ft^3)		Adhesion (lb/ft^2)	Friction Angle (degrees)
Protective Cover			120	Floor Grades	0	22
Effective Stress	100	16				
Total Stress	1,000	0				
Liner System (Typical)			120	3H:1V Sideslope	100	16
Effective Stress	100	16				
Total Stress	1,000	0				
Liner System (Translational Block Analysis)				Peak Stress		
				Floor Grades	188	11
				3H:1V Sideslope	200	15
				Residual Stress		
				Floor Grades	188	9
				3H:1V Sideslope	80	10
				Total Stress		
				Floor Grades	1000	0
				3H:1V Sideslope	1000	0

Comments (Liner System):

The liner system includes a 2-foot-thick compacted clay (compacted clay is 3 feet thick for the Class 1 liner) layer, 60-mil geomembrane (smooth geomembrane on the floor of the landfill and textured on the 3H:1V sideslopes), drainage geocomposite (single-sided on floor grades and double-sided on 3H:IV sideslopes), and a 2-foot-thick protective cover soil layer. This system is modeled as two layers for the global stability analysis: the 3-foot-thick compacted clay liner and the soil protective cover. In addition, both a translational and an infinite stability analysis were performed to establish the minimum interface strength requirements for each layer of the liner system. The minimum interface strength requirements are specified in Appendix IIID.

For the rotational global stability analysis, the liner system is modeled as two layers: the compacted clay liner and the soil protective cover layer. The two geosynthetic layers are not included in the global analysis because they provide a negligible contribution to the forces that are resisting movement. The strength values selected for the liner system represent strength values typically used in the industry and these same strength values have been used in various permit applications approved by TCEQ. Duncan and Wright (2005) provides a comprehensive discussion regarding strength parameters for a liner system. In Chapter 5 – Shear Strengths of Soil and Municipal Solid Waste, a significant amount of data are presented and evaluated for compacted clay liners. The results indicate that the lowest cohesion value for compacted cohesive soils is 9 kPa (187 lb/ft^2) and the lowest reported friction angle value is 19 degrees. Therefore, selected values of 100 lb/ft^2 for cohesion and 16 degrees of friction angle conservatively represent the liner system. Soil properties used in the slope stability analysis are subject to verification at the time of each liner construction. Section 2.4.3 in Appendix IIID – LQCP includes the material strength tests required for soil used for liner construction. Protective cover and compacted clay liner soil unit weight values are based on experience with liner system construction. The global stability analysis is included in Appendices IIIE-A-1 and IIIE-A-3.

The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure by Duncan, Buchianani, and De Wet for the liner system, was developed to show that certain landfill components that are placed on top of each other, such as a geomembrane and compacted clay layer will not experience sliding failure due to the lack of strength between these components. The interface strength values presented in this table represent compacted clay liner internal on the sideslopes, and smooth geomembrane and compacted clay liner interface on floor grades. These strength values represent the interfaces with the lowest strength at the floor and sideslopes (refer to Appendix IIIE-A-4 for the complete evaluation of interfaces that will occur for the liner system 3H:1V sideslope and the bottom liner interface strength value is obtained from the document referenced in this paragraph). The strength parameters were developed using materials from Geosynthetic Research Institute (GRI) publications (e.g., "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces" by George R. Koerner, GRI, Folsom, PA, June 14, 2005). Although the strength parameters (i.e., adhesion and interface friction) used for the application were selected based on published data, it should be noted that these strength parameters will also be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIID). As noted in Appendix IIID, Table 6-1, the strength parameters listed are for the interfaces with the lowest strength parameters to provide for a conservative design.

The translational slope stability analysis was performed using simplified Janbu Method using the Rankine Blocks. This analysis is similar to the interface slope stability analysis discussed above. The purpose of this analysis is to test the critical interfaces under a variety of loading conditions (refer to Appendices IIIE-A-1, IIIE-A-2, and IIIE-A-3 for more information – i.e., the loading conditions reflect different landfill configurations). XSTABL is also used for this analysis. However, for the translational analysis, the liner system strength parameters are modified to reflect the interface strength parameters. The translational stability analysis uses modified liner system strength parameters to reflect the interface strength parameters. As noted above, these strength parameters will also be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design.

[1] Liners on the sideslopes and floor grades are listed separately due to different strength characteristics for clay/smooth geomembrane and clay/textured geomembrane interfaces. The overliner was modeled with clay/textured geomembrane interface for sideslope and top deck areas.

Table 5-3
Summary of Slope Stability Analysis for
Intermediate Cover Slopes

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated[1, 2]		Factor of Safety Acceptable	
		Peak / Effective Stress	Residual / Total Stress	Peak / Effective	Residual / Total
		1.5	1.1/1.3		
Interim Fill Slope A-1	Bishop-Circular	1.60 (effect)	1.56 (total)	YES	YES
Interim Fill Slope A-2	Rankine-Block	1.53 (peak)	1.44 (residual)	YES	YES
Interim Fill Slope A-2	Rankine-Block	--	1.30 (total)	YES	YES

1 Factor of Safety for temporary slopes is 1.5.
2 Block analysis performed for peak and residual stresses.
3 Recommended Minimum Factor of Safety for stability analysis using peak stress is 1.5 and residual stress is 1.1.
4 Interim slope stability analyses were developed for the 2025 LSMPA to incorporate a revised maximum horizontal length of slope of 575 feet at a 3H:1V maximum outer slope.

Computer-generated slope stability analysis output is included in Appendix IIIE-A. As shown in Table 5-2, the minimum calculated factor of safety for excavation, liner, and interim slopes is 1.56, which is an acceptable factor of safety recommended for short-term slope stability. Long-term landfill slope stability has been estimated for the closed (final cover and overliner) condition. The minimum calculated factor of safety for the closed condition is 1.61, which is higher than the recommended factor of safety of 1.5 for long-term slope stability.

5.5.2 Infinite Slope Stability Analysis

Infinite slope stability analysis for the liner and final cover systems has been included in this design in addition to block method analysis (i.e., Rankine Block) discussed in the previous section. The infinite liner and overliner stability analyses address anchor trench design, stability of cover and drainage material on anchored geosynthetics, and shear forces within the liner system. The infinite final cover slope stability analysis addresses the shear forces within the final cover system. These calculations are presented in Appendix IIIE-A-4. As demonstrated in Appendix IIIE-A-4, the liner and cover systems are structurally stable using the strength parameters, which will be verified during each construction event. Prior to each construction event for liner, overliner, and final cover, the POR will perform interface strength testing using the actual material that will be used for each construction event.

Table 5-4
Summary of Slope Stability Analysis for the Final Landfill Configuration

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated[1,2]		Acceptable Factor of Safety	
		Total / Effective Stress	Residual / Total Stress	Peak / Effective	Residual / Total
Final Cover Slope A-1	Bishop-Circular	2.43 (effect)	2.38 (total)	YES	YES
Final Cover Slope A-2	Rankine-Block[3]	2.23 (peak)	2.09 (residual)	YES	YES
Final Cover Slope A-2	Rankine-Block[3]	--	2.05 (total)	YES	YES
Final Cover Slope B-1	Bishop-Circular	2.26 (effect)	2.27 (total)	YES	YES
Final Cover Slope B-2	Rankine-Block	2.67 (peak)	2.55 (residual)	YES	YES
Final Cover Slope B-2	Rankine-Block	--	2.81 (total)	YES	YES
Final Cover Slope C-1	Bishop-Circular	2.62 (effect)	2.69 (total)	YES	YES
Final Cover Slope C-2	Rankine-Block	4.05 (peak)	3.96 (residual)	YES	YES
Final Cover Slope C-2	Rankine-Block	--	3.86 (total)	YES	YES
Final Cover Slope D-1	Bishop-Circular	2.62 (effect)	2.71 (total)	YES	YES
Final Cover Slope D-2	Rankine-Block	3.1 (peak)	2.71 (residual)	YES	YES
Final Cover Slope D-2	Rankine-Block	--	2.79 (total)	YES	YES
Overliner Slope A-1	Bishop-Circular	2.61 (effect)	2.71 (total)	YES	YES
Overliner Slope A-2	Rankine-Block	2.17 (peak)	1.72 (residual)	YES	YES
Overliner Slope A-2	Rankine-Block	--	2.39 (total)	YES	YES
Overliner Slope B-1	Bishop-Circular	2.35 (effect)	2.35 (total)	YES	YES
Overliner Slope B-2	Rankine-Block	3.27 (peak)	3.06 (residual)	YES	YES
Overliner Slope B-2	Rankine-Block	--	3.49 (total)	YES	YES
Overliner Slope C-1	Bishop-Circular	2.55 (effect)	2.56 (total)	YES	YES
Overliner Slope C-2	Rankine-Block	2.05(residual)	1.61 (residual)	YES	YES
Overliner Slope C-2	Rankine-Block	--	2.26 (total)	YES	YES
Overliner Slope D-1	Rankine-Block	6.19 (residual)	4.41 (residual)	YES	YES
Overliner Slope D-1	Rankine-Block	--	15.5 (total)	YES	YES

1 Recommended Minimum Factor of Safety for long term stability analysis using effective stress is 1.5 and short term stability analysis using total stress is 1.3.
2 Recommended Minimum Factor of Safety for stability analysis using peak stress is 1.5 and residual stress is 1.1.
3 Rankine Block analysis uses interface strength values where applicable.

APPENDIX IIIE-A

SLOPE STABILITY ANALYSIS

Includes page IIIE-A-1

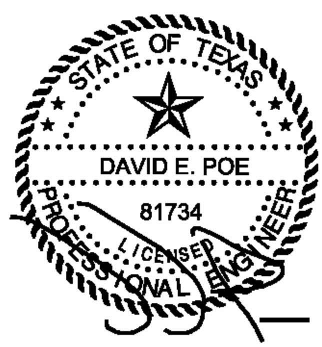
STATE OF TEXAS
DAVID E. POE
81734
LICENSED
PROFESSIONAL ENGINEER

01/30/2025

APPENDIX IIIE-A-2

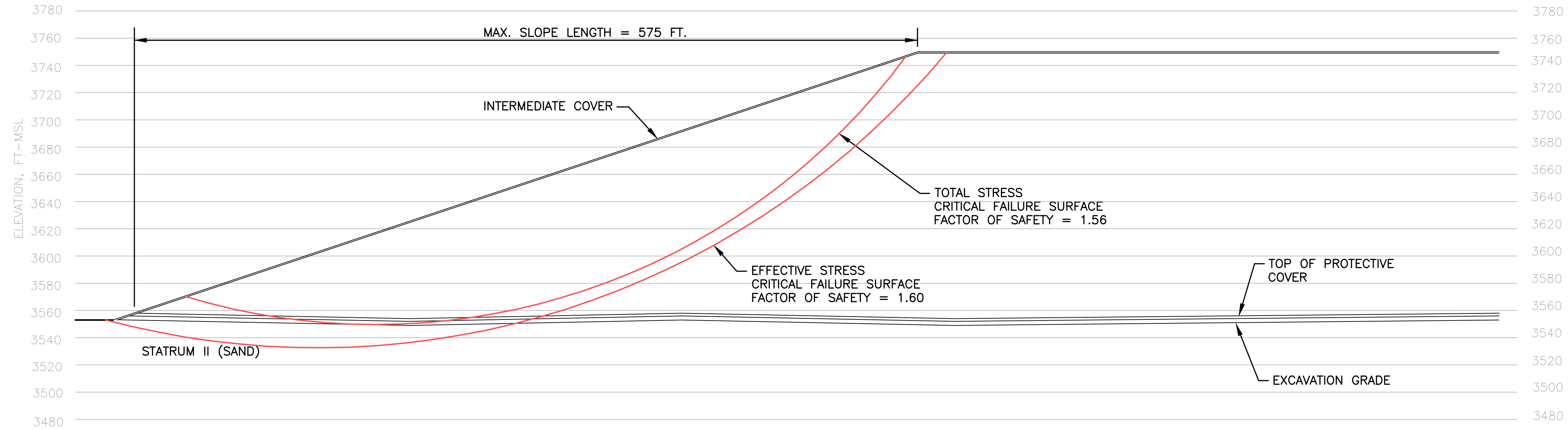
INTERIM LANDFILL CONFIGURATION STABILITY ANALYSIS

Includes pages IIIE-A-2-1 through IIIE-A-2-49



01/30/2025

INTERIM SECTION A–1



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A–1 ROTATIONAL
A
IIIE-A-2-3 IIIE-A-2-4

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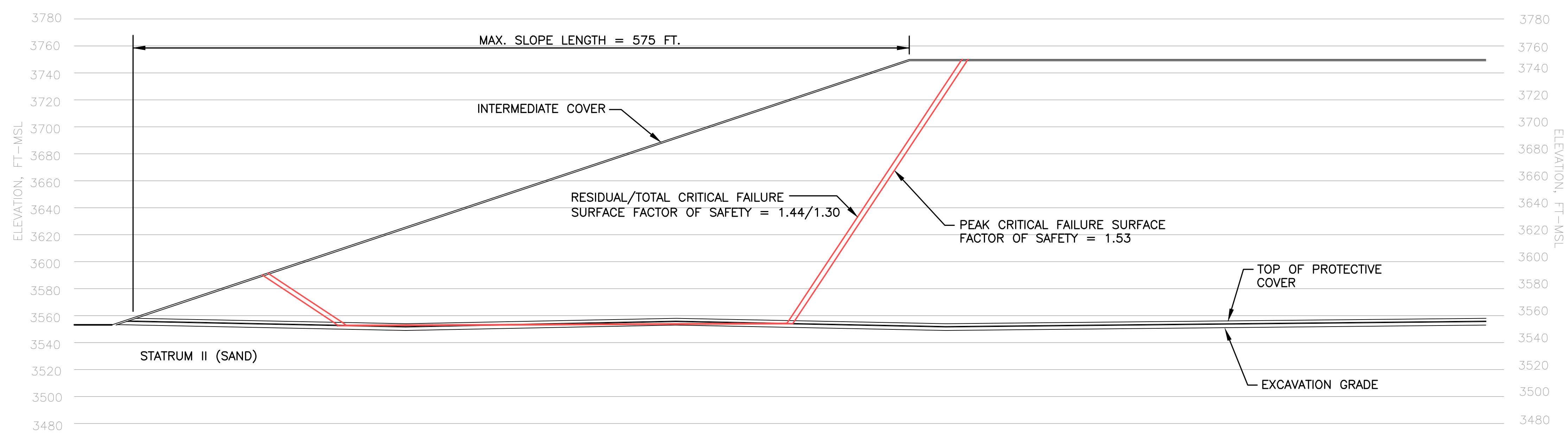
SCALE IN FEET

INTERIM SECTION A–2



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A
IIIE-A-2-3 IIIE-A-2-4

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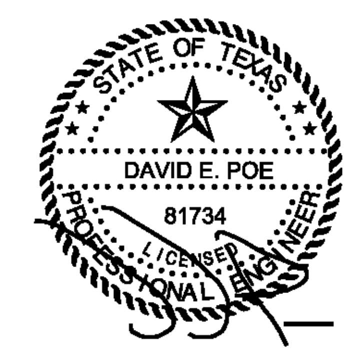
SCALE IN FEET



01/30/2025

☐ DRAFT
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☐ ISSUED FOR CONSTRUCTION

DATE: 11/2017
FILE: 0120-094-11
CAD: IIA-E-A-2-4 SECTIONS.dwg

DRAWN BY: JDW
DESIGN BY: CCH
REVIEWED BY: DEP

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	05/2024	LSMPA

MAJOR PERMIT AMENDMENT
SLOPE STABILITY
INTERIM COVER SECTION A–A

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

WWW.WCGRP.COM

SHEET IIIE–A–2–4

O:\0120\94\LSMPA 2024\PART III\IIIE\A\CLEAN\IIIE-A-2-4 SECTIONS.dwg, byoung, 1:2

Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIE-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Stratum I (Clay)	122.5	--
Stratum I (Caliche)	121.9	--
Stratum II (Sand)	122.5	127.0
Stratum III (Shale)	138.4	139.0

The strength parameters for the in-situ soils were selected based on the following:

Stratum I (Clay and Caliche)

A triaxial shear tests was performed on Stratum I samples which resulted in cohesion and friction angle values listed in the table below. The values in the table will be used for both Clay and Caliche. Moist unit weight and saturated unit weight values are calculated from the dry unit weight, the moisture content, and the void ratio obtained from the triaxial shear test. These unit weight values conservatively compare to the average obtained from all laboratory testing performed on the material.

	Total Stress		Effective Stress	
	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-5	100	26.0	100	27.1

Stratum II (Sand)

Triaxial shear tests and direct shear tests were performed on the Stratum II (sand) samples which resulted in cohesion and friction angle values listed in the table below. Stratum II is modeled using a cohesion of 1,200 psf and a friction angle of 26.7° conservatively. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-3	1620 (total)	40.9 (total)	3020 (effective)	35.0 (effective)
Direct Shear Test WB-121	900 (residual)	26.9 (residual)	1200 (peak)	26.7 (peak)

Stratum III (Shale)

The slope stability analysis indicates no failure surface through this stratum as the top of this stratum is located a minimum of 74 feet below the elevation of the deepest excavation. The laboratory testing for shear strength is reported on page IIIE-18.

Material	Effective Stress		Total Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Stratum I (Clay)	100	26	100	27.1
Stratum I (Caliche)	100	26	100	27.1
Stratum II (Sand)	1,200	26.7	1,200	26.7
Stratum III (Shale)	500	33	5,000	0

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Clay Liner(1)	120	100	16
Protective Cover	120	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees (effective stress) and a cohesion of 1,000 psf and internal friction angle of 0 degrees (total stress) is used for the clay liner for simplified Bishop Method of the slope stability analysis.
2. For translational (block) stability analysis, the strength parameters of the weakest interface were used to model the liner. The values used for the interim slope stability analysis are highlighted in the table below titled "Minimum Required Interface Strength Values". Note that both total and residual stress analyses were performed for the translational analyses.

Solid waste data used in this analysis are listed below.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	59	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1,400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	ϕ = 22,° c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	ϕ = 24,° c = 460 psf (22 kPa) to ϕ = 39,° c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	ϕ = 18° to 43,° c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIM.

Factor of Safety Summary for Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Total	Effective	Total	Effective	Total	Effective
Interim A-1	Bishop-Circular	1.56	1.60	1.5	1.3	YES	YES

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual/Total	Peak	Residual/ Total	Peak	Residual/ Total
Interm A-2	Rankine-Block	1.53	1.44 (Residual) 1.30 (Total)	1.5	1.1/1.3	YES	YES

Minimum Required Interface Strength Parameters

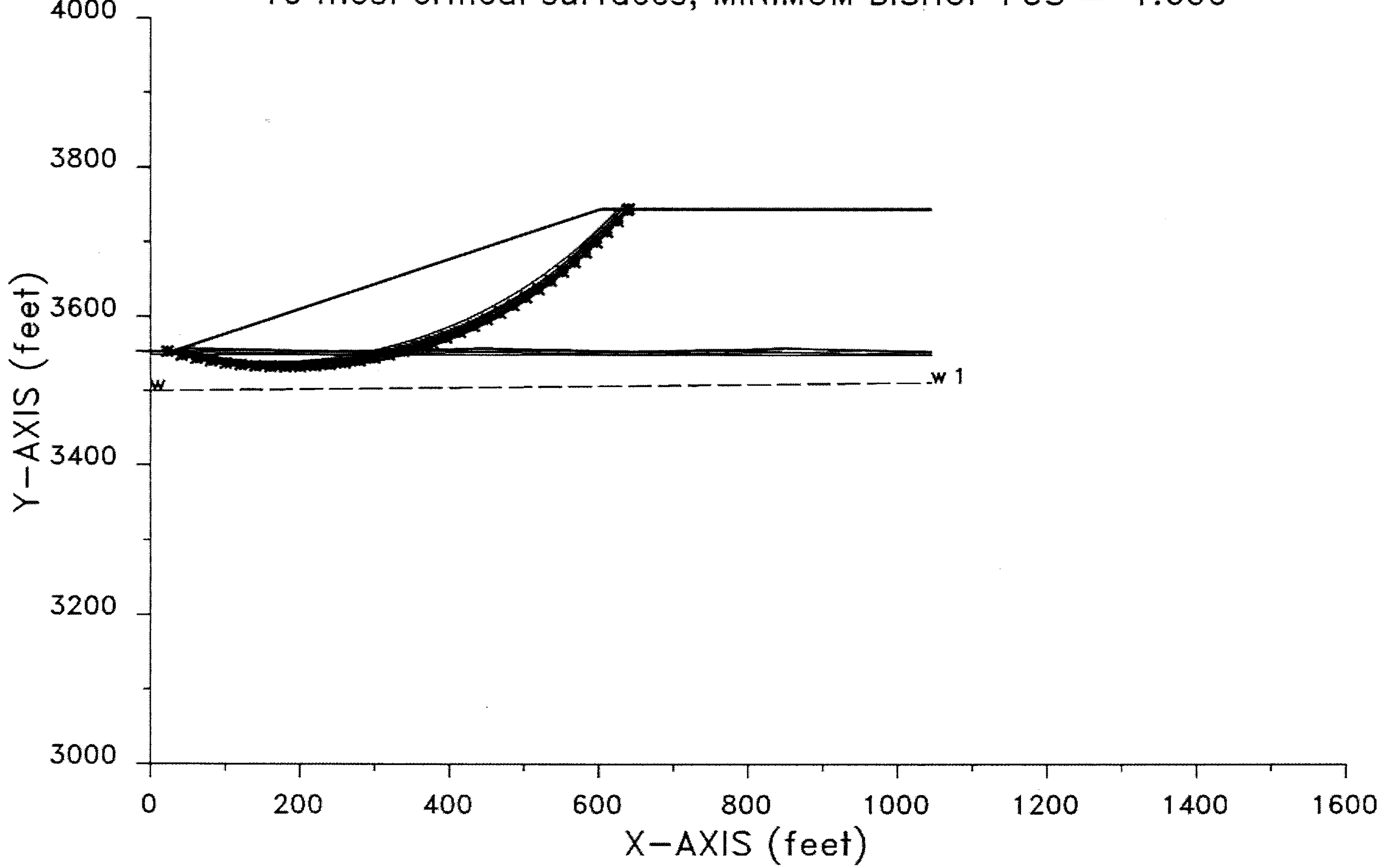
Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner	Protective Cover/Geocomposite	100	18	80	14
Liner (Note 1, 3)	***Geonet/Smooth Geomembrane***	***188***	***11***	***188***	***9***
Liner (Note 3)	Geonet/Textured Geomembrane	0	13	0	10
Liner	Geocomposite/Textured Geomembrane	100	21	80	10
Liner	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner (Note 2)	***Textured Geomembrane/Clay Liner***	***200***	***15***	***80***	***10***
Liner	Clay Internal	100	16	100	12
Liner	Smooth Geomembrane/Geosynthetic Clay Liner	100	16	80	10
Liner	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Liner	Geosynthetic Clay Liner Internal	100	24	380	11
Liner/Protective Cover (Note 4)	***Clay Internal/Protective Cover (Total Stress)***	***--***	***--***	***1000 (Total Only)***	***0 (Total Only)***

1. Interface parameters used for translational block analysis of cell floor.
2. Interface parameters used for translational block analysis of cell sideslope (3H:1V typical).
3. Interface parameters derived from GRI Report #30 (Ref. 5).
4. Total stress values assumed for both rotational and translational analysis of interim conditions. Effective, peak and residual stresses also analyzed.

SLOPE STABILITY XSTABL OUTPUT FILES

INT-A1E4 1-27-25 9:10

SWLF LSMPA INTERIM A1E4 EFFECT NOD2
10 most critical surfaces, MINIMUM BISHOP FOS = 1.606



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*        Slope Stability Analysis       *
*                using the              *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2013      *
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*        Moscow, ID 83843, U.S.A.       *
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*  Ver. 5.209                96 - 2083  *
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Problem Description : SWLF LSMPA INTERIM A1E4 EFFECT NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

21 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	39.7	3556.0	4
3	39.7	3556.0	45.6	3558.0	3
4	45.6	3558.0	603.0	3744.0	5
5	603.0	3744.0	1045.6	3744.0	5
6	45.6	3558.0	245.6	3554.0	3
7	245.6	3554.0	445.6	3558.0	3

8	445.6	3558.0	645.6	3554.0	3
9	645.6	3554.0	845.6	3558.0	3
10	845.6	3558.0	1045.6	3554.0	3
11	39.7	3556.0	245.6	3552.0	4
12	245.6	3552.0	445.6	3556.0	4
13	445.6	3556.0	645.6	3552.0	4
14	645.6	3552.0	845.6	3556.0	4
15	845.6	3558.0	1045.6	3552.0	4
16	30.9	3553.1	245.6	3549.1	1
17	245.6	3549.1	445.6	3553.1	1
18	445.6	3553.1	645.6	3549.1	1
19	645.6	3549.1	845.6	3553.1	1
20	845.6	3553.1	1045.6	3549.1	1
21	.0	3549.0	1045.6	3549.0	2

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = 20.0 ft
and x = 40.0 ft

Each surface terminates between x = 620.0 ft
and x = 640.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

20.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 36 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	22.22	3553.14
2	41.62	3548.28
3	61.17	3544.07
4	80.85	3540.50
5	100.64	3537.58
6	120.51	3535.32
7	140.45	3533.72
8	160.42	3532.77
9	180.42	3532.48
10	200.42	3532.86
11	220.39	3533.89
12	240.32	3535.58
13	260.18	3537.93
14	279.96	3540.93
15	299.62	3544.58
16	319.15	3548.88
17	338.53	3553.82
18	357.74	3559.40
19	376.75	3565.61
20	395.55	3572.44
21	414.11	3579.89
22	432.41	3587.94
23	450.44	3596.60
24	468.18	3605.85
25	485.60	3615.67
26	502.68	3626.07
27	519.42	3637.02
28	535.78	3648.52
29	551.76	3660.56
30	567.32	3673.11
31	582.47	3686.17
32	597.18	3699.72
33	611.43	3713.76
34	625.21	3728.25
35	638.51	3743.19
36	640.01	3745.00

**** Simplified BISHOP FOS = 1.606 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A1E4 EFFECT NOD2

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.606	179.15	4138.74	606.26	22.22	640.01	7.213E+08
2.	1.607	173.62	4120.47	587.74	20.00	625.82	6.664E+08
3.	1.607	170.34	4159.63	623.80	24.44	636.27	7.056E+08
4.	1.607	180.17	4111.68	580.44	22.22	630.02	6.797E+08
5.	1.610	158.67	4171.98	632.80	26.67	625.73	6.621E+08
6.	1.610	189.09	4124.46	589.13	35.56	639.58	6.852E+08
7.	1.610	184.55	4110.81	580.81	22.22	635.65	7.029E+08
8.	1.612	170.56	4155.96	617.70	31.11	631.76	6.730E+08
9.	1.612	187.92	4128.90	591.83	37.78	638.21	6.737E+08
10.	1.612	186.89	4110.01	581.32	20.00	639.25	7.215E+08

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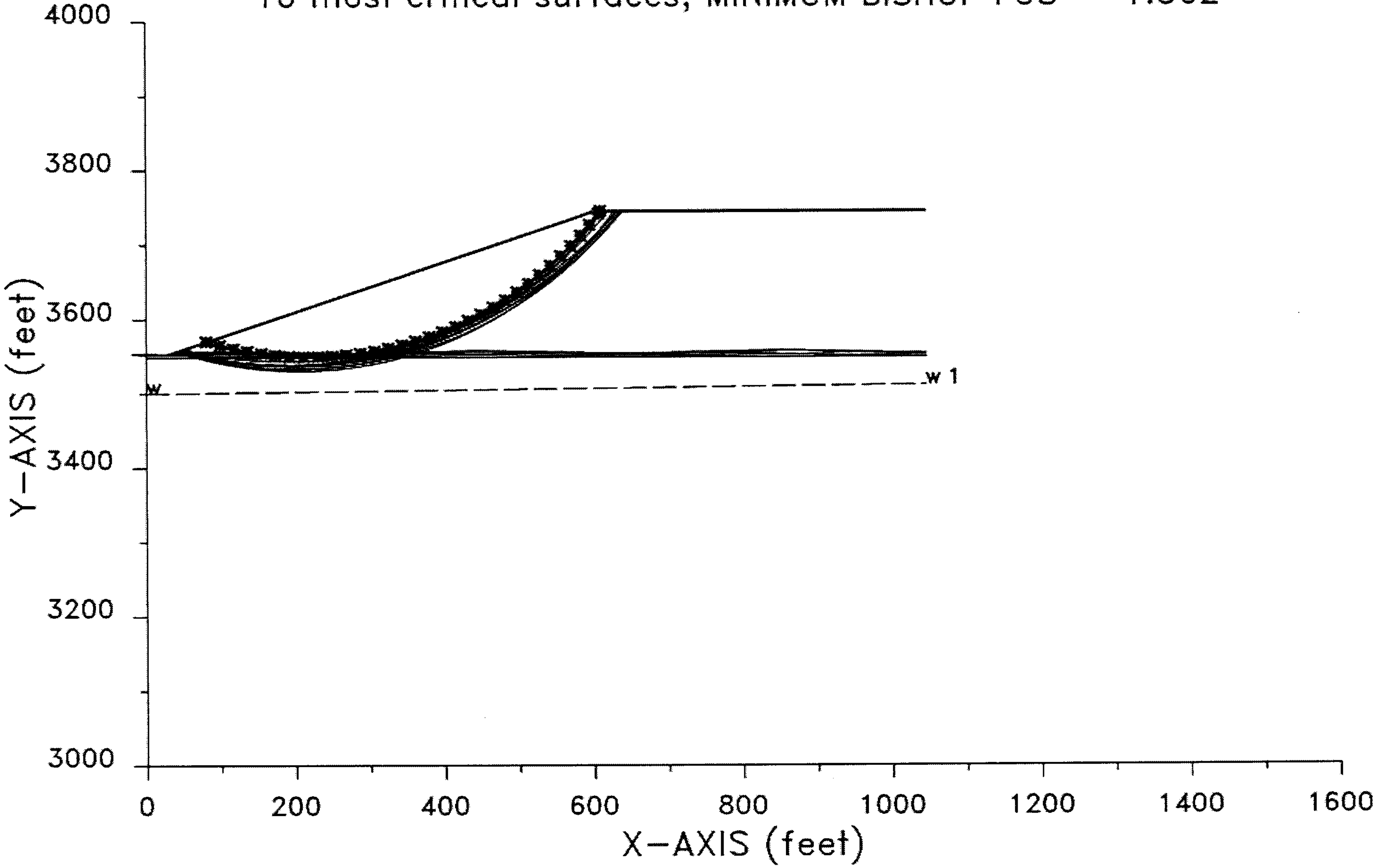
INT-A1T4   1-27-25   9:14

SWLF LSMPA INTERIM A1T4 TOTAL NOD2

10 most critical surfaces, MINIMUM BISHOP FOS = 1.562



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*        Slope Stability Analysis        *
*               using the                *
*            Method of Slices            *
*                                        *
*        Copyright (C) 1992 - 2013       *
*   Interactive Software Designs, Inc.   *
*        Moscow, ID 83843, U.S.A.        *
*                                        *
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*                                        *
*  Ver. 5.209                96 - 2083   *
******************************************
```

Problem Description : SWLF LSMPA INTERIM A1T4 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

21 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	39.7	3556.0	4
3	39.7	3556.0	45.6	3558.0	3
4	45.6	3558.0	603.0	3744.0	5
5	603.0	3744.0	1045.6	3744.0	5
6	45.6	3558.0	245.6	3554.0	3
7	245.6	3554.0	445.6	3558.0	3

8	445.6	3558.0	645.6	3554.0	3
9	645.6	3554.0	845.6	3558.0	3
10	845.6	3558.0	1045.6	3554.0	3
11	39.7	3556.0	245.6	3552.0	4
12	245.6	3552.0	445.6	3556.0	4
13	445.6	3556.0	645.6	3552.0	4
14	645.6	3552.0	845.6	3556.0	4
15	845.6	3558.0	1045.6	3552.0	4
16	30.9	3553.1	245.6	3549.1	1
17	245.6	3549.1	445.6	3553.1	1
18	445.6	3553.1	645.6	3549.1	1
19	645.6	3549.1	845.6	3553.1	1
20	845.6	3553.1	1045.6	3549.1	1
21	.0	3549.0	1045.6	3549.0	2

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3500.00
2	1045.60	3511.60

```
A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     40.0 ft
                             and  x =     80.0 ft


Each surface terminates between   x =    600.0 ft
                            and   x =    640.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   19.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=    -5.0 degrees


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
```

****

USER SELECTED option to maintain strength greater than zero

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *

The most critical circular failure surface
is specified by 33 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	80.00	3570.52
2	98.29	3565.39
3	116.78	3560.98
4	135.42	3557.30
5	154.18	3554.35
6	173.06	3552.14
7	192.00	3550.66
8	210.98	3549.93
9	229.98	3549.94
10	248.97	3550.70
11	267.91	3552.20
12	286.78	3554.44
13	305.54	3557.41
14	324.18	3561.12
15	342.65	3565.55
16	360.94	3570.70
17	379.01	3576.57
18	396.84	3583.14
19	414.40	3590.40
20	431.66	3598.34
21	448.60	3606.95
22	465.18	3616.22
23	481.40	3626.12
24	497.21	3636.66
25	512.59	3647.81
26	527.53	3659.55
27	542.00	3671.86
28	555.98	3684.74
29	569.44	3698.15
30	582.36	3712.07

31	594.73	3726.49
32	606.53	3741.39
33	609.17	3745.00

**** Simplified BISHOP FOS = 1.562 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A1T4 TOTAL NOD2

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.562	220.15	4035.20	485.35	80.00	609.17	4.326E+08
2.	1.592	215.90	4103.50	552.58	75.56	636.31	5.443E+08
3.	1.606	198.89	4089.32	552.68	44.44	631.07	6.198E+08
4.	1.609	195.19	4121.61	582.79	44.44	639.95	6.567E+08
5.	1.609	192.75	4082.62	544.55	44.44	620.02	5.800E+08
6.	1.611	200.56	4093.37	559.72	40.00	638.58	6.632E+08
7.	1.613	183.30	4085.71	547.62	40.00	611.90	5.645E+08
8.	1.616	197.00	4045.96	513.38	40.00	612.95	5.672E+08
9.	1.616	205.58	4052.51	522.28	40.00	627.68	6.217E+08
10.	1.619	187.51	4136.41	592.71	48.89	632.52	6.215E+08

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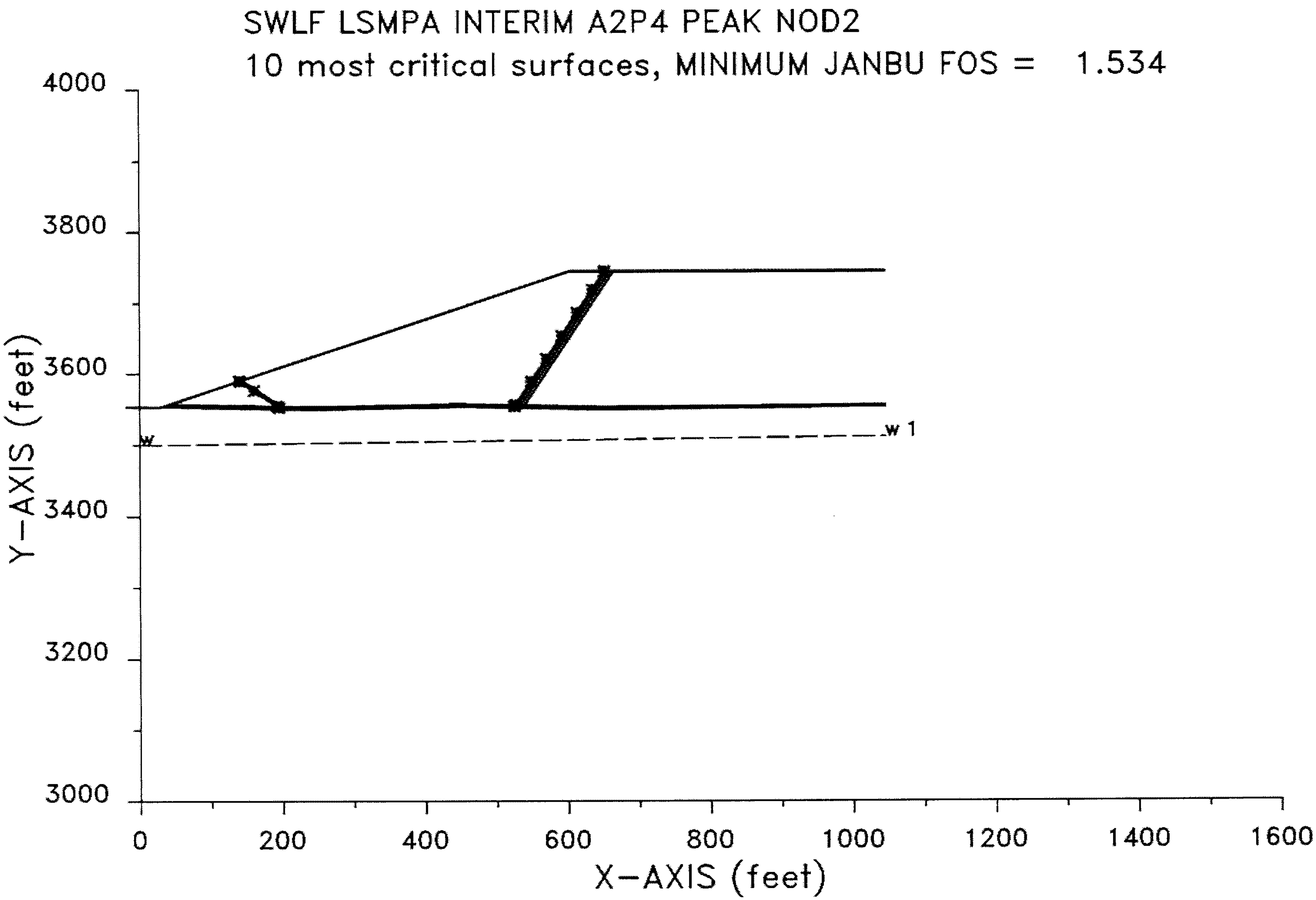

XSTABL File: INT-A2P4   1-27-25   9:12

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******************************************
*              X S T A B L               *
*                                        *
*        Slope Stability Analysis        *
*                using the               *
*             Method of Slices           *
*                                        *
*        Copyright (C) 1992 - 2013       *
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*        Moscow, ID 83843, U.S.A.        *
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*                                        *
*  Ver. 5.209                96 - 2083   *
******************************************
```

Problem Description : SWLF LSMPA INTERIM A2P4 PEAK NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters
----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	188.0	11.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	188.0	11.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.33	3590.32

2	140.29	3589.60
3	159.94	3576.59
4	192.46	3555.06
5	195.19	3553.00
6	195.67	3552.61
7	525.18	3553.94
8	525.56	3554.40
9	527.05	3556.37
10	548.57	3588.89
11	570.10	3621.41
12	591.62	3653.94
13	613.15	3686.46
14	634.67	3718.98
15	651.23	3744.00
16	651.99	3745.00

** Corrected JANBU FOS = 1.534 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.14	3590.26
2	140.11	3589.54
3	159.66	3576.59
4	192.18	3555.07
5	194.91	3553.01
6	195.43	3552.58
7	531.98	3554.10
8	532.12	3554.27
9	533.60	3556.24
10	555.13	3588.76
11	576.65	3621.28
12	598.18	3653.80
13	619.70	3686.33
14	641.23	3718.85
15	657.88	3744.00
16	658.63	3745.00

** Corrected JANBU FOS = 1.538 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.94	3590.86

2	141.90	3590.13
3	162.44	3576.54
4	194.96	3555.01
5	197.69	3552.96
6	198.15	3552.58
7	527.55	3554.09
8	527.77	3554.36
9	529.25	3556.33
10	550.78	3588.85
11	572.30	3621.37
12	593.83	3653.89
13	615.35	3686.41
14	636.88	3718.93
15	653.47	3744.00
16	654.22	3745.00

** Corrected JANBU FOS = 1.539 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.02	3590.22
2	139.99	3589.50
3	159.47	3576.60
4	191.99	3555.07
5	194.72	3553.01
6	195.07	3552.73
7	531.99	3553.85
8	532.33	3554.27
9	533.82	3556.24
10	555.34	3588.76
11	576.87	3621.28
12	598.39	3653.80
13	619.92	3686.32
14	641.44	3718.84
15	658.10	3744.00
16	658.85	3745.00

** Corrected JANBU FOS = 1.540 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.77	3591.14

2	142.73	3590.41
3	163.73	3576.51
4	196.25	3554.99
5	198.98	3552.93
6	199.41	3552.57
7	528.78	3553.98
8	529.07	3554.33
9	530.55	3556.30
10	552.08	3588.82
11	573.60	3621.34
12	595.13	3653.87
13	616.66	3686.39
14	638.18	3718.91
15	654.79	3744.00
16	655.54	3745.00

** Corrected JANBU FOS = 1.541 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.54	3591.39
2	143.50	3590.67
3	164.92	3576.49
4	197.44	3554.96
5	200.17	3552.91
6	200.72	3552.45
7	536.86	3553.77
8	537.19	3554.17
9	538.67	3556.14
10	560.20	3588.66
11	581.73	3621.18
12	603.25	3653.70
13	624.78	3686.22
14	646.30	3718.75
15	663.02	3744.00
16	663.77	3745.00

** Corrected JANBU FOS = 1.542 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.25	3591.63

2	144.21	3590.91
3	166.03	3576.47
4	198.55	3554.94
5	201.28	3552.88
6	201.79	3552.47
7	527.63	3554.30
8	527.68	3554.36
9	529.17	3556.33
10	550.69	3588.85
11	572.22	3621.37
12	593.74	3653.89
13	615.27	3686.41
14	636.79	3718.94
15	653.38	3744.00
16	654.14	3745.00

** Corrected JANBU FOS = 1.543 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.42	3591.69
2	144.38	3590.96
3	166.28	3576.46
4	198.81	3554.94
5	201.54	3552.88
6	201.98	3552.51
7	527.94	3554.18
8	528.08	3554.35
9	529.56	3556.32
10	551.09	3588.84
11	572.62	3621.36
12	594.14	3653.89
13	615.67	3686.41
14	637.19	3718.93
15	653.79	3744.00
16	654.54	3745.00

** Corrected JANBU FOS = 1.543 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.29	3590.98

2	142.25	3590.25
3	162.99	3576.53
4	195.51	3555.00
5	198.24	3552.94
6	198.64	3552.62
7	533.30	3553.96
8	533.53	3554.24
9	535.01	3556.21
10	556.54	3588.73
11	578.06	3621.25
12	599.59	3653.78
13	621.11	3686.30
14	642.64	3718.82
15	659.31	3744.00
16	660.06	3745.00

** Corrected JANBU FOS = 1.544 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.93	3591.52
2	143.89	3590.80
3	165.53	3576.48
4	198.05	3554.95
5	200.78	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.12	3554.13
9	540.60	3556.10
10	562.13	3588.62
11	583.66	3621.14
12	605.18	3653.66
13	626.71	3686.19
14	648.23	3718.71
15	664.97	3744.00
16	665.73	3745.00

** Corrected JANBU FOS = 1.544 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2P4 PEAK NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.534	1.084	139.33	651.99	9.994E+05
2.	1.538	1.084	139.14	658.63	1.019E+06
3.	1.539	1.084	140.94	654.22	1.006E+06
4.	1.540	1.084	139.02	658.85	1.022E+06
5.	1.541	1.084	141.77	655.54	1.009E+06
6.	1.542	1.084	142.54	663.77	1.029E+06
7.	1.543	1.084	143.25	654.14	1.003E+06
8.	1.543	1.084	143.42	654.54	1.005E+06
9.	1.544	1.084	141.29	660.06	1.024E+06
10.	1.544	1.084	142.93	665.73	1.035E+06

* * * END OF FILE * * *

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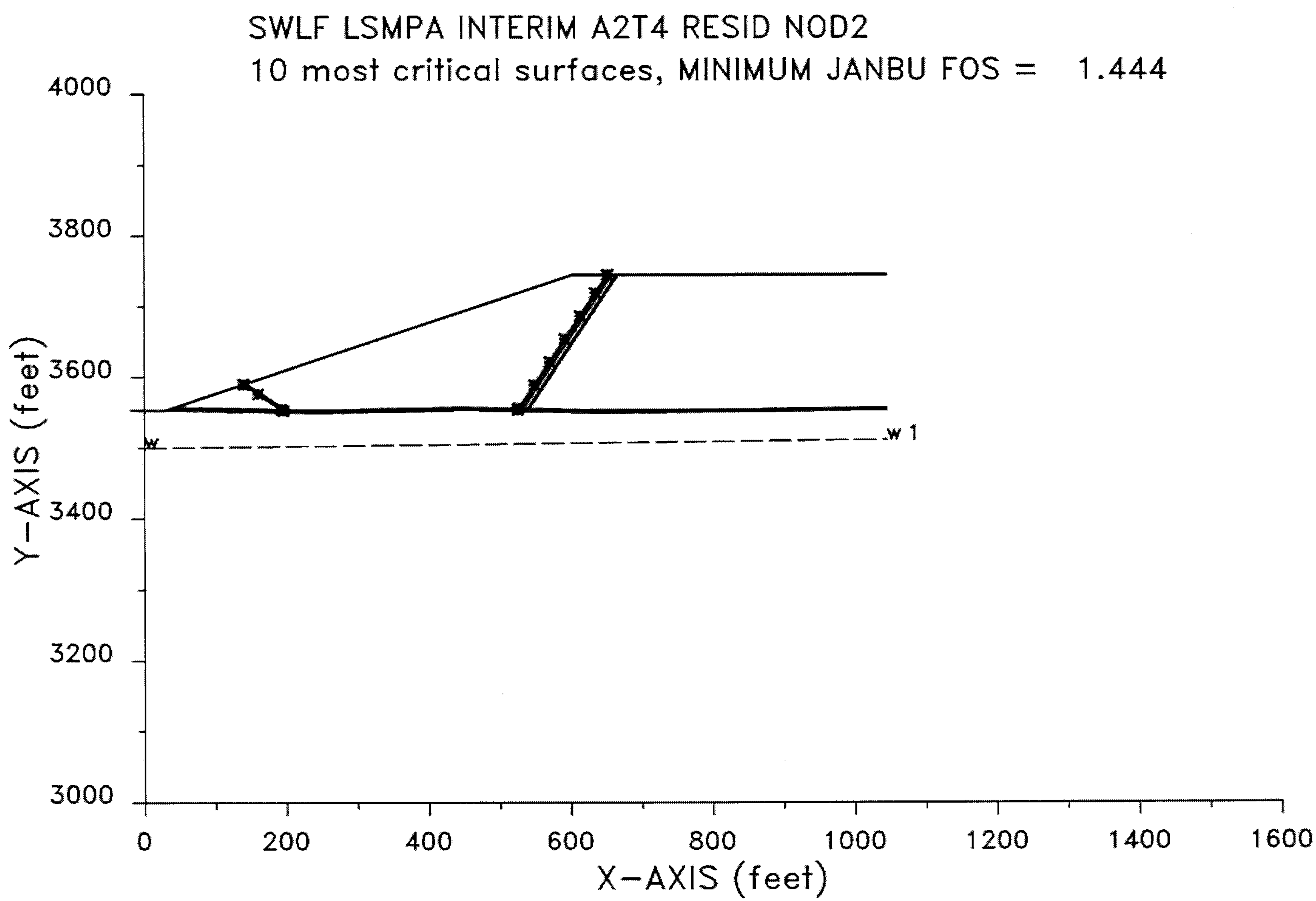

XSTABL File: INT-A2R4   1-27-25   9:15

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*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2013      *
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*        Moscow, ID 83843, U.S.A.       *
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*                                       *
*  Ver. 5.209                96 - 2083  *
*****************************************
```

Problem Description : SWLF LSMPA INTERIM A2T4 RESID NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters
----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	188.0	9.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	188.0	9.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.34	3590.32

2	140.30	3589.60
3	159.96	3576.59
4	192.48	3555.06
5	195.21	3553.00
6	195.67	3552.61
7	525.18	3553.94
8	525.57	3554.40
9	527.06	3556.37
10	548.58	3588.89
11	570.11	3621.41
12	591.64	3653.94
13	613.16	3686.46
14	634.69	3718.98
15	651.25	3744.00
16	652.00	3745.00

** Corrected JANBU FOS = 1.444 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.55	3591.40
2	143.51	3590.67
3	164.94	3576.49
4	197.46	3554.96
5	200.19	3552.91
6	200.72	3552.45
7	536.86	3553.77
8	537.20	3554.17
9	538.69	3556.14
10	560.21	3588.66
11	581.74	3621.18
12	603.26	3653.70
13	624.79	3686.22
14	646.31	3718.75
15	663.03	3744.00
16	663.78	3745.00

** Corrected JANBU FOS = 1.445 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.94	3591.53

2	143.90	3590.80
3	165.55	3576.48
4	198.07	3554.95
5	200.80	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.13	3554.13
9	540.62	3556.10
10	562.14	3588.62
11	583.67	3621.14
12	605.19	3653.66
13	626.72	3686.19
14	648.25	3718.71
15	664.99	3744.00
16	665.74	3745.00

** Corrected JANBU FOS = 1.446 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.16	3590.26
2	140.12	3589.54
3	159.68	3576.59
4	192.20	3555.07
5	194.93	3553.01
6	195.43	3552.58
7	531.98	3554.10
8	532.12	3554.27
9	533.61	3556.24
10	555.13	3588.76
11	576.66	3621.28
12	598.18	3653.80
13	619.71	3686.33
14	641.24	3718.85
15	657.88	3744.00
16	658.64	3745.00

** Corrected JANBU FOS = 1.446 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.01	3591.55

2	143.97	3590.83
3	165.65	3576.47
4	198.18	3554.95
5	200.91	3552.89
6	201.43	3552.44
7	540.76	3553.85
8	540.97	3554.09
9	542.45	3556.06
10	563.98	3588.58
11	585.51	3621.11
12	607.03	3653.63
13	628.56	3686.15
14	650.08	3718.67
15	666.85	3744.00
16	667.60	3745.00

** Corrected JANBU FOS = 1.448 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.95	3590.86
2	141.91	3590.14
3	162.45	3576.54
4	194.97	3555.01
5	197.70	3552.95
6	198.15	3552.58
7	527.55	3554.09
8	527.77	3554.36
9	529.26	3556.33
10	550.78	3588.85
11	572.31	3621.37
12	593.83	3653.89
13	615.36	3686.41
14	636.89	3718.93
15	653.48	3744.00
16	654.23	3745.00

** Corrected JANBU FOS = 1.449 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.78	3591.14

2	142.74	3590.41
3	163.74	3576.51
4	196.26	3554.99
5	198.99	3552.93
6	199.41	3552.57
7	528.78	3553.98
8	529.08	3554.33
9	530.56	3556.30
10	552.09	3588.82
11	573.62	3621.34
12	595.14	3653.87
13	616.67	3686.39
14	638.19	3718.91
15	654.80	3744.00
16	655.55	3745.00

** Corrected JANBU FOS = 1.449 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.63	3591.09
2	142.59	3590.36
3	163.51	3576.52
4	196.03	3554.99
5	198.76	3552.93
6	199.20	3552.56
7	540.79	3553.75
8	541.08	3554.09
9	542.56	3556.06
10	564.09	3588.58
11	585.61	3621.10
12	607.14	3653.63
13	628.66	3686.15
14	650.19	3718.67
15	666.96	3744.00
16	667.71	3745.00

** Corrected JANBU FOS = 1.450 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.03	3590.22

2	139.99	3589.50
3	159.48	3576.60
4	192.01	3555.07
5	194.74	3553.01
6	195.07	3552.73
7	531.99	3553.85
8	532.34	3554.27
9	533.83	3556.24
10	555.35	3588.76
11	576.88	3621.28
12	598.41	3653.80
13	619.93	3686.32
14	641.46	3718.84
15	658.11	3744.00
16	658.86	3745.00

** Corrected JANBU FOS = 1.450 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	139.97	3590.53
2	140.93	3589.81
3	160.94	3576.57
4	193.46	3555.04
5	196.19	3552.98
6	196.65	3552.59
7	539.65	3554.01
8	539.74	3554.12
9	541.23	3556.09
10	562.75	3588.61
11	584.28	3621.13
12	605.80	3653.65
13	627.33	3686.17
14	648.85	3718.69
15	665.60	3744.00
16	666.36	3745.00

** Corrected JANBU FOS = 1.451 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2T4 RESID NOD2

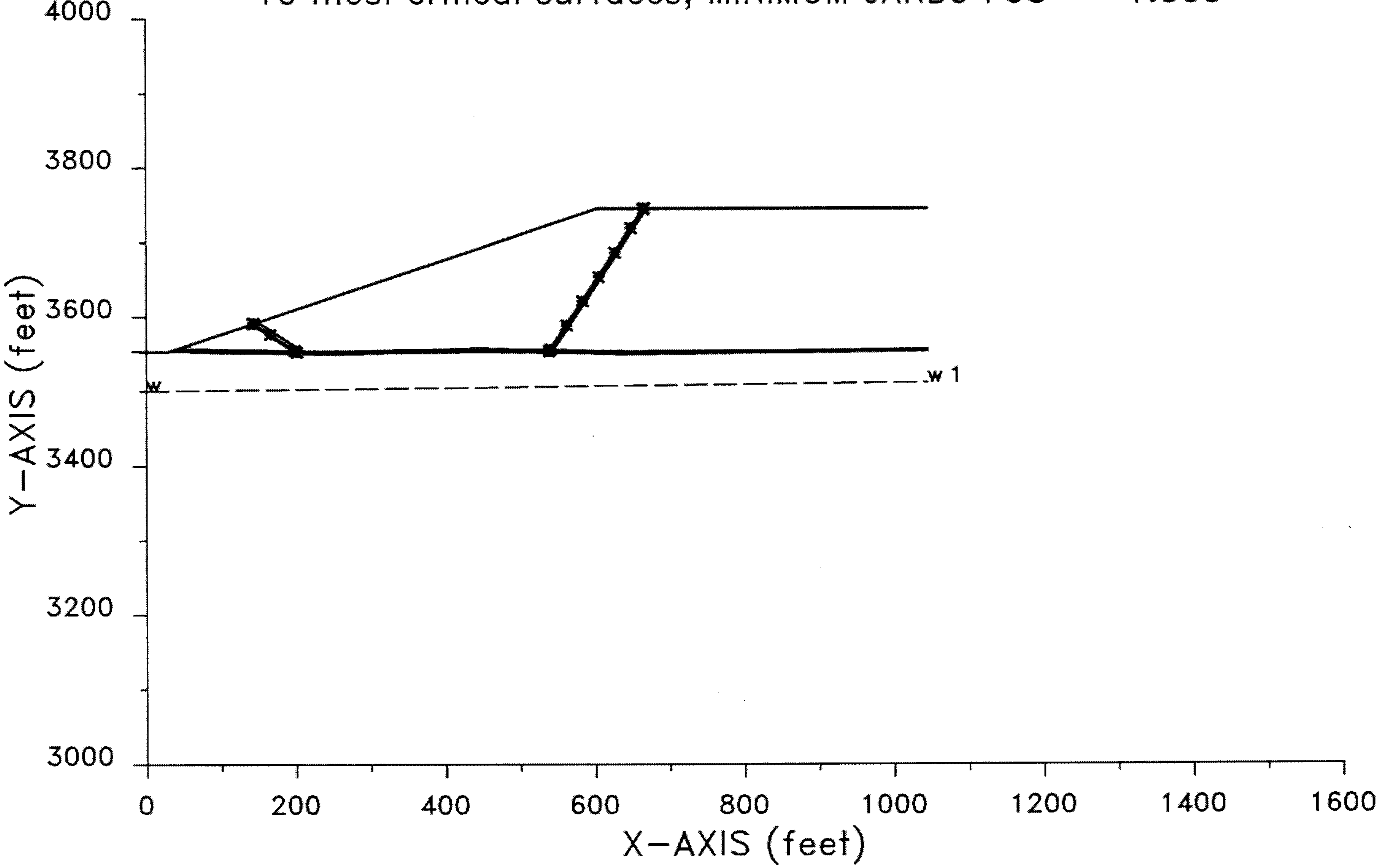
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.444	1.084	139.34	652.00	9.268E+05
2.	1.445	1.084	142.55	663.78	9.492E+05
3.	1.446	1.084	142.94	665.74	9.538E+05
4.	1.446	1.084	139.16	658.64	9.442E+05
5.	1.448	1.084	143.01	667.60	9.589E+05
6.	1.449	1.084	140.95	654.23	9.329E+05
7.	1.449	1.084	141.78	655.55	9.350E+05
8.	1.450	1.084	141.63	667.71	9.632E+05
9.	1.450	1.084	139.03	658.86	9.484E+05
10.	1.451	1.084	139.97	666.36	9.630E+05

* * * END OF FILE * * *

INT-A2T4 1-27-25 9:11

SWLF LSMPA INTERIM A2T4 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 1.305



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*****************************************
*              X S T A B L              *
*                                       *
*       Slope Stability Analysis        *
*              using the                *
*           Method of Slices            *
*                                       *
*       Copyright (C) 1992 - 2013       *
*   Interactive Software Designs, Inc.  *
*       Moscow, ID 83843, U.S.A.        *
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*                                       *
*  Ver. 5.209                96 - 2083  *
*****************************************
```

Problem Description : SWLF LSMPA INTERIM A2T4 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3553.3	27.8	3553.1	1
2	27.8	3553.1	602.8	3745.0	2
3	602.8	3745.0	1045.6	3745.0	2

22 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	27.8	3553.1	30.9	3553.1	1
2	30.9	3553.1	38.5	3555.6	4
3	38.5	3555.6	39.9	3556.1	6
4	39.9	3556.1	45.6	3558.0	3
5	45.6	3558.0	603.0	3744.0	5
6	603.0	3744.0	1045.6	3744.0	5
7	45.6	3558.0	245.6	3554.0	3

8	245.6	3554.0	445.6	3558.0	3
9	445.6	3558.0	645.6	3554.0	3
10	645.6	3554.0	1045.6	3556.1	3
11	39.9	3556.1	245.6	3552.0	6
12	245.6	3552.0	445.6	3556.0	6
13	445.6	3556.0	645.6	3552.0	6
14	645.6	3552.0	1045.6	3556.0	6
15	38.5	3555.6	245.6	3551.5	4
16	245.6	3551.5	445.5	3555.5	4
17	445.5	3555.5	645.5	3551.5	4
18	645.5	3551.5	1045.6	3555.5	4
19	30.9	3553.1	245.5	3549.0	1
20	245.5	3549.0	445.4	3553.0	1
21	445.4	3553.0	645.4	3549.0	1
22	645.4	3549.0	1045.6	3553.0	1

ISOTROPIC Soil Parameters
----

6 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	116.0	120.0	100.0	16.00	.000	.0	0
3	120.0	125.0	100.0	16.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3500.00
2	1045.60	3511.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 39.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	195.0	3552.8	215.0	3552.4	.5
2	525.0	3554.1	545.0	3553.8	.5

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.99	3591.54

2	143.95	3590.82
3	165.62	3576.47
4	198.15	3554.95
5	200.88	3552.89
6	201.31	3552.46
7	538.75	3553.68
8	539.20	3554.13
9	540.68	3556.10
10	562.21	3588.62
11	583.73	3621.14
12	605.26	3653.66
13	626.78	3686.18
14	648.31	3718.71
15	665.05	3744.00
16	665.81	3745.00

** Corrected JANBU FOS = 1.305 ** (Fo factor = 1.084)

Failure surface No. 2 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	142.60	3591.41
2	143.56	3590.69
3	165.02	3576.49
4	197.54	3554.96
5	200.27	3552.90
6	200.72	3552.45
7	536.86	3553.77
8	537.26	3554.17
9	538.74	3556.14
10	560.27	3588.66
11	581.79	3621.18
12	603.32	3653.70
13	624.85	3686.22
14	646.37	3718.74
15	663.09	3744.00
16	663.84	3745.00

** Corrected JANBU FOS = 1.306 ** (Fo factor = 1.084)

Failure surface No. 3 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	148.74	3593.46

2	149.71	3592.74
3	174.55	3576.30
4	207.07	3554.77
5	209.80	3552.71
6	210.24	3552.27
7	542.57	3553.65
8	542.97	3554.05
9	544.45	3556.02
10	565.98	3588.54
11	587.50	3621.07
12	609.03	3653.59
13	630.55	3686.11
14	652.08	3718.63
15	668.87	3744.00
16	669.63	3745.00

** Corrected JANBU FOS = 1.306 ** (Fo factor = 1.084)

Failure surface No. 4 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	143.06	3591.57
2	144.02	3590.84
3	165.73	3576.47
4	198.25	3554.95
5	200.98	3552.89
6	201.43	3552.44
7	540.76	3553.85
8	541.00	3554.09
9	542.49	3556.06
10	564.02	3588.58
11	585.54	3621.11
12	607.07	3653.63
13	628.59	3686.15
14	650.12	3718.67
15	666.88	3744.00
16	667.64	3745.00

** Corrected JANBU FOS = 1.307 ** (Fo factor = 1.084)

Failure surface No. 5 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	149.52	3593.72

2	150.48	3593.00
3	175.75	3576.27
4	208.27	3554.75
5	211.00	3552.69
6	211.46	3552.23
7	542.38	3553.88
8	542.55	3554.06
9	544.04	3556.03
10	565.56	3588.55
11	587.09	3621.07
12	608.62	3653.60
13	630.14	3686.12
14	651.67	3718.64
15	668.45	3744.00
16	669.21	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 6 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	141.67	3591.10
2	142.63	3590.38
3	163.57	3576.52
4	196.09	3554.99
5	198.82	3552.93
6	199.20	3552.56
7	540.79	3553.75
8	541.13	3554.09
9	542.61	3556.06
10	564.14	3588.58
11	585.66	3621.10
12	607.19	3653.62
13	628.71	3686.15
14	650.24	3718.67
15	667.01	3744.00
16	667.76	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 7 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	148.58	3593.41

2	149.54	3592.68
3	174.29	3576.30
4	206.81	3554.78
5	209.54	3552.72
6	209.97	3552.29
7	543.00	3553.79
8	543.25	3554.05
9	544.74	3556.02
10	566.26	3588.54
11	587.79	3621.06
12	609.32	3653.58
13	630.84	3686.10
14	652.37	3718.62
15	669.16	3744.00
16	669.92	3745.00

** Corrected JANBU FOS = 1.308 ** (Fo factor = 1.084)

Failure surface No. 8 specified by 15 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	150.25	3593.97
2	151.21	3593.24
3	176.88	3576.25
4	209.40	3554.72
5	212.13	3552.67
6	212.59	3552.20
7	544.07	3554.03
8	545.55	3556.00
9	567.08	3588.52
10	588.60	3621.04
11	610.13	3653.57
12	631.65	3686.09
13	653.18	3718.61
14	669.98	3744.00
15	670.74	3745.00

** Corrected JANBU FOS = 1.310 ** (Fo factor = 1.084)

Failure surface No. 9 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	140.01	3590.55
2	140.97	3589.83

3	161.00	3576.57
4	193.53	3555.04
5	196.26	3552.98
6	196.65	3552.59
7	539.65	3554.01
8	539.76	3554.12
9	541.24	3556.09
10	562.77	3588.61
11	584.29	3621.13
12	605.82	3653.65
13	627.34	3686.17
14	648.87	3718.69
15	665.62	3744.00
16	666.37	3745.00

** Corrected JANBU FOS = 1.312 ** (Fo factor = 1.084)

Failure surface No.10 specified by 16 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	149.60	3593.75
2	150.56	3593.02
3	175.87	3576.27
4	208.39	3554.74
5	211.12	3552.69
6	211.44	3552.37
7	542.06	3553.63
8	542.50	3554.06
9	543.98	3556.03
10	565.51	3588.55
11	587.04	3621.08
12	608.56	3653.60
13	630.09	3686.12
14	651.61	3718.64
15	668.40	3744.00
16	669.15	3745.00

** Corrected JANBU FOS = 1.313 ** (Fo factor = 1.084)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA INTERIM A2T4 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	1.305	1.084	142.99	665.81	8.383E+05
2.	1.306	1.084	142.60	663.84	8.359E+05
3.	1.306	1.084	148.74	669.63	8.362E+05
4.	1.307	1.084	143.06	667.64	8.423E+05
5.	1.308	1.084	149.52	669.21	8.355E+05
6.	1.308	1.084	141.67	667.76	8.462E+05
7.	1.308	1.084	148.58	669.92	8.386E+05
8.	1.310	1.084	150.25	670.74	8.378E+05
9.	1.312	1.084	140.01	666.37	8.486E+05
10.	1.313	1.084	149.60	669.15	8.392E+05

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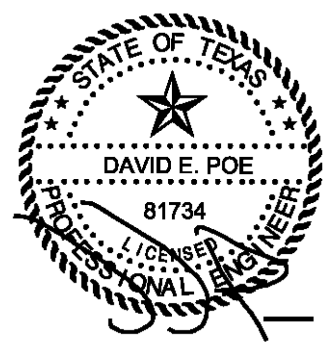
APPENDIX IIIE-A-3

OVERLINER AND FINAL LANDFILL CONFIGURATION STABILITY ANALYSIS

Includes pages IIIE-A-3-1 through IIIE-A-3-306



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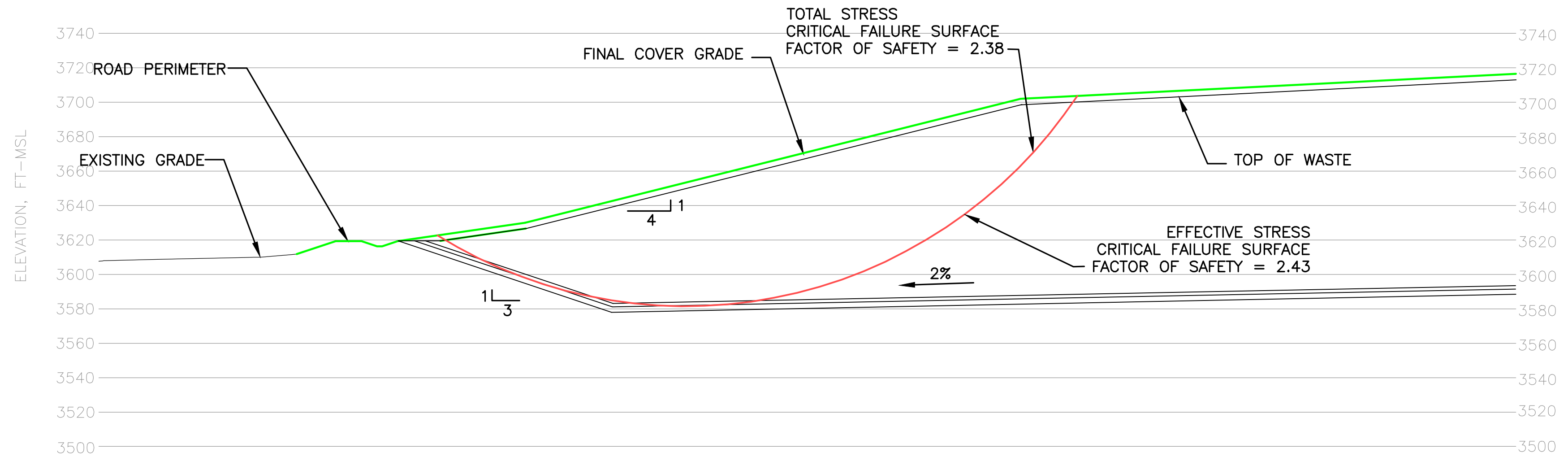

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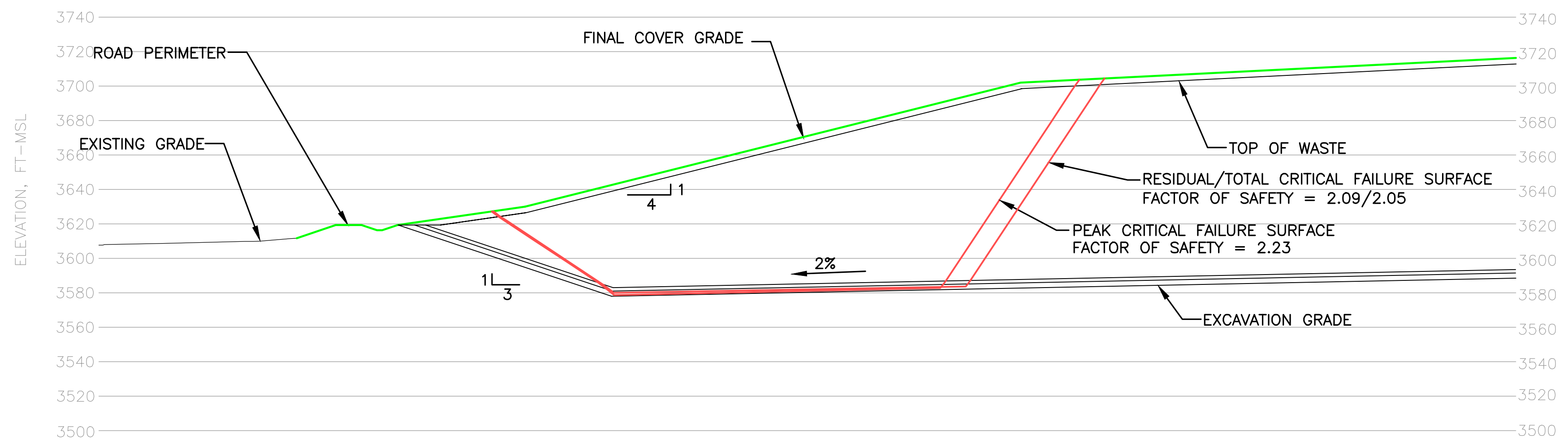
SCALE IN FEET

FINAL COVER SECTION A-2



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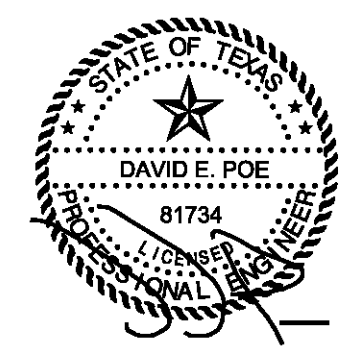

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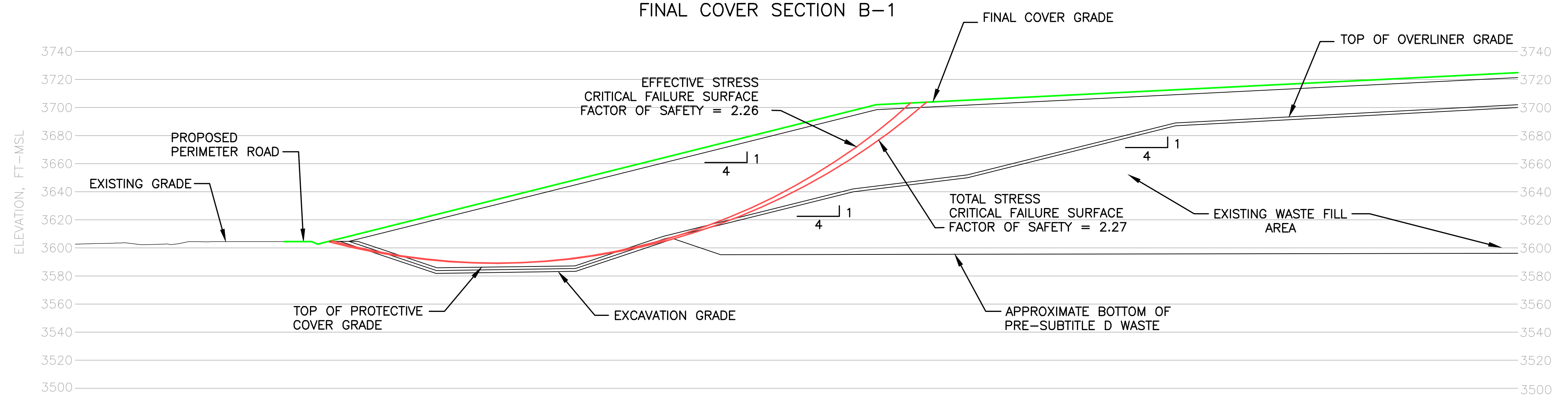

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SCALE IN FEET

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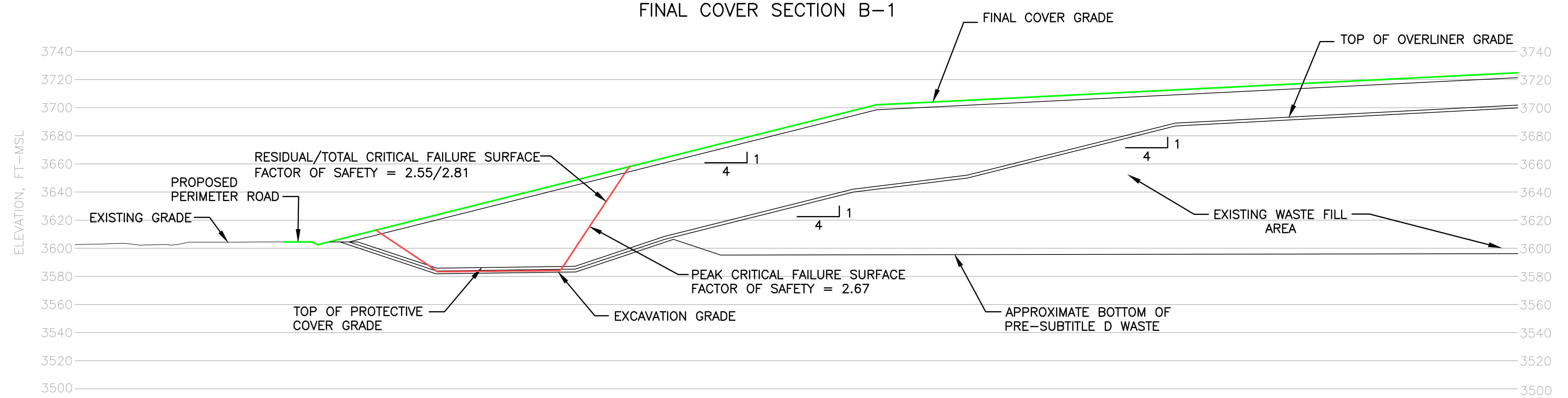

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B–2 TRANSLATION

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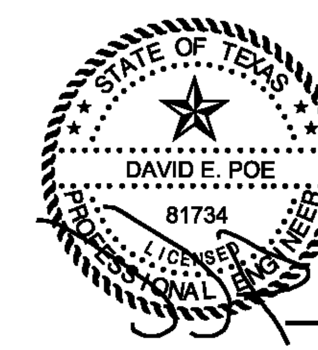

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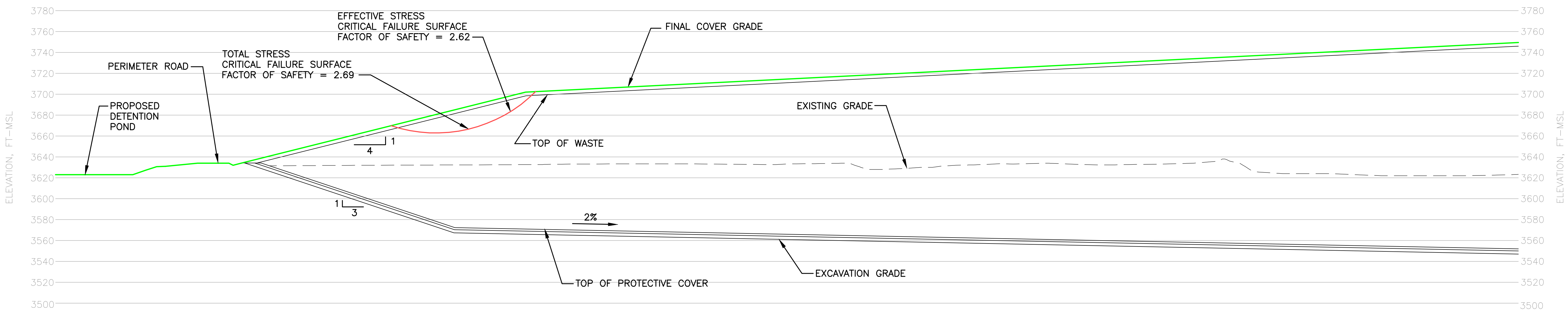
FINAL COVER SECTION C–1



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C–1 ROTATIONAL

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IIIE–A–3–3
IIIE–A–3–7

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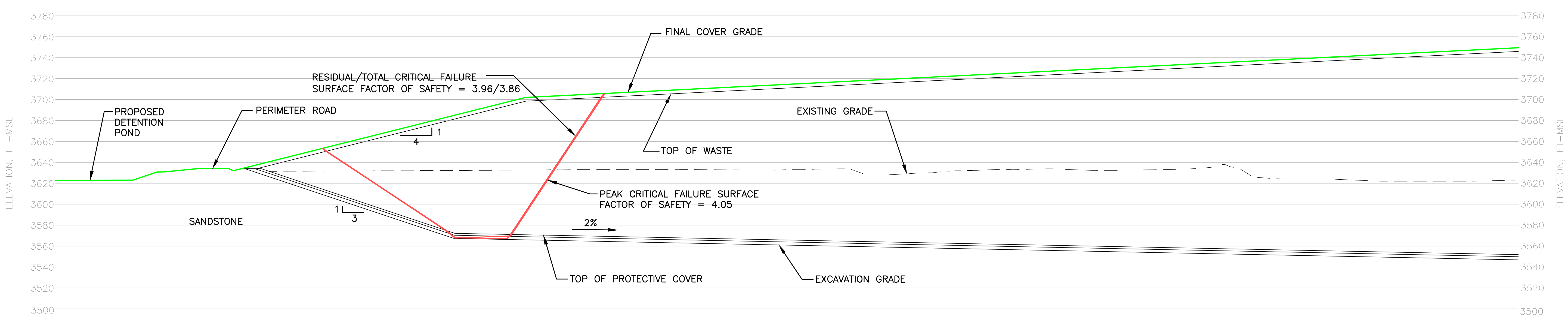
SCALE IN FEET

FINAL COVER SECTION C–2



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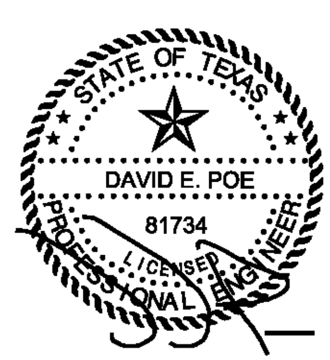

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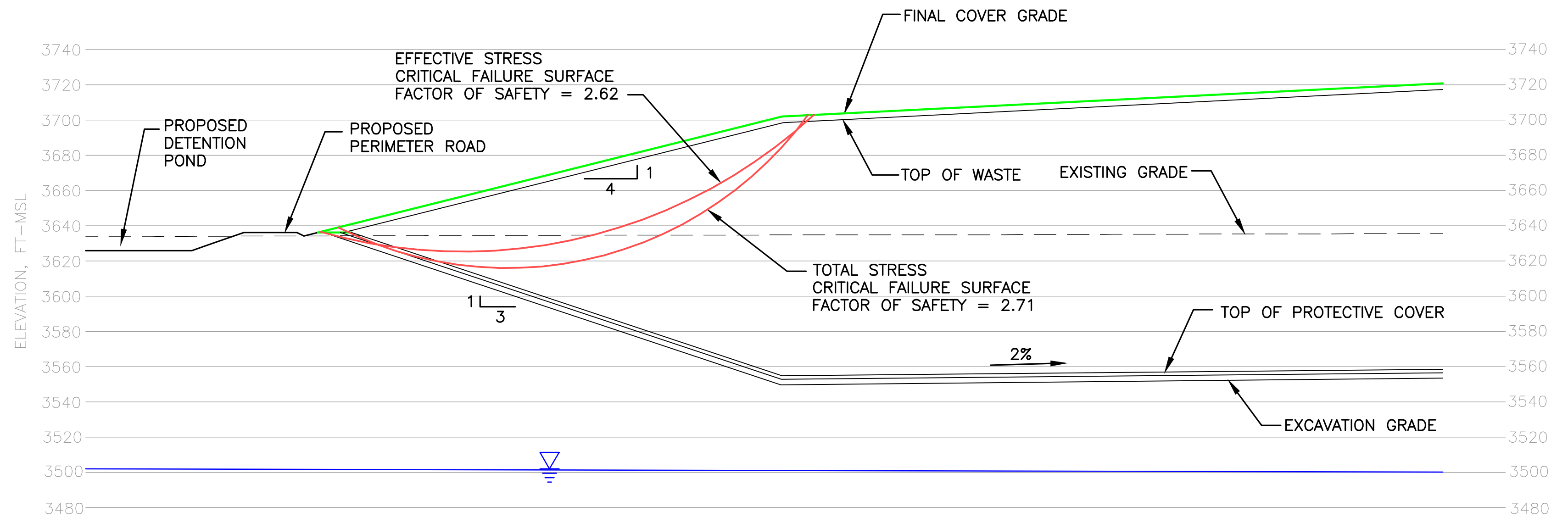
FINAL COVER SECTION D-1



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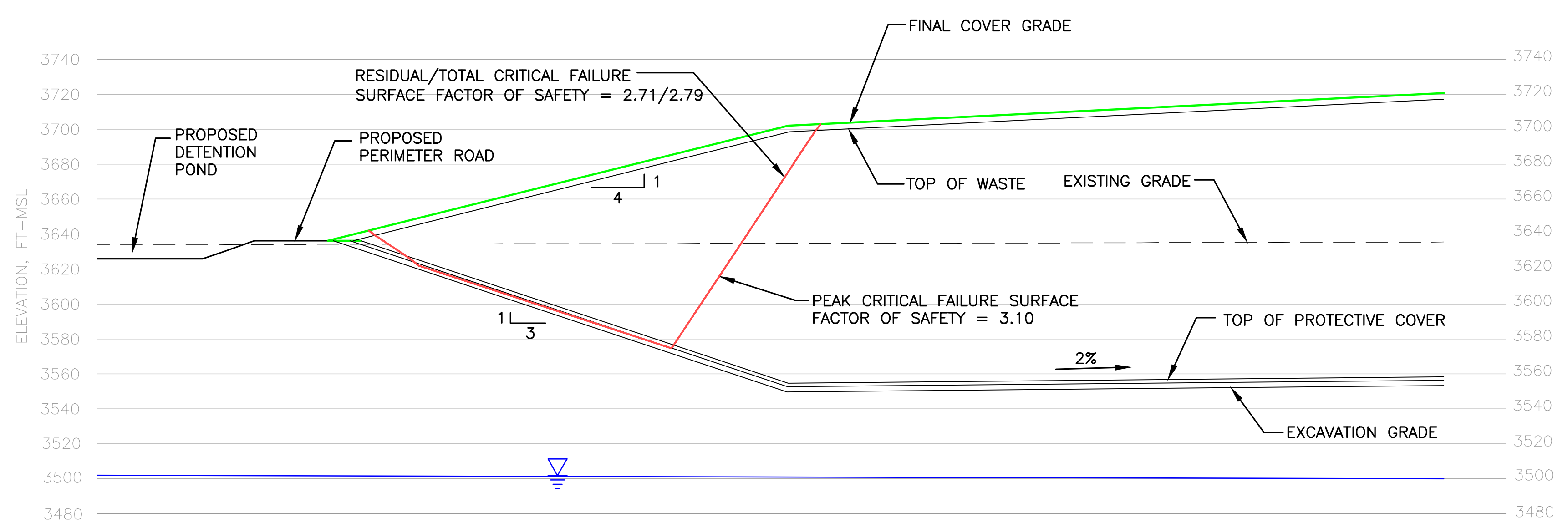
SCALE IN FEET

FINAL COVER SECTION D-2



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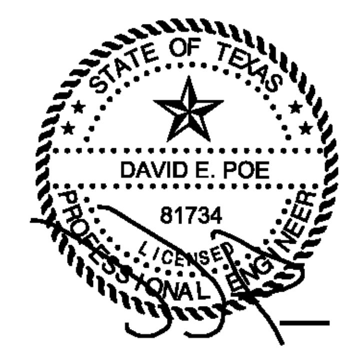

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SHEET IIIE-A-3-8

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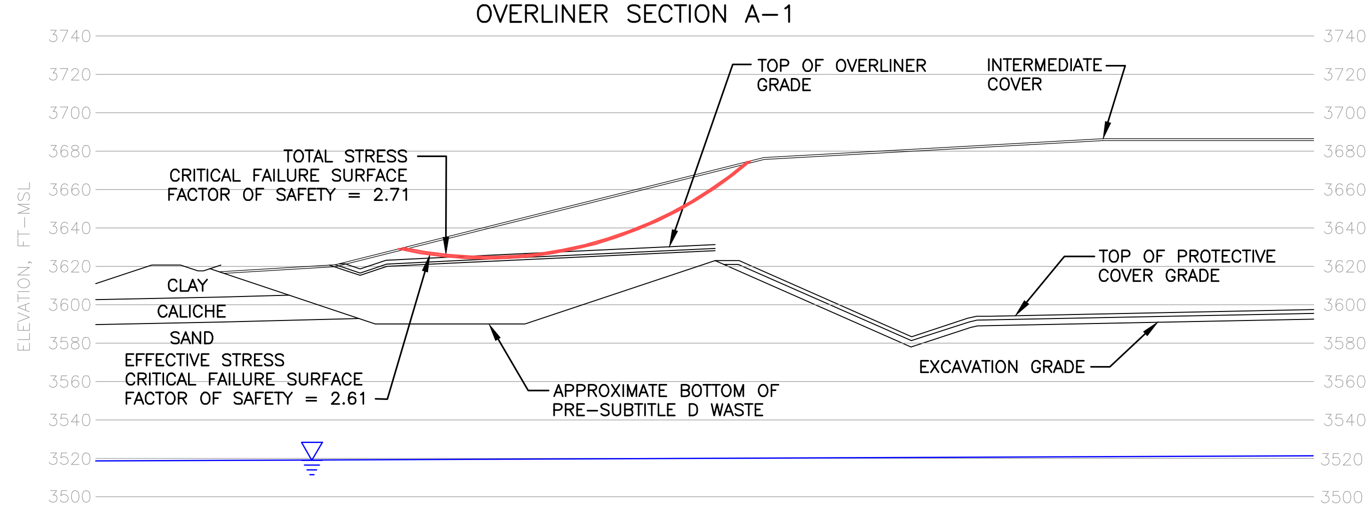
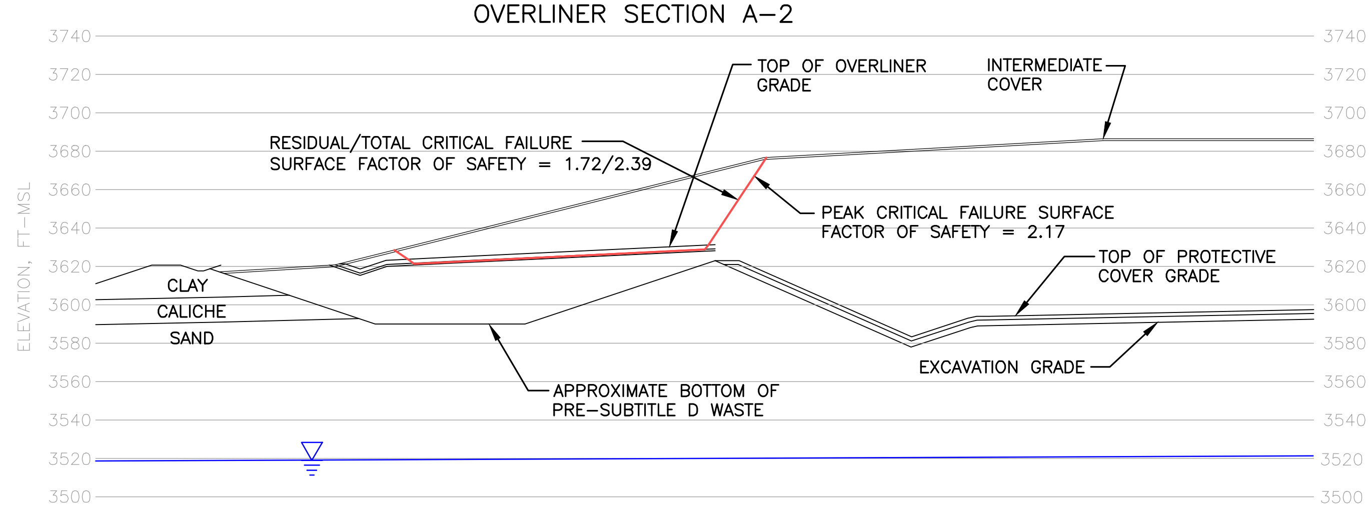
OVERLINER SECTION A–1



SECTION A–1 ROTATIONAL
A
IIIE–A–3–4 IIIE–A–3–9

0 50 100
SCALE IN FEET

OVERLINER SECTION A–2



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A
IIIE–A–3–4 IIIE–A–3–9

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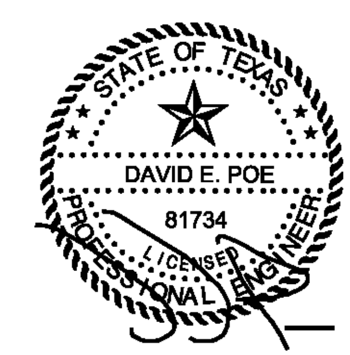
SCALE IN FEET



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DESIGN BY: CCH
REVIEWED BY: DEP

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PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

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SLOPE STABILITY
OVERLINER SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

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SHEET IIIE–A–3–9

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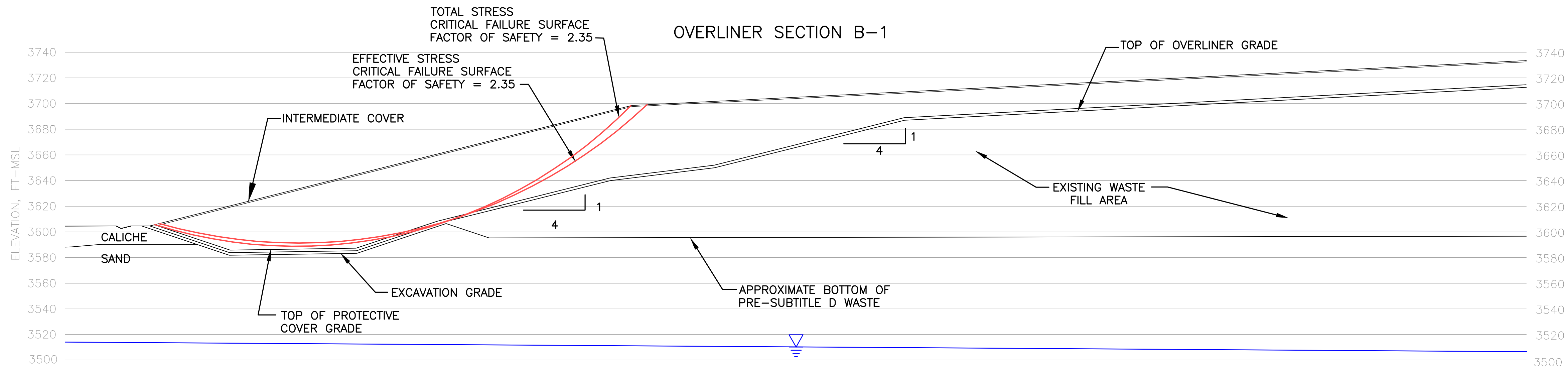
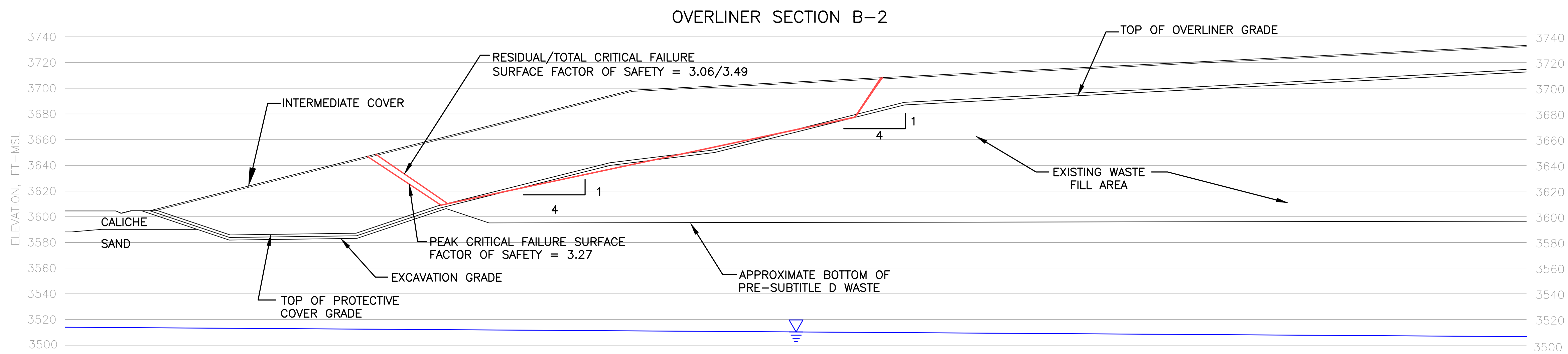


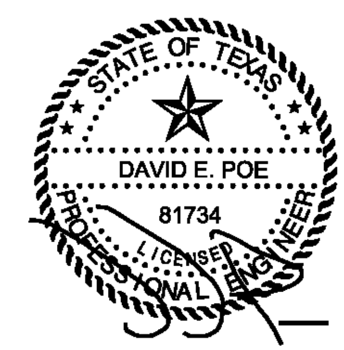
SECTION
B–1 ROTATIONAL
B
IIIE–A–3–4 IIIE–A–3–10

0 50 100
SCALE IN FEET



SECTION
B–2 TRANSLATIONAL
B
IIIE–A–3–4 IIIE–A–3–10

0 50 100
SCALE IN FEET



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SHEET IIIE–A–3–10

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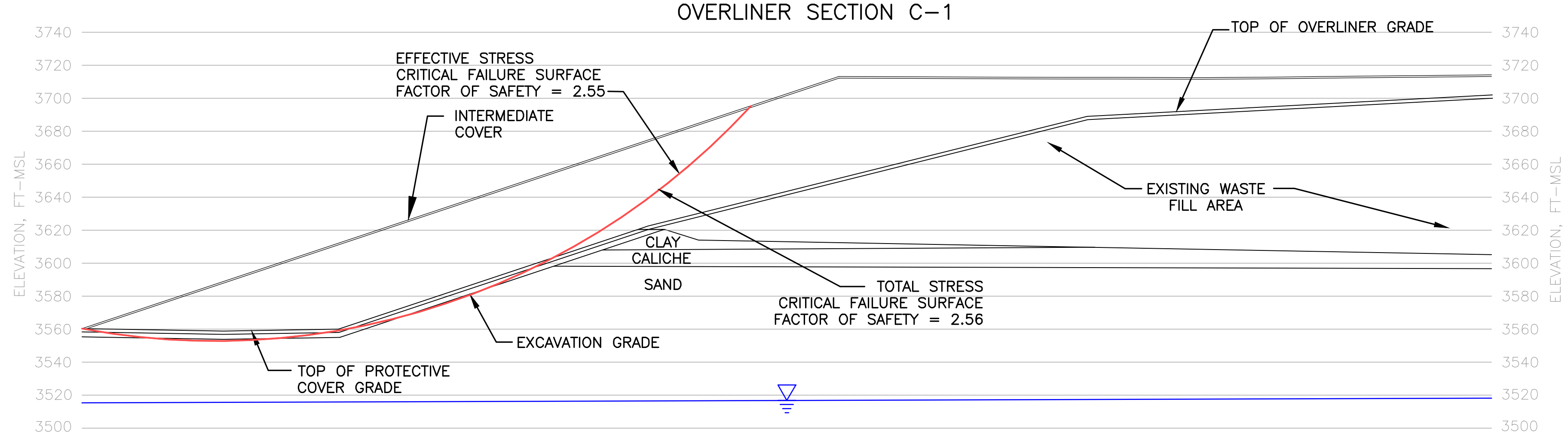
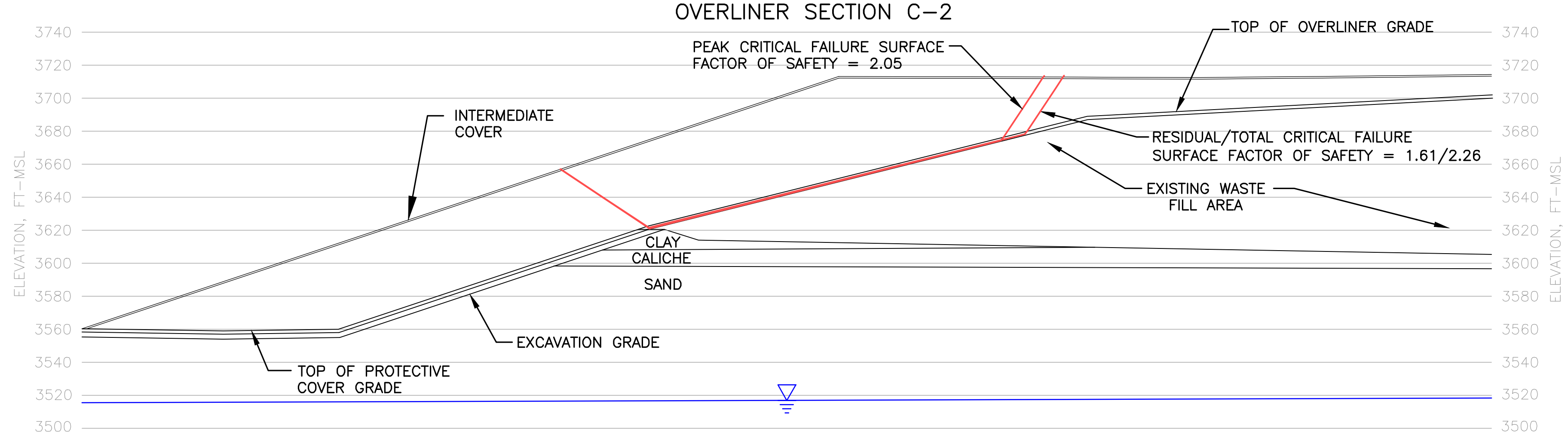
OVERLINER SECTION C–1



SECTION
C–1 ROTATIONAL
C
IIIE–A–3–4 IIIE–A–3–11

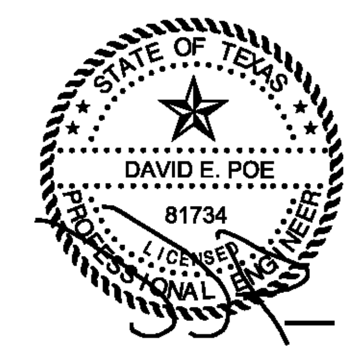
0 50 100
SCALE IN FEET

OVERLINER SECTION C–2



SECTION
C–1 TRANSLATIONAL
C
IIIE–A–3–4 IIIE–A–3–11

0 50 100
SCALE IN FEET



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REVISIONS

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SLOPE STABILITY
OVERLINER SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

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SHEET IIIE–A–3–11

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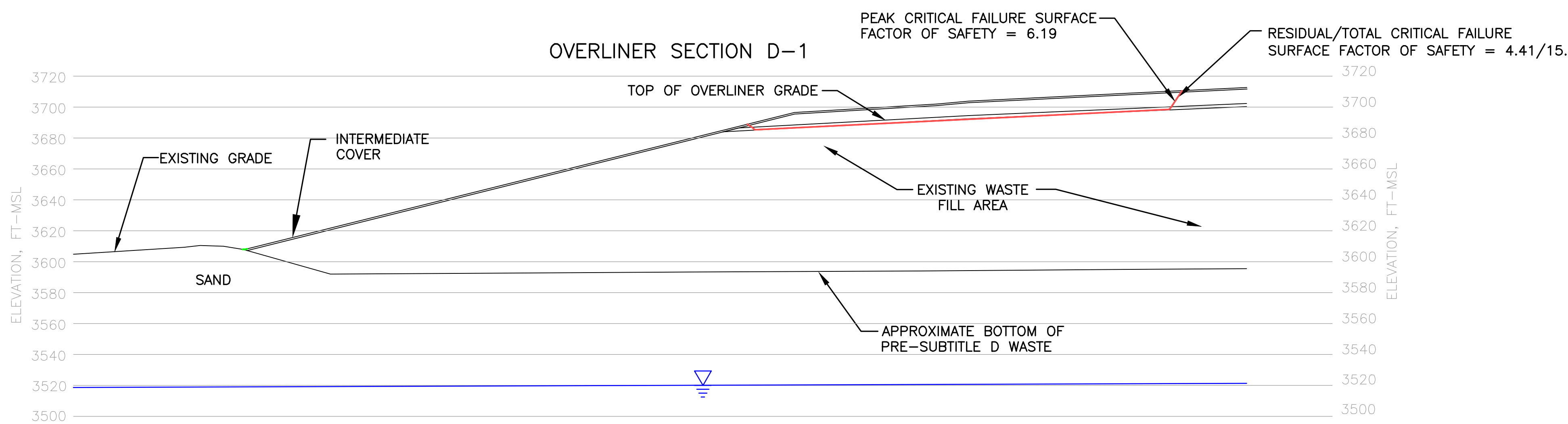
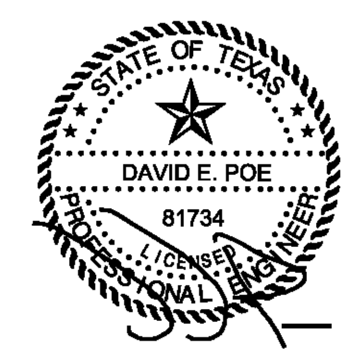


SECTION
D-1 TRANSITIONAL

D
IIIE-A-3-4
IIIE-A-3-12

0 50 100
SCALE IN FEET



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DATE: 11/2017 FILE: 0120-094-11 CAD: IIIE-A-3-12 SECTIONS.dwg	DRAWN BY: JDW DESIGN BY: CCH REVIEWED BY: DEP		
Weaver Consultants Group TBPE REGISTRATION NO. F-3727			WWW.WCGRP.COM SHEET IIIE-A-3-12

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Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIE-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Stratum I (Clay)	122.5	--
Stratum I (Caliche)	121.9	--
Stratum II (Sand)	122.5	127.0
Stratum III (Shale)	138.4	139.0

The strength parameters for the in-situ soils were selected based on the following:

Stratum I (Clay and Caliche)

A triaxial shear test was performed on Stratum I samples which resulted in cohesion and friction angle values listed in the table below. The values in the table will be used for both Clay and Caliche. Moist unit weight and saturated unit weight values are calculated from the dry unit weight, the moisture content, and the void ratio obtained from the triaxial shear test. These unit weight values conservatively compare to the average obtained from all laboratory testing performed on the material.

	Total Stress		Effective Stress	
	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-5	100	26.0	100	27.1

Stratum II (Sand)

A triaxial shear tests and direct shear tests were performed on the Stratum II (sand) samples which resulted in cohesion and friction angle values listed in the table below. Stratum II is modeled using a cohesion of 1,200 psf and a friction angle of 26.7° conservatively. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

	Cohesion (lb/ft^2)	Friction Angle	Cohesion (lb/ft^2)	Friction Angle
Triaxial Shear Test G-3	1620 (total)	40.9 (total)	3020 (effective)	35.0 (effective)
Direct Shear Test WB-121	900 (residual)	26.9 (residual)	1200 (peak)	26.7 (peak)

Shale

The slope stability analysis indicate no failure surface through this stratum as the top of this stratum is located minimum of 74 feet below the elevation of the deepest excavation. The laboratory testing for shear strength is reported on page IIIE-18.

Material	Effective Stress		Total Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Stratum I (Clay)	100	26	100	27.1
Stratum I (Caliche)	100	26	100	27.1
Stratum II (Sand)	1,200	26.7	1,200	26.7
Stratum III (Shale)	500	33	5,000	0

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Final Cover System	116	100	16
Clay Liner[(1)]	120	100	16
Protective Cover	120	100	16
Overliner Protective Cover[(2)]	120	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees (effective stress) and a cohesion of 1,000 psf and internal friction angle of 0 degrees (total stress) is used for the clay liner for simplified Bishop Method of the slope stability analysis.

2. For translational (block) stability analysis, the strength parameters of the weakest interface were used to model the liner. The values used for the final slope stability analysis are highlighted in the table below titled "Minimum Required Interface Strength Values". Note that both total and residual stress analyses were performed for the translational analyses.

3. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the overliner for Simplified Bishop method of the slope stability analysis. For global translational stability analysis, the strength parameters of the weakest interface were used to model the overliner. For peak values, an adhesion of 100 psf and an interface friction angle of 18 degrees (textured geomembrane/GCL) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 8 degrees (smooth geomembrane/GCL) is used.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	59	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^o$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^o$ c = 460 psf (22 kPa) to $\phi = 39,^o$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^o$ to $43,^o$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIM.

Factor of Safety Summary for Long-Term Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress
Final Cover A-1	Bishop-Circular	2.43	2.38	1.5	1.3	YES	YES
Final Cover B-1	Bishop-Circular	2.26	2.27	1.5	1.3	YES	YES
Final Cover C-1	Bishop-Circular	2.62	2.69	1.5	1.3	YES	YES
Final Cover D-1	Bishop-Circular	2.62	2.71	1.5	1.3	YES	YES
Overliner A-1	Bishop-Circular	2.61	2.71	1.5	1.3	YES	YES
Overliner B-1	Bishop-Circular	2.35	2.35	1.5	1.3	YES	YES
Overliner C-1	Bishop-Circular	2.55	2.56	1.5	1.3	YES	YES

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual/ Total	Peak	Residual/ Total	Peak	Residual
Final Cover A-2	Rankine-Block	2.23	2.09/2.05	1.5	1.1 / 1.3	YES	YES
Final Cover B-2	Rankine-Block	2.67	2.55/2.81	1.5	1.1 / 1.3	YES	YES
Final Cover C-2	Rankine-Block	4.05	3.96/3.86	1.5	1.1 / 1.3	YES	YES
Final Cover D-3	Rankine-Block	3.10	2.71/2.79	1.5	1.1 / 1.3	YES	YES
Overliner A-2	Rankine-Block	2.17	1.72/2.39	1.5	1.1 / 1.3	YES	YES
Overliner B-2	Rankine-Block	3.27	3.06/3.49	1.5	1.1 / 1.3	YES	YES
Overliner C-2	Rankine-Block	2.05	1.61/2.26	1.5	1.1 / 1.3	YES	YES
Overliner D-1	Rankine-Block	6.19	4.41/15.5	1.5	1.1 / 1.3	YES	YES

Minimum Required Interface Strength Parameters

Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner/Overliner/FC Systems	Protective Cover/Geocomposite	100	18	80	14
Liner/FC Systems (Notes 1, 3)	***Geonet/Smooth Geomembrane***	***188***	***11***	***188***	***9***
Liner/FC Systems (Note 3)	Geonet/Textured Geomembrane	0	13	0	10
Liner/Overliner/FC Systems	Geocomposite/Textured Geomembrane	100	21	80	10
Liner/FC Systems	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner/FC Systems (Note 2)	***Textured Geomembrane/Clay Liner***	***200***	***15***	***80***	***10***
Liner/Overliner Systems	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Liner/Protective Cover (Note 4)	***Clay Internal/Protective Cover (Total Stress)***	***--***	***--***	***1000 (Total Only)***	***0 (Total Only)***

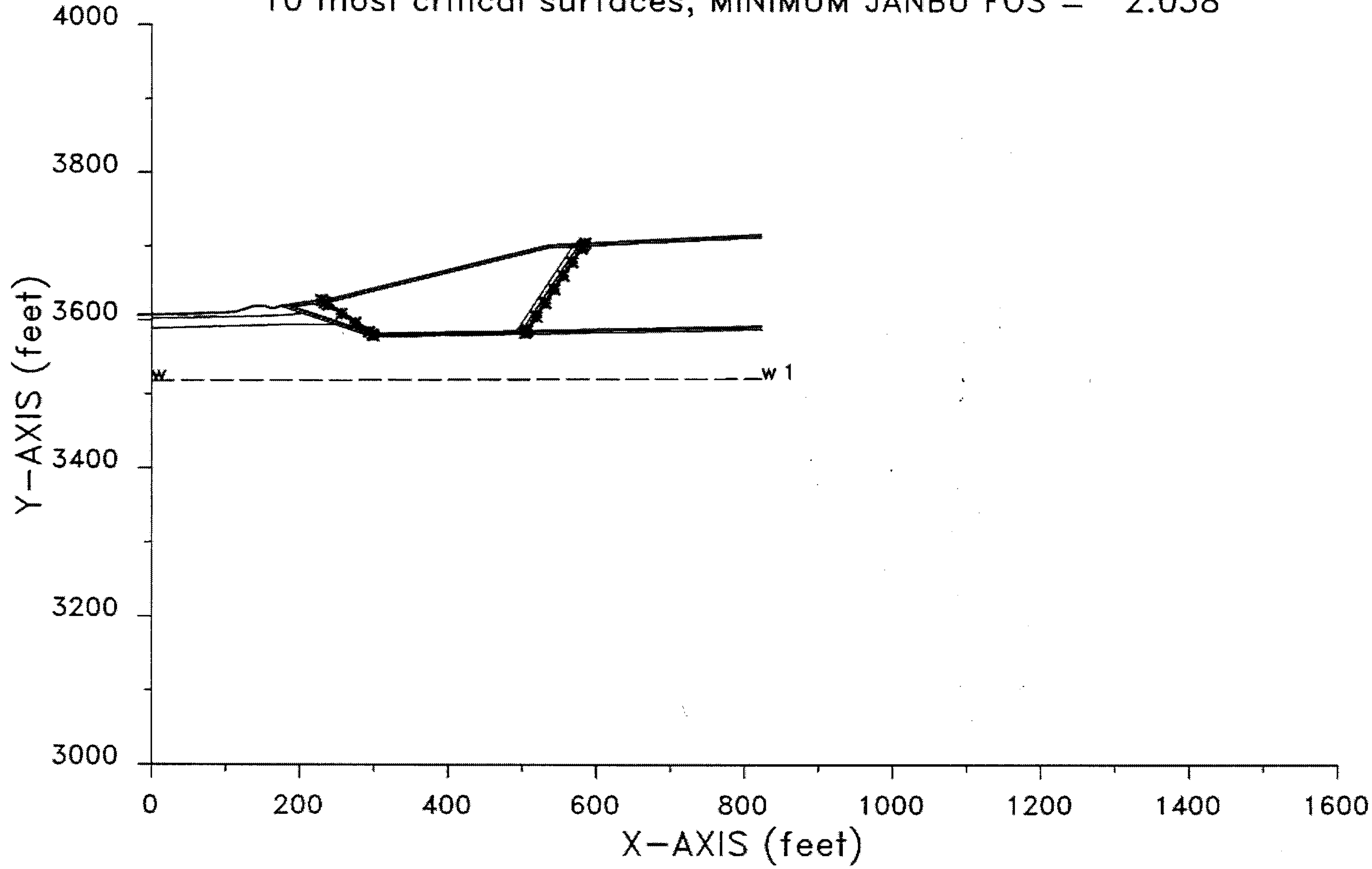
1. Interface parameters used for translational block analysis of cell floor.
2. Interface parameters used for translational block analysis of cell sideslope (3H:1V typical).
3. Interface parameters derived from GRI Report #30 (Ref. 5).
4. Total stress values assumed for both rotational and translational anlaysis of final cover conditions. Effective, peak and residual stresses also analyzed.

ADDITIONAL TRANSITIONAL (BLOCK) STABILITY ANALYSES INCORPORATING TOTAL STRESS PARAMETERS

FCA-2T2 1-26-25 11:32

SWLF LSMPA SEC A-2T2 TOTAL NOD2

10 most critical surfaces, MINIMUM JANBU FOS = 2.058



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*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2013      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
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*          All Rights Reserved          *
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*  Ver. 5.209                96 - 2083  *
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```

Problem Description : SWLF LSMPA SEC A-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3607.6	93.9	3610.0	1
2	93.9	3610.0	114.9	3611.7	1
3	114.9	3611.7	137.6	3619.3	1
4	137.6	3619.3	152.6	3619.3	1
5	152.6	3619.3	161.6	3616.3	1
6	161.6	3616.3	164.6	3616.3	1
7	164.6	3616.3	173.6	3619.3	1
8	173.6	3619.3	173.9	3619.4	1
9	173.9	3619.4	247.6	3630.0	5
10	247.6	3630.0	535.6	3702.0	5
11	535.6	3702.0	823.4	3716.4	5

18 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	173.9	3619.4	183.4	3619.4	8
2	183.4	3619.4	189.7	3619.4	7
3	189.7	3619.4	198.4	3619.4	6
4	198.4	3619.4	248.3	3626.5	6
5	248.3	3626.5	536.1	3698.5	6
6	536.1	3698.5	823.4	3712.9	6
7	189.7	3619.4	298.7	3583.0	7
8	298.7	3583.0	823.3	3593.5	7
9	183.4	3619.4	298.4	3581.0	8
10	298.4	3581.0	823.4	3591.5	9
11	173.6	3619.3	204.4	3609.2	1
12	204.4	3609.2	248.4	3594.5	2
13	248.4	3594.5	298.0	3578.0	3
14	298.0	3578.0	823.4	3588.5	3
15	.0	3602.3	160.0	3606.0	2
16	160.0	3606.0	204.4	3609.2	2
17	.0	3589.3	181.6	3594.5	3
18	181.6	3594.5	248.4	3594.5	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	27.10	.000	.0	0
2	121.9	121.9	100.0	27.10	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	122.5	127.0	1200.0	26.70	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0
6	59.0	59.0	288.0	23.00	.000	.0	0
7	120.0	125.0	100.0	16.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.60
2	823.40	3522.00

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 22.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	298.8	3580.5	318.8	3580.9	5.0
2	488.8	3584.3	508.7	3584.7	5.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	229.33	3627.37
2	233.32	3624.37
3	237.86	3621.37
4	256.20	3609.22
5	274.55	3597.08
6	292.89	3584.94
7	297.90	3581.17
8	299.09	3579.98
9	503.71	3583.67
10	505.18	3585.14
11	506.71	3587.16
12	518.85	3605.51
13	530.99	3623.85
14	543.13	3642.20
15	555.28	3660.55
16	567.42	3678.89
17	579.56	3697.24
18	581.92	3700.80
19	584.68	3704.46

** Corrected JANBU FOS = 2.058 ** (Fo factor = 1.085)

Failure surface No. 2 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	229.08	3627.34
2	233.07	3624.33
3	237.24	3621.57
4	255.59	3609.43
5	273.93	3597.29
6	292.28	3585.14
7	297.28	3581.37
8	298.87	3579.78
9	495.76	3583.04
10	497.71	3584.99
11	499.23	3587.01
12	511.38	3605.36
13	523.52	3623.70
14	535.66	3642.05
15	547.81	3660.40
16	559.95	3678.74

17	572.09	3697.09
18	574.29	3700.41
19	577.05	3704.07

** Corrected JANBU FOS = 2.059 ** (Fo factor = 1.085)

Failure surface No. 3 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	228.81	3627.30
2	232.80	3624.29
3	236.58	3621.79
4	254.92	3609.65
5	273.27	3597.51
6	291.61	3585.37
7	296.62	3581.59
8	299.47	3578.74
9	488.98	3582.77
10	491.06	3584.85
11	492.59	3586.88
12	504.73	3605.23
13	516.88	3623.57
14	529.02	3641.92
15	541.16	3660.26
16	553.30	3678.61
17	565.45	3696.95
18	567.51	3700.07
19	570.27	3703.73

** Corrected JANBU FOS = 2.059 ** (Fo factor = 1.086)

Failure surface No. 4 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.74	3627.86
2	236.73	3624.85
3	244.89	3619.45
4	263.24	3607.31
5	281.58	3595.17
6	299.93	3583.02
7	302.50	3581.08
8	305.11	3578.48
9	502.48	3582.43
10	505.19	3585.14

11	506.72	3587.16
12	518.86	3605.51
13	531.00	3623.85
14	543.15	3642.20
15	555.29	3660.55
16	567.43	3678.89
17	579.57	3697.24
18	581.93	3700.80
19	584.69	3704.46

** Corrected JANBU FOS = 2.065 ** (Fo factor = 1.085)

Failure surface No. 5 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.09	3627.77
2	236.09	3624.76
3	244.13	3619.44
4	262.48	3607.29
5	280.82	3595.15
6	299.17	3583.01
7	301.75	3581.07
8	304.52	3578.29
9	500.60	3583.00
10	502.68	3585.09
11	504.21	3587.11
12	516.35	3605.46
13	528.50	3623.80
14	540.64	3642.15
15	552.78	3660.50
16	564.92	3678.84
17	577.07	3697.19
18	579.37	3700.67
19	582.13	3704.33

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 6 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	231.44	3627.68
2	235.43	3624.67
3	243.03	3619.64
4	261.37	3607.50

5	279.72	3595.36
6	298.06	3583.21
7	300.93	3581.05
8	303.00	3578.98
9	504.51	3583.50
10	506.17	3585.16
11	507.70	3587.18
12	519.84	3605.53
13	531.98	3623.87
14	544.12	3642.22
15	556.27	3660.56
16	568.41	3678.91
17	580.55	3697.26
18	582.93	3700.85
19	585.69	3704.51

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 7 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	230.34	3627.52
2	234.33	3624.51
3	240.32	3620.54
4	258.67	3608.40
5	277.02	3596.26
6	295.36	3584.11
7	299.47	3581.02
8	299.63	3580.86
9	501.23	3582.61
10	503.72	3585.11
11	505.25	3587.13
12	517.39	3605.48
13	529.53	3623.82
14	541.68	3642.17
15	553.82	3660.52
16	565.96	3678.86
17	578.10	3697.21
18	580.43	3700.72
19	583.19	3704.38

** Corrected JANBU FOS = 2.067 ** (Fo factor = 1.085)

Failure surface No. 8 specified by 19 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	232.72	3627.86
2	236.71	3624.85
3	244.87	3619.45
4	263.21	3607.31
5	281.56	3595.17
6	299.90	3583.02
7	302.48	3581.08
8	305.23	3578.33
9	504.48	3584.46
10	505.16	3585.14
11	506.69	3587.16
12	518.83	3605.51
13	530.97	3623.85
14	543.12	3642.20
15	555.26	3660.54
16	567.40	3678.89
17	579.55	3697.24
18	581.90	3700.80
19	584.66	3704.45

** Corrected JANBU FOS = 2.076 ** (Fo factor = 1.085)

Failure surface No. 9 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.33	3627.80
2	236.32	3624.80
3	244.40	3619.44
4	262.75	3607.30
5	281.10	3595.16
6	299.44	3583.01
7	302.02	3581.07
8	302.39	3580.70
9	501.18	3582.25
10	504.04	3585.11
11	505.57	3587.14
12	517.71	3605.49
13	529.86	3623.83
14	542.00	3642.18
15	554.14	3660.52
16	566.28	3678.87
17	578.43	3697.21
18	580.76	3700.74
19	583.52	3704.40

** Corrected JANBU FOS = 2.078 ** (Fo factor = 1.085)

Failure surface No.10 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	231.40	3627.67
2	235.39	3624.66
3	242.93	3619.67
4	261.28	3607.53
5	279.62	3595.39
6	297.97	3583.24
7	300.88	3581.05
8	302.44	3579.49
9	497.06	3584.36
10	497.69	3584.99
11	499.21	3587.01
12	511.36	3605.36
13	523.50	3623.70
14	535.64	3642.05
15	547.78	3660.40
16	559.93	3678.74
17	572.07	3697.09
18	574.27	3700.41
19	577.03	3704.07

** Corrected JANBU FOS = 2.086 ** (Fo factor = 1.085)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC A-2T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.058	1.085	229.33	584.68	5.002E+05
2.	2.059	1.085	229.08	577.05	4.903E+05
3.	2.059	1.086	228.81	570.27	4.814E+05
4.	2.065	1.085	232.74	584.69	5.029E+05
5.	2.067	1.085	232.09	582.13	4.998E+05
6.	2.067	1.085	231.44	585.69	5.038E+05
7.	2.067	1.085	230.34	583.19	4.993E+05
8.	2.076	1.085	232.72	584.66	5.023E+05

9.	2.078	1.085	232.33	583.52	5.009E+05
10.	2.086	1.085	231.40	577.03	4.923E+05

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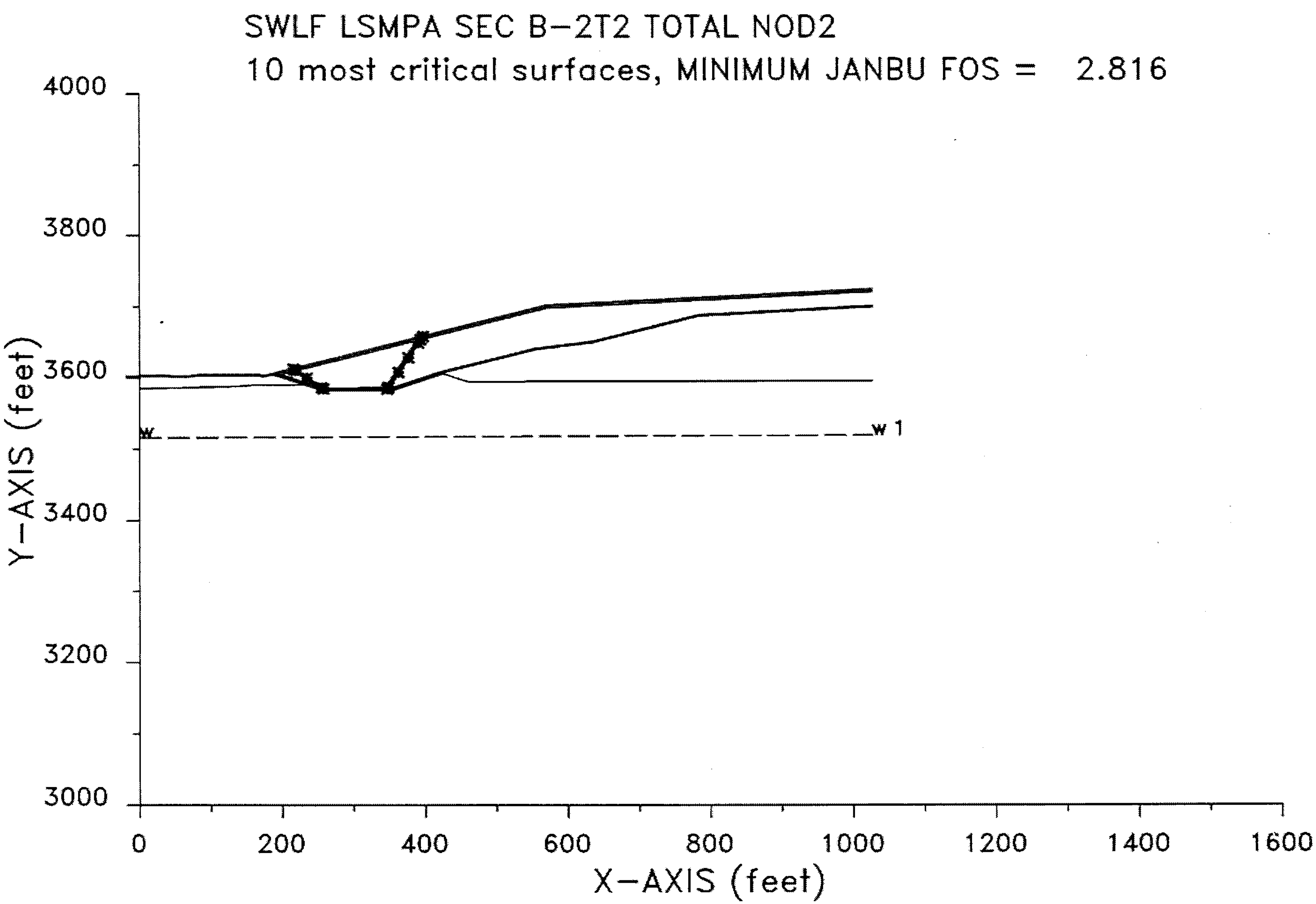

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*           Method of Slices            *
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Problem Description : SWLF LSMPA SEC B-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

9 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3602.7	35.7	3603.6	1
2	35.7	3603.6	45.0	3602.4	1
3	45.0	3602.4	68.0	3602.2	1
4	68.0	3602.2	80.8	3604.4	1
5	80.8	3604.4	168.4	3604.5	1
6	168.4	3604.5	172.4	3602.6	1
7	172.4	3602.6	180.4	3604.6	1
8	180.4	3604.6	570.0	3702.0	4
9	570.0	3702.0	1026.7	3724.8	4

32 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	180.4	3604.6	188.4	3604.6	1

2	188.4	3604.6	194.8	3604.6	7
3	194.8	3604.6	194.9	3604.6	6
4	194.9	3604.6	570.5	3698.5	5
5	570.5	3698.5	1026.7	3721.3	5
6	194.9	3604.6	201.1	3604.6	6
7	201.1	3604.6	257.5	3585.8	6
8	257.5	3585.8	355.6	3587.2	6
9	355.6	3587.2	413.2	3606.4	6
10	413.2	3606.4	419.0	3608.3	9
11	419.0	3608.3	553.6	3642.0	9
12	553.6	3642.0	634.8	3652.0	9
13	634.8	3652.0	782.8	3689.0	9
14	782.8	3689.0	1026.7	3701.9	9
15	413.2	3606.4	419.5	3606.4	6
16	194.9	3604.6	257.2	3583.8	7
17	257.2	3583.8	356.0	3585.2	8
18	356.0	3585.2	419.5	3606.4	7
19	419.5	3606.4	553.9	3640.0	5
20	553.9	3640.0	635.1	3650.0	5
21	635.1	3650.0	783.1	3687.0	5
22	783.1	3687.0	1026.7	3699.9	5
23	419.5	3606.4	425.8	3606.4	7
24	188.4	3604.6	231.7	3590.2	1
25	231.7	3590.2	256.9	3581.8	2
26	256.9	3581.8	356.3	3583.2	2
27	356.3	3583.2	425.8	3606.4	2
28	425.8	3606.4	459.4	3595.2	2
29	459.4	3595.2	1026.7	3596.2	2
30	.0	3585.1	133.8	3588.2	2
31	133.8	3588.2	157.3	3590.2	2
32	157.3	3590.2	231.7	3590.2	2

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	121.9	121.9	100.0	26.00	.000	.0	0
2	122.5	127.0	1200.0	26.70	.000	.0	1
3	122.5	127.0	1200.0	26.70	.000	.0	0
4	116.0	120.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	100.0	16.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0

8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3516.00
2	1026.70	3520.00

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 25.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	257.5	3583.8	267.5	3584.0	4.0

2	337.5	3584.6	347.5	3585.1	4.0

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.32	3613.33
2	218.93	3610.61
3	234.45	3600.33
4	255.30	3586.53
5	257.85	3584.61
6	347.00	3584.49
7	347.59	3585.08
8	349.12	3587.11
9	362.91	3607.95
10	376.71	3628.80
11	390.51	3649.65
12	393.57	3654.27
13	396.93	3658.73

** Corrected JANBU FOS = 2.816 ** (Fo factor = 1.088)

Failure surface No. 2 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.22	3613.05
2	217.83	3610.33
3	231.40	3601.35
4	252.25	3587.55
5	257.23	3583.80
6	257.64	3583.38
7	344.99	3584.23
8	345.82	3585.06
9	347.35	3587.08
10	361.14	3607.93

11	374.94	3628.78
12	388.74	3649.62
13	391.47	3653.74
14	394.83	3658.21

** Corrected JANBU FOS = 2.818 ** (Fo factor = 1.088)

Failure surface No. 3 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.95	3613.24
2	218.57	3610.52
3	233.45	3600.67
4	254.29	3586.87
5	258.34	3583.82
6	259.60	3582.56
7	345.39	3584.10
8	346.36	3585.06
9	347.89	3587.09
10	361.68	3607.94
11	375.48	3628.78
12	389.28	3649.63
13	392.11	3653.90
14	395.47	3658.37

** Corrected JANBU FOS = 2.819 ** (Fo factor = 1.088)

Failure surface No. 4 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.37	3613.34
2	218.98	3610.62
3	234.60	3600.28
4	255.44	3586.49
5	258.97	3583.83
6	260.65	3582.14
7	344.37	3583.22
8	346.21	3585.06
9	347.74	3587.09
10	361.54	3607.93
11	375.33	3628.78
12	389.13	3649.63
13	391.93	3653.86
14	395.30	3658.32

** Corrected JANBU FOS = 2.821 ** (Fo factor = 1.089)

Failure surface No. 5 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.90	3613.23
2	218.52	3610.50
3	233.31	3600.71
4	254.15	3586.92
5	257.92	3584.08
6	343.75	3583.36
7	345.43	3585.05
8	346.96	3587.08
9	360.76	3607.92
10	374.56	3628.77
11	388.35	3649.62
12	391.01	3653.63
13	394.37	3658.09

** Corrected JANBU FOS = 2.823 ** (Fo factor = 1.089)

Failure surface No. 6 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.08	3613.27
2	218.70	3610.55
3	233.81	3600.55
4	254.65	3586.75
5	258.54	3583.82
6	260.36	3582.00
7	343.43	3583.67
8	344.80	3585.04
9	346.33	3587.07
10	360.13	3607.91
11	373.92	3628.76
12	387.72	3649.61
13	390.26	3653.44
14	393.62	3657.91

** Corrected JANBU FOS = 2.833 ** (Fo factor = 1.089)

Failure surface No. 7 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	217.12	3613.78
2	220.73	3611.06
3	238.02	3599.62
4	258.86	3585.82
5	260.05	3584.93
6	346.19	3583.53
7	347.75	3585.08
8	349.27	3587.11
9	363.07	3607.96
10	376.87	3628.80
11	390.67	3649.65
12	393.76	3654.31
13	397.12	3658.78

** Corrected JANBU FOS = 2.838 ** (Fo factor = 1.089)

Failure surface No. 8 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.33	3613.33
2	218.94	3610.61
3	234.49	3600.32
4	255.34	3586.52
5	258.92	3583.82
6	260.72	3582.02
7	345.38	3584.87
8	345.57	3585.05
9	347.09	3587.08
10	360.89	3607.93
11	374.69	3628.77
12	388.49	3649.62
13	391.17	3653.67
14	394.53	3658.13

** Corrected JANBU FOS = 2.838 ** (Fo factor = 1.088)

Failure surface No. 9 specified by 13 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	215.67	3613.42

2	219.28	3610.70
3	235.44	3600.00
4	256.29	3586.20
5	259.30	3583.94
6	343.72	3583.07
7	345.70	3585.05
8	347.23	3587.08
9	361.03	3607.93
10	374.83	3628.77
11	388.63	3649.62
12	391.33	3653.71
13	394.70	3658.17

** Corrected JANBU FOS = 2.841 ** (Fo factor = 1.089)

Failure surface No.10 specified by 14 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	214.07	3613.02
2	217.68	3610.30
3	231.00	3601.48
4	251.85	3587.68
5	256.84	3583.92
6	257.54	3583.23
7	341.00	3583.65
8	342.35	3585.01
9	343.88	3587.03
10	357.68	3607.88
11	371.47	3628.73
12	385.27	3649.57
13	387.35	3652.71
14	390.72	3657.18

** Corrected JANBU FOS = 2.849 ** (Fo factor = 1.089)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC B-2T2 TOTAL NOD2

Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)

1.	2.816	1.088	215.32	396.93	2.137E+05
2.	2.818	1.088	214.22	394.83	2.132E+05
3.	2.819	1.088	214.95	395.47	2.145E+05
4.	2.821	1.089	215.37	395.30	2.149E+05
5.	2.823	1.089	214.90	394.37	2.116E+05
6.	2.833	1.089	215.08	393.62	2.127E+05
7.	2.838	1.089	217.12	397.12	2.135E+05
8.	2.838	1.088	215.33	394.53	2.134E+05
9.	2.841	1.089	215.67	394.70	2.132E+05
10.	2.849	1.089	214.07	390.72	2.083E+05

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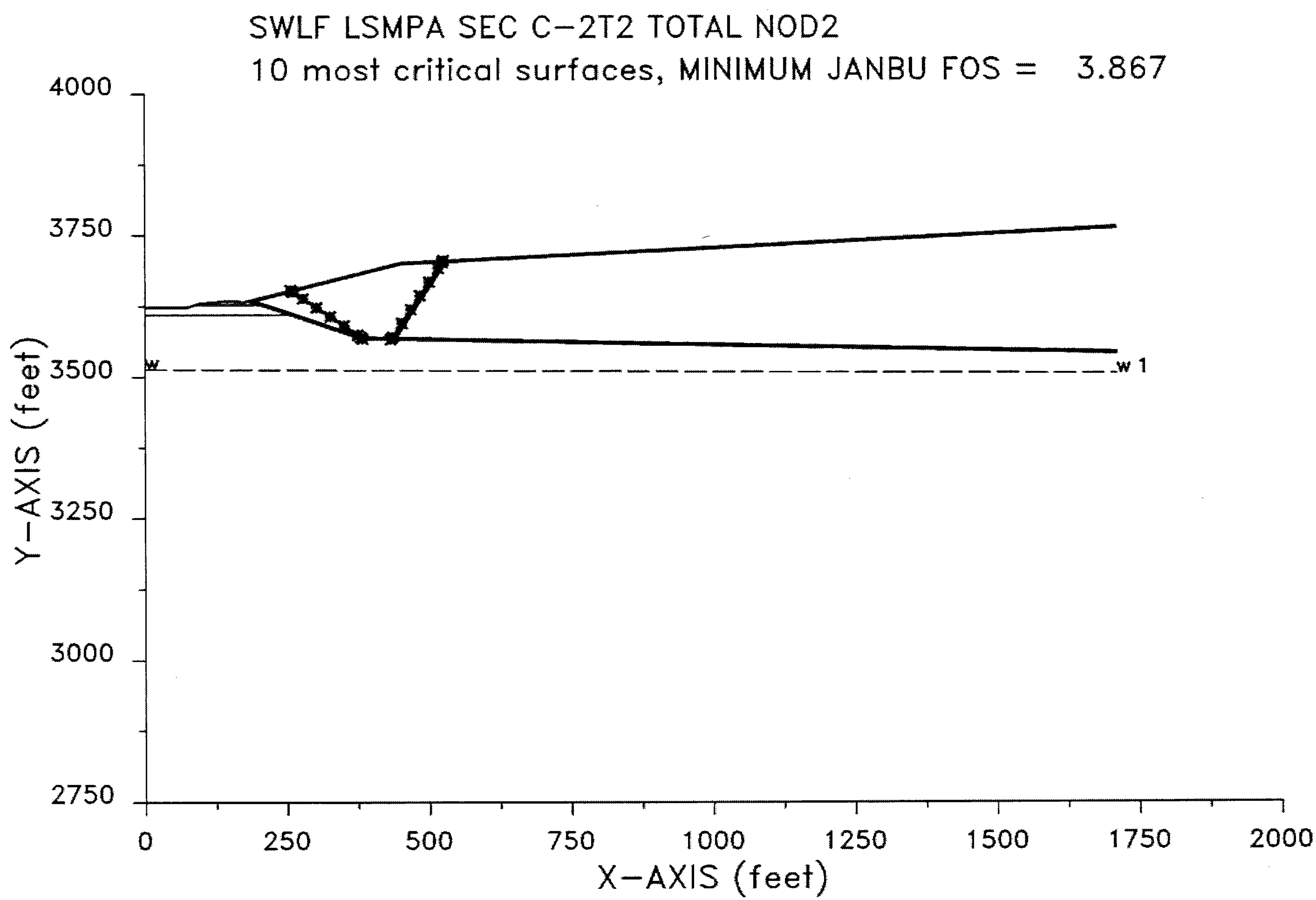

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*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
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Problem Description : SWLF LSMPA SEC C-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3622.9	73.9	3623.0	2
2	73.9	3623.0	74.8	3623.3	2
3	74.8	3623.3	88.3	3627.8	2
4	88.3	3627.8	96.8	3630.7	1
5	96.8	3630.7	105.2	3631.0	1
6	105.2	3631.0	136.0	3634.0	1
7	136.0	3634.0	166.0	3634.0	1
8	166.0	3634.0	170.0	3632.0	1
9	170.0	3632.0	178.4	3634.1	1
10	178.4	3634.1	450.0	3702.0	4
11	450.0	3702.0	1710.0	3765.0	4

16 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	178.3	3634.1	181.0	3634.1	1
2	181.0	3634.1	190.5	3634.1	7
3	190.5	3634.1	192.9	3634.1	6
4	192.9	3634.1	450.5	3698.5	5
5	450.5	3698.5	1710.0	3761.5	5
6	192.7	3634.1	196.9	3634.1	6
7	196.9	3634.1	382.2	3572.3	6
8	382.2	3572.3	1710.0	3545.7	6
9	190.5	3634.1	381.9	3570.3	7
10	381.9	3570.3	1710.0	3543.7	8
11	181.0	3634.1	199.8	3627.8	1
12	199.8	3627.8	253.3	3610.0	2
13	253.3	3610.0	381.4	3567.3	3
14	381.4	3567.3	1710.0	3540.7	3
15	88.3	3627.8	199.8	3627.8	2
16	.0	3610.0	253.3	3610.0	3

ISOTROPIC Soil Parameters
----

8 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	116.0	120.0	100.0	16.00	.000	.0	0
5	59.0	59.0	288.0	23.00	.000	.0	0
6	120.0	125.0	100.0	16.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3514.00
2	1710.00	3506.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 29.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	382.2	3569.8	392.2	3569.6	5.0
2	432.2	3568.8	442.2	3568.6	5.0

```
*************************************************************
**     Factor of safety calculation for surface #    18     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.1247     **
**    This will be ignored for final summary of results     **
*************************************************************
```

The trial failure surface in question is defined by the following 19 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	264.63	3655.66
2	268.24	3652.94
3	269.40	3652.17
4	293.58	3636.16
5	317.77	3620.16
6	341.95	3604.15
7	366.13	3588.14
8	390.31	3572.14
9	391.40	3571.32
10	432.32	3566.32
11	435.23	3569.23
12	436.72	3571.21
13	452.73	3595.39
14	468.73	3619.57
15	484.74	3643.76
16	500.74	3667.94
17	516.75	3692.12
18	523.39	3702.15
19	526.15	3705.81

```
***********************************************************
**     Factor of safety calculation for surface #    23    **
**     failed to converge within FIFTY iterations          **
**                                                         **
**    The last calculated value of the FOS was   4.3289    **
**    This will be ignored for final summary of results    **
***********************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	264.31	3655.58
2	267.93	3652.86
3	268.95	3652.18
4	293.14	3636.17
5	317.32	3620.16
6	341.50	3604.16
7	365.68	3588.15
8	389.87	3572.15
9	390.22	3571.88
10	432.90	3568.29
11	433.87	3569.26
12	435.36	3571.24
13	451.36	3595.42

14	467.37	3619.60
15	483.37	3643.78
16	499.38	3667.97
17	515.39	3692.15
18	521.96	3702.07
19	524.72	3705.74

```
**************************************************************
**     Factor of safety calculation for surface #    32     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.5109     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	265.21	3655.80
2	268.82	3653.08
3	270.22	3652.15
4	294.41	3636.15
5	318.59	3620.14
6	342.77	3604.13
7	366.95	3588.13
8	391.14	3572.12
9	391.75	3571.66
10	435.60	3568.63
11	436.18	3569.21
12	437.67	3571.19
13	453.68	3595.37
14	469.68	3619.55
15	485.69	3643.74
16	501.70	3667.92
17	517.70	3692.10
18	524.38	3702.20
19	527.14	3705.86

```
**************************************************************
**     Factor of safety calculation for surface #    67     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.0711     **
**    This will be ignored for final summary of results     **
**************************************************************
```

```
The trial failure surface in question is
defined by the following 19 coordinate points
```

Point No.	x-surf (ft)	y-surf (ft)
1	265.84	3655.96
2	269.45	3653.24
3	271.12	3652.13
4	295.30	3636.13
5	319.48	3620.12
6	343.67	3604.12
7	367.85	3588.11
8	392.03	3572.10
9	392.15	3572.02
10	440.54	3568.38
11	441.26	3569.11
12	442.75	3571.09
13	458.76	3595.27
14	474.77	3619.45
15	490.77	3643.63
16	506.78	3667.82
17	522.78	3692.00
18	529.71	3702.46
19	532.47	3706.12

```
**************************************************************
**      Factor of safety calculation for surface #    69     **
**      failed to converge within FIFTY iterations           **
**                                                           **
**    The last calculated value of the FOS was   3.8621      **
**    This will be ignored for final summary of results      **
**************************************************************
```

```
The trial failure surface in question is
defined by the following 19 coordinate points
```

Point No.	x-surf (ft)	y-surf (ft)
1	264.50	3655.62
2	268.11	3652.90
3	269.21	3652.17
4	293.39	3636.17
5	317.58	3620.16
6	341.76	3604.15
7	365.94	3588.15
8	390.13	3572.14

9	391.64	3571.00
10	432.51	3567.65
11	434.11	3569.25
12	435.60	3571.23
13	451.61	3595.41
14	467.61	3619.60
15	483.62	3643.78
16	499.63	3667.96
17	515.63	3692.14
18	522.21	3702.09
19	524.97	3705.75

```
*************************************************************
**     Factor of safety calculation for surface #    85     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   3.9094     **
**    This will be ignored for final summary of results     **
*************************************************************
```

The trial failure surface in question is
defined by the following 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	263.36	3655.34
2	266.97	3652.62
3	267.59	3652.20
4	291.78	3636.20
5	315.96	3620.19
6	340.14	3604.19
7	364.33	3588.18
8	388.51	3572.17
9	391.24	3570.11
10	391.55	3569.81
11	432.27	3567.50
12	434.03	3569.26
13	435.51	3571.23
14	451.52	3595.41
15	467.53	3619.60
16	483.53	3643.78
17	499.54	3667.96
18	515.55	3692.15
19	522.12	3702.08
20	524.88	3705.74

****

```
**     Factor of safety calculation for surface #    86     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.0808     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	264.71	3655.68
2	268.33	3652.96
3	269.52	3652.17
4	293.71	3636.16
5	317.89	3620.15
6	342.07	3604.15
7	366.25	3588.14
8	390.44	3572.14
9	391.94	3571.00
10	432.79	3566.53
11	435.49	3569.23
12	436.97	3571.20
13	452.98	3595.39
14	468.99	3619.57
15	484.99	3643.75
16	501.00	3667.93
17	517.01	3692.12
18	523.65	3702.16
19	526.41	3705.82

```
**************************************************************
**     Factor of safety calculation for surface #    92     **
**     failed to converge within FIFTY iterations           **
**                                                          **
**    The last calculated value of the FOS was   4.1527     **
**    This will be ignored for final summary of results     **
**************************************************************
```

The trial failure surface in question is
defined by the following 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	265.73	3655.93
2	269.34	3653.21

3	270.96	3652.14
4	295.14	3636.13
5	319.32	3620.12
6	343.51	3604.12
7	367.69	3588.11
8	391.87	3572.11
9	391.96	3572.04
10	433.59	3569.61
11	434.82	3571.25
12	450.83	3595.43
13	466.83	3619.61
14	482.84	3643.79
15	498.85	3667.98
16	514.85	3692.16
17	521.40	3702.05
18	524.16	3705.71

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.12	3653.53
2	259.73	3650.81
3	277.70	3638.91
4	301.89	3622.91
5	326.07	3606.90
6	350.25	3590.90
7	374.44	3574.89
8	379.44	3571.12
9	382.54	3568.02
10	432.29	3567.27
11	434.28	3569.25
12	435.76	3571.23
13	451.77	3595.41
14	467.78	3619.59
15	483.78	3643.77
16	499.79	3667.96
17	515.80	3692.14

18	522.38	3702.10
19	525.14	3705.76

** Corrected JANBU FOS = 3.867 ** (Fo factor = 1.085)

Failure surface No. 2 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.53	3653.63
2	260.15	3650.91
3	278.85	3638.53
4	303.03	3622.53
5	327.21	3606.52
6	351.39	3590.52
7	375.58	3574.51
8	380.58	3570.74
9	382.24	3569.08
10	435.70	3567.33
11	437.55	3569.19
12	439.04	3571.16
13	455.05	3595.34
14	471.06	3619.53
15	487.06	3643.71
16	503.07	3667.89
17	519.07	3692.07
18	525.82	3702.27
19	528.58	3705.93

** Corrected JANBU FOS = 3.879 ** (Fo factor = 1.086)

Failure surface No. 3 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.69	3653.67
2	260.31	3650.95
3	279.29	3638.39
4	303.47	3622.38
5	327.66	3606.37
6	351.84	3590.37
7	376.02	3574.36
8	381.02	3570.59
9	382.34	3569.27
10	439.69	3567.72
11	441.09	3569.11

12	442.58	3571.09
13	458.58	3595.27
14	474.59	3619.46
15	490.60	3643.64
16	506.60	3667.82
17	522.61	3692.00
18	529.52	3702.45
19	532.28	3706.11

** Corrected JANBU FOS = 3.880 ** (Fo factor = 1.086)

Failure surface No. 4 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.17	3653.79
2	260.79	3651.07
3	280.63	3637.94
4	304.81	3621.93
5	328.99	3605.93
6	353.17	3589.92
7	377.36	3573.92
8	382.16	3570.29
9	384.30	3568.16
10	440.09	3567.52
11	441.67	3569.10
12	443.16	3571.08
13	459.17	3595.26
14	475.18	3619.44
15	491.18	3643.63
16	507.19	3667.81
17	523.19	3691.99
18	530.14	3702.48
19	532.90	3706.14

** Corrected JANBU FOS = 3.899 ** (Fo factor = 1.086)

Failure surface No. 5 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.19	3653.80
2	260.80	3651.08
3	280.67	3637.92
4	304.85	3621.92
5	329.04	3605.91

6	353.22	3589.91
7	377.40	3573.90
8	382.19	3570.29
9	385.06	3567.42
10	438.13	3567.15
11	440.12	3569.13
12	441.60	3571.11
13	457.61	3595.29
14	473.62	3619.48
15	489.62	3643.66
16	505.63	3667.84
17	521.64	3692.02
18	528.51	3702.40
19	531.26	3706.06

** Corrected JANBU FOS = 3.901 ** (Fo factor = 1.086)

Failure surface No. 6 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.49	3653.87
2	261.10	3651.15
3	281.49	3637.65
4	305.67	3621.64
5	329.86	3605.64
6	354.04	3589.63
7	378.22	3573.63
8	382.66	3570.28
9	385.35	3567.59
10	439.07	3566.51
11	441.66	3569.10
12	443.15	3571.08
13	459.16	3595.26
14	475.16	3619.44
15	491.17	3643.63
16	507.18	3667.81
17	523.18	3691.99
18	530.13	3702.48
19	532.89	3706.14

** Corrected JANBU FOS = 3.908 ** (Fo factor = 1.086)

Failure surface No. 7 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)

1	257.36	3653.84
2	260.97	3651.12
3	281.15	3637.77
4	305.33	3621.76
5	329.51	3605.75
6	353.69	3589.75
7	377.88	3573.74
8	382.46	3570.29
9	382.62	3570.13
10	438.45	3566.74
11	440.83	3569.12
12	442.31	3571.10
13	458.32	3595.28
14	474.33	3619.46
15	490.33	3643.64
16	506.34	3667.83
17	522.35	3692.01
18	529.25	3702.44
19	532.01	3706.10

** Corrected JANBU FOS = 3.909 ** (Fo factor = 1.086)

Failure surface No. 8 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	255.90	3653.47
2	259.51	3650.75
3	277.09	3639.12
4	301.27	3623.11
5	325.45	3607.11
6	349.63	3591.10
7	373.82	3575.10
8	378.82	3571.33
9	382.41	3567.73
10	435.69	3569.78
11	436.77	3571.21
12	452.77	3595.39
13	468.78	3619.57
14	484.78	3643.75
15	500.79	3667.94
16	516.80	3692.12
17	523.43	3702.15
18	526.19	3705.81

** Corrected JANBU FOS = 3.910 ** (Fo factor = 1.086)

Failure surface No. 9 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	256.88	3653.72
2	260.49	3651.00
3	279.80	3638.21
4	303.99	3622.21
5	328.17	3606.20
6	352.35	3590.20
7	376.54	3574.19
8	381.54	3570.42
9	383.77	3568.18
10	433.47	3569.07
11	433.67	3569.26
12	435.15	3571.24
13	451.16	3595.42
14	467.17	3619.60
15	483.17	3643.79
16	499.18	3667.97
17	515.19	3692.15
18	521.75	3702.06
19	524.51	3705.73

** Corrected JANBU FOS = 3.910 ** (Fo factor = 1.086)

Failure surface No.10 specified by 19 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	257.43	3653.86
2	261.04	3651.14
3	281.33	3637.70
4	305.52	3621.70
5	329.70	3605.69
6	353.88	3589.69
7	378.06	3573.68
8	382.57	3570.29
9	385.42	3567.44
10	440.08	3568.48
11	440.72	3569.12
12	442.21	3571.10
13	458.21	3595.28
14	474.22	3619.46
15	490.23	3643.65
16	506.23	3667.83

17	522.24	3692.01
18	529.14	3702.43
19	531.90	3706.09

** Corrected JANBU FOS = 3.912 ** (Fo factor = 1.086)

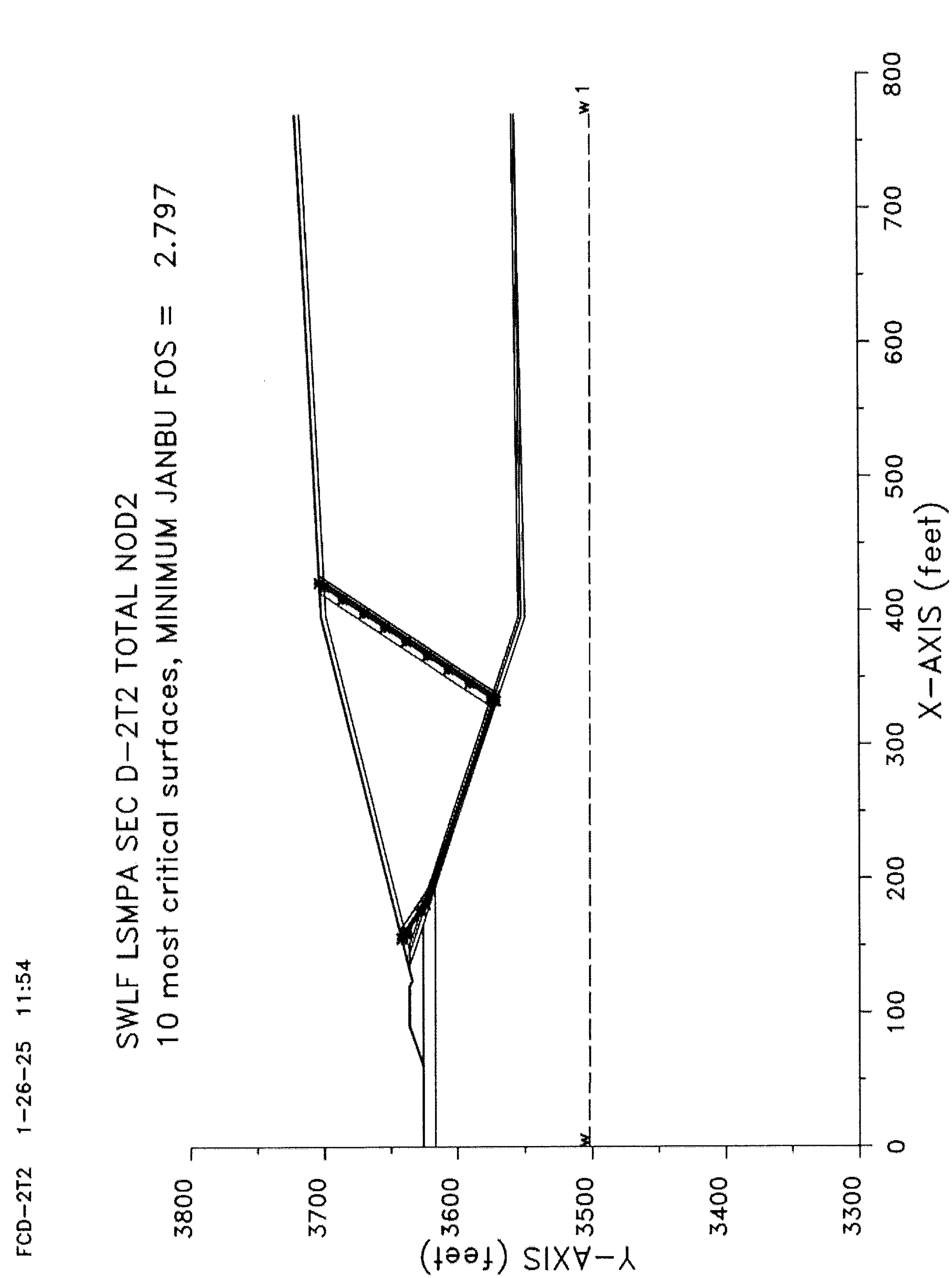
```
*******************************************************************
**                                                               **
**  Out of the    100 surfaces generated and analyzed by XSTABL, **
**        8 surfaces were found to have MISLEADING FOS values.   **
**                                                               **
*******************************************************************
```

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC C-2T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	3.867	1.085	256.12	525.14	6.139E+05
2.	3.879	1.086	256.53	528.58	6.197E+05
3.	3.880	1.086	256.69	532.28	6.249E+05
4.	3.899	1.086	257.17	532.90	6.280E+05
5.	3.901	1.086	257.19	531.26	6.264E+05
6.	3.908	1.086	257.49	532.89	6.294E+05
7.	3.909	1.086	257.36	532.01	6.270E+05
8.	3.910	1.086	255.90	526.19	6.256E+05
9.	3.910	1.086	256.88	524.51	6.156E+05
10.	3.912	1.086	257.43	531.90	6.273E+05

* * * END OF FILE * * *


FCD-2T2 1-26-25 11:54
SWLF LSMPA SEC D-2T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 2.797
Y-AXIS (feet)
X-AXIS (feet)
3800
3700
3600
3500
3400
3300
0
100
200
300
400
500
600
700
800
W
W 1

XSTABL File: FCD-2T2   1-26-25   11:54

```
*****************************************
*              X S T A B L              *
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*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
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*****************************************
```

Problem Description : SWLF LSMPA SEC D-2T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3625.9	60.2	3625.9	2
2	60.2	3625.9	60.3	3625.9	2
3	60.3	3625.9	89.9	3636.2	1
4	89.9	3636.2	119.9	3636.2	1
5	119.9	3636.2	123.9	3634.2	1
6	123.9	3634.2	132.0	3636.2	1
7	132.0	3636.2	395.2	3702.0	5
8	395.2	3702.0	770.1	3720.7	5

18 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	131.9	3636.2	135.1	3636.2	1
2	135.1	3636.2	144.6	3636.2	8

3	144.6	3636.2	146.5	3636.2	7
4	146.5	3636.2	395.7	3698.5	6
5	395.7	3698.5	770.1	3717.2	6
6	146.3	3636.2	150.9	3636.2	7
7	150.9	3636.2	395.2	3554.7	7
8	395.2	3554.7	770.1	3558.5	7
9	144.6	3636.2	394.9	3552.7	8
10	394.9	3552.7	770.1	3556.5	9
11	135.1	3636.2	165.9	3625.9	1
12	165.9	3625.9	192.9	3616.9	2
13	192.9	3616.9	363.7	3560.1	3
14	363.7	3560.1	393.7	3550.1	4
15	393.7	3550.1	394.4	3549.7	3
16	394.4	3549.7	770.1	3556.5	3
17	60.3	3625.9	165.9	3625.9	2
18	.0	3616.9	192.9	3616.9	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	122.5	127.0	1200.0	26.70	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0
6	59.0	59.0	288.0	23.00	.000	.0	0
7	120.0	125.0	100.0	16.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	120.0	125.0	1000.0	.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3502.00
2	770.10	3500.10

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 19.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	180.0	3624.4	200.0	3617.7	5.0
2	320.0	3577.7	340.0	3571.0	5.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.35	3642.04
2	158.97	3639.32
3	160.81	3638.09
4	176.66	3627.61
5	180.83	3624.46
6	332.49	3571.58
7	333.95	3573.03
8	335.21	3574.71
9	345.70	3590.56
10	356.18	3606.40
11	366.67	3622.24
12	377.16	3638.09
13	387.64	3653.93
14	398.13	3669.78
15	408.62	3685.62
16	417.88	3699.61
17	420.64	3703.27

** Corrected JANBU FOS = 2.797 ** (Fo factor = 1.088)

Failure surface No. 2 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.58	3641.84
2	158.19	3639.12
3	158.66	3638.81
4	174.51	3628.32
5	179.51	3624.55
6	180.29	3623.78
7	334.98	3571.75
8	335.69	3572.45
9	336.95	3574.13
10	347.44	3589.98
11	357.93	3605.82
12	368.41	3621.66
13	378.90	3637.51
14	389.39	3653.35
15	399.87	3669.19
16	410.36	3685.04
17	420.08	3699.72
18	422.84	3703.38

** Corrected JANBU FOS = 2.822 ** (Fo factor = 1.088)

Failure surface No. 3 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	156.16	3642.24
2	159.77	3639.52
3	163.05	3637.35
4	178.90	3626.86
5	183.59	3623.32
6	332.44	3571.23
7	334.17	3572.96
8	335.43	3574.64
9	345.92	3590.48
10	356.41	3606.33
11	366.89	3622.17
12	377.38	3638.01
13	387.87	3653.86
14	398.35	3669.70
15	408.84	3685.54
16	418.16	3699.62
17	420.92	3703.28

** Corrected JANBU FOS = 2.824 ** (Fo factor = 1.088)

Failure surface No. 4 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.75	3642.64
2	161.36	3639.91
3	167.46	3635.88
4	183.30	3625.39
5	185.09	3624.04
6	337.38	3569.99
7	338.80	3571.41
8	340.07	3573.09
9	350.56	3588.94
10	361.04	3604.78
11	371.53	3620.62
12	382.02	3636.47
13	392.50	3652.31
14	402.99	3668.15
15	413.48	3684.00
16	423.96	3699.84
17	424.01	3699.91
18	426.77	3703.57

** Corrected JANBU FOS = 2.826 ** (Fo factor = 1.088)

Failure surface No. 5 specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.43	3643.56
2	165.04	3640.83
3	177.68	3632.47
4	193.53	3621.98
5	198.52	3618.22
6	336.70	3572.04
7	336.76	3572.10
8	338.02	3573.78
9	348.51	3589.62
10	358.99	3605.46
11	369.48	3621.31
12	379.97	3637.15
13	390.45	3652.99
14	400.94	3668.84
15	411.43	3684.68
16	421.42	3699.78
17	424.18	3703.45

** Corrected JANBU FOS = 2.829 ** (Fo factor = 1.088)

Failure surface No. 6 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.48	3642.07
2	159.10	3639.35
3	161.17	3637.97
4	177.02	3627.49
5	182.02	3623.72
6	183.64	3622.10
7	328.30	3574.81
8	328.38	3574.89
9	329.64	3576.57
10	340.13	3592.41
11	350.62	3608.26
12	361.10	3624.10
13	371.59	3639.94
14	382.08	3655.79
15	392.56	3671.63

16	403.05	3687.48
17	410.85	3699.26
18	413.61	3702.92

** Corrected JANBU FOS = 2.830 ** (Fo factor = 1.088)

Failure surface No. 7 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.83	3642.16
2	159.44	3639.44
3	162.14	3637.65
4	177.98	3627.17
5	182.98	3623.40
6	186.43	3619.95
7	335.76	3572.26
8	335.89	3572.39
9	337.15	3574.07
10	347.64	3589.91
11	358.13	3605.75
12	368.61	3621.60
13	379.10	3637.44
14	389.59	3653.28
15	400.07	3669.13
16	410.56	3684.97
17	420.33	3699.73
18	423.09	3703.39

** Corrected JANBU FOS = 2.831 ** (Fo factor = 1.088)

Failure surface No. 8 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.40	3642.05
2	159.02	3639.33
3	160.95	3638.05
4	176.80	3627.56
5	181.80	3623.79
6	184.20	3621.39
7	335.79	3571.29
8	336.63	3572.14
9	337.90	3573.82
10	348.39	3589.66
11	358.87	3605.50

12	369.36	3621.35
13	379.85	3637.19
14	390.33	3653.03
15	400.82	3668.88
16	411.31	3684.72
17	421.27	3699.78
18	424.03	3703.44

** Corrected JANBU FOS = 2.835 ** (Fo factor = 1.088)

Failure surface No. 9 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.18	3642.49
2	160.79	3639.77
3	165.88	3636.41
4	181.72	3625.92
5	186.72	3622.15
6	187.91	3620.96
7	333.02	3571.97
8	334.05	3573.00
9	335.32	3574.68
10	345.80	3590.52
11	356.29	3606.37
12	366.78	3622.21
13	377.26	3638.05
14	387.75	3653.90
15	398.24	3669.74
16	408.72	3685.58
17	418.01	3699.61
18	420.77	3703.28

** Corrected JANBU FOS = 2.837 ** (Fo factor = 1.088)

Failure surface No.10 specified by 18 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.28	3643.52
2	164.89	3640.80
3	177.28	3632.60
4	193.12	3622.11
5	198.10	3618.36
6	338.24	3570.90
7	338.77	3571.43

8	340.03	3573.10
9	350.52	3588.95
10	361.01	3604.79
11	371.49	3620.64
12	381.98	3636.48
13	392.47	3652.32
14	402.95	3668.17
15	413.44	3684.01
16	423.93	3699.85
17	423.97	3699.91
18	426.72	3703.57

** Corrected JANBU FOS = 2.840 ** (Fo factor = 1.088)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA SEC D-2T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.797	1.088	155.35	420.64	4.044E+05
2.	2.822	1.088	154.58	422.84	4.157E+05
3.	2.824	1.088	156.16	420.92	4.087E+05
4.	2.826	1.088	157.75	426.77	4.227E+05
5.	2.829	1.088	161.43	424.18	4.141E+05
6.	2.830	1.088	155.48	413.61	3.941E+05
7.	2.831	1.088	155.83	423.09	4.156E+05
8.	2.835	1.088	155.40	424.03	4.184E+05
9.	2.837	1.088	157.18	420.77	4.101E+05
10.	2.840	1.088	161.28	426.72	4.214E+05

* * * END OF FILE * * *

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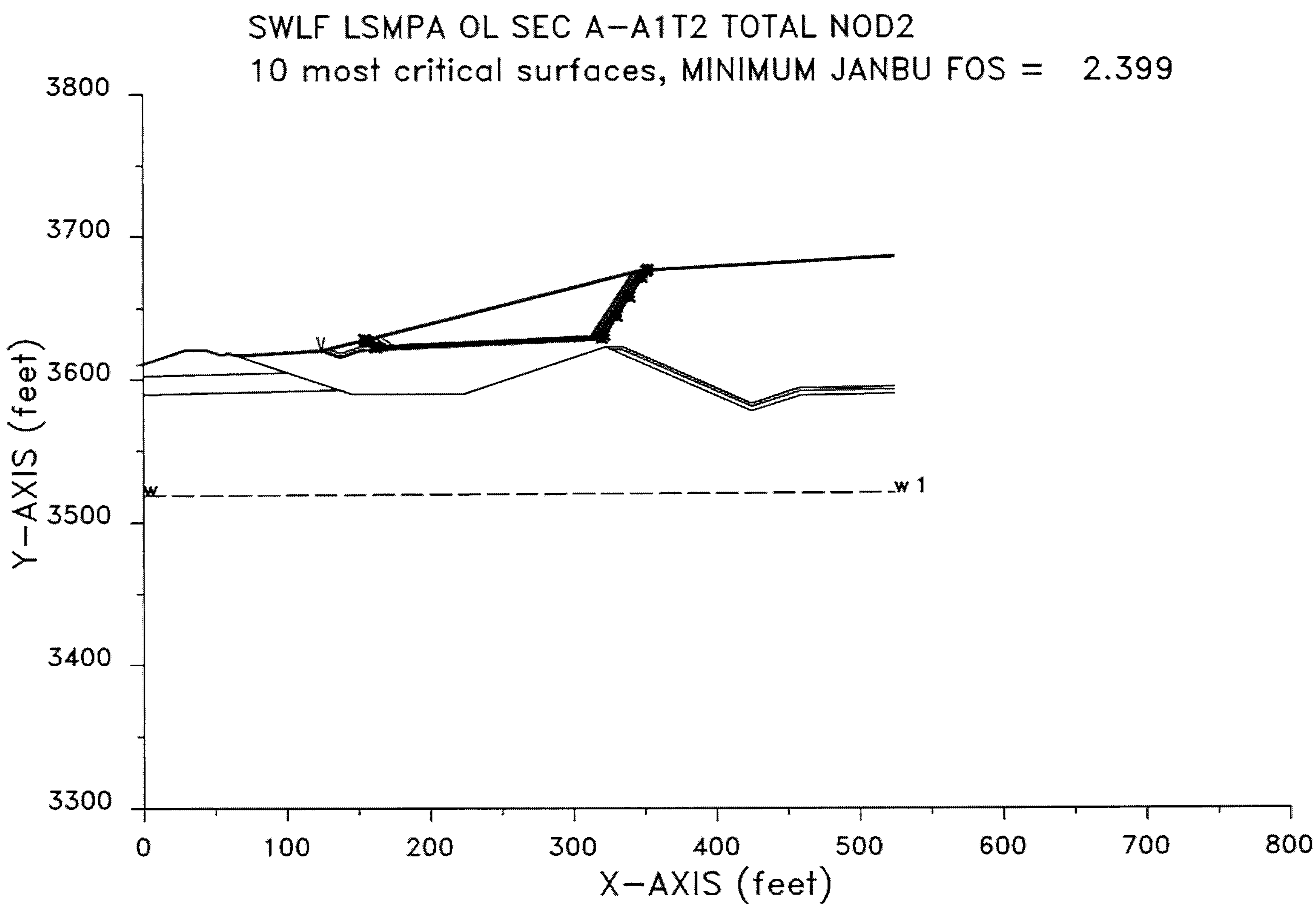

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*****************************************
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*            Method of Slices           *
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Problem Description : SWLF LSMPA OL SEC A-A1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

11 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3611.0	29.1	3620.7	1
2	29.1	3620.7	44.1	3620.7	1
3	44.1	3620.7	53.1	3617.7	1
4	53.1	3617.7	56.1	3617.7	1
5	56.1	3617.7	59.3	3618.8	1
6	59.3	3618.8	64.1	3617.1	1
7	64.1	3617.1	121.7	3620.6	4
8	121.7	3620.6	124.6	3620.8	8
9	124.6	3620.8	126.5	3621.3	5
10	126.5	3621.3	347.7	3676.6	4
11	347.7	3676.6	524.5	3686.5	4

42 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment

1	126.5	3621.3	129.7	3621.3	5
2	129.7	3621.3	130.3	3621.2	5
3	124.6	3620.8	126.4	3630.2	8
4	121.7	3630.2	124.2	3619.8	9
5	66.7	3616.3	124.2	3619.8	9
6	124.2	3619.8	124.8	3619.8	8
7	124.8	3619.8	126.4	3620.2	8
8	126.4	3620.2	130.3	3621.2	5
9	130.3	3621.2	347.9	3675.6	9
10	347.9	3675.6	524.5	3685.5	9
11	130.3	3621.2	137.7	3618.7	5
12	137.7	3618.7	151.1	3623.1	5
13	151.1	3623.1	188.2	3625.0	5
14	188.2	3625.0	322.5	3631.3	5
15	126.4	3620.2	137.7	3616.5	8
16	137.7	3616.5	151.5	3621.1	8
17	151.5	3621.1	188.3	3622.9	8
18	188.3	3622.9	322.5	3629.2	8
19	124.2	3619.8	137.7	3615.3	9
20	137.7	3615.3	151.7	3620.0	9
21	151.7	3620.0	188.3	3621.8	9
22	188.3	3621.8	322.5	3628.1	9
23	66.7	3616.3	100.8	3604.9	1
24	100.8	3604.9	137.0	3592.8	2
25	137.0	3592.8	145.5	3590.0	3
26	145.5	3590.0	223.5	3590.0	3
27	223.5	3590.0	322.5	3623.0	3
28	322.5	3623.0	334.9	3623.0	5
29	334.9	3623.0	424.8	3583.3	5
30	424.8	3583.3	454.0	3592.9	5
31	454.0	3592.9	458.6	3594.0	5
32	458.6	3594.0	524.5	3595.2	5
33	322.5	3623.0	327.0	3621.0	3
34	327.0	3621.0	334.5	3621.0	6
35	334.5	3621.0	424.7	3581.2	6
36	424.7	3581.2	458.8	3592.0	7
37	458.8	3592.0	524.5	3593.3	7
38	327.0	3621.0	424.5	3578.0	3
39	424.5	3578.0	459.2	3589.0	3
40	459.2	3589.0	524.5	3590.3	3
41	.0	3602.6	100.8	3604.9	2
42	.0	3589.6	137.0	3592.8	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	116.0	120.0	100.0	16.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	59.0	59.0	288.0	23.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.70
2	524.50	3520.80

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of
sliding block is   16.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	161.6	3622.1	181.6	3623.1	3.2
2	301.4	3628.7	321.4	3629.7	3.2

****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 48)
****
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter. In such
cases, this effect can only be eliminated by reducing the "c" value.
****

USER SELECTED option for unrestricted values of strength

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.33	3628.26
2	155.38	3627.47
3	161.19	3623.62
4	162.31	3622.78
5	320.40	3629.18
6	321.98	3631.28

7	330.81	3644.62
8	339.64	3657.96
9	348.47	3671.30
10	351.45	3675.80
11	352.24	3676.85

** Corrected JANBU FOS = 2.399 ** (Fo factor = 1.070)

Failure surface No. 2 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	156.22	3628.73
2	157.26	3627.94
3	163.61	3623.74
4	163.65	3623.71
5	318.78	3630.21
6	319.50	3631.16
7	328.33	3644.50
8	337.16	3657.84
9	345.99	3671.19
10	348.95	3675.66
11	349.74	3676.71

** Corrected JANBU FOS = 2.409 ** (Fo factor = 1.070)

Failure surface No. 3 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.51	3629.05
2	158.56	3628.26
3	165.26	3623.83
4	167.12	3622.43
5	318.21	3630.56
6	318.63	3631.12
7	327.46	3644.46
8	336.29	3657.80
9	345.12	3671.15
10	348.08	3675.61
11	348.87	3676.67

** Corrected JANBU FOS = 2.410 ** (Fo factor = 1.070)

Failure surface No. 4 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.47	3628.29
2	155.51	3627.50
3	161.37	3623.63
4	163.45	3622.06
5	314.06	3630.45
6	314.41	3630.92
7	323.24	3644.26
8	332.07	3657.60
9	340.90	3670.95
10	343.20	3674.43
11	344.18	3675.72

** Corrected JANBU FOS = 2.414 ** (Fo factor = 1.069)

Failure surface No. 5 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	158.15	3629.21
2	159.20	3628.42
3	166.08	3623.87
4	167.25	3622.99
5	317.26	3629.48
6	318.49	3631.11
7	327.33	3644.45
8	336.16	3657.80
9	344.99	3671.14
10	347.94	3675.60
11	348.74	3676.66

** Corrected JANBU FOS = 2.426 ** (Fo factor = 1.071)

Failure surface No. 6 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	155.94	3628.66
2	156.98	3627.87
3	163.25	3623.72
4	164.38	3622.87
5	312.66	3630.77
6	312.71	3630.84

7	321.54	3644.18
8	330.37	3657.53
9	339.20	3670.87
10	341.23	3673.93
11	342.21	3675.23

** Corrected JANBU FOS = 2.427 ** (Fo factor = 1.069)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	154.27	3628.24
2	155.32	3627.45
3	161.12	3623.61
4	161.82	3623.08
5	311.69	3629.90
6	312.39	3630.83
7	321.22	3644.17
8	330.05	3657.51
9	338.88	3670.85
10	340.86	3673.84
11	341.84	3675.13

** Corrected JANBU FOS = 2.431 ** (Fo factor = 1.070)

Failure surface No. 8 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	157.87	3629.14
2	158.91	3628.35
3	165.72	3623.85
4	165.76	3623.82
5	315.59	3629.91
6	316.42	3631.01
7	325.25	3644.36
8	334.08	3657.70
9	342.91	3671.04
10	345.54	3675.01
11	346.52	3676.30

** Corrected JANBU FOS = 2.432 ** (Fo factor = 1.070)

Failure surface No. 9 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	164.89	3630.90
2	165.94	3630.11
3	174.70	3624.31
4	175.50	3623.71
5	320.59	3630.58
6	321.08	3631.23
7	329.91	3644.58
8	338.74	3657.92
9	347.58	3671.26
10	350.55	3675.75
11	351.34	3676.80

** Corrected JANBU FOS = 2.435 ** (Fo factor = 1.071)

Failure surface No.10 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	161.39	3630.02
2	162.44	3629.23
3	170.23	3624.08
4	172.25	3622.55
5	315.86	3629.47
6	317.05	3631.04
7	325.88	3644.39
8	334.71	3657.73
9	343.54	3671.07
10	346.27	3675.19
11	347.24	3676.49

** Corrected JANBU FOS = 2.445 ** (Fo factor = 1.072)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC A-A1T2 TOTAL NOD2

Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)

1.	2.399	1.070	154.33	352.24	1.264E+05
2.	2.409	1.070	156.22	349.74	1.180E+05
3.	2.410	1.070	157.51	348.87	1.197E+05
4.	2.414	1.069	154.47	344.18	1.160E+05
5.	2.426	1.071	158.15	348.74	1.210E+05
6.	2.427	1.069	155.94	342.21	1.109E+05
7.	2.431	1.070	154.27	341.84	1.123E+05
8.	2.432	1.070	157.87	346.52	1.151E+05
9.	2.435	1.071	164.89	351.34	1.190E+05
10.	2.445	1.072	161.39	347.24	1.205E+05

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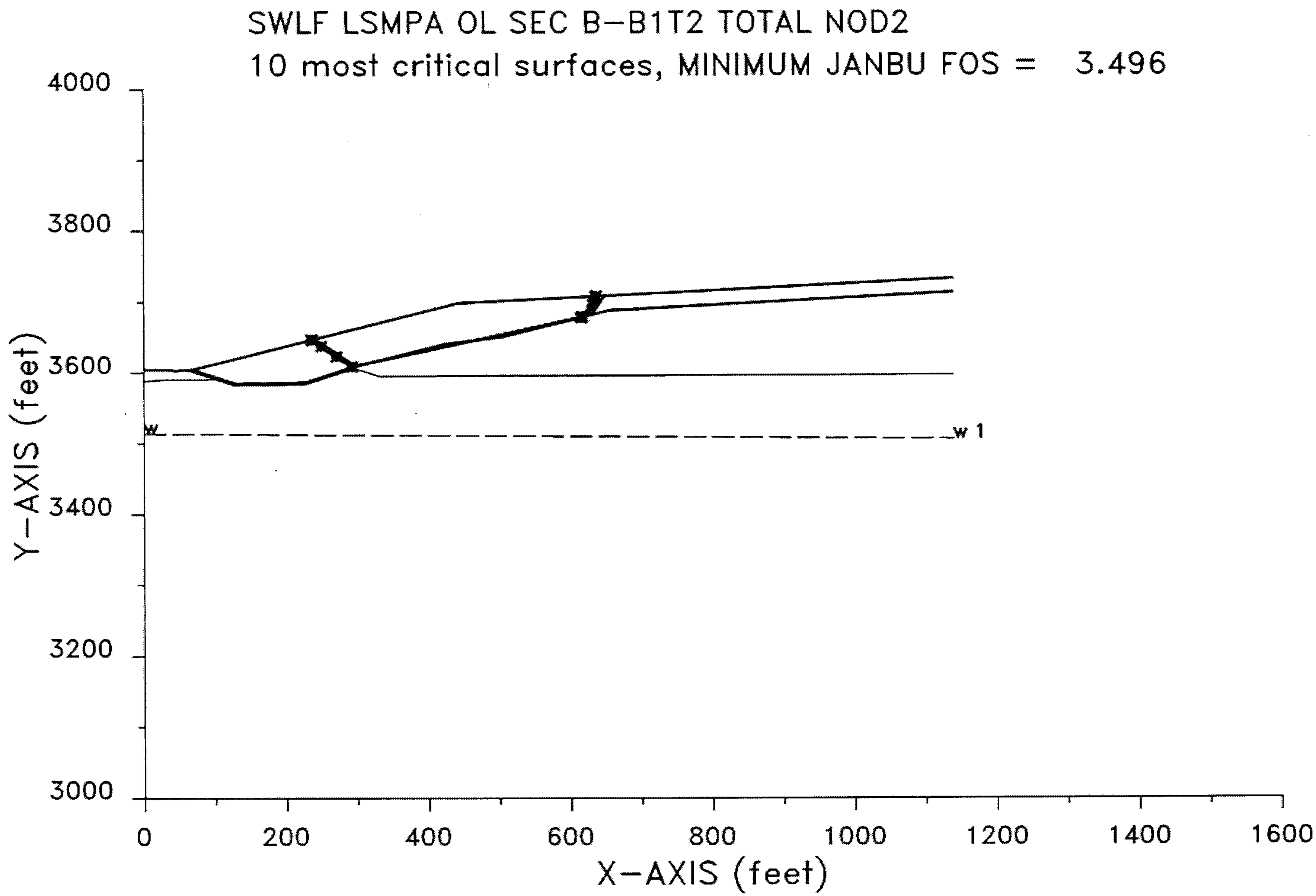

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*              X S T A B L             *
*                                      *
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*               using the              *
*            Method of Slices          *
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* Ver. 5.209                96 - 2083  *
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Problem Description : SWLF LSMPA OL SEC B-B1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3604.5	39.4	3604.5	1
2	39.4	3604.5	43.4	3602.6	1
3	43.4	3602.6	51.4	3604.6	1
4	51.4	3604.6	59.4	3604.6	1
5	59.4	3604.6	65.7	3604.6	6
6	65.7	3604.6	65.8	3604.6	5
7	65.8	3604.6	441.6	3698.5	9
8	441.6	3698.5	1138.7	3733.4	9

27 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	65.8	3604.6	70.0	3604.6	5
2	70.0	3604.6	441.6	3697.5	4

3	441.6	3697.5	1138.7	3732.4	4
4	70.0	3604.6	72.1	3604.6	5
5	72.1	3604.6	128.5	3585.8	5
6	128.5	3585.8	226.6	3587.2	5
7	226.6	3587.2	284.2	3606.4	5
8	284.2	3606.4	289.9	3608.3	8
9	289.9	3608.3	424.5	3642.0	8
10	424.5	3642.0	505.7	3652.0	8
11	505.7	3652.0	653.8	3689.0	8
12	653.8	3689.0	1138.6	3714.7	8
13	65.7	3604.6	128.2	3583.8	6
14	128.2	3583.8	226.9	3585.2	7
15	226.9	3585.2	290.5	3606.4	6
16	290.5	3606.4	424.9	3640.0	4
17	424.9	3640.0	506.1	3650.0	4
18	506.1	3650.0	654.1	3687.0	4
19	654.1	3687.0	1138.7	3712.7	4
20	59.4	3604.6	102.7	3590.2	1
21	102.7	3590.2	127.9	3581.8	2
22	127.9	3581.8	227.3	3583.2	2
23	227.3	3583.2	296.8	3606.4	2
24	296.8	3606.4	330.3	3595.2	2
25	330.3	3595.2	1138.7	3596.6	2
26	.0	3588.1	28.3	3590.2	2
27	28.3	3590.2	102.7	3590.2	2

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	121.9	121.9	100.0	26.00	.000	.0	0
2	122.5	127.0	1200.0	26.70	.000	.0	1
3	122.5	127.0	1200.0	26.70	.000	.0	0
4	59.0	59.0	288.0	23.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water =   62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3514.00
2	1139.10	3506.60

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is   26.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	290.2	3607.3	309.6	3612.2	2.0
2	615.0	3678.3	634.4	3683.1	2.0

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	235.61	3647.03
2	236.63	3646.26
3	249.50	3637.74
4	271.18	3623.39
5	292.86	3609.04
6	292.95	3608.94
7	615.05	3677.57
8	617.38	3679.90
9	631.73	3701.58
10	635.45	3707.21
11	636.24	3708.24

** Corrected JANBU FOS = 3.496 ** (Fo factor = 1.048)

Failure surface No. 2 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	240.62	3648.28
2	241.64	3647.51
3	254.50	3639.00
4	276.19	3624.64
5	297.87	3610.29
6	297.91	3610.25
7	615.34	3677.43
8	617.95	3680.04
9	632.31	3701.73
10	635.95	3707.23
11	636.73	3708.27

** Corrected JANBU FOS = 3.526 ** (Fo factor = 1.048)

Failure surface No. 3 specified by 11 coordinate points

Point	x-surf	y-surf

No.	(ft)	(ft)
1	237.05	3647.39
2	238.07	3646.62
3	250.94	3638.10
4	272.62	3623.75
5	294.30	3609.40
6	294.51	3609.19
7	617.04	3679.29
8	617.74	3679.99
9	632.09	3701.67
10	635.77	3707.22
11	636.55	3708.26

** Corrected JANBU FOS = 3.529 ** (Fo factor = 1.048)

Failure surface No. 4 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	234.83	3646.84
2	235.86	3646.06
3	248.72	3637.55
4	270.40	3623.20
5	292.09	3608.85
6	292.19	3608.74
7	631.86	3682.87
8	632.72	3683.73
9	647.07	3705.42
10	648.70	3707.87
11	649.48	3708.91

** Corrected JANBU FOS = 3.531 ** (Fo factor = 1.047)

Failure surface No. 5 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	232.79	3646.32
2	233.81	3645.55
3	246.68	3637.04
4	268.36	3622.69
5	290.04	3608.34
6	290.42	3607.96
7	624.98	3681.20
8	625.79	3682.00

9	640.14	3703.68
10	642.71	3707.57
11	643.49	3708.61

** Corrected JANBU FOS = 3.532 ** (Fo factor = 1.047)

Failure surface No. 6 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	236.62	3647.28
2	237.64	3646.51
3	250.51	3637.99
4	272.19	3623.64
5	293.87	3609.29
6	294.03	3609.13
7	621.01	3679.91
8	622.21	3681.11
9	636.56	3702.79
10	639.62	3707.41
11	640.40	3708.45

** Corrected JANBU FOS = 3.533 ** (Fo factor = 1.048)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	236.88	3647.35
2	237.91	3646.58
3	250.77	3638.06
4	272.45	3623.71
5	294.14	3609.36
6	294.23	3609.26
7	628.76	3682.02
8	629.73	3682.99
9	644.08	3704.67
10	646.11	3707.74
11	646.90	3708.78

** Corrected JANBU FOS = 3.542 ** (Fo factor = 1.047)

Failure surface No. 8 specified by 11 coordinate points

Point	x-surf	y-surf

No.	(ft)	(ft)
1	235.11	3646.90
2	236.13	3646.13
3	249.00	3637.62
4	270.68	3623.27
5	292.36	3608.92
6	292.90	3608.38
7	625.92	3681.95
8	626.04	3682.06
9	640.39	3703.75
10	642.93	3707.58
11	643.71	3708.62

** Corrected JANBU FOS = 3.556 ** (Fo factor = 1.048)

Failure surface No. 9 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	241.37	3648.47
2	242.39	3647.70
3	255.26	3639.18
4	276.94	3624.83
5	298.62	3610.48
6	298.78	3610.32
7	623.57	3681.20
8	623.91	3681.53
9	638.26	3703.21
10	641.09	3707.49
11	641.87	3708.53

** Corrected JANBU FOS = 3.561 ** (Fo factor = 1.048)

Failure surface No.10 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	241.46	3648.49
2	242.48	3647.72
3	255.35	3639.21
4	277.03	3624.86
5	298.71	3610.51
6	299.03	3610.18
7	616.17	3677.71
8	618.69	3680.23

9	633.04	3701.91
10	636.58	3707.26
11	637.37	3708.30

** Corrected JANBU FOS = 3.562 ** (Fo factor = 1.049)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC B-B1T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	3.496	1.048	235.61	636.24	5.416E+05
2.	3.526	1.048	240.62	636.73	5.326E+05
3.	3.529	1.048	237.05	636.55	5.381E+05
4.	3.531	1.047	234.83	649.48	5.491E+05
5.	3.532	1.047	232.79	643.49	5.556E+05
6.	3.533	1.048	236.62	640.40	5.425E+05
7.	3.542	1.047	236.88	646.90	5.442E+05
8.	3.556	1.048	235.11	643.71	5.523E+05
9.	3.561	1.048	241.37	641.87	5.309E+05
10.	3.562	1.049	241.46	637.37	5.380E+05

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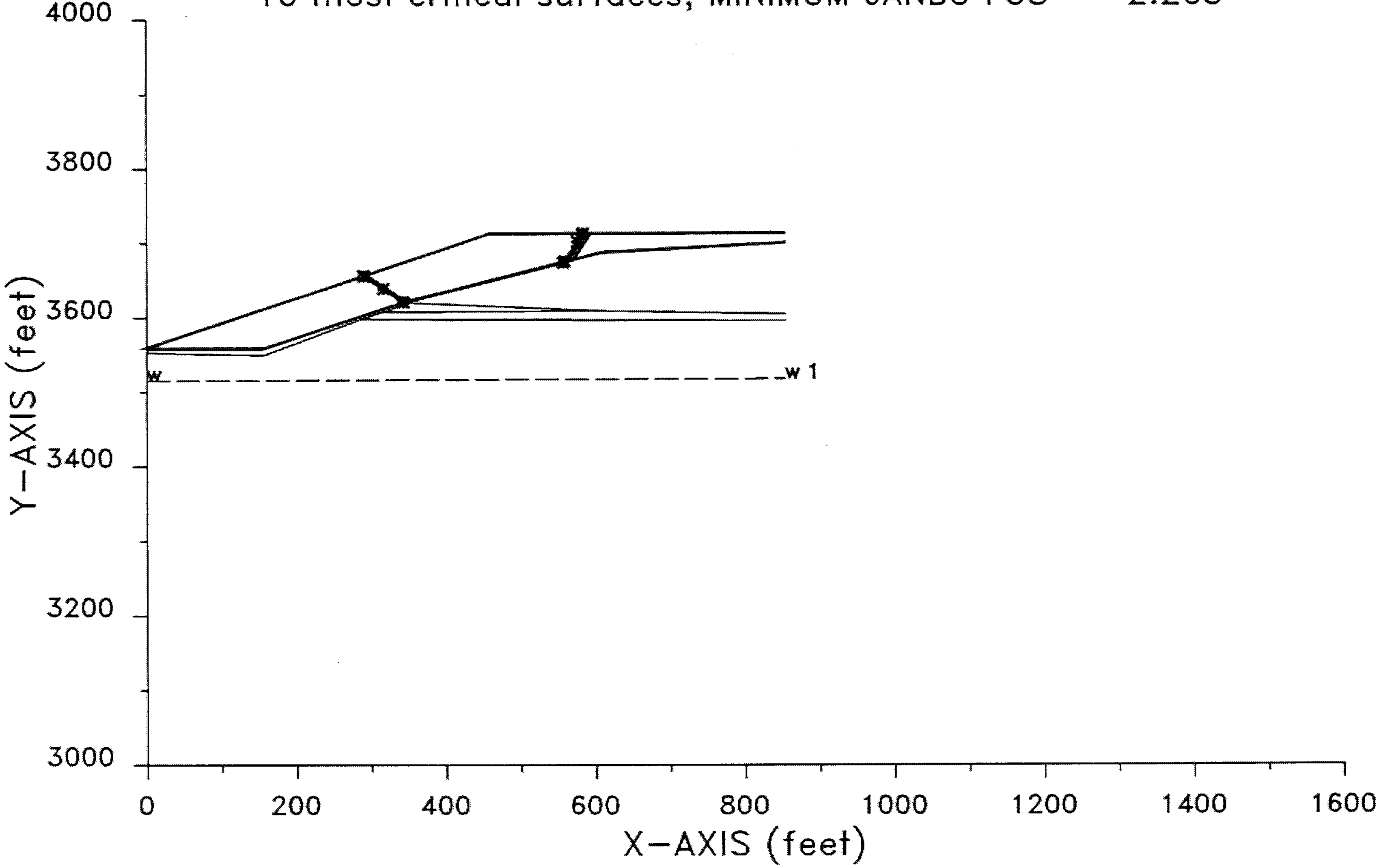
SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 2.263



XSTABL File: OL-C1T2   1-26-25   13:35

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******************************************
*             X S T A B L                *
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*                using the               *
*            Method of Slices            *
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Problem Description : SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

2 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3560.3	458.7	3713.2	9
2	458.7	3713.2	853.9	3714.2	9

20 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3560.3	3.0	3560.3	5
2	3.0	3560.3	458.4	3712.1	4
3	458.4	3712.1	853.9	3713.2	4
4	3.0	3560.3	155.3	3560.0	5
5	155.3	3560.0	336.9	3620.0	8
6	336.9	3620.0	342.8	3622.4	8
7	342.8	3622.4	609.0	3689.0	8
8	609.0	3689.0	854.4	3702.0	8

9	.0	3558.3	155.7	3558.0	7
10	155.7	3558.0	343.3	3620.5	6
11	343.3	3620.5	609.3	3687.0	4
12	609.3	3687.0	853.9	3700.0	4
13	.0	3553.3	156.2	3550.0	3
14	156.2	3550.0	285.8	3598.2	3
15	285.8	3598.2	315.2	3608.0	2
16	315.2	3608.0	352.7	3620.5	1
17	352.7	3620.5	613.6	3609.6	1
18	613.6	3609.6	853.9	3605.3	2
19	315.2	3608.0	613.6	3609.6	2
20	285.8	3598.2	854.0	3596.7	3

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	122.5	100.0	26.00	.000	.0	0
2	121.9	121.9	100.0	26.00	.000	.0	0
3	122.5	127.0	1200.0	26.70	.000	.0	1
4	59.0	59.0	288.0	23.00	.000	.0	0
5	120.0	125.0	100.0	16.00	.000	.0	0
6	120.0	125.0	1000.0	.00	.000	.0	0
7	120.0	125.0	1000.0	.00	.000	.0	0
8	120.0	125.0	1000.0	.00	.000	.0	0
9	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	.00	3515.40
2	853.90	3518.20

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of sliding block is 31.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	343.0	3621.5	362.4	3626.3	2.0
2	556.4	3674.8	575.9	3679.7	2.0

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.01	3656.97

2	290.93	3656.28
3	316.53	3639.34
4	342.38	3622.23
5	343.65	3620.95
6	556.58	3674.23
7	558.78	3676.44
8	575.89	3702.29
9	582.62	3712.45
10	583.42	3713.52

** Corrected JANBU FOS = 2.263 ** (Fo factor = 1.060)

Failure surface No. 2 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	289.78	3656.89
2	290.70	3656.20
3	316.31	3639.25
4	342.16	3622.14
5	343.07	3621.23
6	563.22	3675.95
7	565.34	3678.08
8	582.45	3703.93
9	588.10	3712.46
10	588.91	3713.53

** Corrected JANBU FOS = 2.295 ** (Fo factor = 1.059)

Failure surface No. 3 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	289.70	3656.87
2	290.62	3656.17
3	316.23	3639.22
4	342.08	3622.11
5	343.42	3620.78
6	563.20	3676.93
7	564.02	3677.75
8	581.13	3703.60
9	587.00	3712.46
10	587.80	3713.53

** Corrected JANBU FOS = 2.297 ** (Fo factor = 1.059)

Failure surface No. 4 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	292.28	3657.73
2	293.20	3657.03
3	318.93	3640.00
4	344.78	3622.89
5	346.05	3621.62
6	558.88	3675.54
7	560.11	3676.77
8	577.22	3702.62
9	583.73	3712.45
10	584.53	3713.52

** Corrected JANBU FOS = 2.309 ** (Fo factor = 1.060)

Failure surface No. 5 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	293.46	3658.12
2	294.38	3657.43
3	320.21	3640.33
4	346.06	3623.22
5	347.28	3622.00
6	560.08	3675.47
7	561.81	3677.19
8	578.92	3703.04
9	585.15	3712.45
10	585.96	3713.52

** Corrected JANBU FOS = 2.318 ** (Fo factor = 1.060)

Failure surface No. 6 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.04	3656.98
2	290.96	3656.29
3	316.55	3639.35
4	342.40	3622.24
5	343.28	3621.36
6	571.01	3678.10

7	572.87	3679.96
8	589.98	3705.81
9	594.40	3712.48
10	595.20	3713.55

** Corrected JANBU FOS = 2.327 ** (Fo factor = 1.058)

Failure surface No. 7 specified by 11 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	294.35	3658.42
2	295.27	3657.72
3	295.33	3657.68
4	321.18	3640.57
5	347.03	3623.46
6	348.55	3621.94
7	567.96	3677.09
8	570.15	3679.28
9	587.26	3705.13
10	592.12	3712.47
11	592.93	3713.54

** Corrected JANBU FOS = 2.328 ** (Fo factor = 1.059)

Failure surface No. 8 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.79	3657.23
2	291.71	3656.54
3	317.30	3639.60
4	343.15	3622.49
5	343.81	3621.84
6	568.58	3677.09
7	570.98	3679.49
8	588.09	3705.34
9	592.81	3712.47
10	593.62	3713.54

** Corrected JANBU FOS = 2.330 ** (Fo factor = 1.058)

Failure surface No. 9 specified by 10 coordinate points

Point x-surf y-surf

No.	(ft)	(ft)
1	292.86	3657.92
2	293.78	3657.23
3	319.57	3640.16
4	345.42	3623.05
5	346.53	3621.94
6	564.49	3676.79
7	565.92	3678.22
8	583.03	3704.07
9	588.59	3712.46
10	589.39	3713.53

** Corrected JANBU FOS = 2.334 ** (Fo factor = 1.059)

Failure surface No.10 specified by 10 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	290.90	3657.27
2	291.82	3656.57
3	317.42	3639.63
4	343.27	3622.52
5	344.60	3621.18
6	570.68	3678.90
7	571.37	3679.59
8	588.48	3705.44
9	593.14	3712.47
10	593.94	3713.54

** Corrected JANBU FOS = 2.336 ** (Fo factor = 1.058)

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC C-C1T2 TOTAL NOD2

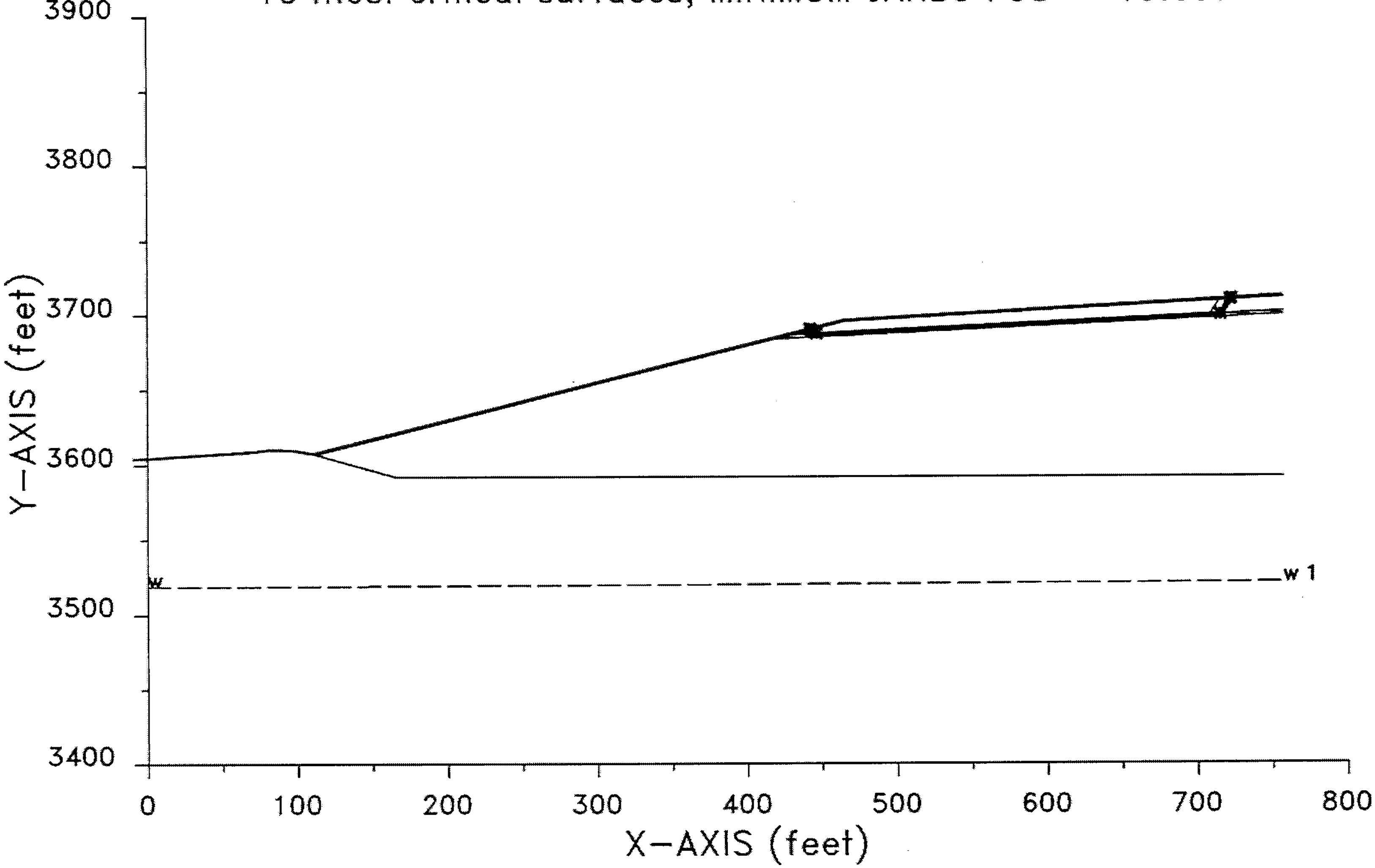
	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	2.263	1.060	290.01	583.42	3.205E+05
2.	2.295	1.059	289.78	588.91	3.253E+05
3.	2.297	1.059	289.70	587.80	3.244E+05
4.	2.309	1.060	292.28	584.53	3.190E+05

5.	2.318	1.060	293.46	585.96	3.192E+05
6.	2.327	1.058	290.04	595.20	3.306E+05
7.	2.328	1.059	294.35	592.93	3.250E+05
8.	2.330	1.058	290.79	593.62	3.283E+05
9.	2.334	1.059	292.86	589.39	3.227E+05
10.	2.336	1.058	290.90	593.94	3.286E+05

* * * END OF FILE * * *

OL-D1T2   1-26-25   13:36

SWLF LSMPA OL SEC D-D1T2 TOTAL NOD2
10 most critical surfaces, MINIMUM JANBU FOS = 15.557



XSTABL File: OL-D1T2   1-26-25   13:36

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*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
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*  Ver. 5.209               96 - 2083   *
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Problem Description : SWLF LSMPA OL SEC D-D1T2 TOTAL NOD2

SEGMENT BOUNDARY COORDINATES
----

7 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3604.7	71.6	3609.2	1
2	71.6	3609.2	81.9	3610.5	1
3	81.9	3610.5	97.0	3610.0	1
4	97.0	3610.0	109.3	3607.9	1
5	109.3	3607.9	111.3	3608.0	5
6	111.3	3608.0	465.3	3696.5	5
7	465.3	3696.5	757.0	3712.7	5

9 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	109.3	3607.9	112.4	3607.2	1
2	112.4	3607.2	419.2	3683.9	3
3	419.2	3683.9	429.4	3686.5	4

4	429.4	3686.5	465.8	3695.6	3
5	465.8	3695.6	757.5	3711.7	3
6	429.4	3686.5	757.5	3702.2	4
7	419.2	3683.9	757.2	3700.2	3
8	109.3	3607.9	165.8	3592.0	1
9	165.8	3592.0	757.2	3592.0	1

ISOTROPIC Soil Parameters
----

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.5	127.0	1200.0	26.70	.000	.0	1
2	122.5	127.0	1200.0	26.70	.000	.0	0
3	59.0	59.0	288.0	23.00	.000	.0	0
4	120.0	125.0	1000.0	.00	.000	.0	0
5	116.0	120.0	100.0	16.00	.000	.0	0

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	3518.60
2	757.20	3521.30

A critical failure surface searching method, using a random technique for generating sliding BLOCK surfaces, has been specified.

The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.

100 trial surfaces will be generated and analyzed.

2 boxes specified for generation of central block base

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

Length of line segments for active and passive portions of
sliding block is   22.0 ft

Box no.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Width (ft)
1	439.5	3686.0	449.4	3686.6	2.0
2	707.2	3699.1	717.2	3699.5	2.0

```
************************************************************
**     Factor of safety calculation for surface #     1    **
**     failed to converge within FIFTY iterations          **
**                                                         **
**    The last calculated value of the FOS was  21.8099    **
**    This will be ignored for final summary of results    **
************************************************************
```

The trial failure surface in question is
defined by the following 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	435.62	3689.08
2	436.64	3688.31
3	438.71	3686.95
4	440.32	3685.34
5	714.52	3699.90
6	714.78	3700.16
7	721.09	3709.69
8	721.89	3710.75

```
************************************************************
**     Factor of safety calculation for surface #     2    **
```

2	439.78	3689.10
3	442.74	3687.14
4	443.45	3686.43
5	712.61	3699.94
6	712.73	3700.06
7	719.04	3709.58
8	719.83	3710.64

```
************************************************************
**     Factor of safety calculation for surface #   100    **
**     failed to converge within FIFTY iterations          **
**                                                         **
**    The last calculated value of the FOS was  24.6188    **
**    This will be ignored for final summary of results    **
************************************************************
```

The trial failure surface in question is
defined by the following 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	442.13	3690.71
2	443.15	3689.94
3	447.07	3687.35
4	447.43	3686.99
5	714.54	3699.69
6	715.02	3700.17
7	721.33	3709.70
8	722.13	3710.76

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *

The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 7 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	441.79	3690.62
2	442.82	3689.85

3	446.51	3687.41
4	715.76	3700.20
5	715.77	3700.20
6	722.09	3709.75
7	722.88	3710.81

** Corrected JANBU FOS = 15.557 ** (Fo factor = 1.017)

Failure surface No. 2 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.33	3689.51
2	438.35	3688.74
3	440.90	3687.05
4	442.62	3685.33
5	714.07	3698.52
6	715.76	3700.20
7	722.08	3709.74
8	722.88	3710.80

** Corrected JANBU FOS = 20.443 ** (Fo factor = 1.019)

Failure surface No. 3 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.05	3689.44
2	438.07	3688.67
3	440.54	3687.03
4	442.33	3685.24
5	713.13	3698.72
6	714.55	3700.14
7	720.86	3709.68
8	721.66	3710.74

** Corrected JANBU FOS = 20.596 ** (Fo factor = 1.019)

Failure surface No. 4 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	435.24	3688.99
2	436.27	3688.22

3	438.22	3686.92
4	439.83	3685.31
5	707.29	3698.49
6	708.66	3699.86
7	714.94	3709.35
8	715.74	3710.41

** Corrected JANBU FOS = 20.802 ** (Fo factor = 1.019)

Failure surface No. 5 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	440.79	3690.37
2	441.81	3689.60
3	445.35	3687.26
4	447.04	3685.57
5	715.98	3698.72
6	717.55	3700.29
7	723.88	3709.84
8	724.68	3710.91

** Corrected JANBU FOS = 20.895 ** (Fo factor = 1.019)

Failure surface No. 6 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	435.62	3689.08
2	436.64	3688.31
3	438.71	3686.95
4	440.32	3685.34
5	714.52	3699.90
6	714.78	3700.16
7	721.09	3709.69
8	721.89	3710.75

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No. 7 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	443.42	3691.03

2	444.45	3690.26
3	448.73	3687.43
4	448.85	3687.31
5	716.60	3699.25
6	717.65	3700.29
7	723.97	3709.85
8	724.77	3710.91

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.019)

Failure surface No. 8 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	437.68	3689.60
2	438.71	3688.83
3	441.36	3687.07
4	442.23	3686.20
5	715.60	3700.08
6	715.73	3700.20
7	722.05	3709.74
8	722.84	3710.80

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No. 9 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	441.72	3690.60
2	442.74	3689.83
3	446.54	3687.32
4	447.97	3685.88
5	715.98	3700.12
6	716.07	3700.22
7	722.39	3709.76
8	723.19	3710.82

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.017)

Failure surface No.10 specified by 8 coordinate points

Point No.	x-surf (ft)	y-surf (ft)

1	441.45	3690.54
2	442.47	3689.77
3	446.20	3687.30
4	447.37	3686.13
5	715.50	3699.52
6	716.20	3700.22
7	722.52	3709.77
8	723.32	3710.83

** Corrected JANBU FOS = 500.000 ** (Fo factor = 1.018)

```
*******************************************************************
**                                                              **
**  Out of the    100 surfaces generated and analyzed by XSTABL, **
**       95 surfaces were found to have MISLEADING FOS values.   **
**                                                              **
*******************************************************************
```

The following is a summary of the TEN most critical surfaces

Problem Description : SWLF LSMPA OL SEC D-D1T2 TOTAL NOD2

	Modified JANBU FOS	Correction Factor	Initial x-coord (ft)	Terminal x-coord (ft)	Available Strength (lb)
1.	15.557	1.017	441.79	722.88	1.590E+05
2.	20.443	1.019	437.33	722.88	2.831E+05
3.	20.596	1.019	437.05	721.66	2.821E+05
4.	20.802	1.019	435.24	715.74	2.782E+05
5.	20.895	1.019	440.79	724.68	2.808E+05
6.	500.000	1.017	435.62	721.89	2.835E+05
7.	500.000	1.019	443.42	724.77	2.770E+05
8.	500.000	1.017	437.68	722.84	2.817E+05
9.	500.000	1.017	441.72	723.19	2.777E+05
10.	500.000	1.018	441.45	723.32	2.782E+05

* * * END OF FILE * * *

APPENDIX IIIE-A-4

INFINITE SLOPE STABILITY ANALYSIS

Includes pages IIIE-A-4-1 through IIIE-A-4-13

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01/30/2025

SOUTHWEST LANDFILL
0120-094-11-107-11
APPENDIX IIIE-A-4
INFINITE SLOPE STABILITY ANALYSIS SUMMARY

Component/Interface	Strength Parameters: Cohesion/Adhesion (psf)		Friction Angle (deg)		H (ft)	γ (pcf)	β (deg)	T (ft)	r_u	b	A	B	Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
	Peak	Residual	Peak	Residual									Peak	Residual	Peak	Residual	Peak	Residual
Liner System (3H:1V Maximum Slope)																		
Composite Liner																		
Protective Cover/Geocomposite	100	80	18	14	2	120	18.43	0	0.00	3.0	1.0	3.3	2.35	1.85	1.5	1.0	YES	YES
Geocomposite/Textured Geomembrane	100	80	21	10	2	120	18.43	0	0.00	3.0	1.0	3.3	2.53	1.63	1.5	1.0	YES	YES
Textured Geomembrane/Clay Liner	200	80	15	10	2	120	18.43	0	0.00	3.0	1.0	3.3	3.55	1.63	1.5	1.0	YES	YES
Clay Liner/Subgrade (Note 1)	200	100	18	12	2	120	18.43	0	0.00	3.0	1.0	3.3	3.72	2.01	1.5	1.0	YES	YES
Clay Liner Internal	100	-	16	-	2	120	18.43	0	0.00	3.0	1.0	3.3	2.24	-	1.5	-	YES	-
Textured Geomembrane / Geosynthetic Clay Liner	100	0	18	0	2	120	18.43	0	0.00	3.0	1.0	3.3	2.35	-	1.5	-	YES	-
Geosynthetic Clay Liner Internal	100	-	24	-	2	120	18.43	0	0.00	3.0	1.0	3.3	2.71	-	1.5	-	YES	-
Geosynthetic Clay Liner/Subgrade	100	80	25	12	2	120	18.43	0	0.00	3.0	1.0	3.3	2.77	1.74	1.5	1.0	YES	YES
Overliner System (25 Percent Maximum Slope)																		
Protective Cover/Geocomposite	100	80	18	14	2	120	11.31	0	0.00	5.0	1.0	5.3	3.83	3.01	1.5	1.0	YES	YES
Geocomposite/Textured Geomembrane	100	80	21	10	2	120	11.31	0	0.00	5.0	1.0	5.3	4.13	2.65	1.5	1.0	YES	YES
Textured Geomembrane/ Geosynthetic Clay Liner	100	80	18	10	2	120	11.31	0	0.00	5.0	1.0	5.3	3.83	2.65	1.5	1.0	YES	YES
Geosynthetic Clay Liner Internal	100	-	24	-	2	120	11.31	0	0.00	5.0	1.0	5.3	4.43	-	1.5	-	YES	-
Geosynthetic Clay Liner/Subgrade	100	100	25	12	2	120	11.31	0	0.00	5.0	1.0	5.3	4.54	3.27	1.5	1.0	YES	YES

Notes

1. Clay liner to subgrade interface assumes that clay is founded on granular or sandy soils. In the event clay liner is founded on predominantly clayey soil, the interface for infinite slope stability analysis would be represented by the "Clay Liner Internal" analysis above.