CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART I

Prepared for
City of Del Rio

September 2023
Revision 1 March 2024
Revision 2 July 2024
Revision 3 March 2025
Revision 4 May 2025

Prepared by
CP&Y, an STV company
TPBE Registration No. F-1741
13155 Noel Road, Suite 200
Dallas, TX 75240
214-638-0500

This document is intended for permitting purposes only.

TCEQ PART I FORM

4. Application Fee

Amount

☒ $2,050—New Landfill Permits, and Landfill Permit Major Amendments Described in 30 TAC 305.62(j)(1)

☐ $150—Other Permits, Landfill Limited Scope Major Amendments, Permit Amendments for Storage and Processing Facilities, and Registrations

Payment Method

☐ Check

☒ Online through ePay portal www3.tceq.texas.gov/epay/

If paid online, enter ePay Trace Number: 582EA000603033

5. Application URL

For applications other than those for arid exempt landfills, provide the URL address of a publicly accessible internet web site where the application and all revisions to the application will be posted.

https://cpyengineering.wixsite.com/mysite

6. Party Responsible for Publishing Notice

Indicate who will be responsible for publishing notice:

☒ Applicant ☐ Agent in Service ☐ Consultant

Contact Name: Gregory Velazquez

Title: Public Works Director Phone: 830-774-8535

Email Address: gvelazquez@cityofdelrio.com

7. Alternative Language Notice

Use the Alternative Language Checklist on Public Notice Verification Form TCEQ-20244-Waste-NORI, TCEQ-20244-Waste-NAPD, or TCEQ-20244-Waste-NAORPM available at www.tceq.texas.gov/permitting/waste_permits/msw_permits/msw_notice.html to determine if an alternative language notice is required.

Is an alternative language notice required for this application?

☒ Yes ☐ No

Indicate the alternative language: Spanish

Signature Page

Site Operator 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: Shawna Burkhart Title: City Manager

Email Address: shawna.burkhart@cityofdelrio.com

Signature: Shawna D Burkhart Date: 5/29/25

Operator or Principal Executive Officer Designation of Authorized Signatory

To be completed by the operator if the application is signed by an authorized representative for the operator.

I hereby designate _____ as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

~~Operator or Principal Executive Officer Name: _____~~

~~Email Address: _____~~

~~Signature: _____ Date: _____~~

Notary

SUBSCRIBED AND SWORN to before me by the said Shawna D Burkhart.

On this 29th day of May, 2025

My commission expires on the 5th day of February, 2026

_____

Notary Public in and for

Val Verde County, Texas

MARIA CASTRO ACOSTA
Notary Public, State of Texas
Comm. Expires 02-05-2026
Notary ID 10096157

Note: Application Must Bear Signature & Seal of Notary Public

CITY OF CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART I/II – GENERAL APPLICATION REQUIREMENTS

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VAL VERDE COUNTY, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION
PARTS I/II – GENERAL APPLICATION REQUIREMENTS

APPENDIX I/II B
COORDINATION DEMONSTRATION

Prepared for
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Revision 1 August 2024
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05/28/2025

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COORDINATION WITH
MIDDLE RIO GRANDE DEVELOPMENT COUNCIL

- July 17, 2024 letter requesting MRGDC concurrence that the landfill expansion is consistent with the Regional Solid Waste Plan
- August 27, 2024 Board of Directors meeting minutes approving the landfill expansion project.

MIDDLE RIO GRANDE DEVELOPMENT COUNCIL
BOARD OF DIRECTORS MEETING
MINUTES

SSGT Willie de Leon Civic Center **Tuesday, August 27, 2024**
300 E Main St **1:00 PM**
Uvalde, Texas 78801

Members Present:
Hon. Bella Rubio, Real County Judge
Hon. Lewis Owens, Val Verde County Judge
Hon. Martha A. Gomez Ponce, Dimmit County Judge
Hon. Frank Moreno, Mayor of Crystal City
Hon. Ramsey English-Cantu, Maverick County Judge
Hon. Cindy Martinez Rivera, Zavala County Judge
Hon. Everado Zamora, Mayor of Uvalde
Hon. Hazel Pendley, Mayor of Leakey
Dr. Hector Gonzales, Southwest Texas Junior College
Mr. Jack Alba, La Salle County Member-at-Large
Mr. Jesus Sanchez, Maverick County Member-at-Large
Mr. Joe Cardenas, Uvalde County Member-at-Large
Hon. John P. Schuster, Kinney County Judge
Dr. Jorge Garza, Sul Ross State University
Hon. Sandra Luna, Mayor of Cotulla
Hon. Leodoro Martinez III, La Salle County Judge
Ms. Otila Gonzalez, Val Verde County Member-at-Large
Commissioner Raul Gomez, Zavala County Member-at-Large
Ms. Rebecca Flores, Kinney County Member-at-Large
Dr. Rose Pearson, Carrizo Springs Superintendent Education Representative
Hon. James DeReus, City of Del Rio Councilperson-at-Large

Members Absent:
Hon. William R. Mitchell, Uvalde County Judge
Hon. Alvaro Arreola, Mayor of Del Rio
Hon. Michael Aguirre, Mayor of Brackettville
Hon. Juan Gomez, Real County Member-at-Large
Hon. Mario Dj Ruiz, Dimmit County Member-at-Large
Hon. Oscar Puente, Mayor of Carrizo Springs
Hon. Rolando Salinas, Mayor of Eagle Pass
Mr. William Davis, City of Eagle Pass Councilperson-at-Large

Guest Present:
Rodrigo Jaime, Workforce Board Member
Terry Allison, Motorola
Frank Puente, RZ Communication
Father Matthew DeLeon, Sacred Heart Church
Carmen Gutierrez, City of Del Rio Council Women
Tina Martinez, City of Del Rio Council Women
Gerardo Perez, Maverick County Food Pantry
Pierson Ray, Congressman Gonzales Office
Regina Aviles, Congressman Gonzales Office
Andi Dooley, US Senator John Cornyn Office
Robert Diaz, Carrizo Springs CSA
Chris Hiller, Workforce Board Member
W.B.Sansum, Real
Ginny Lewis Ford, TARC

MRGDC Staff:
Raul Diaz, Planning Director
Brenda Gonzales, CCS
Nadia Rivera, Public Safety
Brabara Lopez, Workforce Director
Michael Camarillo, PSO
Eric Martinez, Planning
Max Pereda, Fiscal
Betsy Prado, Controller
Josefina Castillo, Planning
Jose Hernandez, IT
Michelle Garcia, Executive Director
Ariana Gonzalez, HR
Roxanna Gonzalez, Workforce
Karina Aguirre, Planning
Michaela Ramirez, Admin/211
Silvia Moreno, WIOA

Workforce Staff:
Marcos Gonales, WFSMRG

I. ROLL CALL AND DETERMINATION OF QUORUM

Honorable Bella Rubio, called the regular board meeting of the Middle Rio Grande Development Council Board of Directors to order at 1:08 p.m.
The Middle Rio Grande Development Council Board of Directors met for their board meeting on Tuesday, August 27, 2024. Upon roll call, twenty-one (21) members listed above were determined to be present or represented by their official alternate. Having established a quorum, the following business was conducted.

II. **INTRODUCTION OF GUESTS**
The guest listed above were introduced.

III. **APPROVAL OF MINUTES- JUNE 18, 2024**
A motion was made by Hon. Ramsey English Cantu to approve the minutes of June 18, 2024 as presented...motion seconded by Hon. Leodoro Martinez III...motion carried.

IV. **NEW BUSINESS**

1. **EXECUTIVE COMMITTEE: Presenter:**
Hon. Bella Rubio

a. **ACTION ITEMS:**

1. Discussion and/or action to authorize MRGDC's 2024-2025 Holiday Schedule.
A motion was made by Hon. Martha A. Gomez Ponce to approve MRGDC's 2024-2025 Holiday Schedule...motion seconded by Hon. John P. Schuster...motion carried.

2. Discussion and/or action to authorize to amend Salary Schedule.
A motion was made by Hon. John P. Schuster to approve to amend Salary Schedule...motion seconded by Hon. Martha A. Gomez Ponce...motion carried.

3. Discussion and/or action to approve MRGDC Board of Directors Meeting Schedule FY 2024-2025.
A motion was made by Hon. Martha A. Gomez Ponce to approve MRGDC Board of Directors Meeting Schedule FY 2024-2025...motion seconded by Hon. Leodoro Martinez III...motion carried.

4. Discussion and/or action to approve the extension of the Child Care Contract between the Middle Rio Grande Development Council and the Board. This extension begins October 1, 2024 to September 30, 2025. This is the 1st extension of a 4-year awarded contract.
A motion was made by Hon. Leodoro Martinez III to approve the extension of the Child Care Contract between the Middle Rio Grande Development Council and the Board. This extension begins October1, 2024 to September 30, 2025. This is the 1st extension of a 4-year awarded contract...motion seconded by Hon. John P. Schuster...motion carried.

5. Discussion and/or action to approve Audit RFP services for FY beginning on September 1, 2024 and ending September 30, 2028 to Garza and Gonzalez Associates.

A motion was made by Mr. Joe A. Cardenas to approve Audit RFP services for FY beginning on September 1, 2024 and ending September 30, 2028 to Garza and Gonzalez Associates in the estimated amount of $55,500…motion seconded by Hon. John P. Schuster…motion carried.

6. Discussion and/or action to approve changes to the MRGDC policies and procedures regarding the dress code.

A motion was made by Hon. Martha A. Gomez Ponce to approve changes to the MRGDC policies and procedures regarding the dress code…motion seconded by Hon. Leodoro Martinez III…motion carried.

7. Discussion and/or action to approve changes to the MRGDC policies and procedures regarding the holidays.

A motion was made by Hon. Leodoro Martinez III to approve changes to the MRGDC policies and procedures regarding the holidays…motion seconded by Hon. John P. Schuster…motion carried.

8. Discussion and/or action to approve Executive Director, Ms. Michelle Garcia's, evaluation.

MRGDC Board of Directors will convene in closed session under the Texas Open Meetings Act, Texas Government Code Section 551.074 et seq. Chapter 551.074 – Personnel

MRGDC Board of Directors did not go into closed session for this item. A motion was made by Hon. Lewis Owens to approve Executive Director, Ms. Michelle Garcia, evaluation with approved raise…motion seconded by Hon. Ramsey English Cantu…motion carried.

b. **INFORMATION ITEM:**

1. Board of Directors Code of Conduct.

Hon. Bella Rubio informed the board of the Code of Conduct.

2. TDA Status Update.

Hon. Bella Rubio informed the board of the TDA Status Update.

3. Reminder of increased membership dues.

Hon. Bella Rubio informed the board that next FY the membership dues will be increased.

2. **BUDGET COMMITTEE:**

Presenter: President Hector Gonzales

a. **ACTION ITEM:**

b. Discussion and/or action to approve Budget for Fiscal Year beginning on October 1, 2024 and ending September 30, 2025.

A motion was made by President Hector Gonzales…to approve Budget for Fiscal Year beginning on October 1, 2024 and ending September 30, 2025…motion seconded by Mr. Joe Cardenas…motion carried.

3. **ADVISORY COMMITTEES**

a. **Area Advisory Committee on Aging**
Presenter: Hon. Bella Rubio

1. **INFORMATION ITEM:**

a. Area Agency on Aging Program Report.

Hon. Bella Rubio informed the board that the Area Agency on Aging Program Report is on page 27.

b. **2-1-1 Area Information Center**
Presenter: Hon. Bella Rubio

1. **ACTION ITEM:**

a. Discussion and/or action to ratify 211 Budget for a 3-year period in the amount of $1,059,723.16.
SFY24- $217,433.48
SFY25- $217,433.48
SFY26- $217,433.48

A motion was made by Hon. Bella Rubio to approve ratification of 211 Budget for a 3-year period in the amount of $1,059,723.16.
SFY24- $217,433.48
SFY25- $217,433.48
SFY26- $217,433.48…motion seconded by Hon. John P. Schuster…motion carried.

2. **INFORMATION ITEM:**

a. 2-1-1 I&R Program Report. Pg.31

Hon. Bella Rubio informed the board that the 2-1-1 I&R Program Report is on page 31.

b. Committee Member Nominations.

Hon. Bella Rubio informed the board that 2-1-1 will be taking committee nominations from each County Judge.

c. **9-1-1 Advisory Committee**
Presenter: Hon. John P. Schuster

1. **ACTION ITEM:**

a. Discussion and/or action on the upcoming Biennium Stage 1 Budget for 2026-2027 Year 1 Total base + Expectations $2,617,110 and Year 2 Total Base + Exceptions $1,698,921.

A motion was made by Hon. John P. Schuster to approve the upcoming Biennium Stage 1 Budget for 2026-2027 Year 1 Total base + Expectations $2,617,110 and Year 2 Total Base + Exceptions $1,698,921…motion seconded by Hon. Leodoro Martinez III…motion carried.

b. Discussion and/or action to approve Intrado Viper Software Maintenance Service Renewal agreement of $69,444.00 for FY 24-25.

A motion was made by Hon. John P. Schuster to approve Intrado Viper Software Maintenance Service Renewal agreement of $69,444.00 for FY 24-25…motion seconded by Hon. Leodoro Martinez III…motion carried.

c. Discussion and/or action to approve Intrado ECats (MIS) Service Renewal agreement of $34,505.60 for FY 24-25.

A motion was made by Hon. John P. Schuster to approve Intrado ECats (MIS) Service Renewal agreement of $34,505.60 for FY 24-25…motion seconded by Mr. Joe A. Cardenas…motion carried.

d. Discussion and/or action to approve Western States Communications Inc. Hardware Equipment Maintenance Renewal agreement of $143,221.50 for FY 24-25.

A motion was made by Hon. John P. Schuster to approve Western States Communications Inc. Hardware Equipment Maintenance Renewal agreement of $143,221.50 for FY 24-25…motion seconded by Hon. Leodoro Martinez III…motion carried.

2. **INFORMATION ITEM:**

a. 9-1-1 Program Report.

Hon. John P. Schuster informed the board that the 9-1-1 Program Report is on page 88.

d. **<u>Homeland Security Committee</u>**
Presenter: Hon. Bella Rubio

1. **ACTION ITEM:**

a. Discussion and/or action to accept Interlocal Agreement with the Governor's Office, Public Safety Division in the amount of $18,375.

A motion was made by Hon. Bella Rubio to accept Interlocal Agreement with the Governor's Office, Public Safety Division in the amount of $18,375…motion seconded by Hon. Ramsey English Cantu…motion carried.

2. **INFORMATION ITEM:**

a. Homeland Security Committee Report.

Hon. Bella Rubio informed the board that the Homeland Security Committee Report is on page 126.

e. **Criminal Justice Advisory Committee**
Presenter: Hon. Leodoro Martinez III

1. **ACTION ITEMS:**

a. Discussion and/or action to approve CJAC Policies.
A motion was made by Hon. Leodoro Martinez III to approve CJAC Policies…motion seconded by Hon. John P. Schuster…motion carried.

b. Discussion and/or action to ratify the Law Enforcement Contact to update Southwest Texas Jr. College to Southwest Texas College.
A motion was made by Hon. Leodoro Martinez III to ratify the Law Enforcement Contract to update Southwest Texas Jr. College to Southwest Texas College…motion seconded by Hon. John P. Schuster…motion carried.

b. Discussion and/or action to ratify the two-year Interlocal CJD Contract in the amount of $43,100.92.
A motion was made by Hon. Leodoro Martinez III to ratify the two-year Interlocal CJD Contract in the amount of $43,100.92…motion seconded by Hon. John P. Schuster…motion carried.

2. **INFORMATION ITEM:**

a. Criminal Justice Program Report.
Hon. Leodoro Martinez III informed the board that the Criminal Justice Program Report is on page 171.

f. **Solid Waste Advisory Committee**
Presenter: Mr. Joe Cardenas

1. **ACTION ITEM:**

a. Discussion and/or action on extension of Del Rio Landfill.
A motion was made by Mr. Joe A. Cardenas to approve extension of Del Rio Landfill…motion seconded by Hon. John P. Schuster…motion carried.

2. **INFORMATION ITEM:**

a. Solid Waste Program Report.
Mr. Joe A. Cardenas informed the board that the Solid Waste Program Report is on page 172.

4. **STANDING COMMITTEES**

a. **Community & Economic Development Committee**
Presenter: Hon. Bella Rubio

1. **INFORMATION ITEM:**

a. Planning and Operations Activity Report.
Hon. Bella Rubio informed the board that the Planning and Operations Activity Report is on page 174.

b. **Finance Committee**
Presenter: Mr. Joe Cardenas

1. **ACTION ITEM:**

a. Ratification of expenditures/obligations of goods and services over $25,000.
A motion was made by Mr. Joe A. Cardenas to approve ratification of expenditures/ obligations of goods and services over $25,000…motion seconded by Hon. John P. Schuster…President Hector Gonzales abstained…motion carried.

2. **INFORMATION ITEM:**

a. Finance Report update of "Statement of Expenditures".
Mr. Joe A. Cardenas informed the board that the Finance Report update of "Statement of Expenditures" is on page 177.

c. **Workforce Committee**
Presenter: Ms. Otila Gonzalez

1. **ACTION ITEMS:**

a. Discussion and or/action to accept Workforce Innovation and Opportunity Act-Adult #2724WOA001; from July 01, 2024 to June 30, 2026. Total Award Amount $878,332.
A motion was made by Ms. Otila Gonzalez to accept Workforce Innovation and Opportunity Act-Adult #2724WOA001; from July 01, 2024 to June 30, 2026. Total Award Amount $878,332…motion was seconded by Hon. Lewis Owens…motion carried.

b. Discussion and or action to accept Workforce Innovation and Opportunity Act-Dislocated Worker #2724WOD001; from July 01, 2024 to June 30, 2026. Total Award Amount $486,423.
A motion was made by Ms. Otila Gonzalez to accept Workforce Innovation and Opportunity Act- Dislocated Worker #2724WOD001; from July 01, 2024 to June 30, 2026. Total Award Amount $486,423…motion seconded by Hon. Leodoro Martinez III…motion carried.

c. Discussion and or/action to accept Workforce Innovation and Opportunity Act-Youth
#2724WOY001; from July 01, 2024 to June 30, 2026. Total Award Amount $943,981.
A motion was made by Ms. Otila Gonzalez to accept Workforce Innovation and Opportunity Act- Youth #2724WOY001; from July 01, 2024 to June 30, 2026. Total Award Amount $943,981…motion seconded by Hon. John P. Schuster…motion carried.

d. Discussion and or/action to accept Workforce Innovation and Opportunity Act-Rapid Response #2724WOR001; July 01, 2024 to June 30, 2025. Total Award Amount $16,058.

A motion was made by Ms. Otila Gonzalez to accept Workforce Innovation and Opportunity Act-Rapid Response #2724WOR001; July 01, 2024 to June 30, 2025. Total Award Amount $16,058…motion seconded by Hon. Leodoro Martinez III…motion carried.

e. Discussion and or/action to accept Child Care Services Formula Allocation # 2725CCF001. Total Award Amount $10,107,312.

A motion was made by Ms. Otila Gonzalez to accept Child Care Services Formula Allocation # 2725CCF001. Total Award Amount $10,107,312…motion seconded by Hon. John P. Schuster…motion carried.

f. Discussion and/or action to accept Vocational Rehabilitation Integration Agency Contract #2723COL001 from September 1, 2024 to October 31, 2025 in the amount of $132,236.88.

A motion was made by Ms. Otila Gonzales to accept Vocational Rehabilitation Integration Agency Contract #2723COL001 from September 1, 2024 to October 31, 2025 in the amount of $132,236.88…motion seconded by Hon. Leodoro Martinez III…motion carried.

2. **INFORMATION ITEM:**

a. Workforce/ Child Care Report.

Ms. Otila Gonzalez informed the board that the Workforce/ Child Care Report is on page 190.

5. **NOMINATING COMMITTEE:**

Presenter: Hon. Martha A. Gomez Ponce

a. **ACTION ITEM:**

1. Discussion and/or action to authorize the recommended MRGDC's FY 2024-2025 Board Officers.

- President
- 1st Vice-President
- 2nd Vice-President
- 3rd Vice-President
- Secretary
- Treasurer
- Immediate Past President

A motion was made by Hon. Martha A. Gomez Ponce to approve the recommended MRGDC's FY 2024-2025 Board Officers as presented

- President- Hon. Lewis Owens
- 1st Vice-President- Hon. Martha A. Gomez Ponce
- 2nd Vice-President – Hon. Ramsey English Cantu
- 3rd Vice-President- Hon. Leodoro Martinez III

- Secretary- Hon. Cindy Martinez Rivera
- Treasurer- Hon. William R. Mitchell
- Immediate Past President- Hon. Bella Rubio

Motion seconded by Hon. Leodoro Martinez III…motion carried.

6. **ADMINISTRATIVE ACTIVITIES**

a. **INFORMATION ITEMS:**

1. **Workforce Board Executive Director's Report: Rosie Lozano**

Ms. Rosie Lozano was not present.

2. **MRGDC Executive Director's Report: Michelle Garcia**

Ms. Michelle Garcia informed the Board that the Workforce Board did a risk assessment on MRGDC and the results came back moderate. Ms. Michelle Garcia also thanked all the staff for all their hard work getting the annual board meeting set up.

V. **OTHER BUSINESS**

No other business was discussed.

VI. **ADJOURNMENT**

A motion was made by Hon. Lewis Owens to adjourn the meeting at 1:33 p.m..... motion seconded by Hon. Martha A. Gomez Ponce…motion carried.

ATTEST:

Hon. Lewis Owens
Board President

Hon. Cindy Martinez Rivera
Secretary

CITY OF CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART I/II – GENERAL APPLICATION REQUIREMENTS

APPENDIX I/II E
TCEQ FORMS

Prepared for
City of Del Rio

Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER

05/28/2025

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TCEQ FORM 20719

TRANSPORTATION DATA AND REPORT FORM

6. If you checked "No" in Item I.5 above, provide TxDOT's response to the traffic and location restrictions compliance coordination for the subject site: *(Enter TxDOT's response to coordination correspondence)* **TXDOT did not have any objections or concerns with potential traffic impact to the highway facility. Refer to Appendix I/IIB page I/IIB-132 for the TXDOT response letter.**

III. TxDOT Recommended Roadway or Intersection Improvements (as applicable)

Enter TxDOT's recommendations for improvement of roadways or intersections that lead to the site:

1. **None**

IV. Documentation of Coordination of Improvement Designs of Public Roadways (turning lanes, storage lanes, acceleration/deceleration lanes, etc.) at and Near the Site Entrances with Agencies that Exercise Maintenance Responsibility

1. Complete Table 1 with information regarding documentation of coordination of improvement designs for existing and proposed roads.

Table 1: Public Roadway Improvements Coordination

Existing and Proposed Roads Associated with the Site Entrance(s)	Agency Exercising Maintenance Responsibility	Date of Coordination Correspondence from the Applicant or Site Operator to the Agency Responsible	Date of the Coordination Response Letter from the Agency Responsible	Did the Agency Responsible Require Improvements to the Roadway(s) Associated with the Site Entrance(s) (check Yes or No as applicable)
Railway Ave	City of Del Rio	Landfill is Owned by the City	NA	☐Yes ☒No
US 90	TxDOT	July 5, 2024	September 24, 2024	☐Yes ☒No
US 277	TxDOT	July 5, 2024	September 24, 2024	☐Yes ☒No
				☐Yes ☐No

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

SITE DEVELOPMENT PLAN

Prepared for
City of Del Rio

September 2023
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Revision 2 March 2025
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STATE OF TEXAS
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VAL VERDE COUNTY, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIC
LEACHATE AND CONTAINATED WATER MANAGEMENT PLAN

Prepared for
City of Del Rio

September 2023
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STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER

Twobista Metaferia
05/28/2025

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LIST OF FIGURES

1.0 INTRODUCTION

This Leachate and Contaminated Water Management Plan for the City of Del Rio Landfill was prepared consistent with Title 30 Texas Administrative Code (TAC) §§330.305(g), 330.177, 330.207, and 330.333. This plan provides the details of the collection, storage, treatment and disposal of contaminated water, and leachate generated during the active and post-closure periods of the landfill. The design details for the liner and final cover systems are included in Appendix IIIA-A - Liner, and Final Cover System Details.

2.0 LEACHATE AND CONTAMINATED WATER GENERATION

2.1 Generation Process

Leachate is generated when water percolates through the layers of solid waste as moisture is released from high moisture content waste. The capacity of solid waste to absorb moisture is known as field capacity. When the field capacity is exceeded, leachate is generated. However, leachate may also flow within the landfill through preferential pathways; therefore, some downward flow of leachate will occur before the field capacity of waste is reached. The quantity of leachate produced will depend upon the climate, site topography, type of cover, construction and landfilling procedures, and waste characteristics.

Contaminated water is defined in Title 30 TAC §330.3(37) as "leachate, gas condensate, or water that has come into contact with waste." Contaminated water is generated when stormwater runoff has come into contact with solid waste at the working face of the landfill or any other area at the site where water contacts solid waste, leachate, or gas condensate. The SOP outlines the locations where water may come into contact with solid waste, leachate, or gas condensate. Section 33 of the SOP details the measures for containing and disposing of contaminated water.

2.2 Leachate Generation and Contaminated Stormwater Modeling

The Hydrologic Evaluation of Landfill Performance (HELP) model, Version 4.0, was used to estimate the amount of leachate that will be generated at the City of Del Rio Landfill. The HELP model is a quasi-two-dimensional hydrologic model of water movement across, into, through, and out of landfills. The model uses climate, soil, and landfill design data to perform a solution technique that accounts for the effects of surface storage, runoff, infiltration, percolation, soil-moisture storage, evapotranspiration, and lateral drainage.

Leachate generation was evaluated for both active and closed landfill conditions. An explanation of the assumed conditions, methodologies, models and printouts of the results are included as Appendix IIIC-A. The leachate generation rates produced by HELP are used for the leachate collection system (LCS) design.

2.3 Stormwater Management

The City of Del Rio Landfill will manage surface water throughout the active life of the landfill to minimize the amount of stormwater that will come in contact with waste or leachate. Uncontaminated surface water will be controlled through the use of diversion berms, and stormwater diversion ditches. To promote runoff and prevent ponding, the operational cover will be graded and maintained.

Stormwater that comes into contact with waste will be considered contaminated water and handled consistent with Title 30 TAC §330.207. Contaminated water will be contained by the containment berm

Table 3-3 Leachate Sump Operating Plan

Leachate Level Description	Condition	Action Required
Leachate level between lip of sump and pump intake at the bottom of the sump.	System is functioning as designed. The drainage geocomposite leachate collection layer installed on the floor of the landfill is designed to convey the estimated peak leachate flow rate without the leachate level within the geocomposite exceeding the thickness of the geocomposite. The operation of the leachate sump and the conveyance capacity of the geocomposite leachate collection layer work in tandem to maintain compliance with the design standard listed in §330.331(a)(1).	The depth of leachate in the sump is monitored by a landfill personnel at least 1 time per week. Leachate flow to the sump and sump pump capacity are listed in Table 4-1. The sump design is discussed in Section 3.4.
Leachate level between the lip of the sump and 0.02 inches (0.05 cm) above the lip of the sump.	The 0.02-inch design standard listed in Appendix IIIK per §330.331(a)(1) has not been exceeded.	For these two conditions, the sump operation will be monitored daily until the leachate is pumped out by the Operator. For both conditions, the leachate levels in the sump will be recorded daily. If it is determined that the pump is malfunctioning, it will be removed and replaced immediately. In addition, the pumps will be replaced when it is determined that a larger capacity pump is needed based on existing conditions.
Leachate level over 0.02 inches above the lip of the sump.	The design standard listed in Appendix IIIK per §330.331(a)(1) has been exceeded.	

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIC-A
HELP MODEL ANALYSIS

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER
05/28/2025

Prepared by
CP&Y an STV Company
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2.3 Landfill Profile

The landfill profiles for various stages of the landfill development are presented in the attached HELP Model summary sheets. The profile presented below includes a clay liner with a standard Subtitle D final cover system.

2.3.1 Liner Systems

The Subtitle D clay liner designed for developed and undeveloped cells consists of a 24-inch-thick compacted clay liner with a hydraulic conductivity of $1x10^{-7}$ cm/s. Default soil characteristics from the HELP model were selected for the compacted clay liner.

2.3.2 Leachate Collection System

Developed Subtitle D Cells 1 through 6 were constructed with an LCS that includes a 200-mil thick single-sided geocomposite for floor grades and double-sided geocomposite for the sideslopes. Cells 7 through 10 will be constructed with a 250-mil thick single-sided geocomposite for floor grades and double-sided geocomposite for the sideslopes.

2.3.3 Waste Layers

Various waste thicknesses were modeled to represent the various stages of landfill development in the Subtitle D and pre-subtitle D areas. A default wilting point was selected from HELP to represent municipal solid waste. The waste column was split into two layers. The top 50-foot layer was modeled with a hydraulic conductivity of $1x10^{-3}$ cm/s. The moisture content, field capacity, and porosity values were selected as discussed previously.

2.3.4 Intermediate Cover

The intermediate cover consists of a 12-inch-thick layer of soil placed over the waste. Default soil characteristics were selected from HELP to represent the available onsite soils with a hydraulic conductivity of $6.4x10^{-5}$ cm/s.

2.3.5 Final Cover

The final cover over the Subtitle D and pre-Subtitle D areas consists of a 12-inch erosion layer with the top 6 inches capable of sustaining growth of vegetation and an 18-inch infiltration layer. The infiltration layer consists of compacted soil with a hydraulic conductivity of $1x10^{-7}$ cm/s. The site is modeled using $1x10^{-5}$ cm/s hydraulic conductivity for the infiltration layer and provides a conservative design.

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIE
CLOSURE PLAN

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

Prepared by
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214-638-0500

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Similar to the proposed final cover areas, permanent final cover erosion control structures include swales and chutes that will be constructed on the existing final cover. Swales shall be constructed at every 160 feet or less and shall not exceed a length of 578 feet. The design of the final cover system erosion control structures is provided in Appendix IIIH-B. A soil loss and sheet flow velocity demonstration for the erosion layer is included in Appendix IIIH-D – Erosion Layer Evaluation. A minimum of 90% vegetation cover shall be maintained for final cover.

2.3 Installation Methods and Procedures

The final cover system will be constructed in accordance with the requirements listed on the permit drawings in Appendix IIIA-A and the Final Cover System Quality Control Plan presented in Appendix IIIE-A. Testing and evaluation of the final cover system during construction will be in accordance with Appendix IIIE-A.

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIG
CLOSURE AND POST-CLOSURE CARE COST ESTIMATE

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

Prepared by
CP&Y an STV Company
TPBE Registration No. F-1741
13155 Noel Road, Suite 200
Dallas, TX 75240
214-638-0500

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Appendix IIIG-A. TCEQ Forms 20721 and 20723

Texas Commission on Environmental Quality

Post-Closure Care Cost Estimate Form for Municipal Solid Waste Type I Landfills

This form is for use by applicants or site operators to provide post-closure care cost estimates for post-closure care of MSW Type I landfills to meet the requirements in 30 Texas Administrative Code (TAC) Chapter 330, Section 330.63(j) and 30 TAC Chapter 330 Subchapter L. The costs to be provided herein are cost estimates for hiring a third party to conduct post-closure care of the largest waste fill area that has been certified closed in writing by the TCEQ executive director.

If you need assistance in completing this form, please contact the MSW Permits Section in the Waste Permits Division at (512) 239-2335.

I. General Information

Facility Name: **City of Del Rio Landfill**

MSW Permit No.: **207C**

Date: **05/28/2025**

Revision Number: **3**

Site Operator/Permittee Name and Mailing Address: **City of Del Rio 114 W Martin St Del Rio, TX 78840**

Total Post-Closure Care Cost Estimate (2023 Dollar Amount): **$2,269,302.30**

II. Professional Engineer's Statement, Seal, and Signature

I am a licensed professional engineer in the State of Texas. To the best of my knowledge, this Post- Closure Care Cost Estimate has been completed in substantial conformance with the facility Post-Closure Care Plan and, in my professional opinion, is in compliance with Title 30 of the Texas Administrative Code, Chapter 330.

Name: **Tewobista Metaferia, P.E.** Title: **Project Engineer**

Date: **05/28/2025**

Company Name: **CP&Y as STV Company** Firm Registration Number: **F-1741**

Professional Engineer's Seal

Signature

Post-Closure Care Cost Estimate for MSW Type I Landfills

Facility Name: City of Del Rio Landfill | Revision No.: 3

Permit No: 207C | Date: 05/28/2025

Table 1: Post-Closure Care Cost Estimates

Item No.	Item Description	Units	Annual Qty.	Unit Cost	Annual Cost	Source of Unit Cost Estimate[i]
1.0 Engineering Costs						
1.1	Site Inspection and Recordkeeping[ii]	YR	1	$1,408.91	$1,408.91	4
1.2	Correctional Plans and Specifications	YR	1	$1,650.23	$1,650.23	4
1.3 Site Monitoring						
1.3.1 Groundwater Monitoring System						
1.3.1(a)	Sampling and Analysis of GW Monitoring Wells (Quantity = 2 x Number of wells)	Wells	NA	NA	NA	NA
1.3.1(b)	Piezometers/Well Abandonment	Each	NA	NA	NA	NA
1.3.2 LFG Monitoring System						
1.3.2(a)	LFG Quarterly Monitoring (Quarterly)	Year	1	$5,613.98	$5,613.98	4
1.3.2(b)	LFG Probe Plugging and Abandonment (one time cost)	Each	6	$9,905.75	$59,434.50	2
1.4 Additional Engineering Cost Items (Detail in Attachments)						
1.4.1	Additional Engineering Cost Items (describe in attachments)	NA			NA	
1.5 Engineering Costs Subtotal						
1.5.1	Engineering Costs Subtotal				$68,107.62	
2.0 Construction and Maintenance Costs						
2.1	Cap and Sideslopes Repairs and Revegetation	YR	1	$10,073.34	$10,073.34	4
2.2	Mowing and Vegetation Management	Acres	The cost for this line item is included in line item 2.1			

Post-Closure Care Cost Estimate for MSW Type I Landfills

Facility Name: City of Del Rio Landfill | Revision No.: 3

Permit No: 207C | Date: 05/28/2025

Item No.	Item Description	Units	Annual Qty.	Unit Cost	Annual Cost	Source of Unit Cost Estimate[i]
2.3	Groundwater Monitoring System Maintenance	NA	NA	NA	NA	NA
2.4	LFG Monitoring Probes Maintenance	YR	1	$439.31	$439.31	4
2.5	LFG Collection System Maintenance	YR	30			
2.6	Perimeter Fence and Gates Maintenance (one time cost)	LS	1	$6,690.00	$6,690.00	1
2.7	Access Roads Maintenance (one time cost)	LS	1	$11,150.00	$11,150.00	1
2.8	Drainage System Cleanout/Repairs	The cost for this line item is included in line item 2.1				
2.9 Additional Construction and Maintenance Cost Items (Details in Attachments)						
2.9.1	Additional Construction and Maintenance Cost Items (details in attachments)	NA			NA	
2.10 Construction and Maintenance Costs Subtotal						
2.10.1	Construction and Maintenance Costs Subtotal				$28,352.65	
3.0 Leachate Management						
3.1	Leachate Management System Operation and Maintenance	NA	NA	NA	NA	NA
3.2	Leachate Disposal	Gals/yr	75,795.24	$0.60	$45,477.00	2
3.3 Additional Leachate Management Cost Items (Details in Attachments)						
3.4	Additional Leachate Management Cost Items (details in attachments)	NA			NA	
3.5 Leachate Management Costs Subtotal						

Post-Closure Care Cost Estimate for MSW Type I Landfills

Facility Name: City of Del Rio Landfill | Revision No.: 3

Permit No: 207C | Date: 05/28/2025

Item No.	Item Description	Units	Annual Qty.	Unit Cost	Annual Cost	Source of Unit Cost Estimate[i]
3.5.1	Leachate Management Costs Subtotal				$45,477.00	
4.0 Sum of Engineering, Construction, and Leachate Management Costs (The one-time cost items have been annualized over a 30-year period in the cost summary below)						
4.1	Sum of Engineering, Construction, and Leachate Management Cost Subtotals				$67,238.59	
5.0 Contingency						
5.1	Contingency (10% of Sum of Engineering, Construction, and Leachate Management Cost Subtotals)				$6723.86	
6.0 Third Party Administration and Project Management Costs						
6.1	Third Party Administration and Project Management Costs (2.5% of Sum of Engineering, Construction, and Leachate Management Cost Subtotals)				$1,680.96	
7. Total Post-Closure Cost						
7.1	Total Annual Post-Closure Cost (Sum of amounts in Sections 4, 5, and 6)				$75,643.41	
7.2	30 Year Post-Closure Costs (Total Annual Post-Closure Cost x 30)				$2,269,302.30	

[i] Sources of Unit Cost Estimates may include:

(1) Published Cost Estimator Manuals (e.g., RS Means);
(2) Third Party Quotes (e.g., Environmental Field Services Contractors); or
(3) Verifiable Data based on Actual Operations

[ii] Example Description for Item No. 1.1 – "Includes costs for site inspection performed at least annually for identification of areas experiencing settlement or subsidence, erosion or other drainage-related problems, inspection of the leachate collection system, gas monitoring system and LFG monitoring system."

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT

APPENDIX IIIH
SURFACE WATER DRAINAGE PLAN

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

Prepared by
CP&Y an STV Company
TPBE Registration No. F-1741
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214-638-0500

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Appendix IIIH-C. Channel and Pond Design

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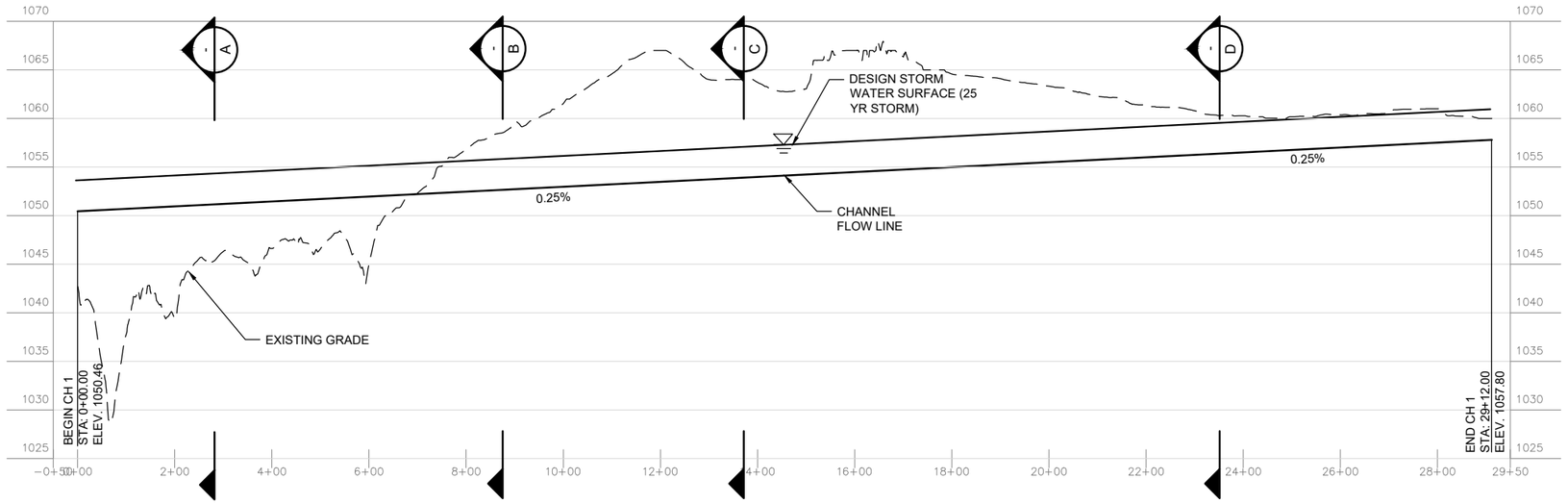
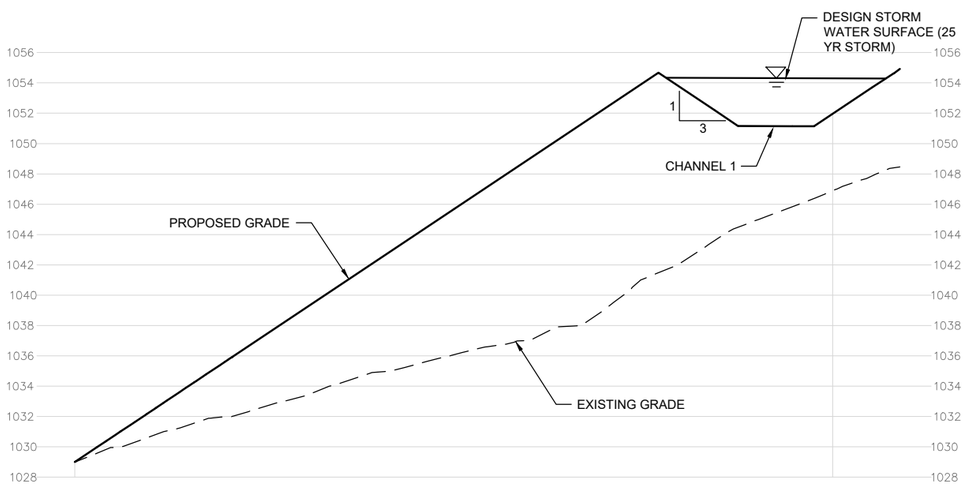


CH1 IIH-C-4 CHANNEL 1 PROFILE

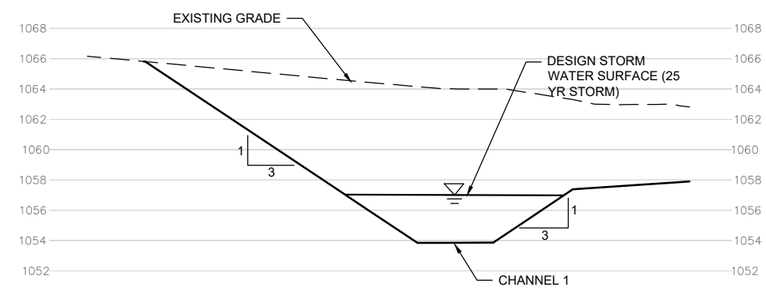
SCALE IN FEET (HORIZONTAL) 0 150 300

SCALE IN FEET (VERTICAL) 0 5 10



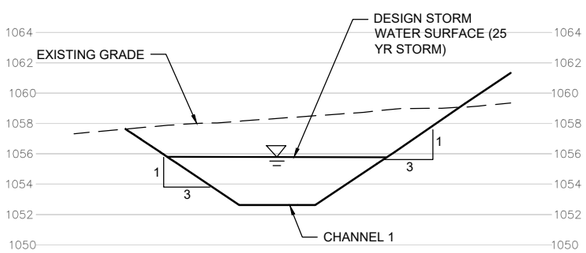
A - SECTION

SCALE IN FEET (HORIZONTAL) 0 10 20 SCALE IN FEET (VERTICAL) 0 5 10



C - SECTION

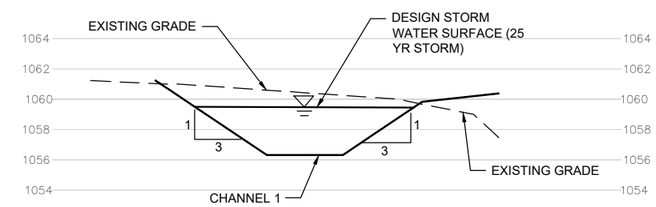
SCALE IN FEET (HORIZONTAL) 0 10 20 SCALE IN FEET (VERTICAL) 0 5 10



B - SECTION

SCALE IN FEET (HORIZONTAL) 0 10 20

SCALE IN FEET (VERTICAL) 0 5 10



D - SECTION

SCALE IN FEET (HORIZONTAL) 0 10 20

SCALE IN FEET (VERTICAL) 0 5 10

Channel	Station		Flow Rate (cfs)	Bottom Slope %	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
CH1	0+00.00	31+29.16	246.2	0.25%	10	3.16	4.00

THE FOLLOWING WAS USED TO SELECT THE TYPE OF CHANNEL LINING MATERIAL

- VEGETATION WILL BE USED IN ALL AREAS WHERE VELOCITIES ARE LESS THAN 5 FT/S.
- TURF REINFORCEMENT MATTING WILL BE USED IN CHANNEL SECTIONS THAT HAVE VELOCITIES BETWEEN 5 FT/S AND 13 FT/S.

FOR PERMITTING PURPOSES ONLY

CP&Y an STV Company
TEXAS REGISTERED ENGINEERING FIRM TBPE F-1741
City of Del Rio Texas

05/28/2025
STATE OF TEXAS
TEMOBISTA METAFERIA
123183
LICENSED PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
1.	3RD TECHNICAL NOD	STV	05/ 2025

VERIFY SCALE 0 1" BAR LENGTH EQUALS ONE INCH ON ORIGINAL DRAWING. VERIFY LENGTH ON THIS SHEET AND ADJUST SCALE ACCORDINGLY

CITY OF DEL RIO LANDFILL NO. 207C
MAJOR PERMIT AMENDMENT

CHANNEL 1 PROFILE AND CROSS SECTIONS

DESIGN: T. METAFERIA
DRAWN: T. METAFERIA
REVIEW: B. HINDMAN
CP&Y: DELR200302
CLIENT: CITY OF DEL RIO

FIGURE
IIIH-C-5

PRINTED BY: MetafeT
FILE PATH: C:\pwworking\stv\pw_stv\tmetaferia\d0942276\DELR200302 Figure IIIH-C-5.dwg

Appendix IIIH-D. Final Cover Erosion Control Structure Design

05/28/2025

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1.0 DRAINAGE SWALE DESIGN

Typical Swale Design Summary:

- Typical swale drainage areas analyzed are shown on sheet IIIH-D-2.
- Hydraulic calculations are summarized on page IIIH-D-4.
- Maximum normal depth is 1.47 feet (Drainage Area SW4).
- Maximum flow velocity is 2.75 fps (Drainage Area SW4).
- Vegetation will be established on the swales to protect against erosion.

Typical swale drainage areas were selected such that all slope conditions (5% and 25%) are included in this analysis. Additionally, swales with large individual drainage areas and short and long swale lengths are included in this analysis. In addition, swales shall be constructed at every 160 feet or less and shall not exceed a length of 578 feet.

Appendix IIIH-E. Erosion Layer Evaluation

05/28/2025

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2.0 FINAL COVER EROSION LAYER EVALUATION

This appendix presents the supporting documentation for evaluation of the thickness of the erosion layer for the final cover system at the Del Rio Landfill. The evaluation is based on the premise of adding excess soil to increase the time required before maintenance is needed as recommended in the EPA Solid Waste Disposal Facility Criteria Technical Manual (EPA 530-R-93-017, November 1993). The design procedure is as follows:

- Minimum thickness of the erosion layer at the end of the 30-year post-closure period is evaluated based on the depth of frost penetration or 6 inches, whichever is greater. For Val Verde County, the approximate depth of frost penetration is approximately 0.5 inches (see IIIH-E-14). Therefore, the minimum erosion layer thickness is 6.0 inches.
- Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following SCS procedures. The soil loss is adjusted by a safety factor of 2 and is then converted to a thickness. The thickness of the soil loss over a 30-year post-closure period is added to the minimum thickness of the erosion layer (from Step 1) to yield an initial thickness to be placed at closure of the site. According to the USLE, the typical 5 percent topslope and 25 percent side slope require a minimum of 6.0 inches for the erosion layer. These USLE requirements include the 6-inch minimum required by regulations. Conservatively, a 12-inch erosion layer is proposed over final cover.
- Stormwater flows over the final cover system by (1) sheet flow over the topslope and sideslopes and (2) channelized flow in the drainage berms (or swales). The letdown structures are lined with gabions to prevent erosion given that the velocities in the letdowns are over 5 ft/sec.
- Sheet flow velocities for the topslope and sideslope cases for a 25-year storm event are calculated to be less than permissible nonerosive velocities. A permissible nonerosive velocity is defined as 5.0 ft/sec or less.
- Channelized flow for drainage swales is also calculated to be less than permissible nonerosive velocities. The supporting calculations are presented on pages IIIH-D-4.
- Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches. The erosion layer shall also include a mixture of Bermuda, vetch, rye, wheat grass, wildflowers, and flowering plants. The TxDOT seeding for Val Verde County (Laredo District) is shown on pages IIIH-E-20 through IIIH-E-23.
- Native and introduced grasses will be hydroseeded with fertilizer on the disked (parallel to contours) erosion layer upon final grading. Temporary cold weather vegetation will be established if needed. Irrigation will be employed for 6 to 8 weeks or until vegetation is well established. Erosion control measures such as silt fences and straw bales will be used to minimize erosion until the vegetation is established. Areas that experience erosion or do not readily vegetate after hydroseeding will be reseeded until vegetation is established or the soil will be replaced with soil that will support the grasses.
- Swales shall be constructed at every 160 feet or less and shall not exceed a length of 578 feet.
- A minimum of 90% vegetation cover shall be maintained for final cover.

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT PLAN

APPENDIX IIIK
WASTE CONTAINMENT POINT OF COMPLIANCE

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
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Prepared by
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Tewobista Metaferia
05/28/2025

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Appendix IIIK-A. LEACHATE GENERATION MODEL

05/28/2025

LANDFILL PROFILE

The landfill profiles for various stages of the landfill development are presented in the attached HELP Model summary sheets. The profile presented below includes a clay liner with a standard Subtitle D final cover system.

Liner Systems

The Subtitle D clay liner designed for developed and undeveloped cells consists of a 24-inch-thick compacted clay liner with a hydraulic conductivity of 1x10-7 cm/s. Default soil characteristics from the HELP model were selected for the compacted clay liner.

OverLiner Systems

The overliner system consists of a GCL and 40-mil LLDPE geomembrane. The geomembrane liner was modeled for a good quality installation quality, 4 construction defects per acre, and a production pinhole density of 1 hole/acre. Default soil characteristic from the HELP Model were selected for the LLDPE geomembrane hydraulic conductivity.

Leachate Collection System

Developed Subtitle D Cells 1 through 5 were constructed with an LCS that includes a 200-mil thick single-sided geocomposite (floor grades).

Waste Layers

A default wilting point was selected from HELP to represent municipal solid waste. The waste layer was modeled with a hydraulic conductivity of $1x10^{-3}$ cm/s, which is the default HELP number for MSW. The moisture content, field capacity, and porosity values were selected as discussed previously.

Intermediate Cover

The intermediate cover consists of a 12-inch-thick layer of soil placed over the waste. Default soil characteristics were selected from HELP to represent the available onsite soils with a hydraulic conductivity of $6.4x10^{-5}$ cm/s.

Final Cover

The final cover over the Subtitle D and pre-Subtitle D areas consists of a 12-inch erosion layer with the top 6 inches capable of sustaining growth of vegetation and an 18-inch infiltration layer. The infiltration layer consists of compacted soil with a hydraulic conductivity of $1x10^{-7}$ cm/s. The site is modeled using $1x10^{-5}$ cm/s hydraulic conductivity for the infiltration layer and provides a conservative design.

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT

APPENDIX IIIL
GEOTECHINCAL REPORT

Prepared for
City of Del Rio

September 2023
Revision 1 March 2025
Revision 2 May 2025

Prepared by
CP&Y an STV Company
TPBE Registration No. F-1741
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05/28/2025

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APPENDICES

5.0 SLOPE STABILITY ANALYSIS

5.1 General

This slope stability analysis has been developed to analyze excavation slope and landfill completion slopes using critical sections for each condition. Slide2 was used to analyze the stability of excavation slopes and the final configuration of the site. Slide is an industry standard computer program developed by Rocscience Inc. and has been used widely in several slope stability application for dams, embankments, excavations, retaining walls and soil slopes.

The input file for the program includes:

- Slope surface geometry.
- Subsurface information to identify different types of soil materials in horizontal and vertical directions so that each subsurface segment is identified with corresponding soil strength parameters.
- Groundwater information. The program is capable of modeling multiple groundwater surfaces that may be applicable to various subsurface soil components identified in the second bullet.
- Material strength information. Each soil section (horizontal or vertical) identified in the second bullet is assigned with strength parameters including cohesion and friction angle.
- Model control and simulation user interface of the model that allows selection of the method of analysis (e.g., Simplified Bishop) and identifying simulation control parameters.

Automatic failure surface generation functions, that use either initiation/termination ranges of the failure surface or use search boxes to define failure surface location, are used to locate the critical failure surface. The two methods employed for this slope stability analysis are described below.

- Simplified Janbu Method - This method uses the method of slices to determine the stability of the mass above a failure surface.
- 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 worst case critical sections were analyzed under static condition for short-term (construction) and long-term (after construction) safety. The slope stability analyses are provided in Appendix IIIL-A.

The stability analysis has been conducted by demonstrating that, for each analyzed section, the forces resisting slope movement are greater than those potentially causing movement. The ratio of forces resisting movement to those creating movement is referred to as the factor of safety (FS). A slope is considered stable when the FS is equal to or greater than 1.0. For slope stability, an FS greater than 1.0 is preferred.

To account for increased uncertainty in the system, the FS value is adjusted accordingly. A factor of safety of 1.5 is applied to slopes expected to remain stable over the long term, including both excavation and final cover configurations. An FS of 1.3 is considered acceptable for total stress conditions that are temporary. Configurations Analyzed

Slope stability analyses were conducted on critical cross sections to assess the stability of the excavation, interim fill, overliner, and final cover slopes. Section geometries were developed based on the proposed excavation and final contour plans. The selected sections represent the longest and steepest slopes for each condition—excavation, final cover, overliner, and interim fill—which are considered to represent the worst-case, most critical scenarios for landfill stability.

Evaluation locations were chosen to capture these critical conditions, with cross-section profiles that include both the landfill configuration and the underlying natural materials at and below the toe of the excavation. For the interim fill condition, a representative slope profile was assumed, which does not exceed the slope of the final cover.

The excavation, overliner, interim fill, and final cover configurations were modeled to reflect these worst-case critical slope conditions. Analyses were performed using both circular and block failure surfaces. The maximum design slopes include a 4 horizontal to 1 vertical (4H:1V) gradient for final cover slopes and a 3H:1V gradient for excavation slopes.

Figures showing the analyzed cross-section locations are included in the top-of-liner plan and final completion plan provided in **Appendix IIIL-A**. Additionally, the configurations analyzed are illustrated in the same appendix.

It is assumed that the horizontal length of an interim slope will not exceed that is included in Appendix IIIL-A. Should the horizontal length of an actual interim slope be greater during site operations, an additional analysis will be performed if deemed necessary by a registered engineer, and the results will be maintained in the Site Operating Record.

5.2 Input Parameters

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, along with engineering judgment and experience with similar materials. To ensure representative properties for the various soil groups, the unit weight for Stratum II and III used in the model is based on the average unit weight for each stratum, as outlined in Tables 3-1, 3-2, and 3-3. Since groundwater is not present at the site, no groundwater surface is modeled.

Table 5-1 summarizes the unit weights and strength parameters used in the stability analyses for the evaluated landfill slopes, including excavation, overliner, interim fill, and final cover slopes. The selected strength parameters for both the liner and final cover systems are based on industry standards and are representative of the material properties that will be utilized during construction. These parameters will be verified during prior to construction.

5.3 Infinite Slope Stability Analysis

The infinite slope stability analysis for the liner and final cover system is detailed in Appendix IIIL-A. This analysis covers the stability of the anchor trench design, the stability of cover and drainage materials placed on anchored geosynthetics, and the shear forces within the liner system. Additionally, the final cover slope stability analysis specifically addresses the shear forces within the final cover system.

As demonstrated in the calculations presented in Appendix IIIL-A, both the liner and final cover systems are structurally stable when using industry-standard strength parameters. These parameters will be verified during the construction. Prior to the construction liner, overliner, and/or final cover, the POR will perform interface strength testing with the actual materials that will be used during.

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

Strength Parameters			Comments
Liner System			The liner system includes a 2-foot-thick compacted clay layer, drainage geocomposite (single-sided on floor grades and double-sided on 3H:IV sideslopes), and a 2-foot-thick protective cover soil layer. An infinite slope stability analysis, included in Appendix IIIL-A, was preformed to establish the minimum interface strength requirements for each layer of the liner. 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 geocomposite 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 geocomposite 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 IIIL-A 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). The strength parameters listed are for the interfaces with the lowest strength parameters to provide for a conservative design. 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 drainage geocomposite layer is not included in the global analysis because it provides 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) provide 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. 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 IIIL-A. For the rotational global stability analysis, the overliner system is modeled as a single layer and the strength parameters represent the protective cover layer (for this analysis the material strength parameters are used). 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 overliner system represent strength values typically used in the industry for liner systems (see liner system discussion below). The unit weight of the overliner system is consistent with that selected for the liner system and is based on experience with liner system construction. The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure by Duncan, Buchianani, and De Wet for the overliner system, was developed to show that overliner components that are placed on top of each other, such as the geomembrane and geocomposite, will not experience sliding failure due to the lack of strength between these components. The interface 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 overliner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIID). The strength parameters listed are for the weakest interface to provide for a conservative design.
Soil Material Strength Parameters			
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Unit Weight (lb/ft^3)**	
Clay Liner 100 (Effective) 1000 (Total) Protective Cover 100 (Effective) 1000 (Total) Overliner 100 (Effective) 1000 (Total)	Clay Liner 16 (Effective) 0 (Total) Protective Cover 16 (Effective) 0 (Total) GCL 16 (Effective) 0 (Total)	120	
Final Cover System			The final cover system includes the erosion layer and compacted clay infiltration layer. For the rotational global stability analysis, the final cover system is modeled as a single layer and the strength parameters represent the compacted clay infiltration layer and the erosion layer. The strength values selected for the final cover system represent strength values typically used in the industry and these same strength values have been used in various permit applications approved by TCEQ. The global stability analysis for rotational failure analysis uses the soil material strength parameters (i.e., cohesion of 100 lb/ft^2 and a friction angle of 16 degrees). The global stability analysis is included in Appendix IIIL-A.
Soil Material Strength Parameters			
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Unit Weight (lb/ft^3)**	
100	16	120	
Solid Waste			The strength parameters for solid waste were based on information contained in the following references: Pagotto and Rimoldi (1987), Landva and Clark (1990), and Richardson and Reynolds (1991). These sources list cohesion and friction angle values that range from 210 lb/ft^2 to 605 lb/ft^2 and 18° (for residual strength or large displacement for direct shear test which requires a factor of safety of 1) to 43°, respectively. The selected strength values (cohesion = 288 psf and friction angle = 23°) are conservatively selected to represent peak strength for MSW. The unit weight of waste was obtained from Appendix IIIB - Site Life Calculations.
Material Strength Parameters			
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Unit Weight (lb/ft^3)**	
288	23	47	

5.4 Results of Stability Analysis

The stability analysis results, obtained using the computer program, show that both the proposed excavation and final configuration slopes are stable under the analyzed conditions. Tables 5-2 and 5-3 summarize the stability analysis results for the landfill slopes, comparing the calculated factor of safety to the recommended minimum factors of safety. The recommended minimum factors of safety for the analyzed conditions were based on guidelines from the U.S. Corps of Engineers' "Design and Construction of Levees" manual (EM 1110-2-1913) and the EPA's "Technical Guidance Manual for the Design of Solid Waste Disposal Facilities." Specifically, a factor of safety of 1.3 was used for short-term slope stability (excavation slopes), while a factor of safety of 1.5 was applied for long-term slope stability (overliner and final cover slopes).

Table 5-2 Summary of Slope Stability Analysis for Excavation Slopes

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated		Recommended Minimum of Safety		Acceptable Factor of Safety Met?
		Effective Stress	Total Stress	Effective Stress	Total Stress	
Excavation Slope A-1	Bishop-Circular	1.8	1.9	1.5	1.3	YES
Excavation Slope A-2	Janbu/Randkine	1.7	1.8	1.5	1.3	YES
Excavation Slope B-1	Bishop-Circular	1.8	1.9	1.5	1.3	YES
Excavation Slope B-2	Janbu/Randkine	1.8	1.9	1.5	1.3	YES

Table 5-3 Summary of Slope Stability Analysis for Interim Fill, Overline and Final Landfill Configurations

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated		Recommended Minimum of Safety		Acceptable Factor of Safety Met?
		Effective Stress	Total Stress	Effective Stress	Total Stress	
Interim Fill F-1	Bishop-Circular	1.9	1.9	1.5	1.3	YES
Interim Fill F-2	Janbu/Randkine	1.7	1.7	1.5	1.3	YES
Final Cover C-1	Bishop-Circular	2.4	2.4	1.5	1.3	YES
Final Cover C-2	Janbu/Randkine	2.0	2.0	1.5	1.3	YES
Final Cover D-1	Bishop-Circular	3.1	3.1	1.5	1.3	YES
Final Cover D-2	Janbu/Randkine	3.1	2.6	1.5	1.3	YES
Overliner E-1	Bishop-Circular	3.0	3.0	1.5	1.3	YES
Overliner E-2	Janbu/Randkine	2.9	2.9	1.5	1.3	YES

The computer-generated slope stability analysis output is included in Appendix IIIL-A. As shown in Tables 5-2 and 5-3:

- the minimum calculated factor of safety for excavation slopes is 1.7, which exceeds the acceptable minimum factor of safety of 1.5;
- minimum calculated factor of safety for final cover slopes is 2.0, which is well above the acceptable minimum factor of safety of 1.5;
- minimum calculated factor of safety for overliner slopes is 2.4, which is well above the acceptable minimum factor of safety of 1.5.
- minimum calculated factor of safety for interim slope is 1.9, which is above the acceptable minimum factor of safety of 1.5.

The stability analysis results demonstrate that all analyzed conditions have an acceptable factor of safety.

6.0 SETTLEMENT, STRAIN, AND HEAVE ANALYSIS

6.1 General

The purpose of the settlement and heave analysis is to ensure that the liner system will not be negatively affected by foundation settlement. This analysis also evaluates the settlement of the final cover system to confirm that the proposed design can accommodate the potential strain caused by waste settlement.

Settlement of the liner system will result from the consolidation of foundation materials under the weight of the landfill components, including the protective cover, solid waste, daily cover, and final cover systems. Laboratory consolidation tests show that the foundation soils have low compressibility. Settlement of the final cover system will occur as a result of both foundation soil consolidation and consolidation within the solid waste. Total consolidation of the final cover includes primary and secondary consolidation of the deposited waste. Appendix IIIL-B provides detailed information on the foundation heave, settlement, and final cover settlement analyses.

6.2 Foundation Heave

Potential heave (rebound) resulting from the excavation of overburden above the excavation base was estimated using standard consolidation theory for soils and the recompression index obtained from the rebound portion of the consolidation tests. To estimate the potential for heave, the load is reduced, reflecting the projected weight of the excavated soil, rather than increasing the load on the soils. With a maximum excavation depth of approximately 78 feet (calculated as the difference between the existing ground elevation and the bottom of excavation at a given location), a heave of approximately 5.36 feet was calculated.

The heave estimate provided is considered overly conservative, as it assumes that the underlying shale will heave in accordance with both the limited consolidation testing performed on the shale and the rebound curve from the consolidation test results. In reality, the actual heave is expected to be significantly less. This will be monitored during construction through surveying of excavation and protective cover grades. The depth of floor grade excavation for each sector (liner area draining to an LCS sump) is generally consistent, meaning the depth of soil to be removed does not vary significantly within each sector. Where excavation depth is shallower, heave will also be less and can be considered negligible.

These calculations are included in Appendix IIIL-B-1. Heave will occur shortly after excavation (before and during liner construction) and will not negatively impact the performance of the liner system.

6.3 Foundation Settlement and Strain

The potential for foundation settlement has been evaluated using consolidation test results for Stratum III. These test results indicate that the shale in this stratum exhibits characteristics of over-consolidation, meaning that the previous stresses on the unit were greater than the current vertical stresses acting on it. The pre-consolidation pressure is typically considered to represent the maximum vertical overburden stress the soil layer has experienced in the past. For this analysis, the pre-consolidation stresses were incorporated into the settlement and strain evaluations.

The results of these analyses are presented in Appendix IIIL-B. As shown in Appendix IIIL-B, settlement within the foundation geological unit at the site is negligible and will not negatively impact the performance of the leachate collection system or cause harmful strain on the liner system components.

6.4 Final Cover Settlement and Strain

Settlement of the landfill final cover occurs due to both the settlement of foundation soils and the settlement of waste materials. Generally, the settlement of the foundation soils is minimal compared to the settlement of the deposited waste. Waste settlement consists of both primary and secondary settlement.

Solid waste settlement begins rapidly as it is placed and continues over an extended period of time. Initially, municipal solid waste undergoes primary settlement due to its own weight, the weight of the final cover, equipment, and other factors. Primary settlement occurs quickly, typically within the first month after waste placement. At this point, the weight of the final cover system becomes the only contributing factor to primary consolidation. By the time the final cover construction is completed, settlement of the waste due to the cover's weight will have been fully realized.

Secondary settlement persists at significant rates well beyond the primary settlement phase. This is driven by a combination of mechanical secondary compression, physico-chemical reactions, and bio-chemical decay. The settlement analysis for the final cover system is detailed in Appendix IIIL-B-3.

A strain analysis has been incorporated into the final cover settlement analysis presented in Appendix IIIL-B-3. The goal of the settlement and strain analysis is to ensure that the final cover system will remain stable as designed and maintain positive drainage. Assuming uniform waste settlement, the sideslopes are expected to maintain positive drainage. Based on the settlement estimates for both the maximum waste thickness (where the most significant settlement is expected to occur on the landfill's top deck) and the minimum waste thickness (where minimal settlement is anticipated), the final cover will experience a maximum strain of -0.008 percent. This strain is well below the allowable strain for the final cover soil infiltration layer. The strain demonstration in Appendix IIIL-B-3 confirms that the top deck areas of the final cover will remain stable and maintain a minimum slope of 2.29%, ensuring positive drainage after settlement.

7.0 CONCLUSIONS NAD RECOMMENDATIONS

This geotechnical analysis was developed based on (1) geotechnical data from testing performed on soil samples collected at the site, (2) the general soil stratigraphy of the project area, and (3) the known geotechnical characteristics of solid waste and soils used in landfill components. Based on this analysis, it is concluded that the proposed landfill and its components (such as the leachate collection system) will be geotechnically stable and will function as designed. The key findings of the geotechnical analysis are summarized below:

- All geotechnical engineering tests were conducted in accordance with industry standards and recognized procedures (e.g., ASTM standards).
- The stability of the proposed landfill excavation slopes and final cover is acceptable as designed (refer to Appendix IIIL-A).
- Foundation settlement after filling is expected to be negligible and well within the strain limits of the liner system (see Appendix IIIL-B).
- Settlement of the final cover system will not negatively impact its performance, and the system will function as intended (see Appendix IIIL-B).

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART III – SITE DEVELOPMENT

APPENDIX IIIL-A
SLOPE STABLITY ANALYSIS

Prepared for
City of Del Rio

September 2023
Revision 1 March 2025

STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER

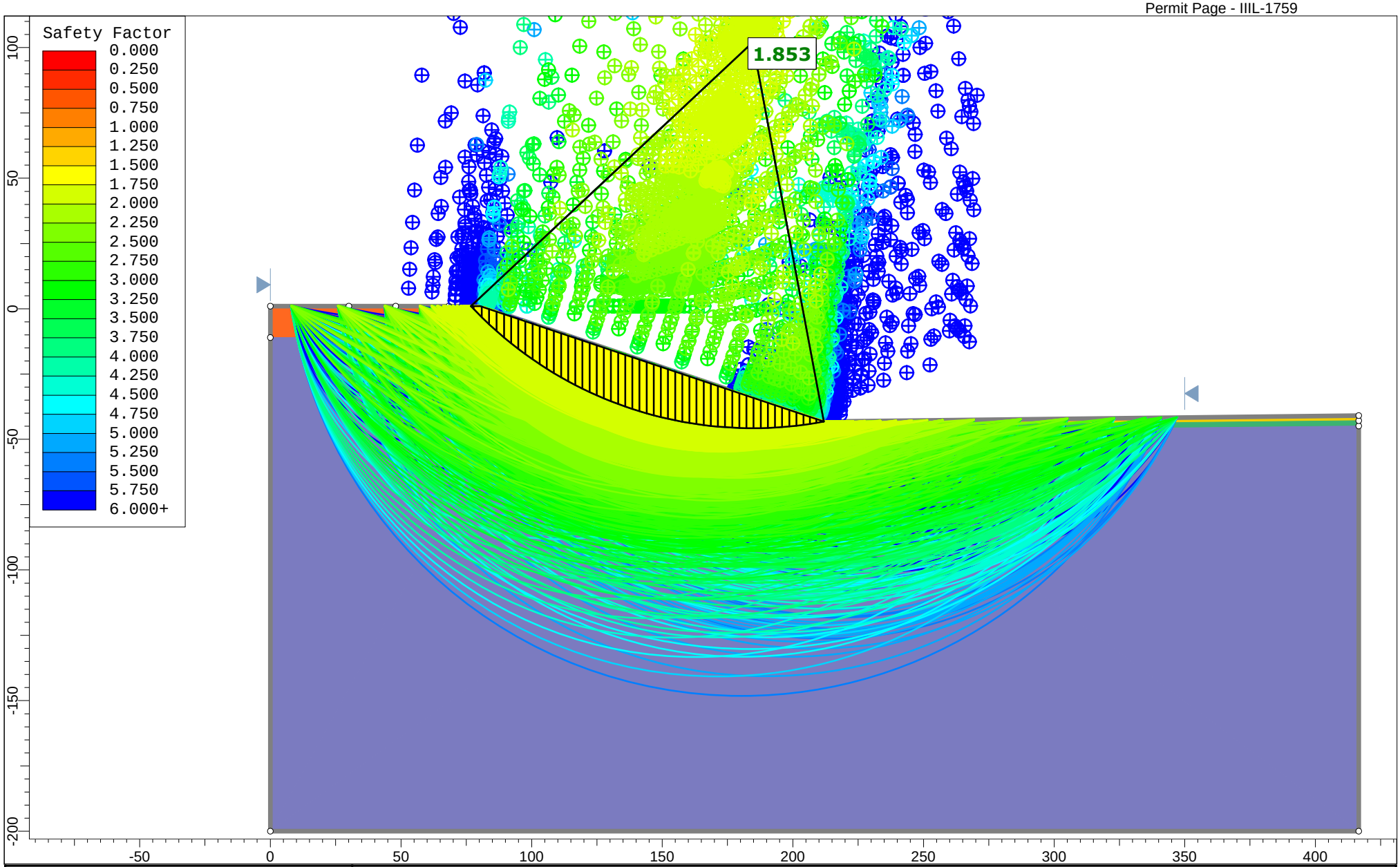
Twobista Metaferia
05/28/2025

Prepared by
CP&Y an STV Company
TPBE Registration No. F-1741
13155 Noel Road, Suite 200
Dallas, TX 75240
214-638-0500

This document is intended for permitting purposes only.

EXCAVATION CONFIGURATION

STABILITY ANALYSIS



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	Drawn By		Company
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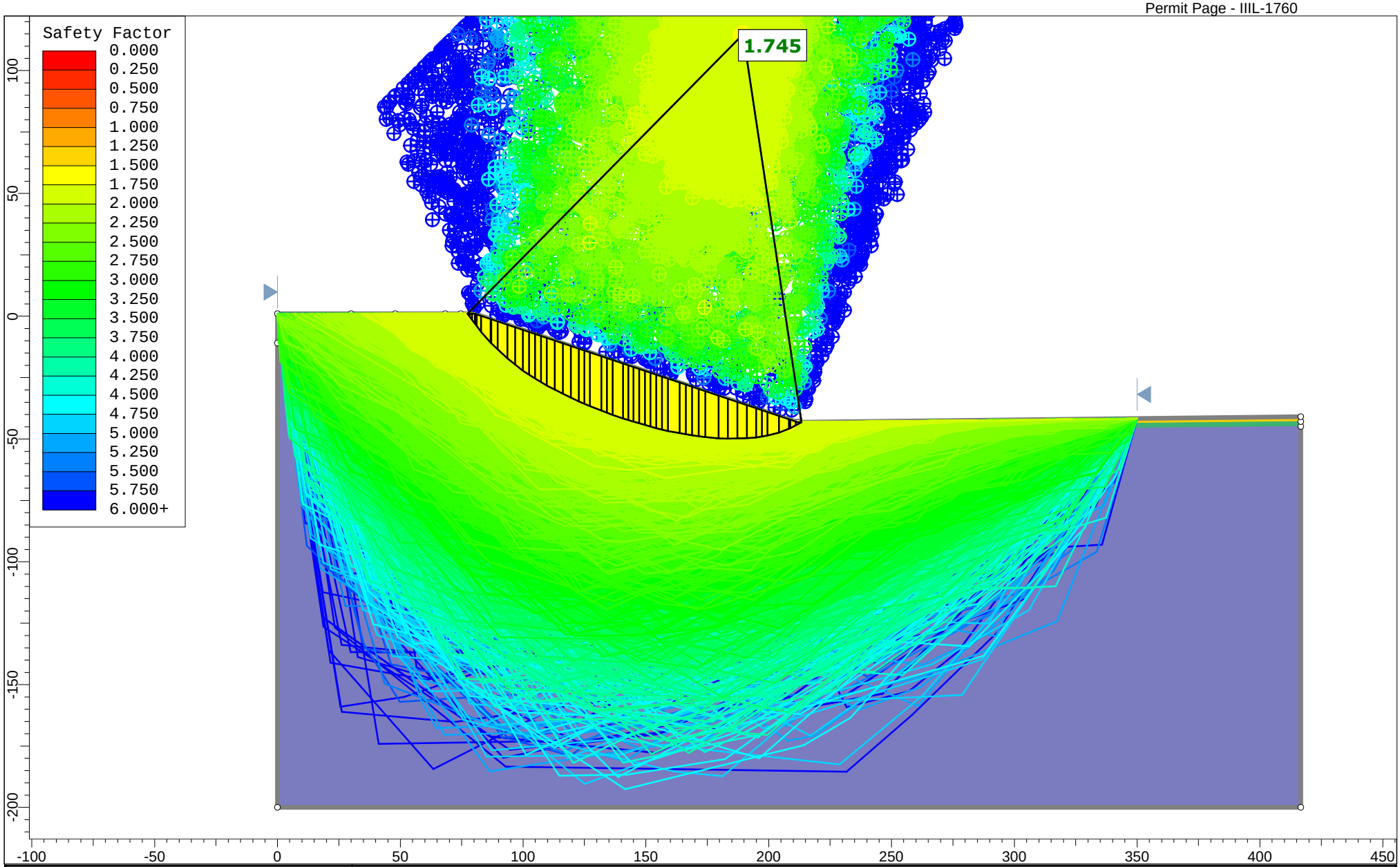

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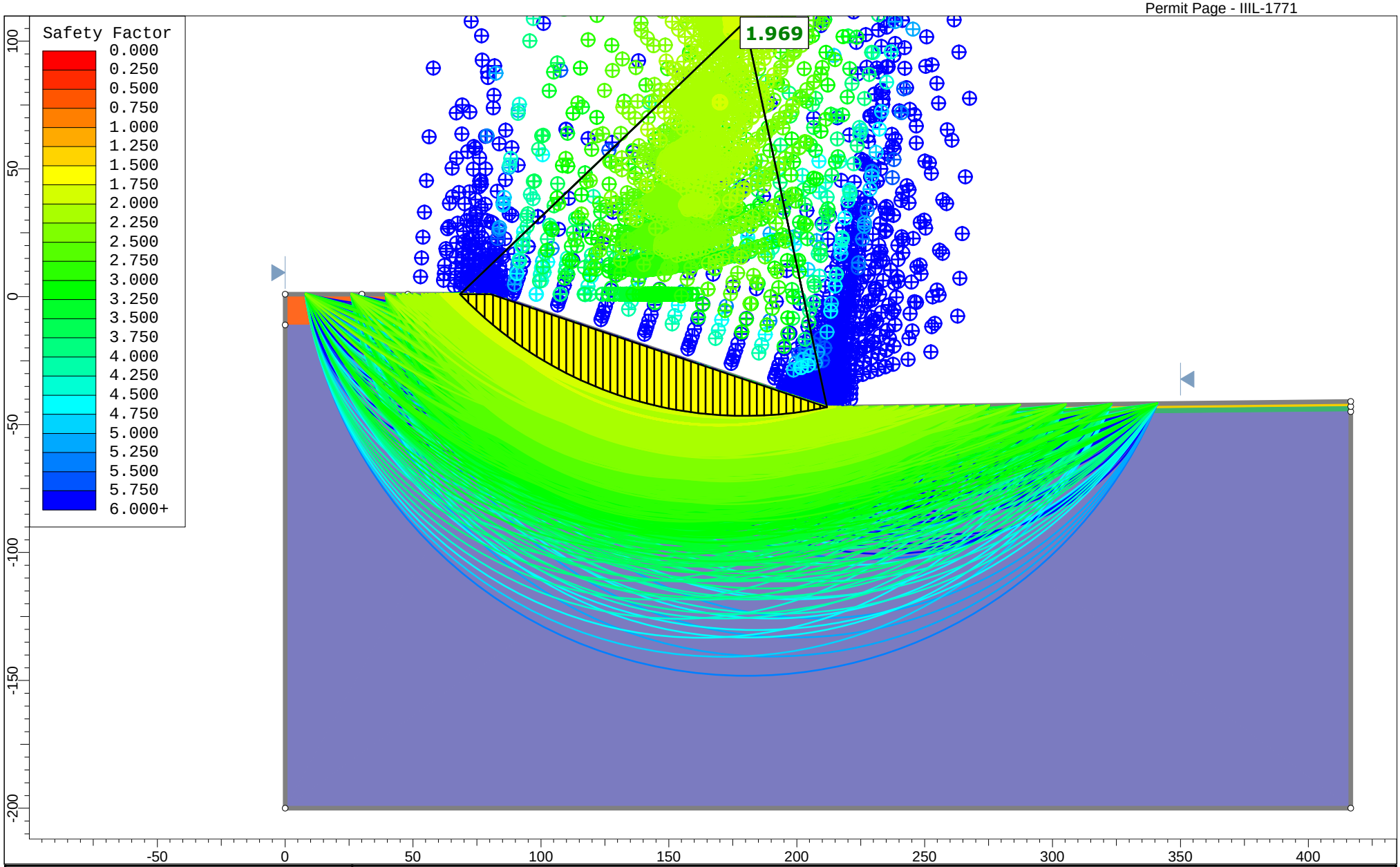

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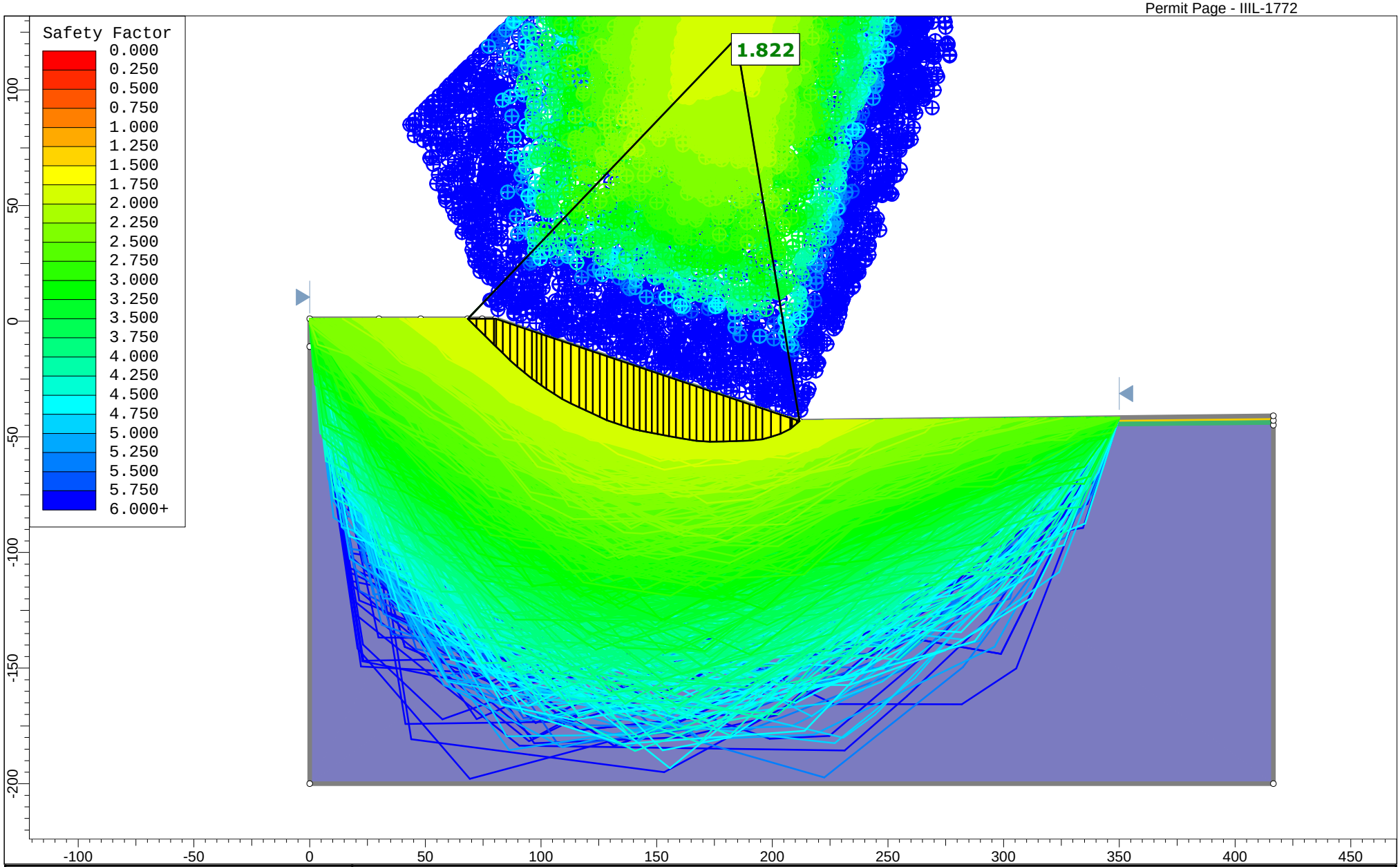

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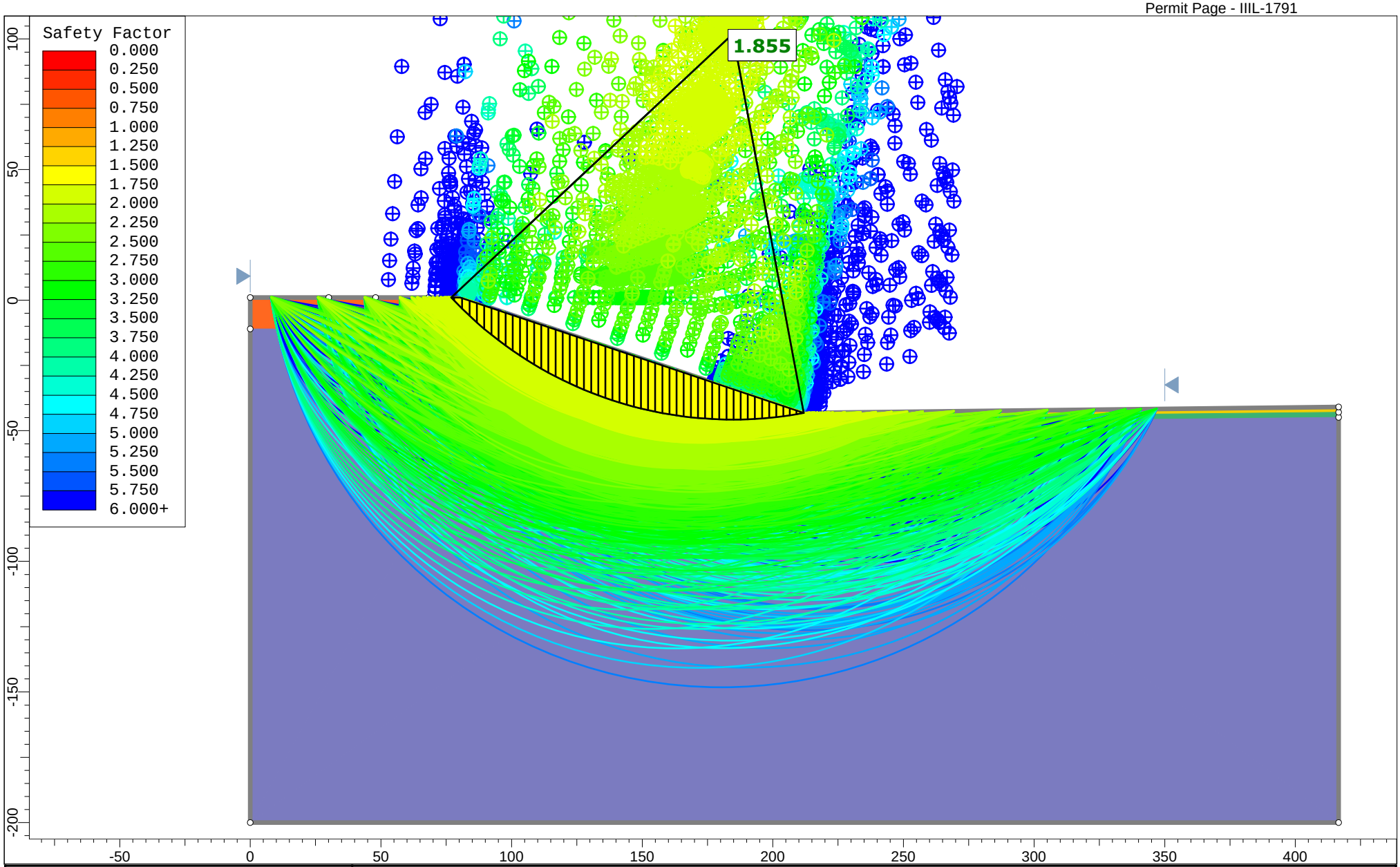

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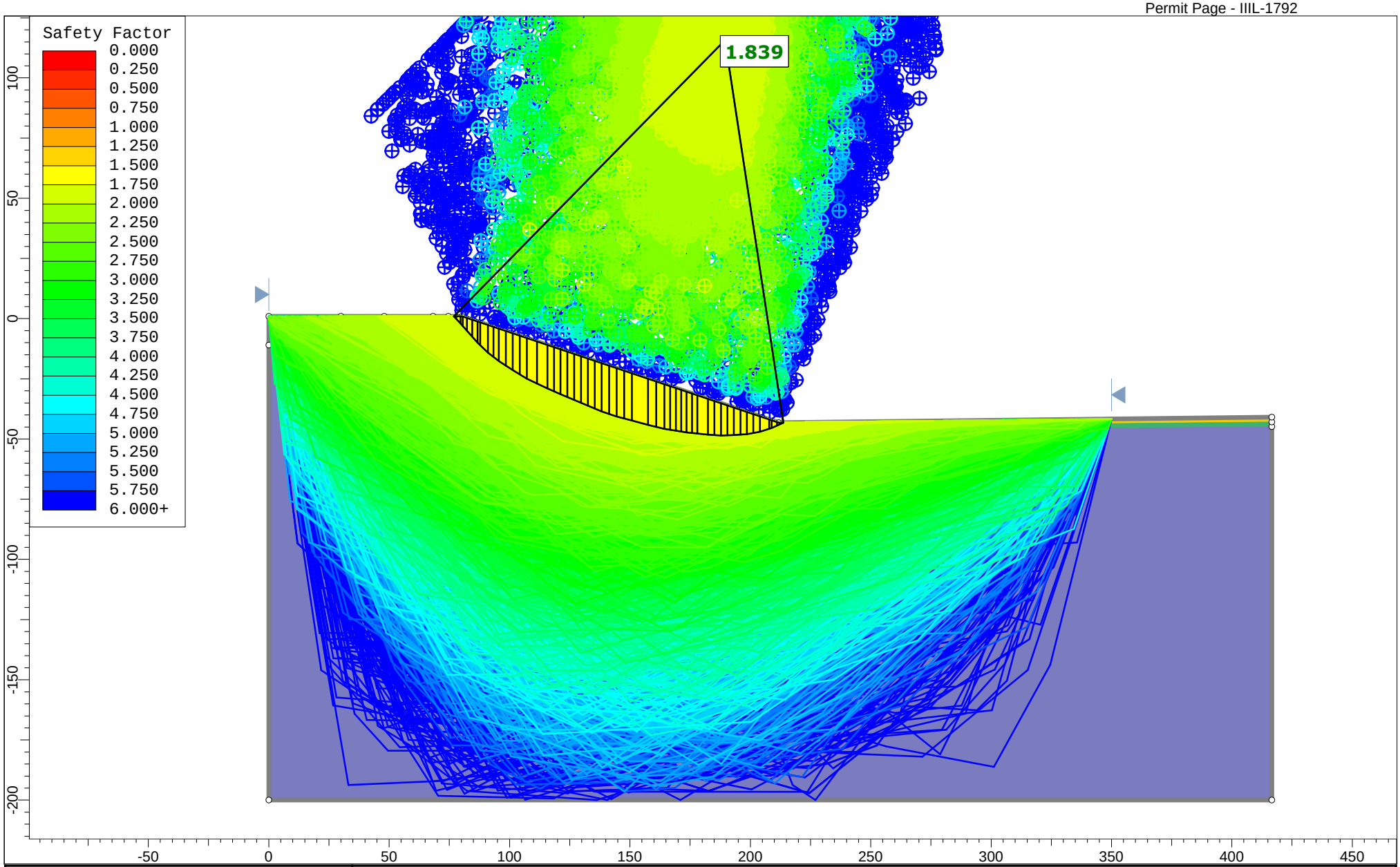

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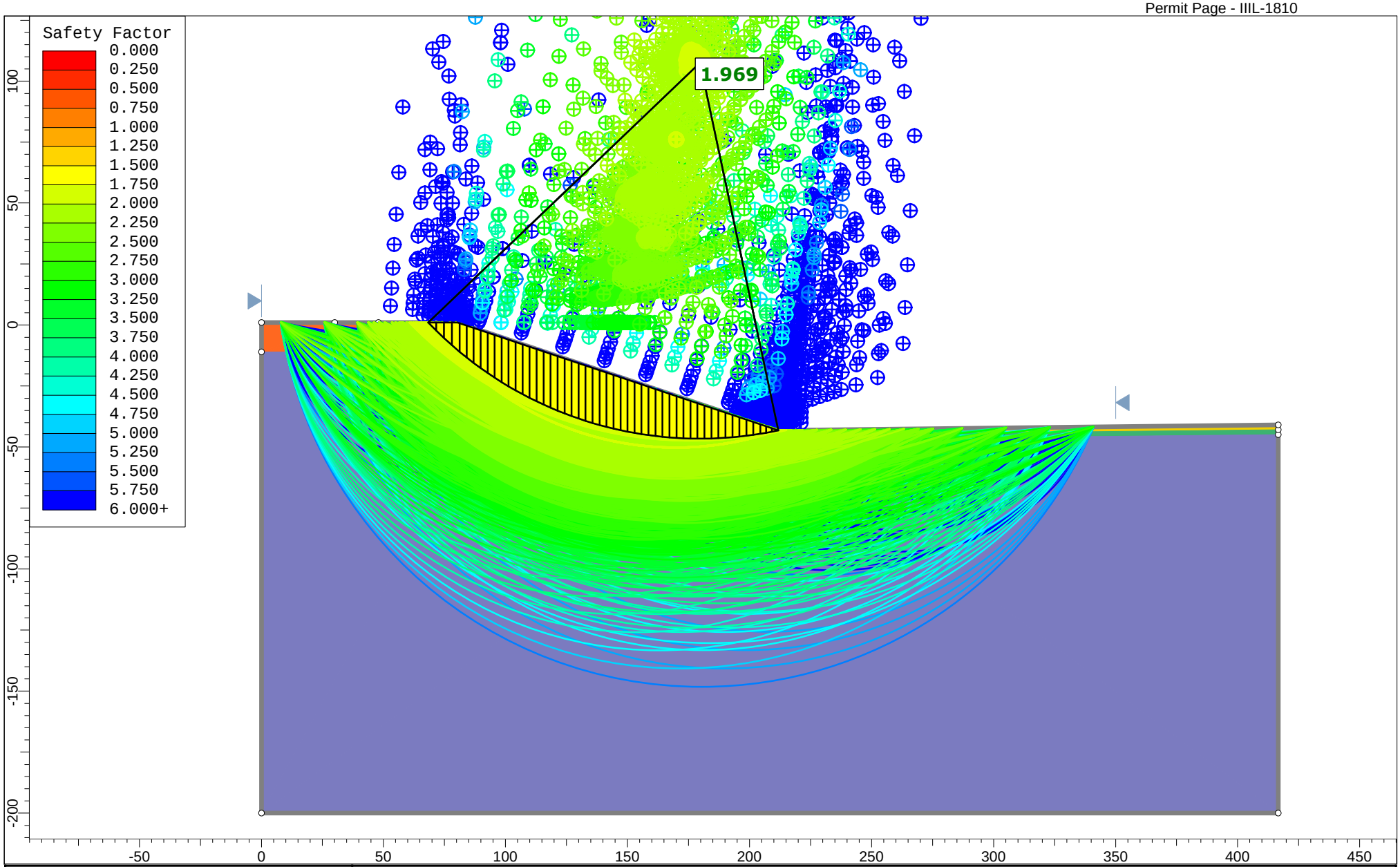

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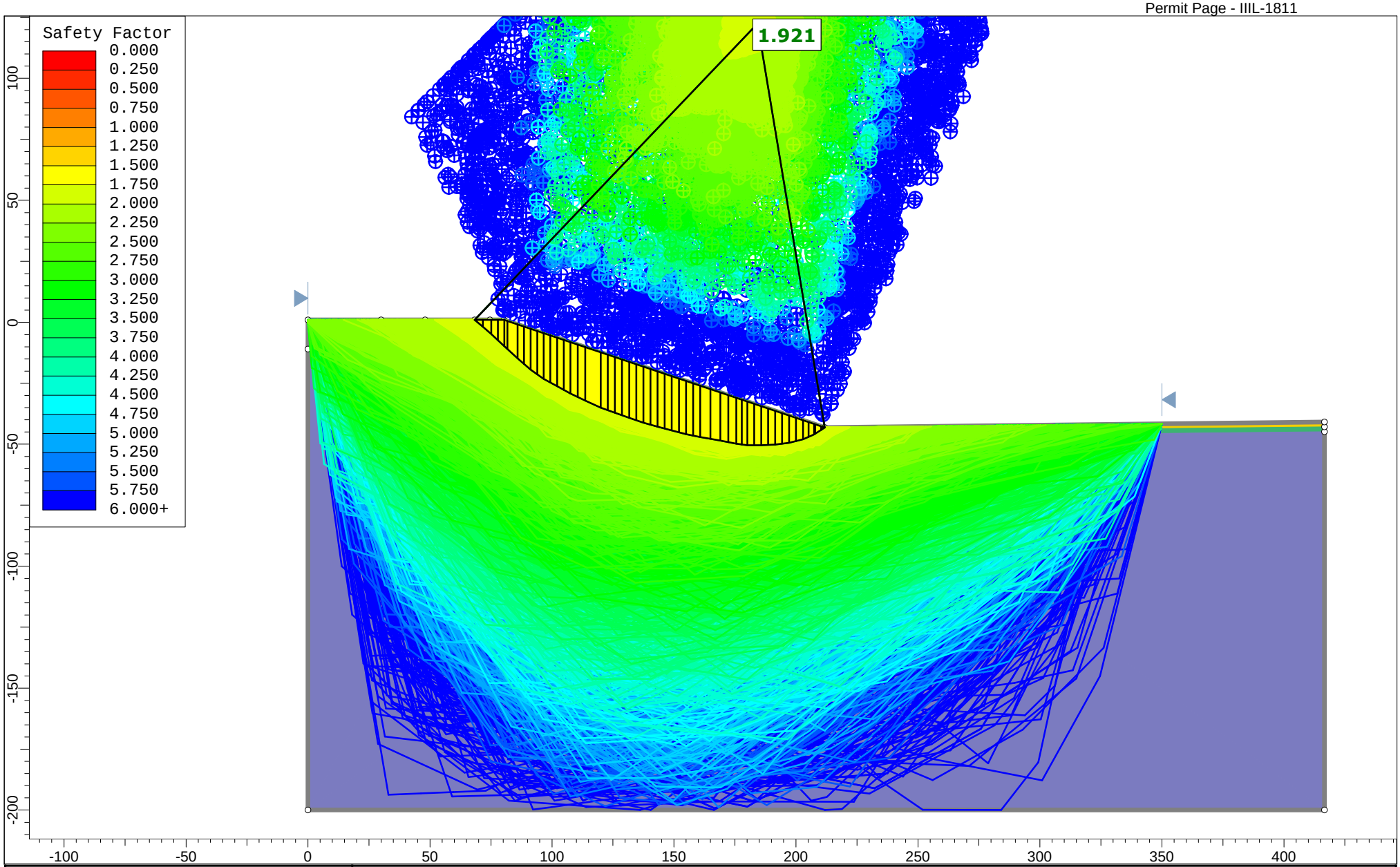

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INTERIM, OVERLINER AND FINAL CONFIGURATION STABILITY ANALYSIS

Permit Page - IIIL-1838A

LEGEND

- PERMIT BOUNDARY
- CLOSED CELL BOUNDARY
- LIMIT OF WASTE
- 1090 FINAL COVER GRADES
- 1084 EXISTING GRADES
- SWALES
- 1090 INTERMEDIATE GRADES
- 1014 EXCAVATION GRADES
- EXISTING CHUTE
- PROPOSED CHUTES
- GP-5 PROPOSED GAS PROBE
- UV-1 PROPOSED GAS VENTS
- CUT/FILL MARKERS

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0 200 400
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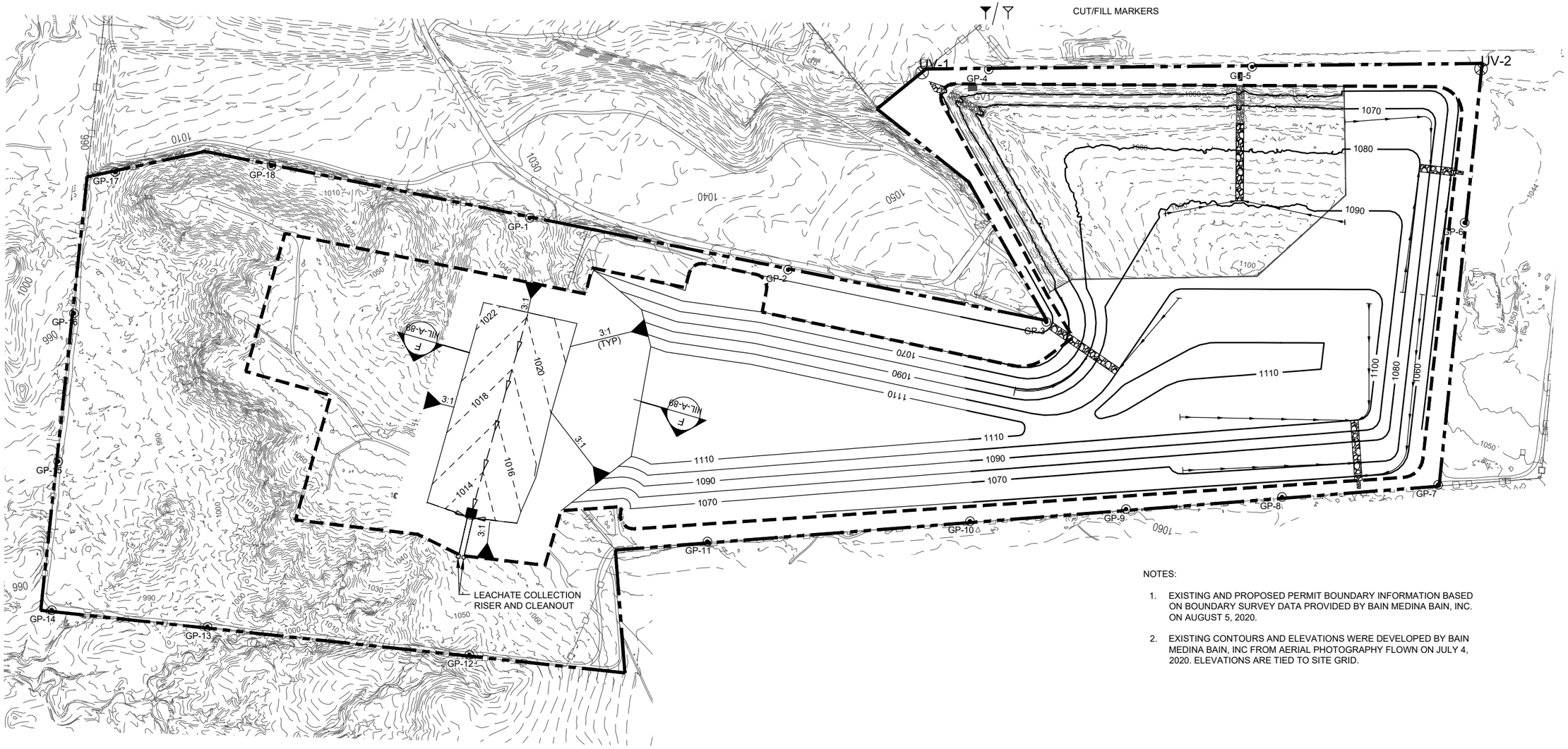

NOTES:

1. EXISTING AND PROPOSED PERMIT BOUNDARY INFORMATION BASED ON BOUNDARY SURVEY DATA PROVIDED BY BAIN MEDINA BAIN, INC. ON AUGUST 5, 2020.
2. EXISTING CONTOURS AND ELEVATIONS WERE DEVELOPED BY BAIN MEDINA BAIN, INC FROM AERIAL PHOTOGRAPHY FLOWN ON JULY 4, 2020. ELEVATIONS ARE TIED TO SITE GRID.

FOR PERMITTING PURPOSES ONLY

CP&Y an STV company
TEXAS REGISTERED ENGINEERING FIRM TBPE F-1741

CITY OF DEL RIO TEXAS

STATE OF TEXAS — TEMOBISTA METAFERIA — 123183 — LICENSED PROFESSIONAL ENGINEER — 05/28/2025

NO.	REVISION	BY	DATE
1.	3RD TECHNICAL NOD	STV	05/ 2025

VERIFY SCALE 0 1" BAR LENGTH EQUALS ONE INCH ON ORIGINAL DRAWING. VERIFY LENGTH ON THIS SHEET AND ADJUST SCALE ACCORDINGLY

CITY OF DEL RIO LANDFILL NO. 207C
MAJOR PERMIT AMENDMENT

INTERIM FILL SLOPE
STABILITY SECTION LOCATION

DESIGN: T. METAFERIA
DRAWN: T. METAFERIA
REVIEW: B. HINDMAN
CP&Y: DELR200302
CLIENT: CITY OF DEL RIO

FIGURE
IIIL-A-88A

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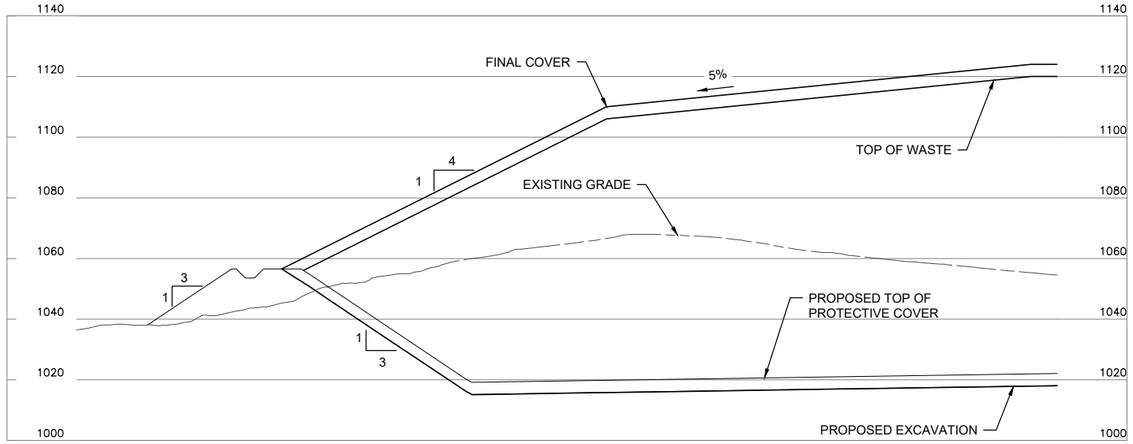
Permit Page - IIIL-1839



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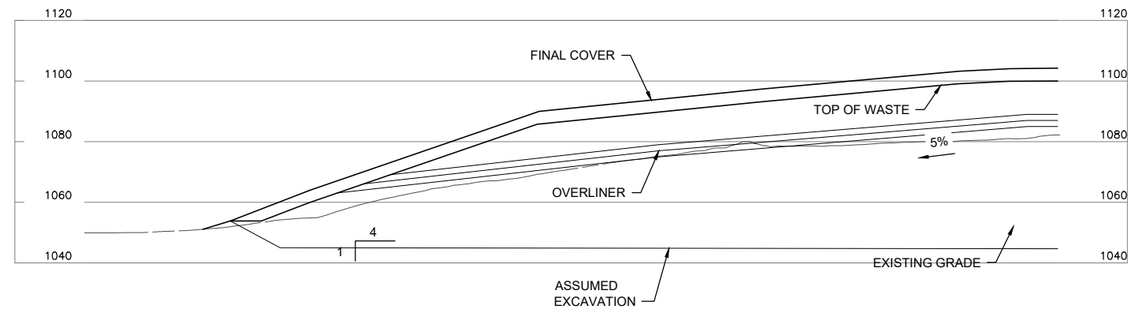

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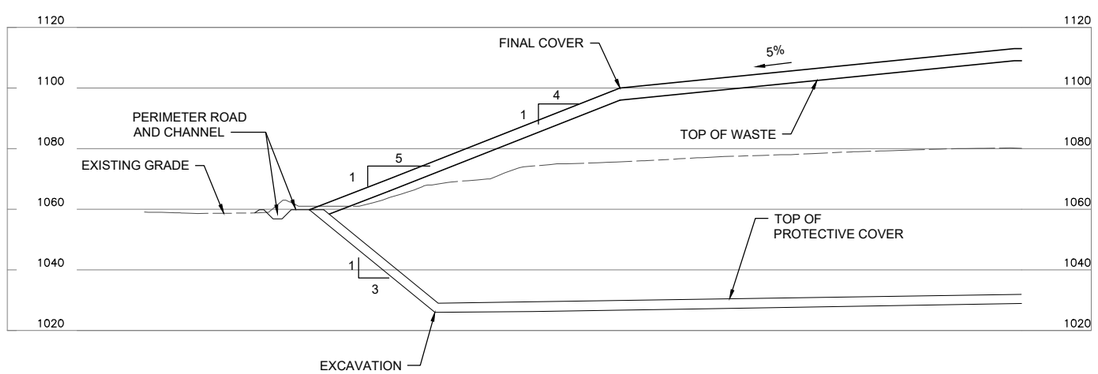

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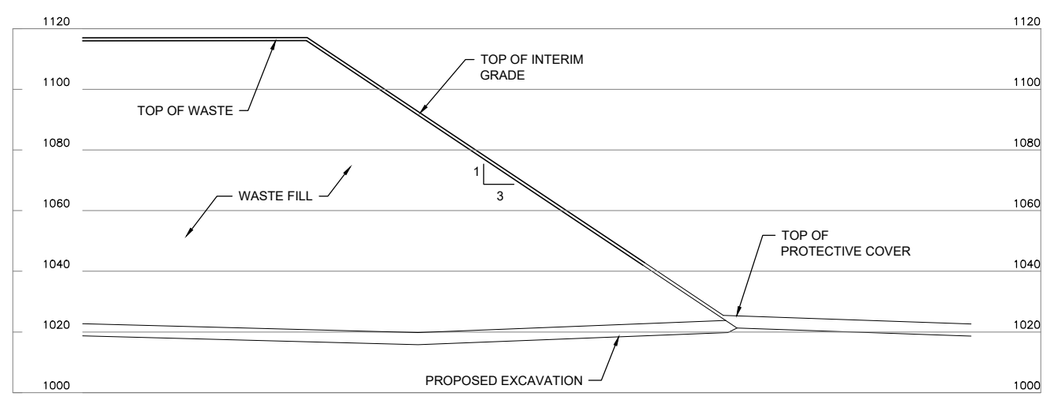

F IIIL-A-89A INTERIM SECTION

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VERT 0 5 10
SCALE IN FEET

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TEXAS REGISTERED ENGINEERING FIRM
TBPE F-1741

CITY OF Del Rio TEXAS

STATE OF TEXAS
TEMOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER
05/28/2025

NO.	REVISION	BY	DATE
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1.	2ND TECHNICAL NOD	STV	03/ 2025

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BAR LENGTH EQUALS ONE INCH ON ORIGINAL DRAWING. VERIFY LENGTH ON THIS SHEET AND ADJUST SCALE ACCORDINGLY.

CITY OF DEL RIO LANDFILL NO. 207C
MAJOR PERMIT AMENDMENT

OVERLINER AND FINAL COVER SLOPE
CROSS SECTIONS

DESIGN: T. METAFERIA
DRAWN: T. METAFERIA
REVIEW: B. HINDMAN
CP&Y: DELR200302
CLIENT: CITY OF DEL RIO

FIGURE
IIIL-A-89

PRINTED BY: MetafeT
FILE PATH: C:\pwworking\stv\pw_stv\tmetaferia\d0942279\DELR200302 Slope Stability Cross Section.dwg

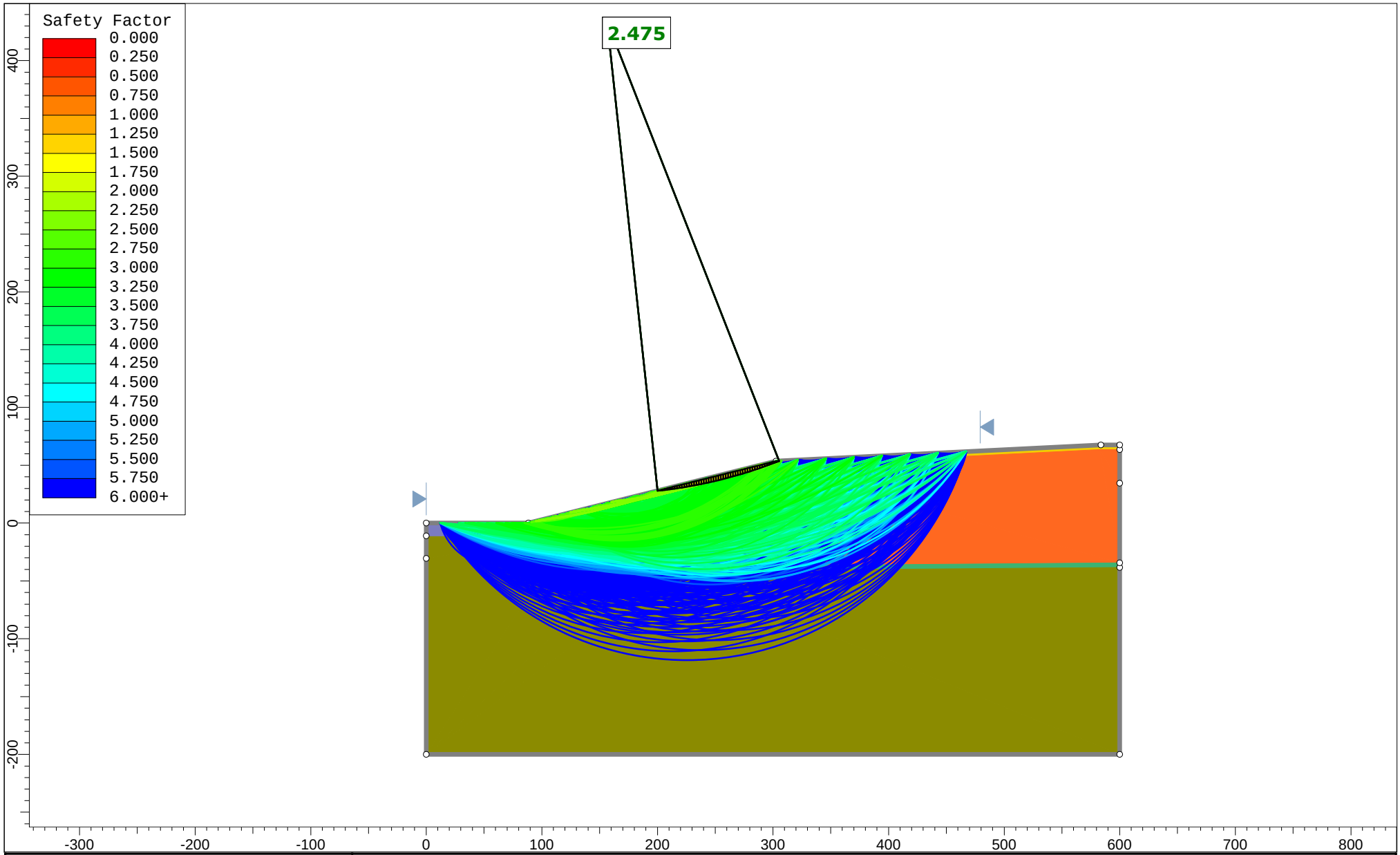
Factor of Safety Summary for Final Slope Stability Analysis

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Effective	Total	Effective	Total	Effective	Total
Final Cover C-1	Bishop-Circular	2.4	2.4	1.5	1.3	YES	YES
Final Cover D-1	Bishop-Circular	3.1	3.1	1.5	1.3	YES	YES
Overliner E-1	Bishop-Circular	2.4	2.4	1.5	1.3	YES	YES
Interim F-1	Bishop-Circular	1.9	1.9	1.5	1.3	YES	YES

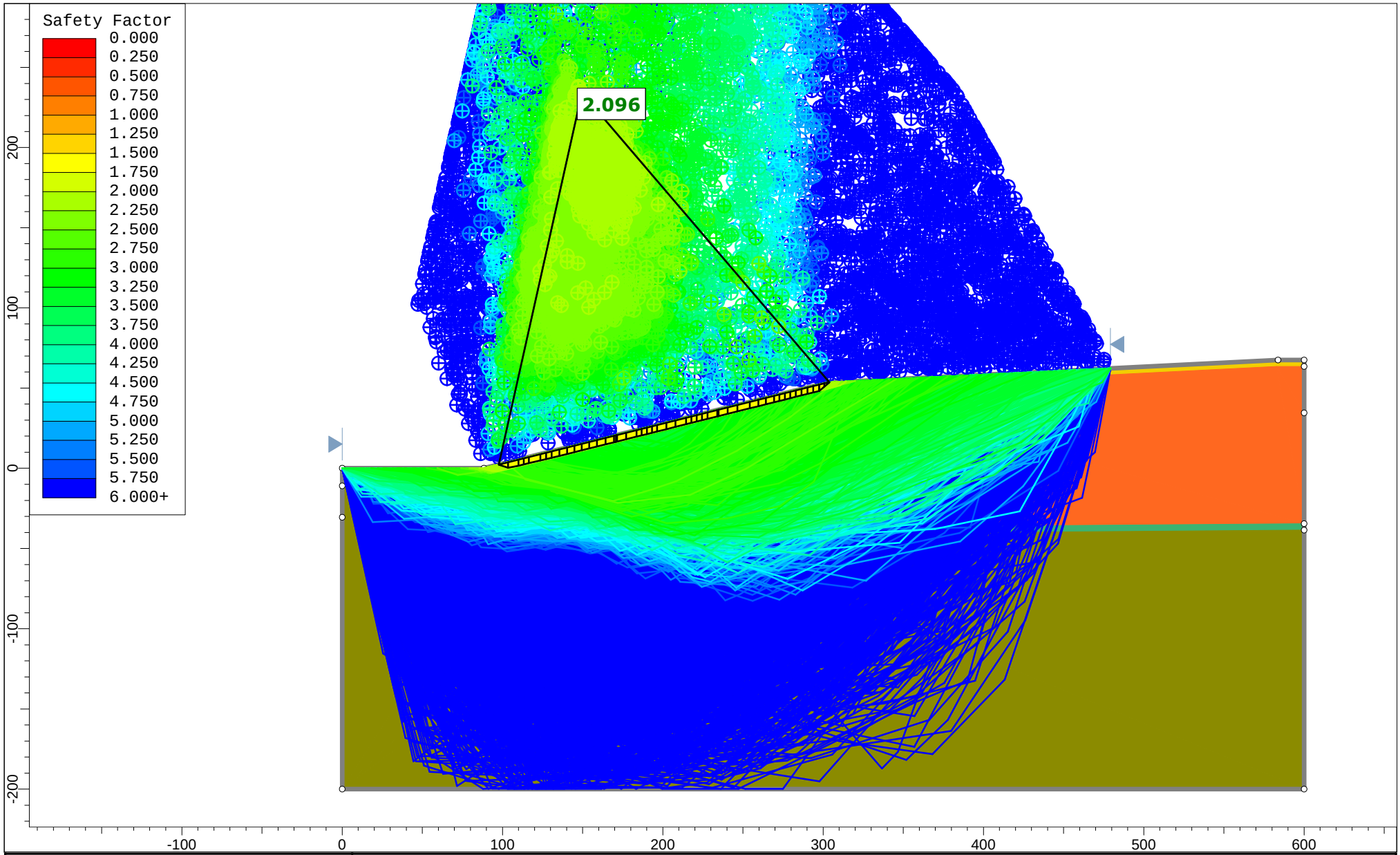
Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Effective	Total	Effective	Total	Effective	Total
Final Cover C-2	Janbu	2.0	2.0	1.5	1.3	YES	YES
Final Cover D-2	Janbu	3.1	2.6	1.5	1.3	YES	YES
Overliner E-2	Janbu	3.0	3.0	1.5	1.3	YES	YES
Interim F-2	Janbu	1.7	1.7	1.5	1.3	YES	YES

Minimum Required Interface Strength Parameters

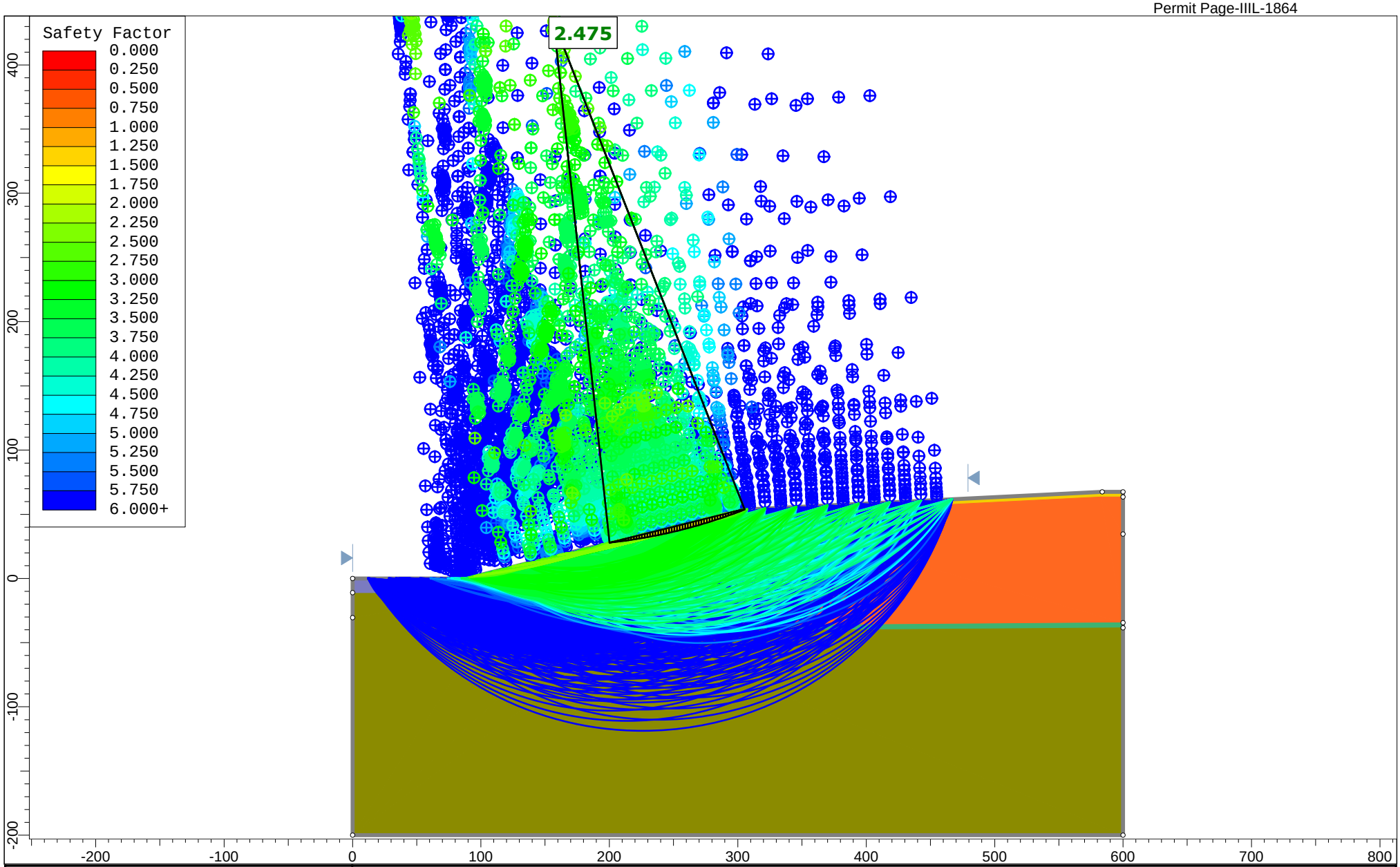
Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner	Protective Cover/ Geocomposite	100.0	18.0	80.0	14.0
Liner	Geocomposite/ Textured Geomembrane	100.0	21.0	80.0	10.0
Liner	Textured Geomembrane/ Geosynthetic Clay Liner	100.0	18.0	80.0	10.0
Liner	Geocomposite/ Clay Liner	100.0	15.0	80.0	10.0



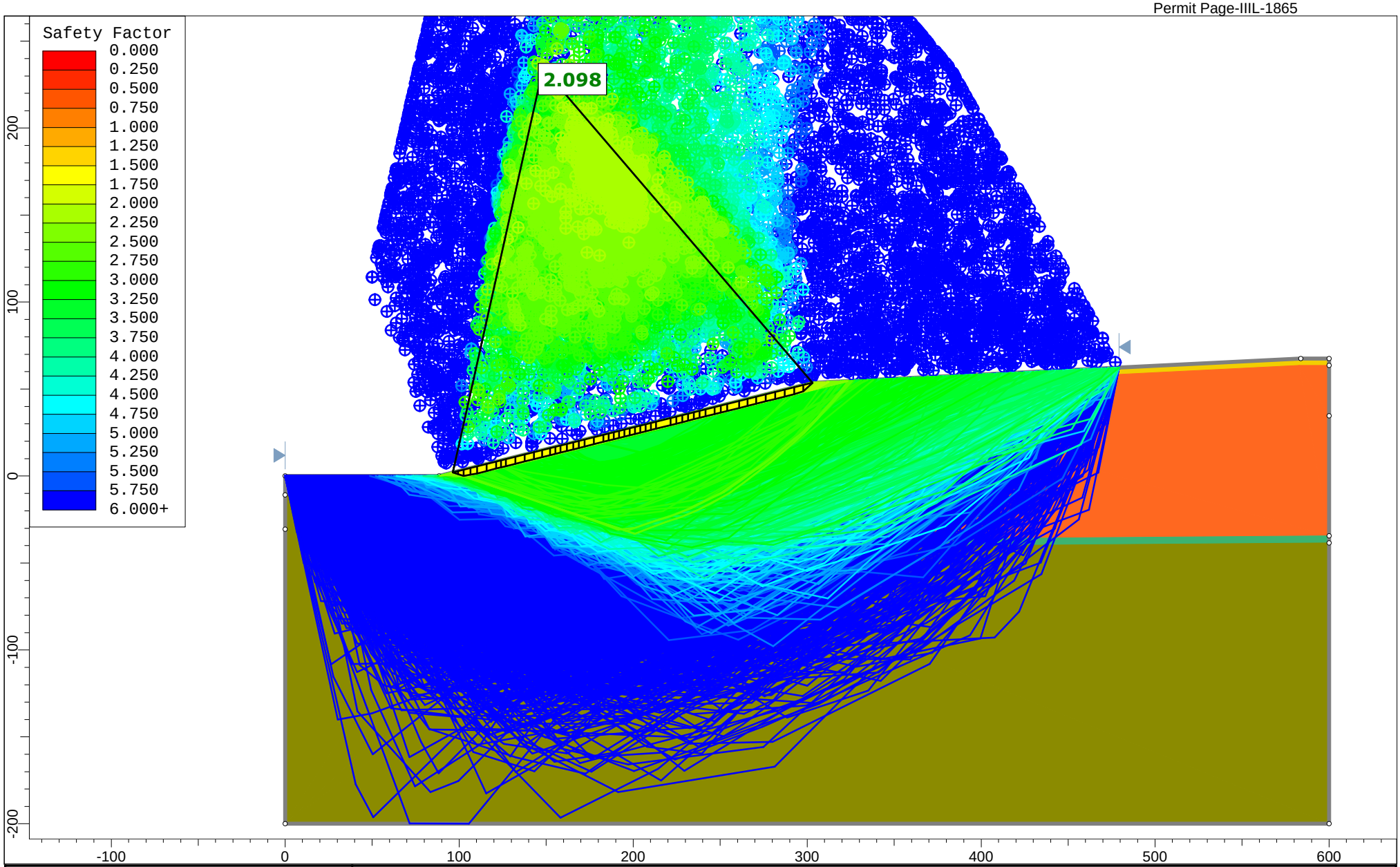
rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date	3/22/2025, 10:02:02 PM	File Name: Slide2-FC Section C_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date	3/22/2025, 10:02:02 PM	File Name: Slide2-FC Section C_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-FC Section C_Total Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method -Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-FC Section C_Total Stress.slmd

Materials

Final Cover	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	16
Water Surface	Assigned per scenario
Ru Value	0
Liner	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	116
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Waste	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	47
Cohesion [psf]	288
Friction Angle [deg]	23
Water Surface	Assigned per scenario
Ru Value	0
Stratum II	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110.9
Cohesion [psf]	4000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Stratum III	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	109.7
Cohesion [psf]	2800
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Simplified Bishop Method - Total Stress	Simplified Janbu Method - Total Stress
Final Cover		✓	✓
Liner		✓	✓
Waste		✓	✓
Stratum II		✓	✓
Stratum III		✓	✓

Global Minimums

Simplified Bishop Method - Total Stress

Method: bishop simplified

FS	2.474790
Center:	156.527, 433.638
Radius:	408.086
Left Slip Surface Endpoint:	200.091, 27.884
Right Slip Surface Endpoint:	305.279, 53.628
Resisting Moment:	8.35479e+06 lb-ft
Driving Moment:	3.37595e+06 lb-ft
Total Slice Area:	287.057 ft2
Surface Horizontal Width:	105.188 ft
Surface Average Height:	2.72898 ft

Simplified Janbu Method -Total Stress

Method: janbu simplified

FS	2.097560
Axis Location:	148.079, 234.531
Left Slip Surface Endpoint:	96.241, 1.958
Right Slip Surface Endpoint:	303.035, 53.517
Resisting Horizontal Force:	46511.7 lb
Driving Horizontal Force:	22175.8 lb
Total Slice Area:	796.393 ft2
Surface Horizontal Width:	206.794 ft
Surface Average Height:	3.85113 ft

Global Minimum Coordinates

Simplified Janbu Method -Total Stress

Method: janbu simplified

X	Y
96.2411	1.95754
102.538	0.00280765
106.43	0.717132
110.322	1.43146
115.787	2.81691
121.249	4.24041
126.747	5.60555
132.244	6.97069
137.599	8.31257
142.953	9.64254
152.192	11.9043
158.243	13.4255
165.515	15.2253
172.051	16.8545
177.427	18.2488
182.803	19.6432
188.873	21.0632
194.942	22.6289
201.011	24.1047
207.08	25.6374
213.149	27.1764
221.487	29.2356
228.166	30.917
234.844	32.5983
241.523	34.2713
246.788	35.5909
253.971	37.3521
260.856	39.0456
265.748	40.2825
270.64	41.5195
276.112	42.8795
281.584	44.2395
287.056	45.5911
292.528	46.9616
297.782	48.715
303.035	53.5167

Valid and Invalid Surfaces

Simplified Bishop Method - Total Stress

Method: bishop simplified

Number of Valid Surfaces:	11850
Number of Invalid Surfaces:	0

Simplified Janbu Method -Total Stress

Method: janbu simplified

Number of Valid Surfaces:	23758
Number of Invalid Surfaces:	1311

Error Codes
Error Code -106 reported for 8 surfaces
Error Code -108 reported for 42 surfaces
Error Code -111 reported for 476 surfaces
Error Code -112 reported for 257 surfaces
Error Code -121 reported for 115 surfaces
Error Code -124 reported for 1 surface
Error Code -145 reported for 73 surfaces
Error Code -1000 reported for 339 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

-121 = Concave failure surface, only convex surfaces have been defined as being allowed.

-124 = A slice has a width less than the minimum acceptable value.

-145 = Slip surface was clipped vertically by a weak layer in a region of compression. Such a surface cannot be evaluated using Limit Equilibrium. For more information, see Help Documentation on weak layers.

-1000 = No valid slip surface is generated

Slice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 2.47479

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.10377	37.0869	6.27669	Final Cover	100	16	41.9167	103.735	13.0259	0	13.0259	17.6363	17.6363
2	2.10377	109.866	6.57393	Final Cover	100	16	45.8472	113.462	46.9483	0	46.9483	52.2319	52.2319
3	2.10377	179.852	6.87134	Final Cover	100	16	49.6212	122.802	79.5206	0	79.5206	85.5002	85.5002
4	2.10377	247.04	7.16895	Final Cover	100	16	53.2388	131.755	110.742	0	110.742	117.438	117.438
5	2.10377	311.425	7.46675	Final Cover	100	16	56.6998	140.32	140.613	0	140.613	148.044	148.044
6	2.10377	373.001	7.76475	Final Cover	100	16	60.0043	148.498	169.133	0	169.133	177.315	177.315
7	2.10377	431.763	8.06296	Final Cover	100	16	63.1522	156.288	196.301	0	196.301	205.247	205.247
8	2.10377	487.703	8.36139	Final Cover	100	16	66.1435	163.691	222.118	0	222.118	231.84	231.84
9	2.10377	540.817	8.66005	Final Cover	100	16	68.9781	170.706	246.582	0	246.582	257.088	257.088
10	2.10377	591.096	8.95895	Final Cover	100	16	71.6558	177.333	269.692	0	269.692	280.989	280.989
11	2.10377	638.535	9.2581	Final Cover	100	16	74.1766	183.572	291.449	0	291.449	303.54	303.54
12	2.10377	683.127	9.5575	Final Cover	100	16	76.5404	189.421	311.849	0	311.849	324.737	324.737
13	2.10377	724.863	9.85716	Final Cover	100	16	78.747	194.882	330.894	0	330.894	344.577	344.577
14	2.10377	763.736	10.1571	Final Cover	100	16	80.7964	199.954	348.581	0	348.581	363.056	363.056
15	2.10377	799.738	10.4573	Final Cover	100	16	82.6882	204.636	364.909	0	364.909	380.17	380.17
16	2.10377	832.861	10.7578	Final Cover	100	16	84.4225	208.928	379.876	0	379.876	395.917	395.917
17	2.10377	863.097	11.0586	Final Cover	100	16	85.9988	212.829	393.482	0	393.482	410.29	410.29
18	2.10377	890.436	11.3597	Final Cover	100	16	87.4171	216.339	405.724	0	405.724	423.287	423.287
19	2.10377	914.87	11.6612	Final Cover	100	16	88.6774	219.458	416.601	0	416.601	434.902	434.902
20	2.10377	936.389	11.9629	Final Cover	100	16	89.7793	222.185	426.11	0	426.11	445.132	445.132
21	2.10377	954.983	12.265	Final Cover	100	16	90.7224	224.519	434.249	0	434.249	453.972	453.972
22	2.10377	970.644	12.5675	Final Cover	100	16	91.5068	226.46	441.017	0	441.017	461.417	461.417
23	2.10377	983.359	12.8703	Final Cover	100	16	92.1315	228.006	446.412	0	446.412	467.462	467.462
24	2.10377	993.12	13.1735	Final Cover	100	16	92.5974	229.159	450.43	0	450.43	472.103	472.103
25	2.10377	999.914	13.477	Final Cover	100	16	92.9028	229.915	453.069	0	453.069	475.333	475.333
26	2.10377	1003.73	13.7809	Final Cover	100	16	93.0487	230.276	454.326	0	454.326	477.149	477.149
27	2.10377	1004.56	14.0853	Final Cover	100	16	93.0342	230.24	454.2	0	454.2	477.543	477.543
28	2.10377	1002.39	14.39	Final Cover	100	16	92.8588	229.806	452.687	0	452.687	476.512	476.512
29	2.10377	997.203	14.6951	Final Cover	100	16	92.5222	228.973	449.783	0	449.783	474.048	474.048

30	2.10377	988.993	15.0007	Final Cover	100	16	92.0244	227.741	445.487	0	445.487	470.146	470.146
31	2.10377	977.745	15.3067	Final Cover	100	16	91.3649	226.109	439.794	0	439.794	464.8	464.8
32	2.10377	963.445	15.6132	Final Cover	100	16	90.543	224.075	432.701	0	432.701	458.003	458.003
33	2.10377	946.081	15.9201	Final Cover	100	16	89.5587	221.639	424.204	0	424.204	449.75	449.75
34	2.10377	925.638	16.2275	Final Cover	100	16	88.4111	218.799	414.301	0	414.301	440.032	440.032
35	2.10377	902.101	16.5354	Final Cover	100	16	87.0999	215.554	402.986	0	402.986	428.845	428.845
36	2.10377	875.457	16.8437	Final Cover	100	16	85.625	211.904	390.257	0	390.257	416.18	416.18
37	2.10377	845.69	17.1526	Final Cover	100	16	83.9857	207.847	376.109	0	376.109	402.03	402.03
38	2.10377	812.784	17.462	Final Cover	100	16	82.1815	203.382	360.537	0	360.537	386.389	386.389
39	2.10377	776.724	17.7719	Final Cover	100	16	80.2121	198.508	343.539	0	343.539	369.248	369.248
40	2.10377	737.494	18.0823	Final Cover	100	16	78.0766	193.223	325.107	0	325.107	350.6	350.6
41	2.10377	695.076	18.3933	Final Cover	100	16	75.7746	187.526	305.24	0	305.24	330.437	330.437
42	2.10377	649.454	18.7049	Final Cover	100	16	73.3055	181.416	283.931	0	283.931	308.75	308.75
43	2.10377	600.609	19.017	Final Cover	100	16	70.6689	174.891	261.175	0	261.175	285.532	285.532
44	2.10377	548.525	19.3297	Final Cover	100	16	67.8641	167.95	236.968	0	236.968	260.774	260.774
45	2.10377	493.182	19.6431	Final Cover	100	16	64.8906	160.59	211.304	0	211.304	234.466	234.466
46	2.10377	434.562	19.957	Final Cover	100	16	61.7475	152.812	184.178	0	184.178	206.6	206.6
47	2.10377	372.644	20.2716	Final Cover	100	16	58.4345	144.613	155.584	0	155.584	177.167	177.167
48	2.10377	307.409	20.5868	Final Cover	100	16	54.9506	135.991	125.517	0	125.517	146.157	146.157
49	2.10377	236.13	20.9026	Final Cover	100	16	51.1526	126.592	92.7374	0	92.7374	112.273	112.273
50	2.10377	89.8717	21.2191	Final Cover	100	16	43.4076	107.425	25.8934	0	25.8934	42.7468	42.7468

Query 1 (bishop simplified) - Safety Factor: 2.47479

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.10377	37.0869	6.27669	Final Cover	100	16	41.9167	103.735	13.0259	0	13.0259	17.6363	17.6363
2	2.10377	109.866	6.57393	Final Cover	100	16	45.8472	113.462	46.9483	0	46.9483	52.2319	52.2319
3	2.10377	179.852	6.87134	Final Cover	100	16	49.6212	122.802	79.5206	0	79.5206	85.5002	85.5002
4	2.10377	247.04	7.16895	Final Cover	100	16	53.2388	131.755	110.742	0	110.742	117.438	117.438
5	2.10377	311.425	7.46675	Final Cover	100	16	56.6998	140.32	140.613	0	140.613	148.044	148.044
6	2.10377	373.001	7.76475	Final Cover	100	16	60.0043	148.498	169.133	0	169.133	177.315	177.315
7	2.10377	431.763	8.06296	Final Cover	100	16	63.1522	156.288	196.301	0	196.301	205.247	205.247
8	2.10377	487.703	8.36139	Final Cover	100	16	66.1435	163.691	222.118	0	222.118	231.84	231.84
9	2.10377	540.817	8.66005	Final Cover	100	16	68.9781	170.706	246.582	0	246.582	257.088	257.088
10	2.10377	591.096	8.95895	Final Cover	100	16	71.6558	177.333	269.692	0	269.692	280.989	280.989
11	2.10377	638.535	9.2581	Final Cover	100	16	74.1766	183.572	291.449	0	291.449	303.54	303.54
12	2.10377	683.127	9.5575	Final Cover	100	16	76.5404	189.421	311.849	0	311.849	324.737	324.737
13	2.10377	724.863	9.85716	Final Cover	100	16	78.747	194.882	330.894	0	330.894	344.577	344.577
14	2.10377	763.736	10.1571	Final Cover	100	16	80.7964	199.954	348.581	0	348.581	363.056	363.056
15	2.10377	799.738	10.4573	Final Cover	100	16	82.6882	204.636	364.909	0	364.909	380.17	380.17
16	2.10377	832.861	10.7578	Final Cover	100	16	84.4225	208.928	379.876	0	379.876	395.917	395.917
17	2.10377	863.097	11.0586	Final Cover	100	16	85.9988	212.829	393.482	0	393.482	410.29	410.29
18	2.10377	890.436	11.3597	Final Cover	100	16	87.4171	216.339	405.724	0	405.724	423.287	423.287
19	2.10377	914.87	11.6612	Final Cover	100	16	88.6774	219.458	416.601	0	416.601	434.902	434.902
20	2.10377	936.389	11.9629	Final Cover	100	16	89.7793	222.185	426.11	0	426.11	445.132	445.132
21	2.10377	954.983	12.265	Final Cover	100	16	90.7224	224.519	434.249	0	434.249	453.972	453.972
22	2.10377	970.644	12.5675	Final Cover	100	16	91.5068	226.46	441.017	0	441.017	461.417	461.417
23	2.10377	983.359	12.8703	Final Cover	100	16	92.1315	228.006	446.412	0	446.412	467.462	467.462
24	2.10377	993.12	13.1735	Final Cover	100	16	92.5974	229.159	450.43	0	450.43	472.103	472.103
25	2.10377	999.914	13.477	Final Cover	100	16	92.9028	229.915	453.069	0	453.069	475.333	475.333
26	2.10377	1003.73	13.7809	Final Cover	100	16	93.0487	230.276	454.326	0	454.326	477.149	477.149
27	2.10377	1004.56	14.0853	Final Cover	100	16	93.0342	230.24	454.2	0	454.2	477.543	477.543
28	2.10377	1002.39	14.39	Final Cover	100	16	92.8588	229.806	452.687	0	452.687	476.512	476.512
29	2.10377	997.203	14.6951	Final Cover	100	16	92.5222	228.973	449.783	0	449.783	474.048	474.048
30	2.10377	988.993	15.0007	Final Cover	100	16	92.0244	227.741	445.487	0	445.487	470.146	470.146
31	2.10377	977.745	15.3067	Final Cover	100	16	91.3649	226.109	439.794	0	439.794	464.8	464.8
32	2.10377	963.445	15.6132	Final Cover	100	16	90.543	224.075	432.701	0	432.701	458.003	458.003
33	2.10377	946.081	15.9201	Final Cover	100	16	89.5587	221.639	424.204	0	424.204	449.75	449.75

34	2.10377	925.638	16.2275	Final Cover	100	16	88.4111	218.799	414.301	0	414.301	440.032	440.032
35	2.10377	902.101	16.5354	Final Cover	100	16	87.0999	215.554	402.986	0	402.986	428.845	428.845
36	2.10377	875.457	16.8437	Final Cover	100	16	85.625	211.904	390.257	0	390.257	416.18	416.18
37	2.10377	845.69	17.1526	Final Cover	100	16	83.9857	207.847	376.109	0	376.109	402.03	402.03
38	2.10377	812.784	17.462	Final Cover	100	16	82.1815	203.382	360.537	0	360.537	386.389	386.389
39	2.10377	776.724	17.7719	Final Cover	100	16	80.2121	198.508	343.539	0	343.539	369.248	369.248
40	2.10377	737.494	18.0823	Final Cover	100	16	78.0766	193.223	325.107	0	325.107	350.6	350.6
41	2.10377	695.076	18.3933	Final Cover	100	16	75.7746	187.526	305.24	0	305.24	330.437	330.437
42	2.10377	649.454	18.7049	Final Cover	100	16	73.3055	181.416	283.931	0	283.931	308.75	308.75
43	2.10377	600.609	19.017	Final Cover	100	16	70.6689	174.891	261.175	0	261.175	285.532	285.532
44	2.10377	548.525	19.3297	Final Cover	100	16	67.8641	167.95	236.968	0	236.968	260.774	260.774
45	2.10377	493.182	19.6431	Final Cover	100	16	64.8906	160.59	211.304	0	211.304	234.466	234.466
46	2.10377	434.562	19.957	Final Cover	100	16	61.7475	152.812	184.178	0	184.178	206.6	206.6
47	2.10377	372.644	20.2716	Final Cover	100	16	58.4345	144.613	155.584	0	155.584	177.167	177.167
48	2.10377	307.409	20.5868	Final Cover	100	16	54.9506	135.991	125.517	0	125.517	146.157	146.157
49	2.10377	236.13	20.9026	Final Cover	100	16	51.1526	126.592	92.7374	0	92.7374	112.273	112.273
50	2.10377	89.8717	21.2191	Final Cover	100	16	43.4076	107.425	25.8934	0	25.8934	42.7468	42.7468

Simplified Janbu Method -Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 2.09756

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.14861	333.139	-17.245	Final Cover	100	16	64.8868	136.104	125.909	0	125.909	105.767	105.767
2	3.14861	999.416	-17.245	Final Cover	100	16	95.0942	199.466	346.877	0	346.877	317.359	317.359
3	3.892	1707.26	10.4001	Final Cover	100	16	105.011	220.267	419.42	0	419.42	438.694	438.694
4	3.892	1827.44	10.4001	Final Cover	100	16	109.129	228.905	449.544	0	449.544	469.573	469.573
5	5.46425	2643.04	14.2275	Final Cover	100	16	109.993	230.716	455.861	0	455.861	483.749	483.749
6	5.4628	2615.79	14.6053	Final Cover	100	16	109.249	229.156	450.421	0	450.421	478.889	478.889
7	2.74877	1306.97	13.9456	Final Cover	100	16	108.981	228.594	448.464	0	448.464	475.526	475.526
8	2.74877	1308.17	13.9456	Final Cover	100	16	109.039	228.716	448.887	0	448.887	475.964	475.964
9	5.49754	2619.97	13.9456	Final Cover	100	16	109.126	228.899	449.523	0	449.523	476.621	476.621
10	5.3545	2552.51	14.069	Final Cover	100	16	109.111	228.866	449.41	0	449.41	476.754	476.754
11	5.3545	2553.04	13.949	Final Cover	100	16	109.156	228.961	449.741	0	449.741	476.853	476.853
12	4.61909	2210.44	13.757	Final Cover	100	16	109.438	229.552	451.802	0	451.802	478.596	478.596
13	4.61909	2222.79	13.757	Final Cover	100	16	109.791	230.294	454.389	0	454.389	481.269	481.269
14	3.02557	1459.04	14.1115	Final Cover	100	16	109.831	230.377	454.677	0	454.677	482.288	482.288
15	3.02557	1457.12	14.1115	Final Cover	100	16	109.747	230.201	454.065	0	454.065	481.655	481.655
16	3.6359	1751.61	13.9017	Final Cover	100	16	109.823	230.361	454.623	0	454.623	481.805	481.805
17	3.6359	1755.01	13.9017	Final Cover	100	16	109.947	230.62	455.528	0	455.528	482.741	482.741
18	3.26813	1579.28	13.9953	Final Cover	100	16	109.994	230.72	455.873	0	455.873	483.288	483.288
19	3.26813	1579.81	13.9953	Final Cover	100	16	110.015	230.764	456.027	0	456.027	483.448	483.448
20	5.37624	2582.45	14.5399	Final Cover	100	16	109.466	229.611	452.007	0	452.007	480.398	480.398
21	5.37624	2548.77	14.5399	Final Cover	100	16	108.639	227.876	445.957	0	445.957	474.134	474.134
22	3.03461	1437.82	13.1681	Final Cover	100	16	108.967	228.565	448.36	0	448.36	473.854	473.854
23	3.03461	1455.15	13.1681	Final Cover	100	16	109.724	230.153	453.895	0	453.895	479.566	479.566
24	3.0346	1459.21	14.4662	Final Cover	100	16	109.553	229.795	452.647	0	452.647	480.91	480.91
25	3.0346	1450	14.4662	Final Cover	100	16	109.153	228.954	449.715	0	449.715	477.875	477.875
26	3.03461	1448.99	13.6664	Final Cover	100	16	109.322	229.309	450.954	0	450.954	477.535	477.535
27	3.03461	1456.17	13.6664	Final Cover	100	16	109.635	229.966	453.243	0	453.243	479.901	479.901
28	3.03461	1458.16	14.1732	Final Cover	100	16	109.586	229.863	452.887	0	452.887	480.562	480.562
29	3.03461	1454.96	14.1732	Final Cover	100	16	109.447	229.571	451.867	0	451.867	479.507	479.507
30	3.03461	1451.2	14.2285	Final Cover	100	16	109.268	229.196	450.562	0	450.562	478.269	478.269
31	3.03461	1446.87	14.2285	Final Cover	100	16	109.08	228.801	449.183	0	449.183	476.842	476.842
32	8.3375	3980.4	13.8736	Final Cover	100	16	109.256	229.172	450.475	0	450.475	477.46	477.46

33	3.3394	1597.31	14.1302	Final Cover	100	16	109.308	229.281	450.855	0	450.855	478.373	478.373
34	3.3394	1594.51	14.1302	Final Cover	100	16	109.197	229.048	450.045	0	450.045	477.535	477.535
35	3.3394	1591.71	14.1302	Final Cover	100	16	109.087	228.816	449.235	0	449.235	476.696	476.696
36	3.3394	1588.91	14.1302	Final Cover	100	16	108.976	228.583	448.424	0	448.424	475.858	475.858
37	3.3394	1586.95	14.0627	Final Cover	100	16	108.916	228.458	447.988	0	447.988	475.27	475.27
38	3.3394	1585.82	14.0627	Final Cover	100	16	108.872	228.365	447.662	0	447.662	474.934	474.934
39	5.26507	2497.76	14.0707	Final Cover	100	16	108.806	228.227	447.182	0	447.182	474.453	474.453
40	3.59147	1706.13	13.7767	Final Cover	100	16	108.97	228.571	448.382	0	448.382	475.101	475.101
41	3.59147	1713.03	13.7767	Final Cover	100	16	109.224	229.104	450.24	0	450.24	477.021	477.021
42	6.88501	3301.06	13.8182	Final Cover	100	16	109.542	229.77	452.563	0	452.563	479.506	479.506
43	4.89168	2348.17	14.1911	Final Cover	100	16	109.518	229.721	452.391	0	452.391	480.086	480.086
44	4.89168	2338.92	14.1911	Final Cover	100	16	109.268	229.197	450.562	0	450.562	478.193	478.193
45	5.47205	2613.24	13.9571	Final Cover	100	16	109.254	229.167	450.459	0	450.459	477.612	477.612
46	5.47205	2617.26	13.9571	Final Cover	100	16	109.351	229.371	451.168	0	451.168	478.346	478.346
47	5.47205	2624.02	13.8745	Final Cover	100	16	109.537	229.76	452.525	0	452.525	479.581	479.581
48	5.47205	2627.34	14.0605	Final Cover	100	16	109.567	229.823	452.749	0	452.749	480.19	480.19
49	5.25387	2381.94	18.4558	Final Cover	100	16	104.876	219.983	418.433	0	418.433	453.434	453.434
50	5.25377	1141.1	42.4261	Final Cover	100	16	68.7875	144.286	154.443	0	154.443	217.313	217.313

Query 1 (janbu simplified) - Safety Factor: 2.09756

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.14861	333.139	-17.245	Final Cover	100	16	64.8868	136.104	125.909	0	125.909	105.767	105.767
2	3.14861	999.416	-17.245	Final Cover	100	16	95.0942	199.466	346.877	0	346.877	317.359	317.359
3	3.892	1707.26	10.4001	Final Cover	100	16	105.011	220.267	419.42	0	419.42	438.694	438.694
4	3.892	1827.44	10.4001	Final Cover	100	16	109.129	228.905	449.544	0	449.544	469.573	469.573
5	5.46425	2643.04	14.2275	Final Cover	100	16	109.993	230.716	455.861	0	455.861	483.749	483.749
6	5.4628	2615.79	14.6053	Final Cover	100	16	109.249	229.156	450.421	0	450.421	478.889	478.889
7	2.74877	1306.97	13.9456	Final Cover	100	16	108.981	228.594	448.464	0	448.464	475.526	475.526
8	2.74877	1308.17	13.9456	Final Cover	100	16	109.039	228.716	448.887	0	448.887	475.964	475.964
9	5.49754	2619.97	13.9456	Final Cover	100	16	109.126	228.899	449.523	0	449.523	476.621	476.621
10	5.3545	2552.51	14.069	Final Cover	100	16	109.111	228.866	449.41	0	449.41	476.754	476.754
11	5.3545	2553.04	13.949	Final Cover	100	16	109.156	228.961	449.741	0	449.741	476.853	476.853
12	4.61909	2210.44	13.757	Final Cover	100	16	109.438	229.552	451.802	0	451.802	478.596	478.596
13	4.61909	2222.79	13.757	Final Cover	100	16	109.791	230.294	454.389	0	454.389	481.269	481.269
14	3.02557	1459.04	14.1115	Final Cover	100	16	109.831	230.377	454.677	0	454.677	482.288	482.288
15	3.02557	1457.12	14.1115	Final Cover	100	16	109.747	230.201	454.065	0	454.065	481.655	481.655
16	3.6359	1751.61	13.9017	Final Cover	100	16	109.823	230.361	454.623	0	454.623	481.805	481.805
17	3.6359	1755.01	13.9017	Final Cover	100	16	109.947	230.62	455.528	0	455.528	482.741	482.741
18	3.26813	1579.28	13.9953	Final Cover	100	16	109.994	230.72	455.873	0	455.873	483.288	483.288
19	3.26813	1579.81	13.9953	Final Cover	100	16	110.015	230.764	456.027	0	456.027	483.448	483.448
20	5.37624	2582.45	14.5399	Final Cover	100	16	109.466	229.611	452.007	0	452.007	480.398	480.398
21	5.37624	2548.77	14.5399	Final Cover	100	16	108.639	227.876	445.957	0	445.957	474.134	474.134
22	3.03461	1437.82	13.1681	Final Cover	100	16	108.967	228.565	448.36	0	448.36	473.854	473.854
23	3.03461	1455.15	13.1681	Final Cover	100	16	109.724	230.153	453.895	0	453.895	479.566	479.566
24	3.0346	1459.21	14.4662	Final Cover	100	16	109.553	229.795	452.647	0	452.647	480.91	480.91
25	3.0346	1450	14.4662	Final Cover	100	16	109.153	228.954	449.715	0	449.715	477.875	477.875
26	3.03461	1448.99	13.6664	Final Cover	100	16	109.322	229.309	450.954	0	450.954	477.535	477.535
27	3.03461	1456.17	13.6664	Final Cover	100	16	109.635	229.966	453.243	0	453.243	479.901	479.901
28	3.03461	1458.16	14.1732	Final Cover	100	16	109.586	229.863	452.887	0	452.887	480.562	480.562
29	3.03461	1454.96	14.1732	Final Cover	100	16	109.447	229.571	451.867	0	451.867	479.507	479.507
30	3.03461	1451.2	14.2285	Final Cover	100	16	109.268	229.196	450.562	0	450.562	478.269	478.269
31	3.03461	1446.87	14.2285	Final Cover	100	16	109.08	228.801	449.183	0	449.183	476.842	476.842
32	8.3375	3980.4	13.8736	Final Cover	100	16	109.256	229.172	450.475	0	450.475	477.46	477.46
33	3.3394	1597.31	14.1302	Final Cover	100	16	109.308	229.281	450.855	0	450.855	478.373	478.373

34	3.3394	1594.51	14.1302	Final Cover	100	16	109.197	229.048	450.045	0	450.045	477.535	477.535
35	3.3394	1591.71	14.1302	Final Cover	100	16	109.087	228.816	449.235	0	449.235	476.696	476.696
36	3.3394	1588.91	14.1302	Final Cover	100	16	108.976	228.583	448.424	0	448.424	475.858	475.858
37	3.3394	1586.95	14.0627	Final Cover	100	16	108.916	228.458	447.988	0	447.988	475.27	475.27
38	3.3394	1585.82	14.0627	Final Cover	100	16	108.872	228.365	447.662	0	447.662	474.934	474.934
39	5.26507	2497.76	14.0707	Final Cover	100	16	108.806	228.227	447.182	0	447.182	474.453	474.453
40	3.59147	1706.13	13.7767	Final Cover	100	16	108.97	228.571	448.382	0	448.382	475.101	475.101
41	3.59147	1713.03	13.7767	Final Cover	100	16	109.224	229.104	450.24	0	450.24	477.021	477.021
42	6.88501	3301.06	13.8182	Final Cover	100	16	109.542	229.77	452.563	0	452.563	479.506	479.506
43	4.89168	2348.17	14.1911	Final Cover	100	16	109.518	229.721	452.391	0	452.391	480.086	480.086
44	4.89168	2338.92	14.1911	Final Cover	100	16	109.268	229.197	450.562	0	450.562	478.193	478.193
45	5.47205	2613.24	13.9571	Final Cover	100	16	109.254	229.167	450.459	0	450.459	477.612	477.612
46	5.47205	2617.26	13.9571	Final Cover	100	16	109.351	229.371	451.168	0	451.168	478.346	478.346
47	5.47205	2624.02	13.8745	Final Cover	100	16	109.537	229.76	452.525	0	452.525	479.581	479.581
48	5.47205	2627.34	14.0605	Final Cover	100	16	109.567	229.823	452.749	0	452.749	480.19	480.19
49	5.25387	2381.94	18.4558	Final Cover	100	16	104.876	219.983	418.433	0	418.433	453.434	453.434
50	5.25377	1141.1	42.4261	Final Cover	100	16	68.7875	144.286	154.443	0	154.443	217.313	217.313

Interslice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 2.47479

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	200.091	27.8836	0	0	0
2	202.194	28.115	85.026	0	0
3	204.298	28.3574	169.939	0	0
4	206.402	28.6109	254.002	0	0
5	208.506	28.8755	336.519	0	0
6	210.609	29.1513	416.838	0	0
7	212.713	29.4381	494.351	0	0
8	214.817	29.7361	568.491	0	0
9	216.921	30.0453	638.735	0	0
10	219.025	30.3658	704.603	0	0
11	221.128	30.6974	765.66	0	0
12	223.232	31.0404	821.512	0	0
13	225.336	31.3946	871.811	0	0
14	227.44	31.7601	916.251	0	0
15	229.543	32.137	954.572	0	0
16	231.647	32.5253	986.556	0	0
17	233.751	32.925	1012.03	0	0
18	235.855	33.3362	1030.88	0	0
19	237.958	33.7588	1043	0	0
20	240.062	34.193	1048.37	0	0
21	242.166	34.6388	1047.01	0	0
22	244.27	35.0961	1038.95	0	0
23	246.373	35.5651	1024.31	0	0
24	248.477	36.0458	1003.24	0	0
25	250.581	36.5382	975.935	0	0
26	252.685	37.0424	942.637	0	0
27	254.789	37.5584	903.644	0	0
28	256.892	38.0862	859.297	0	0
29	258.996	38.626	809.989	0	0
30	261.1	39.1777	756.164	0	0
31	263.204	39.7414	698.313	0	0
32	265.307	40.3172	636.983	0	0
33	267.411	40.9051	572.769	0	0
34	269.515	41.5052	506.32	0	0
35	271.619	42.1175	438.34	0	0
36	273.722	42.7421	369.586	0	0
37	275.826	43.379	300.868	0	0
38	277.93	44.0283	233.054	0	0
39	280.034	44.6901	167.068	0	0
40	282.138	45.3644	103.892	0	0
41	284.241	46.0513	44.5641	0	0
42	286.345	46.7509	-9.81537	0	0
43	288.449	47.4631	-58.0874	0	0
44	290.553	48.1882	-99.0315	0	0
45	292.656	48.9262	-131.364	0	0
46	294.76	49.6771	-153.739	0	0
47	296.864	50.441	-164.745	0	0
48	298.968	51.218	-162.904	0	0
49	301.071	52.0082	-146.671	0	0
50	303.175	52.8117	-113.743	0	0
51	305.279	53.6285	0	0	0

Query 1 (bishop simplified) - Safety Factor: 2.47479

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	200.091	27.8836	0	0	0
2	202.194	28.115	85.026	0	0
3	204.298	28.3574	169.939	0	0
4	206.402	28.6109	254.002	0	0
5	208.506	28.8755	336.519	0	0
6	210.609	29.1513	416.838	0	0
7	212.713	29.4381	494.351	0	0
8	214.817	29.7361	568.491	0	0
9	216.921	30.0453	638.735	0	0
10	219.025	30.3658	704.603	0	0
11	221.128	30.6974	765.66	0	0
12	223.232	31.0404	821.512	0	0
13	225.336	31.3946	871.811	0	0
14	227.44	31.7601	916.251	0	0
15	229.543	32.137	954.572	0	0
16	231.647	32.5253	986.556	0	0
17	233.751	32.925	1012.03	0	0
18	235.855	33.3362	1030.88	0	0
19	237.958	33.7588	1043	0	0
20	240.062	34.193	1048.37	0	0
21	242.166	34.6388	1047.01	0	0
22	244.27	35.0961	1038.95	0	0
23	246.373	35.5651	1024.31	0	0
24	248.477	36.0458	1003.24	0	0
25	250.581	36.5382	975.935	0	0
26	252.685	37.0424	942.637	0	0
27	254.789	37.5584	903.644	0	0
28	256.892	38.0862	859.297	0	0
29	258.996	38.626	809.989	0	0
30	261.1	39.1777	756.164	0	0
31	263.204	39.7414	698.313	0	0
32	265.307	40.3172	636.983	0	0
33	267.411	40.9051	572.769	0	0
34	269.515	41.5052	506.32	0	0
35	271.619	42.1175	438.34	0	0
36	273.722	42.7421	369.586	0	0
37	275.826	43.379	300.868	0	0
38	277.93	44.0283	233.054	0	0
39	280.034	44.6901	167.068	0	0
40	282.138	45.3644	103.892	0	0
41	284.241	46.0513	44.5641	0	0
42	286.345	46.7509	-9.81537	0	0
43	288.449	47.4631	-58.0874	0	0
44	290.553	48.1882	-99.0315	0	0
45	292.656	48.9262	-131.364	0	0
46	294.76	49.6771	-153.739	0	0
47	296.864	50.441	-164.745	0	0
48	298.968	51.218	-162.904	0	0
49	301.071	52.0082	-146.671	0	0
50	303.175	52.8117	-113.743	0	0
51	305.279	53.6285	0	0	0

Simplified Janbu Method -Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 2.09756

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	96.2411	1.95754	0	0	0
2	99.3898	0.980174	326.982	0	0
3	102.538	0.00280765	964.867	0	0
4	106.43	0.717132	1073.21	0	0
5	110.322	1.43146	1176.03	0	0
6	115.787	2.81691	1144.36	0	0
7	121.249	4.24041	1098.88	0	0
8	123.998	4.92298	1091.78	0	0
9	126.747	5.60555	1084.55	0	0
10	132.244	6.97069	1069.69	0	0
11	137.599	8.31257	1049.79	0	0
12	142.953	9.64254	1035.03	0	0
13	147.573	10.7734	1028.66	0	0
14	152.192	11.9043	1020.99	0	0
15	155.217	12.6649	1006.84	0	0
16	158.243	13.4255	992.897	0	0
17	161.879	14.3254	982.342	0	0
18	165.515	15.2253	971.421	0	0
19	168.783	16.0399	958.894	0	0
20	172.051	16.8545	946.31	0	0
21	177.427	18.2488	903.458	0	0
22	182.803	19.6432	864.605	0	0
23	185.838	20.3532	876.337	0	0
24	188.873	21.0632	886.431	0	0
25	191.907	21.8461	863.89	0	0
26	194.942	22.6289	842.43	0	0
27	197.976	23.3668	840.814	0	0
28	201.011	24.1047	838.456	0	0
29	204.046	24.8711	823.311	0	0
30	207.08	25.6374	808.525	0	0
31	210.115	26.4069	792.797	0	0
32	213.149	27.1764	777.558	0	0
33	221.487	29.2356	759.146	0	0
34	224.826	30.0763	744.47	0	0
35	228.166	30.917	730.106	0	0
36	231.505	31.7576	716.055	0	0
37	234.844	32.5983	702.315	0	0
38	238.184	33.4348	690.617	0	0
39	241.523	34.2713	679.043	0	0
40	246.788	35.5909	660.735	0	0
41	250.38	36.4715	656.523	0	0
42	253.971	37.3521	651.586	0	0
43	260.856	39.0456	637.989	0	0
44	265.748	40.2825	613.124	0	0
45	270.64	41.5195	589.301	0	0
46	276.112	42.8795	573.412	0	0
47	281.584	44.2395	557.089	0	0
48	287.056	45.5911	543.725	0	0
49	292.528	46.9616	521.686	0	0
50	297.782	48.715	337.978	0	0
51	303.035	53.5167	0	0	0

Query 1 (janbu simplified) - Safety Factor: 2.09756

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	96.2411	1.95754	0	0	0
2	99.3898	0.980174	326.982	0	0
3	102.538	0.00280765	964.867	0	0
4	106.43	0.717132	1073.21	0	0
5	110.322	1.43146	1176.03	0	0
6	115.787	2.81691	1144.36	0	0
7	121.249	4.24041	1098.88	0	0
8	123.998	4.92298	1091.78	0	0
9	126.747	5.60555	1084.55	0	0
10	132.244	6.97069	1069.69	0	0
11	137.599	8.31257	1049.79	0	0
12	142.953	9.64254	1035.03	0	0
13	147.573	10.7734	1028.66	0	0
14	152.192	11.9043	1020.99	0	0
15	155.217	12.6649	1006.84	0	0
16	158.243	13.4255	992.897	0	0
17	161.879	14.3254	982.342	0	0
18	165.515	15.2253	971.421	0	0
19	168.783	16.0399	958.894	0	0
20	172.051	16.8545	946.31	0	0
21	177.427	18.2488	903.458	0	0
22	182.803	19.6432	864.605	0	0
23	185.838	20.3532	876.337	0	0
24	188.873	21.0632	886.431	0	0
25	191.907	21.8461	863.89	0	0
26	194.942	22.6289	842.43	0	0
27	197.976	23.3668	840.814	0	0
28	201.011	24.1047	838.456	0	0
29	204.046	24.8711	823.311	0	0
30	207.08	25.6374	808.525	0	0
31	210.115	26.4069	792.797	0	0
32	213.149	27.1764	777.558	0	0
33	221.487	29.2356	759.146	0	0
34	224.826	30.0763	744.47	0	0
35	228.166	30.917	730.106	0	0
36	231.505	31.7576	716.055	0	0
37	234.844	32.5983	702.315	0	0
38	238.184	33.4348	690.617	0	0
39	241.523	34.2713	679.043	0	0
40	246.788	35.5909	660.735	0	0
41	250.38	36.4715	656.523	0	0
42	253.971	37.3521	651.586	0	0
43	260.856	39.0456	637.989	0	0
44	265.748	40.2825	613.124	0	0
45	270.64	41.5195	589.301	0	0
46	276.112	42.8795	573.412	0	0
47	281.584	44.2395	557.089	0	0
48	287.056	45.5911	543.725	0	0
49	292.528	46.9616	521.686	0	0
50	297.782	48.715	337.978	0	0
51	303.035	53.5167	0	0	0

Discharge Sections

Entity Information

Simplified Bishop Method - Total Stress

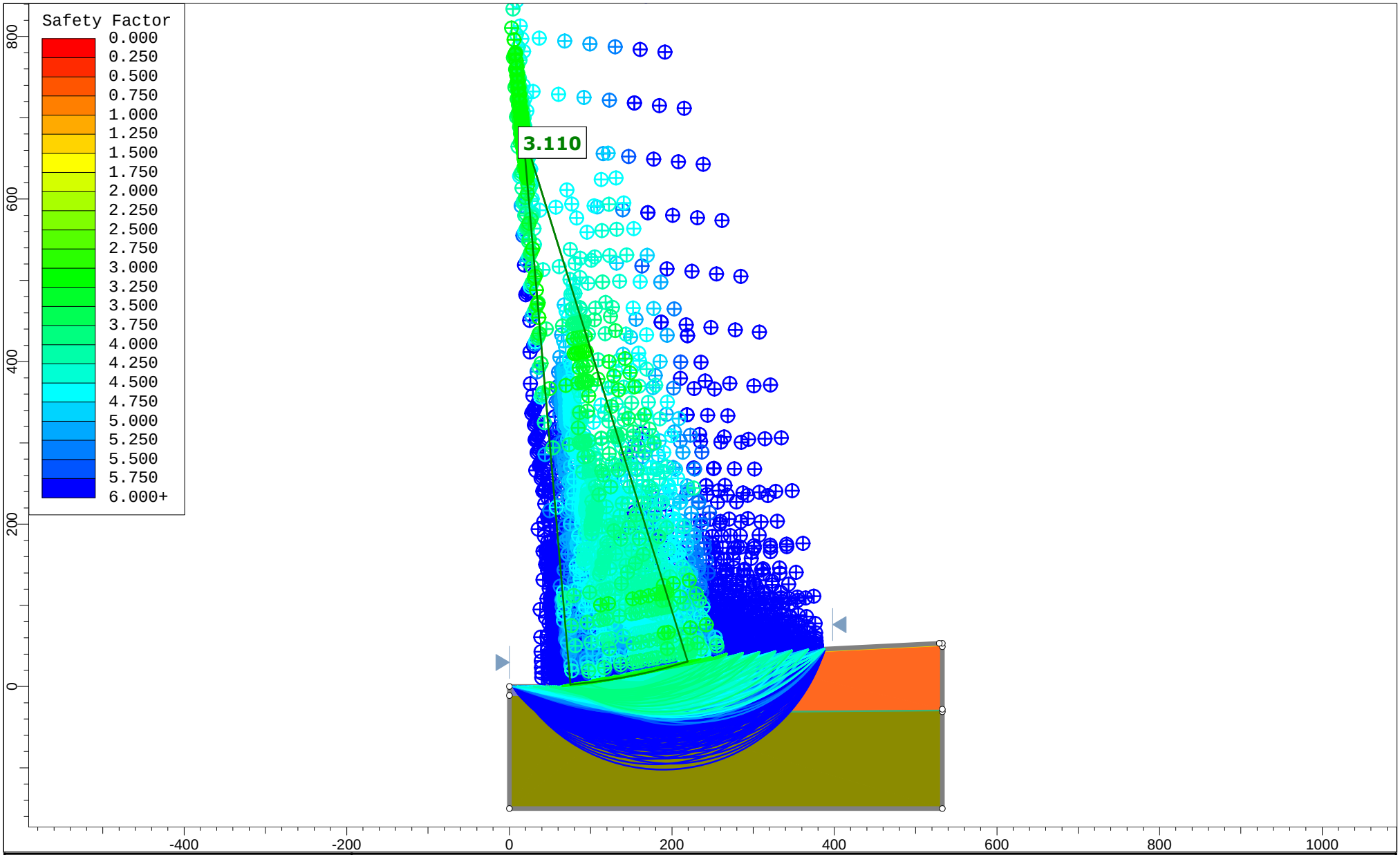
Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0 0, -11 0, -30.6081 0, -200 600, -200 600, -38.5 600, -34.5 600, 34.5 600, 63.5 600, 67.5 583.7, 67.5 302.7, 53.5 88.4, 0
Material Boundary	101, 0 134.147, -11 213.7, -37.4 600, -34.5
Material Boundary	88.4, 0 121.692, -11 181.037, -30.6081 213.7, -41.4 600, -38.5
Material Boundary	88.4, 0 101, 0 104.6, 0 302.7, 49.5 582.7, 63.5 600, 63.5
Material Boundary	0, -11 121.692, -11

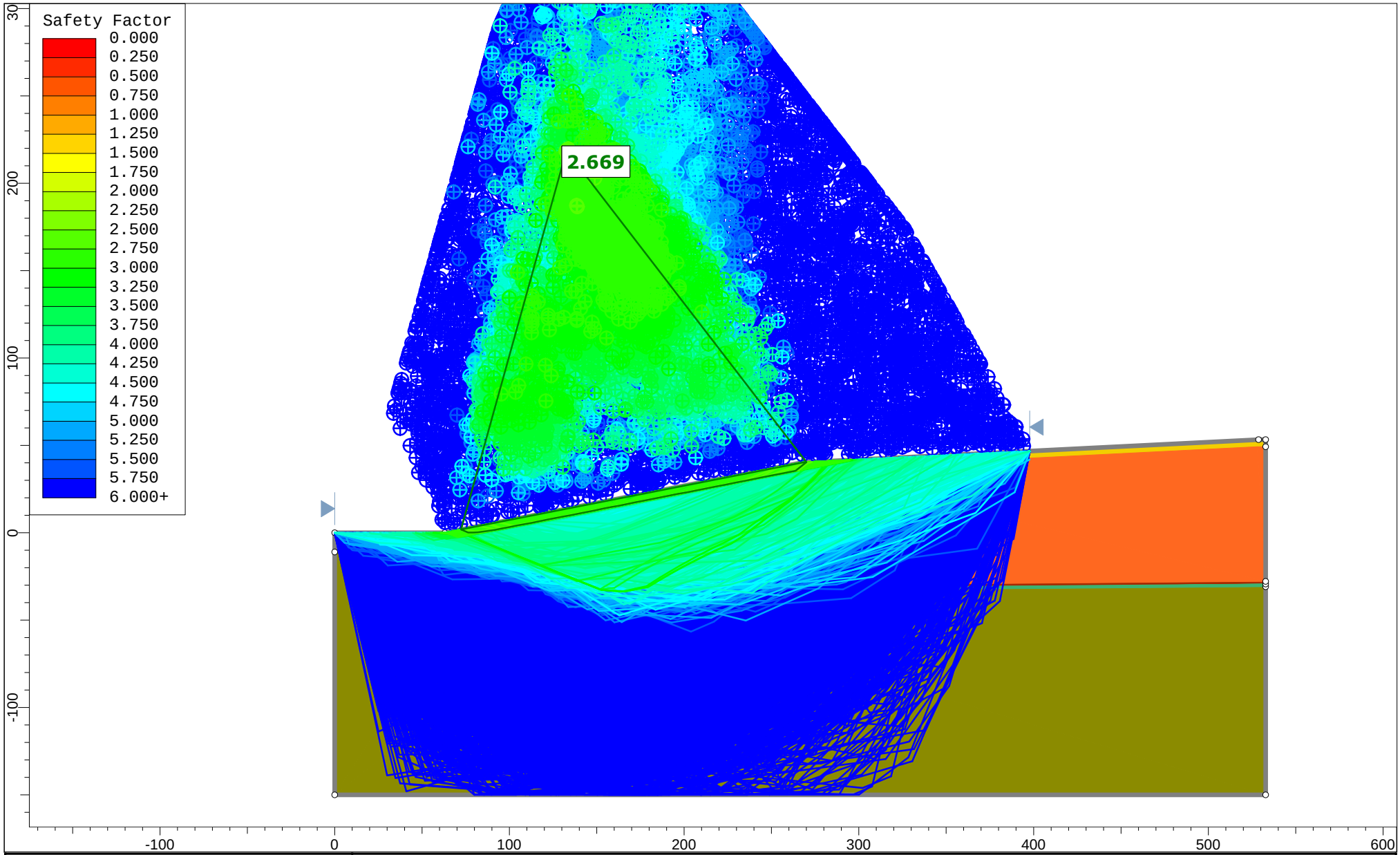
Simplified Janbu Method -Total Stress

Shared Entities

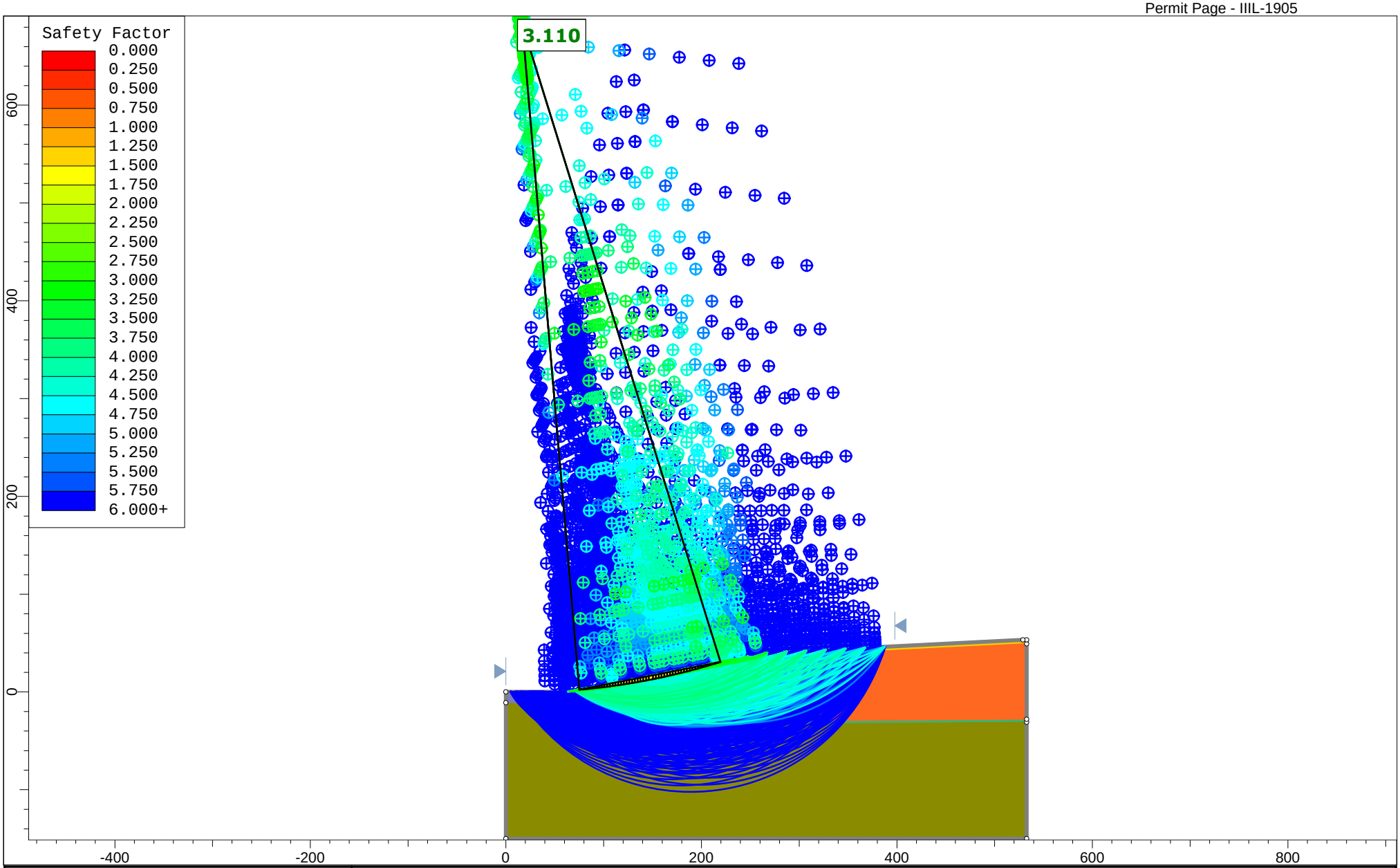
Type	Coordinates (x,y)
External Boundary	0, 0 0, -11 0, -30.6081 0, -200 600, -200 600, -38.5 600, -34.5 600, 34.5 600, 63.5 600, 67.5 583.7, 67.5 302.7, 53.5 88.4, 0
Material Boundary	101, 0 134.147, -11 213.7, -37.4 600, -34.5
Material Boundary	88.4, 0 121.692, -11 181.037, -30.6081 213.7, -41.4 600, -38.5
Material Boundary	88.4, 0 101, 0 104.6, 0 302.7, 49.5 582.7, 63.5 600, 63.5
Material Boundary	0, -11 121.692, -11



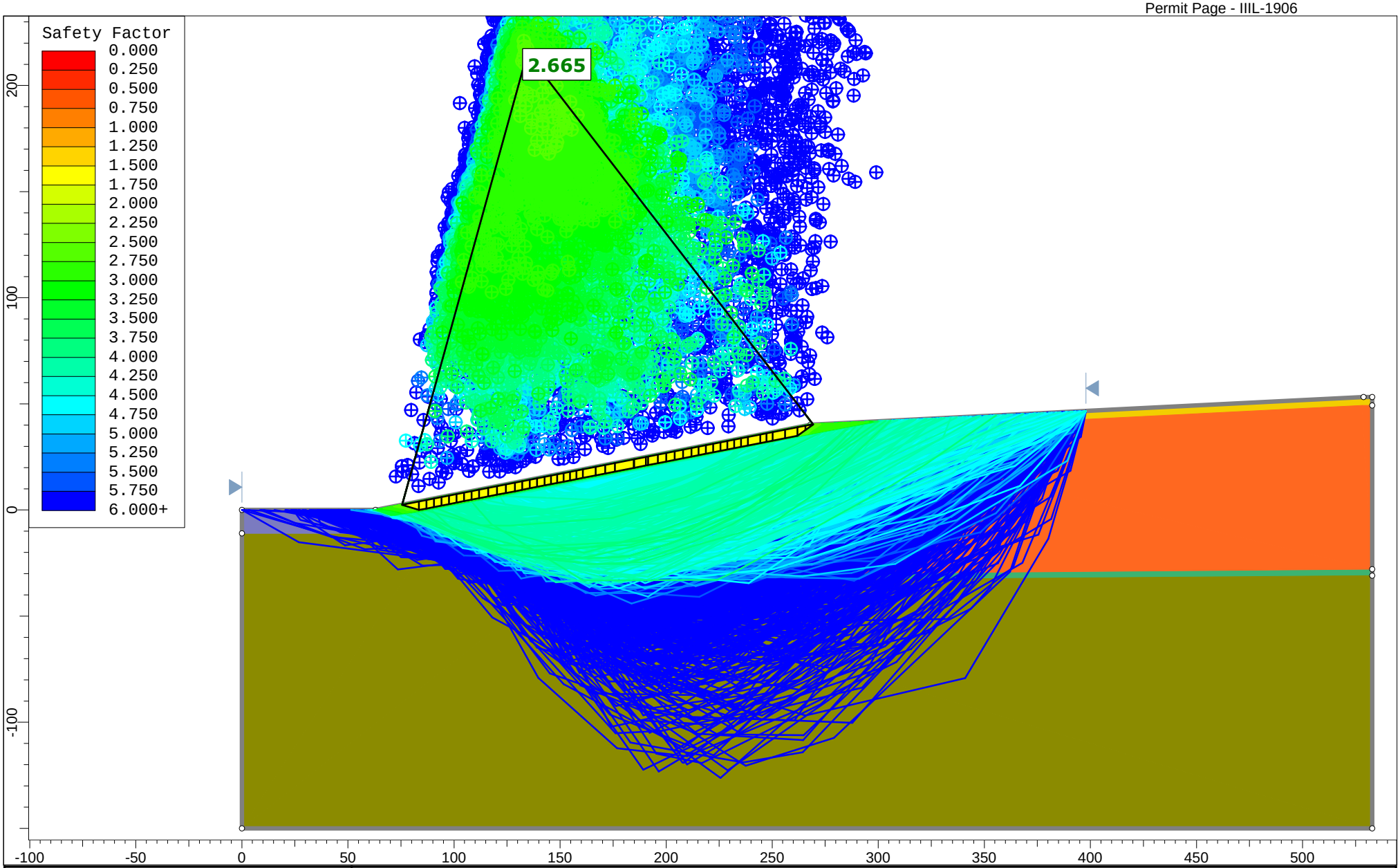
rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date	3/22/2025, 11:19:25 PM	File Name: Slide2-FC Section D_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date	3/22/2025, 11:19:25 PM	File Name: Slide2-FC Section D_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-FC Section D_Total Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-FC Section D_Total Stress.slmd

Materials

Final Cover	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	16
Water Surface	Assigned per scenario
Ru Value	0
Liner	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	116
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Waste	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	47
Cohesion [psf]	288
Friction Angle [deg]	23
Water Surface	Assigned per scenario
Ru Value	0
Stratum II	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110.9
Cohesion [psf]	4000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Stratum III	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	109
Cohesion [psf]	2800
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Simplified Bishop Method - Total Stress	Simplified Janbu Method - Total Stress
Final Cover		✓	✓
Liner		✓	✓
Waste		✓	✓
Stratum II		✓	✓
Stratum III		✓	✓

Valid and Invalid Surfaces

Simplified Bishop Method - Total Stress

Method: bishop simplified

Number of Valid Surfaces:	10927
Number of Invalid Surfaces:	0

Simplified Janbu Method - Total Stress

Method: bishop simplified

Number of Valid Surfaces:	23598
Number of Invalid Surfaces:	26541

Error Codes

Error Code -106 reported for 25 surfaces
Error Code -108 reported for 59 surfaces
Error Code -109 reported for 1 surface
Error Code -111 reported for 389 surfaces
Error Code -112 reported for 400 surfaces
Error Code -121 reported for 188 surfaces
Error Code -124 reported for 4 surfaces
Error Code -145 reported for 244 surfaces
Error Code -1000 reported for 25231 surfaces

Method: janbu simplified

Number of Valid Surfaces:	23524
Number of Invalid Surfaces:	26615

Error Codes

Error Code -106 reported for 25 surfaces
Error Code -108 reported for 68 surfaces
Error Code -109 reported for 1 surface
Error Code -111 reported for 489 surfaces
Error Code -112 reported for 425 surfaces
Error Code -121 reported for 188 surfaces
Error Code -124 reported for 4 surfaces
Error Code -145 reported for 244 surfaces
Error Code -1000 reported for 25171 surfaces

Error Code Descriptions

Slice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 3.11046

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.84463	52.5032	5.02672	Final Cover	100	16	33.5792	104.447	15.5074	0	15.5074	18.461	18.461
2	2.84463	155.463	5.26632	Final Cover	100	16	36.8748	114.698	51.2569	0	51.2569	54.6558	54.6558
3	2.84463	254.326	5.50602	Final Cover	100	16	40.0364	124.531	85.5517	0	85.5517	89.411	89.411
4	2.84463	349.088	5.74582	Final Cover	100	16	43.0638	133.948	118.391	0	118.391	122.724	122.724
5	2.84463	439.745	5.98572	Final Cover	100	16	45.957	142.947	149.776	0	149.776	154.594	154.594
6	2.84463	526.29	6.22572	Final Cover	100	16	48.7161	151.529	179.705	0	179.705	185.019	185.019
7	2.84463	608.718	6.46583	Final Cover	100	16	51.341	159.694	208.178	0	208.178	213.996	213.996
8	2.84463	687.023	6.70606	Final Cover	100	16	53.8316	167.441	235.195	0	235.195	241.525	241.525
9	2.84463	761.2	6.9464	Final Cover	100	16	56.188	174.77	260.756	0	260.756	267.602	267.602
10	2.84463	831.242	7.18687	Final Cover	100	16	58.41	181.682	284.859	0	284.859	292.225	292.225
11	2.84463	897.143	7.42747	Final Cover	100	16	60.4977	188.176	307.505	0	307.505	315.392	315.392
12	2.84463	958.896	7.6682	Final Cover	100	16	62.451	194.251	328.693	0	328.693	337.101	337.101
13	2.84463	1016.49	7.90906	Final Cover	100	16	64.2697	199.908	348.422	0	348.422	357.35	357.35
14	2.84463	1069.93	8.15006	Final Cover	100	16	65.9539	205.147	366.69	0	366.69	376.135	376.135
15	2.84463	1119.2	8.39121	Final Cover	100	16	67.5032	209.966	383.496	0	383.496	393.454	393.454
16	2.84463	1164.28	8.63251	Final Cover	100	16	68.9181	214.367	398.843	0	398.843	409.305	409.305
17	2.84463	1205.19	8.87397	Final Cover	100	16	70.1977	218.347	412.727	0	412.727	423.687	423.687
18	2.84463	1241.9	9.11558	Final Cover	100	16	71.3425	221.908	425.145	0	425.145	436.592	436.592
19	2.84463	1274.41	9.35735	Final Cover	100	16	72.3523	225.049	436.099	0	436.099	448.021	448.021
20	2.84463	1302.71	9.5993	Final Cover	100	16	73.2271	227.77	445.587	0	445.587	457.971	457.971
21	2.84463	1326.79	9.84142	Final Cover	100	16	73.9662	230.069	453.605	0	453.605	466.436	466.436
22	2.84463	1346.64	10.0837	Final Cover	100	16	74.57	231.947	460.152	0	460.152	473.413	473.413
23	2.84463	1362.25	10.3262	Final Cover	100	16	75.0381	233.403	465.232	0	465.232	478.904	478.904
24	2.84463	1373.62	10.5689	Final Cover	100	16	75.3705	234.437	468.836	0	468.836	482.898	482.898
25	2.84463	1380.73	10.8117	Final Cover	100	16	75.567	235.048	470.968	0	470.968	485.399	485.399
26	4.33239	2106.16	11.1184	Final Cover	100	16	75.5981	235.145	471.306	0	471.306	486.163	486.163
27	2.87639	1395.03	11.4267	Final Cover	100	16	75.4557	234.702	469.761	0	469.761	485.012	485.012
28	2.87639	1386.83	11.673	Final Cover	100	16	75.1673	233.805	466.631	0	466.631	482.161	482.161
29	2.87639	1374.17	11.9195	Final Cover	100	16	74.7391	232.473	461.987	0	461.987	477.764	477.764

30	2.87639	1357.05	12.1662	Final Cover	100	16	74.1707	230.705	455.823	0	455.823	471.814	471.814
31	2.87639	1335.46	12.4132	Final Cover	100	16	73.4621	228.501	448.136	0	448.136	464.306	464.306
32	2.87639	1309.37	12.6604	Final Cover	100	16	72.6131	225.86	438.924	0	438.924	455.236	455.236
33	2.87639	1278.79	12.9078	Final Cover	100	16	71.6232	222.781	428.189	0	428.189	444.604	444.604
34	2.87639	1243.69	13.1555	Final Cover	100	16	70.4925	219.264	415.923	0	415.923	432.399	432.399
35	2.87639	1204.06	13.4035	Final Cover	100	16	69.2206	215.308	402.13	0	402.13	418.625	418.625
36	2.87639	1159.89	13.6516	Final Cover	100	16	67.8073	210.912	386.799	0	386.799	403.268	403.268
37	2.87639	1111.16	13.9001	Final Cover	100	16	66.2523	206.075	369.929	0	369.929	386.325	386.325
38	2.87639	1057.86	14.1488	Final Cover	100	16	64.5554	200.797	351.519	0	351.519	367.793	367.793
39	2.87639	999.97	14.3978	Final Cover	100	16	62.7161	195.076	331.569	0	331.569	347.669	347.669
40	2.87639	937.482	14.6471	Final Cover	100	16	60.7343	188.911	310.071	0	310.071	325.945	325.945
41	2.87639	870.377	14.8966	Final Cover	100	16	58.6095	182.303	287.023	0	287.023	302.615	302.615
42	2.87639	798.638	15.1465	Final Cover	100	16	56.3416	175.248	262.422	0	262.422	277.673	277.673
43	2.87639	722.25	15.3966	Final Cover	100	16	53.9302	167.748	236.265	0	236.265	251.116	251.116
44	2.87639	641.196	15.6471	Final Cover	100	16	51.375	159.8	208.547	0	208.547	222.937	222.937
45	2.87639	555.459	15.8978	Final Cover	100	16	48.6756	151.404	179.265	0	179.265	193.129	193.129
46	2.87639	465.022	16.1489	Final Cover	100	16	45.8316	142.558	148.416	0	148.416	161.687	161.687
47	2.87639	369.866	16.4002	Final Cover	100	16	42.8428	133.261	115.995	0	115.995	128.604	128.604
48	2.87639	269.974	16.6519	Final Cover	100	16	39.7088	123.513	81.9979	0	81.9979	93.8748	93.8748
49	2.87639	165.327	16.904	Final Cover	100	16	36.4291	113.311	46.4218	0	46.4218	57.4925	57.4925
50	2.87639	55.9063	17.1564	Final Cover	100	16	33.0034	102.656	9.26151	0	9.26151	19.4502	19.4502

Query 1 (bishop simplified) - Safety Factor: 3.11046

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.84463	52.5032	5.02672	Final Cover	100	16	33.5792	104.447	15.5074	0	15.5074	18.461	18.461
2	2.84463	155.463	5.26632	Final Cover	100	16	36.8748	114.698	51.2569	0	51.2569	54.6558	54.6558
3	2.84463	254.326	5.50602	Final Cover	100	16	40.0364	124.531	85.5517	0	85.5517	89.411	89.411
4	2.84463	349.088	5.74582	Final Cover	100	16	43.0638	133.948	118.391	0	118.391	122.724	122.724
5	2.84463	439.745	5.98572	Final Cover	100	16	45.957	142.947	149.776	0	149.776	154.594	154.594
6	2.84463	526.29	6.22572	Final Cover	100	16	48.7161	151.529	179.705	0	179.705	185.019	185.019
7	2.84463	608.718	6.46583	Final Cover	100	16	51.341	159.694	208.178	0	208.178	213.996	213.996
8	2.84463	687.023	6.70606	Final Cover	100	16	53.8316	167.441	235.195	0	235.195	241.525	241.525
9	2.84463	761.2	6.9464	Final Cover	100	16	56.188	174.77	260.756	0	260.756	267.602	267.602
10	2.84463	831.242	7.18687	Final Cover	100	16	58.41	181.682	284.859	0	284.859	292.225	292.225
11	2.84463	897.143	7.42747	Final Cover	100	16	60.4977	188.176	307.505	0	307.505	315.392	315.392
12	2.84463	958.896	7.6682	Final Cover	100	16	62.451	194.251	328.693	0	328.693	337.101	337.101
13	2.84463	1016.49	7.90906	Final Cover	100	16	64.2697	199.908	348.422	0	348.422	357.35	357.35
14	2.84463	1069.93	8.15006	Final Cover	100	16	65.9539	205.147	366.69	0	366.69	376.135	376.135
15	2.84463	1119.2	8.39121	Final Cover	100	16	67.5032	209.966	383.496	0	383.496	393.454	393.454
16	2.84463	1164.28	8.63251	Final Cover	100	16	68.9181	214.367	398.843	0	398.843	409.305	409.305
17	2.84463	1205.19	8.87397	Final Cover	100	16	70.1977	218.347	412.727	0	412.727	423.687	423.687
18	2.84463	1241.9	9.11558	Final Cover	100	16	71.3425	221.908	425.145	0	425.145	436.592	436.592
19	2.84463	1274.41	9.35735	Final Cover	100	16	72.3523	225.049	436.099	0	436.099	448.021	448.021
20	2.84463	1302.71	9.5993	Final Cover	100	16	73.2271	227.77	445.587	0	445.587	457.971	457.971
21	2.84463	1326.79	9.84142	Final Cover	100	16	73.9662	230.069	453.605	0	453.605	466.436	466.436
22	2.84463	1346.64	10.0837	Final Cover	100	16	74.57	231.947	460.152	0	460.152	473.413	473.413
23	2.84463	1362.25	10.3262	Final Cover	100	16	75.0381	233.403	465.232	0	465.232	478.904	478.904
24	2.84463	1373.62	10.5689	Final Cover	100	16	75.3705	234.437	468.836	0	468.836	482.898	482.898
25	2.84463	1380.73	10.8117	Final Cover	100	16	75.567	235.048	470.968	0	470.968	485.399	485.399
26	4.33239	2106.16	11.1184	Final Cover	100	16	75.5981	235.145	471.306	0	471.306	486.163	486.163
27	2.87639	1395.03	11.4267	Final Cover	100	16	75.4557	234.702	469.761	0	469.761	485.012	485.012
28	2.87639	1386.83	11.673	Final Cover	100	16	75.1673	233.805	466.631	0	466.631	482.161	482.161
29	2.87639	1374.17	11.9195	Final Cover	100	16	74.7391	232.473	461.987	0	461.987	477.764	477.764
30	2.87639	1357.05	12.1662	Final Cover	100	16	74.1707	230.705	455.823	0	455.823	471.814	471.814
31	2.87639	1335.46	12.4132	Final Cover	100	16	73.4621	228.501	448.136	0	448.136	464.306	464.306
32	2.87639	1309.37	12.6604	Final Cover	100	16	72.6131	225.86	438.924	0	438.924	455.236	455.236
33	2.87639	1278.79	12.9078	Final Cover	100	16	71.6232	222.781	428.189	0	428.189	444.604	444.604

34	2.87639	1243.69	13.1555	Final Cover	100	16	70.4925	219.264	415.923	0	415.923	432.399	432.399
35	2.87639	1204.06	13.4035	Final Cover	100	16	69.2206	215.308	402.13	0	402.13	418.625	418.625
36	2.87639	1159.89	13.6516	Final Cover	100	16	67.8073	210.912	386.799	0	386.799	403.268	403.268
37	2.87639	1111.16	13.9001	Final Cover	100	16	66.2523	206.075	369.929	0	369.929	386.325	386.325
38	2.87639	1057.86	14.1488	Final Cover	100	16	64.5554	200.797	351.519	0	351.519	367.793	367.793
39	2.87639	999.97	14.3978	Final Cover	100	16	62.7161	195.076	331.569	0	331.569	347.669	347.669
40	2.87639	937.482	14.6471	Final Cover	100	16	60.7343	188.911	310.071	0	310.071	325.945	325.945
41	2.87639	870.377	14.8966	Final Cover	100	16	58.6095	182.303	287.023	0	287.023	302.615	302.615
42	2.87639	798.638	15.1465	Final Cover	100	16	56.3416	175.248	262.422	0	262.422	277.673	277.673
43	2.87639	722.25	15.3966	Final Cover	100	16	53.9302	167.748	236.265	0	236.265	251.116	251.116
44	2.87639	641.196	15.6471	Final Cover	100	16	51.375	159.8	208.547	0	208.547	222.937	222.937
45	2.87639	555.459	15.8978	Final Cover	100	16	48.6756	151.404	179.265	0	179.265	193.129	193.129
46	2.87639	465.022	16.1489	Final Cover	100	16	45.8316	142.558	148.416	0	148.416	161.687	161.687
47	2.87639	369.866	16.4002	Final Cover	100	16	42.8428	133.261	115.995	0	115.995	128.604	128.604
48	2.87639	269.974	16.6519	Final Cover	100	16	39.7088	123.513	81.9979	0	81.9979	93.8748	93.8748
49	2.87639	165.327	16.904	Final Cover	100	16	36.4291	113.311	46.4218	0	46.4218	57.4925	57.4925
50	2.87639	55.9063	17.1564	Final Cover	100	16	33.0034	102.656	9.26151	0	9.26151	19.4502	19.4502

Simplified Janbu Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 2.66533

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	8.0063	1932.78	-17.0371	Final Cover	100	16	65.6547	174.992	261.526	0	261.526	241.407	241.407
2	3.54432	1711.2	11.0983	Final Cover	100	16	87.6113	233.513	465.615	0	465.615	482.801	482.801
3	3.54432	1711.11	11.0983	Final Cover	100	16	87.6087	233.506	465.59	0	465.59	482.776	482.776
4	3.54432	1711.01	11.0983	Final Cover	100	16	87.6057	233.498	465.563	0	465.563	482.747	482.747
5	3.54432	1710.92	11.0983	Final Cover	100	16	87.603	233.491	465.538	0	465.538	482.722	482.722
6	3.54432	1710.82	11.0983	Final Cover	100	16	87.6	233.483	465.51	0	465.51	482.694	482.694
7	3.54432	1710.73	11.0983	Final Cover	100	16	87.5974	233.476	465.485	0	465.485	482.668	482.668
8	3.54432	1712.66	10.9496	Final Cover	100	16	87.6796	233.695	466.249	0	466.249	483.213	483.213
9	3.54432	1716.63	10.9496	Final Cover	100	16	87.7974	234.009	467.346	0	467.346	484.332	484.332
10	4.21194	2044.59	10.9777	Final Cover	100	16	87.9081	234.304	468.375	0	468.375	485.428	485.428
11	4.21194	2049.11	10.9777	Final Cover	100	16	88.0214	234.606	469.427	0	469.427	486.501	486.501
12	4.21194	2051.16	11.1052	Final Cover	100	16	88.0514	234.686	469.705	0	469.705	486.988	486.988
13	4.21194	2050.76	11.1052	Final Cover	100	16	88.0413	234.659	469.609	0	469.609	486.891	486.891
14	3.48946	1697.78	11.1739	Final Cover	100	16	87.9929	234.53	469.163	0	469.163	486.544	486.544
15	3.48946	1695.68	11.1739	Final Cover	100	16	87.9298	234.362	468.575	0	468.575	485.944	485.944
16	3.48946	1693.44	11.1852	Final Cover	100	16	87.86	234.176	467.927	0	467.927	485.3	485.3
17	3.48946	1691.04	11.1852	Final Cover	100	16	87.7876	233.983	467.255	0	467.255	484.614	484.614
18	3.0121	1458.74	11.0882	Final Cover	100	16	87.77	233.936	467.091	0	467.091	484.292	484.292
19	3.0121	1458.87	11.0882	Final Cover	100	16	87.7745	233.948	467.134	0	467.134	484.336	484.336
20	3.0121	1458.77	11.1107	Final Cover	100	16	87.7677	233.93	467.068	0	467.068	484.305	484.305
21	3.0121	1458.46	11.1107	Final Cover	100	16	87.7565	233.9	466.967	0	466.967	484.202	484.202
22	3.0121	1458.34	11.0912	Final Cover	100	16	87.7557	233.898	466.956	0	466.956	484.159	484.159
23	3.0121	1458.41	11.0912	Final Cover	100	16	87.758	233.904	466.979	0	466.979	484.182	484.182
24	6.0242	2917.03	11.0912	Final Cover	100	16	87.7617	233.914	467.015	0	467.015	484.219	484.219
25	4.53876	2197.88	11.0939	Final Cover	100	16	87.7644	233.921	467.038	0	467.038	484.247	484.247
26	4.53876	2197.92	11.0939	Final Cover	100	16	87.7651	233.923	467.047	0	467.047	484.256	484.256
27	8.87105	4295.97	11.0939	Final Cover	100	16	87.7666	233.927	467.06	0	467.06	484.269	484.269
28	0.20647	99.9883	11.0939	Final Cover	100	16	87.7674	233.929	467.065	0	467.065	484.275	484.275
29	5.57312	2698.1	11.1192	Final Cover	100	16	87.7475	233.876	466.881	0	466.881	484.126	484.126
30	1.00146	484.66	11.1192	Final Cover	100	16	87.7295	233.828	466.713	0	466.713	483.956	483.956
31	4.57166	2211.81	11.1192	Final Cover	100	16	87.7141	233.787	466.568	0	466.568	483.808	483.808
32	3.95948	1914.62	11.1258	Final Cover	100	16	87.686	233.712	466.31	0	466.31	483.554	483.554

33	3.95948	1913.56	11.1258	Final Cover	100	16	87.6578	233.637	466.047	0	466.047	483.286	483.286
34	3.95948	1912.51	11.1258	Final Cover	100	16	87.6297	233.562	465.787	0	465.787	483.02	483.02
35	3.95948	1911.45	11.1258	Final Cover	100	16	87.6015	233.487	465.525	0	465.525	482.752	482.752
36	3.42364	1652.06	11.1145	Final Cover	100	16	87.5817	233.434	465.34	0	465.34	482.546	482.546
37	3.42364	1651.56	11.1145	Final Cover	100	16	87.5663	233.393	465.194	0	465.194	482.397	482.397
38	3.42364	1651.05	11.1145	Final Cover	100	16	87.5505	233.351	465.051	0	465.051	482.25	482.25
39	3.42364	1650.55	11.1145	Final Cover	100	16	87.5351	233.31	464.907	0	464.907	482.104	482.104
40	3.2358	1559.54	11.1133	Final Cover	100	16	87.5205	233.271	464.772	0	464.772	481.964	481.964
41	3.2358	1559.12	11.1133	Final Cover	100	16	87.507	233.235	464.645	0	464.645	481.834	481.834
42	3.2358	1558.7	11.1133	Final Cover	100	16	87.4931	233.198	464.517	0	464.517	481.704	481.704
43	3.2358	1558.28	11.1133	Final Cover	100	16	87.4796	233.162	464.39	0	464.39	481.574	481.574
44	5.84516	2813.47	11.1223	Final Cover	100	16	87.4526	233.09	464.141	0	464.141	481.334	481.334
45	2.92258	1405.97	11.1223	Final Cover	100	16	87.4252	233.017	463.885	0	463.885	481.072	481.072
46	2.92258	1405.46	11.1223	Final Cover	100	16	87.4068	232.968	463.713	0	463.713	480.897	480.897
47	5.84516	2809.39	11.1223	Final Cover	100	16	87.379	232.894	463.457	0	463.457	480.635	480.635
48	5.84516	2807.34	11.1223	Final Cover	100	16	87.3423	232.796	463.114	0	463.114	480.285	480.285
49	3.68565	1347.85	35.5064	Final Cover	100	16	71.3831	190.26	314.773	0	314.773	365.703	365.703
50	3.68565	490.114	35.5064	Final Cover	100	16	48.1308	128.285	98.6396	0	98.6396	132.979	132.979

Query 1 (bishop simplified) - Safety Factor: 2.66533

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	8.0063	1932.78	-17.0371	Final Cover	100	16	65.6547	174.992	261.526	0	261.526	241.407	241.407
2	3.54432	1711.2	11.0983	Final Cover	100	16	87.6113	233.513	465.615	0	465.615	482.801	482.801
3	3.54432	1711.11	11.0983	Final Cover	100	16	87.6087	233.506	465.59	0	465.59	482.776	482.776
4	3.54432	1711.01	11.0983	Final Cover	100	16	87.6057	233.498	465.563	0	465.563	482.747	482.747
5	3.54432	1710.92	11.0983	Final Cover	100	16	87.603	233.491	465.538	0	465.538	482.722	482.722
6	3.54432	1710.82	11.0983	Final Cover	100	16	87.6	233.483	465.51	0	465.51	482.694	482.694
7	3.54432	1710.73	11.0983	Final Cover	100	16	87.5974	233.476	465.485	0	465.485	482.668	482.668
8	3.54432	1712.66	10.9496	Final Cover	100	16	87.6796	233.695	466.249	0	466.249	483.213	483.213
9	3.54432	1716.63	10.9496	Final Cover	100	16	87.7974	234.009	467.346	0	467.346	484.332	484.332
10	4.21194	2044.59	10.9777	Final Cover	100	16	87.9081	234.304	468.375	0	468.375	485.428	485.428
11	4.21194	2049.11	10.9777	Final Cover	100	16	88.0214	234.606	469.427	0	469.427	486.501	486.501
12	4.21194	2051.16	11.1052	Final Cover	100	16	88.0514	234.686	469.705	0	469.705	486.988	486.988
13	4.21194	2050.76	11.1052	Final Cover	100	16	88.0413	234.659	469.609	0	469.609	486.891	486.891
14	3.48946	1697.78	11.1739	Final Cover	100	16	87.9929	234.53	469.163	0	469.163	486.544	486.544
15	3.48946	1695.68	11.1739	Final Cover	100	16	87.9298	234.362	468.575	0	468.575	485.944	485.944
16	3.48946	1693.44	11.1852	Final Cover	100	16	87.86	234.176	467.927	0	467.927	485.3	485.3
17	3.48946	1691.04	11.1852	Final Cover	100	16	87.7876	233.983	467.255	0	467.255	484.614	484.614
18	3.0121	1458.74	11.0882	Final Cover	100	16	87.77	233.936	467.091	0	467.091	484.292	484.292
19	3.0121	1458.87	11.0882	Final Cover	100	16	87.7745	233.948	467.134	0	467.134	484.336	484.336
20	3.0121	1458.77	11.1107	Final Cover	100	16	87.7677	233.93	467.068	0	467.068	484.305	484.305
21	3.0121	1458.46	11.1107	Final Cover	100	16	87.7565	233.9	466.967	0	466.967	484.202	484.202
22	3.0121	1458.34	11.0912	Final Cover	100	16	87.7557	233.898	466.956	0	466.956	484.159	484.159
23	3.0121	1458.41	11.0912	Final Cover	100	16	87.758	233.904	466.979	0	466.979	484.182	484.182
24	6.0242	2917.03	11.0912	Final Cover	100	16	87.7617	233.914	467.015	0	467.015	484.219	484.219
25	4.53876	2197.88	11.0939	Final Cover	100	16	87.7644	233.921	467.038	0	467.038	484.247	484.247
26	4.53876	2197.92	11.0939	Final Cover	100	16	87.7651	233.923	467.047	0	467.047	484.256	484.256
27	8.87105	4295.97	11.0939	Final Cover	100	16	87.7666	233.927	467.06	0	467.06	484.269	484.269
28	0.20647	99.9883	11.0939	Final Cover	100	16	87.7674	233.929	467.065	0	467.065	484.275	484.275
29	5.57312	2698.1	11.1192	Final Cover	100	16	87.7475	233.876	466.881	0	466.881	484.126	484.126
30	1.00146	484.66	11.1192	Final Cover	100	16	87.7295	233.828	466.713	0	466.713	483.956	483.956
31	4.57166	2211.81	11.1192	Final Cover	100	16	87.7141	233.787	466.568	0	466.568	483.808	483.808
32	3.95948	1914.62	11.1258	Final Cover	100	16	87.686	233.712	466.31	0	466.31	483.554	483.554
33	3.95948	1913.56	11.1258	Final Cover	100	16	87.6578	233.637	466.047	0	466.047	483.286	483.286

34	3.95948	1912.51	11.1258	Final Cover	100	16	87.6297	233.562	465.787	0	465.787	483.02	483.02
35	3.95948	1911.45	11.1258	Final Cover	100	16	87.6015	233.487	465.525	0	465.525	482.752	482.752
36	3.42364	1652.06	11.1145	Final Cover	100	16	87.5817	233.434	465.34	0	465.34	482.546	482.546
37	3.42364	1651.56	11.1145	Final Cover	100	16	87.5663	233.393	465.194	0	465.194	482.397	482.397
38	3.42364	1651.05	11.1145	Final Cover	100	16	87.5505	233.351	465.051	0	465.051	482.25	482.25
39	3.42364	1650.55	11.1145	Final Cover	100	16	87.5351	233.31	464.907	0	464.907	482.104	482.104
40	3.2358	1559.54	11.1133	Final Cover	100	16	87.5205	233.271	464.772	0	464.772	481.964	481.964
41	3.2358	1559.12	11.1133	Final Cover	100	16	87.507	233.235	464.645	0	464.645	481.834	481.834
42	3.2358	1558.7	11.1133	Final Cover	100	16	87.4931	233.198	464.517	0	464.517	481.704	481.704
43	3.2358	1558.28	11.1133	Final Cover	100	16	87.4796	233.162	464.39	0	464.39	481.574	481.574
44	5.84516	2813.47	11.1223	Final Cover	100	16	87.4526	233.09	464.141	0	464.141	481.334	481.334
45	2.92258	1405.97	11.1223	Final Cover	100	16	87.4252	233.017	463.885	0	463.885	481.072	481.072
46	2.92258	1405.46	11.1223	Final Cover	100	16	87.4068	232.968	463.713	0	463.713	480.897	480.897
47	5.84516	2809.39	11.1223	Final Cover	100	16	87.379	232.894	463.457	0	463.457	480.635	480.635
48	5.84516	2807.34	11.1223	Final Cover	100	16	87.3423	232.796	463.114	0	463.114	480.285	480.285
49	3.68565	1347.85	35.5064	Final Cover	100	16	71.3831	190.26	314.773	0	314.773	365.703	365.703
50	3.68565	490.114	35.5064	Final Cover	100	16	48.1308	128.285	98.6396	0	98.6396	132.979	132.979

Global Minimum Query (janbu simplified) - Safety Factor: 2.64077

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	8.0063	1932.78	-17.0371	Final Cover	100	16	66.2865	175.047	261.722	0	261.722	241.409	241.409
2	3.54432	1711.2	11.0983	Final Cover	100	16	88.4091	233.468	465.457	0	465.457	482.8	482.8
3	3.54432	1711.11	11.0983	Final Cover	100	16	88.406	233.46	465.432	0	465.432	482.774	482.774
4	3.54432	1711.01	11.0983	Final Cover	100	16	88.4034	233.453	465.405	0	465.405	482.746	482.746
5	3.54432	1710.92	11.0983	Final Cover	100	16	88.4004	233.445	465.38	0	465.38	482.72	482.72
6	3.54432	1710.82	11.0983	Final Cover	100	16	88.3977	233.438	465.352	0	465.352	482.692	482.692
7	3.54432	1710.73	11.0983	Final Cover	100	16	88.3947	233.43	465.327	0	465.327	482.667	482.667
8	3.54432	1712.66	10.9496	Final Cover	100	16	88.478	233.65	466.094	0	466.094	483.212	483.212
9	3.54432	1716.63	10.9496	Final Cover	100	16	88.5973	233.965	467.188	0	467.188	484.329	484.329
10	4.21194	2044.59	10.9777	Final Cover	100	16	88.7086	234.259	468.219	0	468.219	485.427	485.427
11	4.21194	2049.11	10.9777	Final Cover	100	16	88.823	234.561	469.268	0	469.268	486.498	486.498
12	4.21194	2051.16	11.1052	Final Cover	100	16	88.8529	234.64	469.547	0	469.547	486.987	486.987
13	4.21194	2050.76	11.1052	Final Cover	100	16	88.8426	234.613	469.451	0	469.451	486.89	486.89
14	3.48946	1697.78	11.1739	Final Cover	100	16	88.7938	234.484	469.003	0	469.003	486.542	486.542
15	3.48946	1695.68	11.1739	Final Cover	100	16	88.7302	234.316	468.415	0	468.415	485.942	485.942
16	3.48946	1693.44	11.1852	Final Cover	100	16	88.6597	234.13	467.767	0	467.767	485.298	485.298
17	3.48946	1691.04	11.1852	Final Cover	100	16	88.5867	233.937	467.095	0	467.095	484.612	484.612
18	3.0121	1458.74	11.0882	Final Cover	100	16	88.5692	233.891	466.932	0	466.932	484.289	484.289
19	3.0121	1458.87	11.0882	Final Cover	100	16	88.5738	233.903	466.974	0	466.974	484.333	484.333
20	3.0121	1458.77	11.1107	Final Cover	100	16	88.5666	233.884	466.909	0	466.909	484.302	484.302
21	3.0121	1458.46	11.1107	Final Cover	100	16	88.5556	233.855	466.808	0	466.808	484.199	484.199
22	3.0121	1458.34	11.0912	Final Cover	100	16	88.5545	233.852	466.8	0	466.8	484.159	484.159
23	3.0121	1458.41	11.0912	Final Cover	100	16	88.5571	233.859	466.823	0	466.823	484.183	484.183
24	6.0242	2917.03	11.0912	Final Cover	100	16	88.5609	233.869	466.857	0	466.857	484.218	484.218
25	4.53876	2197.88	11.0939	Final Cover	100	16	88.5636	233.876	466.881	0	466.881	484.246	484.246
26	4.53876	2197.92	11.0939	Final Cover	100	16	88.5643	233.878	466.889	0	466.889	484.255	484.255
27	8.87105	4295.97	11.0939	Final Cover	100	16	88.5658	233.882	466.902	0	466.902	484.268	484.268
28	0.20647	99.9883	11.0939	Final Cover	100	16	88.5662	233.883	466.907	0	466.907	484.274	484.274
29	5.57312	2698.1	11.1192	Final Cover	100	16	88.5465	233.831	466.722	0	466.722	484.125	484.125
30	1.00146	484.66	11.1192	Final Cover	100	16	88.5283	233.783	466.555	0	466.555	483.955	483.955
31	4.57166	2211.81	11.1192	Final Cover	100	16	88.5124	233.741	466.412	0	466.412	483.808	483.808
32	3.95948	1914.62	11.1258	Final Cover	100	16	88.4844	233.667	466.151	0	466.151	483.553	483.553
33	3.95948	1913.56	11.1258	Final Cover	100	16	88.456	233.592	465.889	0	465.889	483.285	483.285

34	3.95948	1912.51	11.1258	Final Cover	100	16	88.4276	233.517	465.629	0	465.629	483.019	483.019
35	3.95948	1911.45	11.1258	Final Cover	100	16	88.3992	233.442	465.366	0	465.366	482.75	482.75
36	3.42364	1652.06	11.1145	Final Cover	100	16	88.3791	233.389	465.182	0	465.182	482.545	482.545
37	3.42364	1651.56	11.1145	Final Cover	100	16	88.3632	233.347	465.036	0	465.036	482.396	482.396
38	3.42364	1651.05	11.1145	Final Cover	100	16	88.3477	233.306	464.893	0	464.893	482.249	482.249
39	3.42364	1650.55	11.1145	Final Cover	100	16	88.3322	233.265	464.75	0	464.75	482.103	482.103
40	3.2358	1559.54	11.1133	Final Cover	100	16	88.3174	233.226	464.614	0	464.614	481.963	481.963
41	3.2358	1559.12	11.1133	Final Cover	100	16	88.3038	233.19	464.487	0	464.487	481.833	481.833
42	3.2358	1558.7	11.1133	Final Cover	100	16	88.2898	233.153	464.36	0	464.36	481.703	481.703
43	3.2358	1558.28	11.1133	Final Cover	100	16	88.2758	233.116	464.232	0	464.232	481.572	481.572
44	5.84516	2813.47	11.1223	Final Cover	100	16	88.2489	233.045	463.984	0	463.984	481.333	481.333
45	2.92258	1405.97	11.1223	Final Cover	100	16	88.2209	232.971	463.727	0	463.727	481.071	481.071
46	2.92258	1405.46	11.1223	Final Cover	100	16	88.2023	232.922	463.556	0	463.556	480.896	480.896
47	5.84516	2809.39	11.1223	Final Cover	100	16	88.1747	232.849	463.299	0	463.299	480.634	480.634
48	5.84516	2807.34	11.1223	Final Cover	100	16	88.1376	232.751	462.956	0	462.956	480.284	480.284
49	3.68565	1347.85	35.5064	Final Cover	100	16	71.9989	190.132	314.33	0	314.33	365.698	365.698
50	3.68565	490.114	35.5064	Final Cover	100	16	48.546	128.199	98.3408	0	98.3408	132.976	132.976

Interslice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 3.11046

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	75.0955	2.3719	0	0	0
2	77.9402	2.62211	91.5096	0	0
3	80.7848	2.88431	182.822	0	0
4	83.6294	3.15852	273.096	0	0
5	86.474	3.44475	361.541	0	0
6	89.3187	3.74302	447.42	0	0
7	92.1633	4.05334	530.045	0	0
8	95.0079	4.37572	608.777	0	0
9	97.8526	4.7102	683.033	0	0
10	100.697	5.05677	752.276	0	0
11	103.542	5.41547	816.026	0	0
12	106.386	5.78631	873.849	0	0
13	109.231	6.16931	925.366	0	0
14	112.076	6.56449	970.249	0	0
15	114.92	6.97188	1008.22	0	0
16	117.765	7.39149	1039.06	0	0
17	120.61	7.82336	1062.59	0	0
18	123.454	8.26749	1078.7	0	0
19	126.299	8.72392	1087.32	0	0
20	129.144	9.19267	1088.43	0	0
21	131.988	9.67377	1082.08	0	0
22	134.833	10.1672	1068.36	0	0
23	137.677	10.6731	1047.41	0	0
24	140.522	11.1914	1019.45	0	0
25	143.367	11.7222	984.716	0	0
26	146.211	12.2654	943.531	0	0
27	150.544	13.1168	869.322	0	0
28	153.42	13.6982	812.956	0	0
29	156.296	14.2925	751.571	0	0
30	159.173	14.8996	685.75	0	0
31	162.049	15.5198	616.136	0	0
32	164.926	16.1529	543.434	0	0
33	167.802	16.799	468.407	0	0
34	170.678	17.4582	391.882	0	0
35	173.555	18.1305	314.744	0	0
36	176.431	18.8159	237.945	0	0
37	179.308	19.5146	162.496	0	0
38	182.184	20.2264	89.4726	0	0
39	185.06	20.9515	20.0155	0	0
40	187.937	21.6899	-44.6708	0	0
41	190.813	22.4417	-103.316	0	0
42	193.69	23.2068	-154.584	0	0
43	196.566	23.9855	-197.07	0	0
44	199.442	24.7776	-229.305	0	0
45	202.319	25.5832	-249.748	0	0
46	205.195	26.4025	-256.791	0	0
47	208.072	27.2353	-248.755	0	0
48	210.948	28.0819	-223.89	0	0
49	213.824	28.9423	-180.373	0	0
50	216.701	29.8164	-116.311	0	0
51	219.577	30.7044	0	0	0

Query 1 (bishop simplified) - Safety Factor: 2.66533

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	75.4884	2.44895	0	0	0
2	83.4947	-0.00449075	1167.29	0	0
3	87.0391	0.690765	1154.09	0	0
4	90.5834	1.38602	1140.9	0	0
5	94.1277	2.08128	1127.72	0	0
6	97.672	2.77653	1114.54	0	0
7	101.216	3.47179	1101.38	0	0
8	104.761	4.16704	1088.22	0	0
9	108.305	4.85276	1079.27	0	0
10	111.849	5.53847	1069.98	0	0
11	116.061	6.35548	1057.58	0	0
12	120.273	7.1725	1044.79	0	0
13	124.485	7.99925	1027.33	0	0
14	128.697	8.826	1009.9	0	0
15	132.187	9.51528	993.566	0	0
16	135.676	10.2046	977.415	0	0
17	139.165	10.8946	961.131	0	0
18	142.655	11.5845	945.058	0	0
19	145.667	12.1749	933.704	0	0
20	148.679	12.7652	922.339	0	0
21	151.691	13.3567	910.417	0	0
22	154.703	13.9482	898.523	0	0
23	157.715	14.5387	887.127	0	0
24	160.728	15.1292	875.726	0	0
25	166.752	16.3101	852.904	0	0
26	171.29	17.2001	835.598	0	0
27	175.829	18.09	818.288	0	0
28	184.7	19.8295	784.446	0	0
29	184.907	19.87	783.658	0	0
30	190.48	20.9653	761.292	0	0
31	191.481	21.1621	757.288	0	0
32	196.053	22.0606	739.068	0	0
33	200.012	22.8393	723.157	0	0
34	203.972	23.618	707.339	0	0
35	207.931	24.3966	691.613	0	0
36	211.891	25.1753	675.979	0	0
37	215.315	25.8479	662.842	0	0
38	218.738	26.5205	649.749	0	0
39	222.162	27.1931	636.7	0	0
40	225.585	27.8657	623.695	0	0
41	228.821	28.5013	611.476	0	0
42	232.057	29.1369	599.293	0	0
43	235.293	29.7726	587.147	0	0
44	238.529	30.4082	575.038	0	0
45	244.374	31.5573	552.853	0	0
46	247.296	32.1319	541.827	0	0
47	250.219	32.7064	530.846	0	0
48	256.064	33.8556	509.016	0	0
49	261.909	35.0047	487.365	0	0
50	265.595	37.6343	-77.2577	0	0
51	269.281	40.2638	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.64077

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	75.4884	2.44895	0	0	0
2	83.4947	-0.00449075	1172.87	0	0
3	87.0391	0.690765	1162.63	0	0
4	90.5834	1.38602	1152.4	0	0
5	94.1277	2.08128	1142.18	0	0
6	97.672	2.77653	1131.96	0	0
7	101.216	3.47179	1121.76	0	0
8	104.761	4.16704	1111.56	0	0
9	108.305	4.85276	1105.57	0	0
10	111.849	5.53847	1099.25	0	0
11	116.061	6.35548	1090.38	0	0
12	120.273	7.1725	1081.12	0	0
13	124.485	7.99925	1067.2	0	0
14	128.697	8.826	1053.31	0	0
15	132.187	9.51528	1039.9	0	0
16	135.676	10.2046	1026.67	0	0
17	139.165	10.8946	1013.31	0	0
18	142.655	11.5845	1000.16	0	0
19	145.667	12.1749	991.331	0	0
20	148.679	12.7652	982.487	0	0
21	151.691	13.3567	973.086	0	0
22	154.703	13.9482	963.712	0	0
23	157.715	14.5387	954.837	0	0
24	160.728	15.1292	945.956	0	0
25	166.752	16.3101	928.175	0	0
26	171.29	17.2001	914.667	0	0
27	175.829	18.09	901.156	0	0
28	184.7	19.8295	874.737	0	0
29	184.907	19.87	874.122	0	0
30	190.48	20.9653	856.42	0	0
31	191.481	21.1621	853.254	0	0
32	196.053	22.0606	838.858	0	0
33	200.012	22.8393	826.259	0	0
34	203.972	23.618	813.75	0	0
35	207.931	24.3966	801.333	0	0
36	211.891	25.1753	789.007	0	0
37	215.315	25.8479	778.73	0	0
38	218.738	26.5205	768.496	0	0
39	222.162	27.1931	758.305	0	0
40	225.585	27.8657	748.157	0	0
41	228.821	28.5013	738.639	0	0
42	232.057	29.1369	729.157	0	0
43	235.293	29.7726	719.711	0	0
44	238.529	30.4082	710.301	0	0
45	244.374	31.5573	692.991	0	0
46	247.296	32.1319	684.401	0	0
47	250.219	32.7064	675.856	0	0
48	256.064	33.8556	658.897	0	0
49	261.909	35.0047	642.115	0	0
50	265.595	37.6343	80.9477	0	0
51	269.281	40.2638	0	0	0

Discharge Sections

Entity Information

Simplified Bishop Method - Total Stress

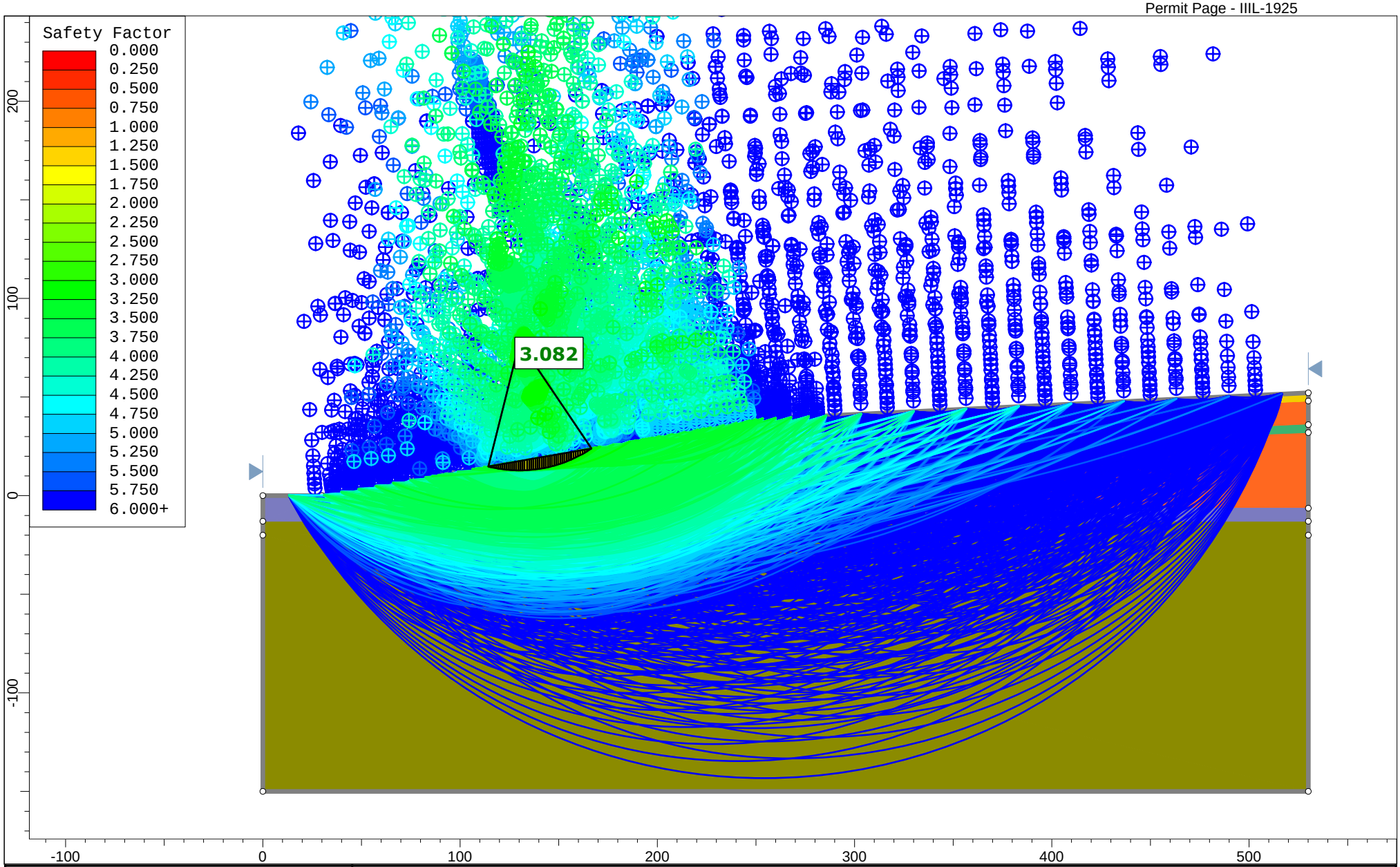
Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0 0, -11 0, -150 532.8, -150 532.8, -30.9 532.8, -27.9 532.8, 49.2 532.8, 53.2 528.8, 53.2 268, 40.2 63, 0
Material Boundary	63, 0 72.5, 0 148, -30.9 532.8, -27.9
Material Boundary	63, 0 90.5811, -11 148, -33.9 532.8, -30.9
Material Boundary	72.5, 0 83.8, 0 268, 36.2 528, 49.2 532.8, 49.2
Material Boundary	0, -11 90.5811, -11

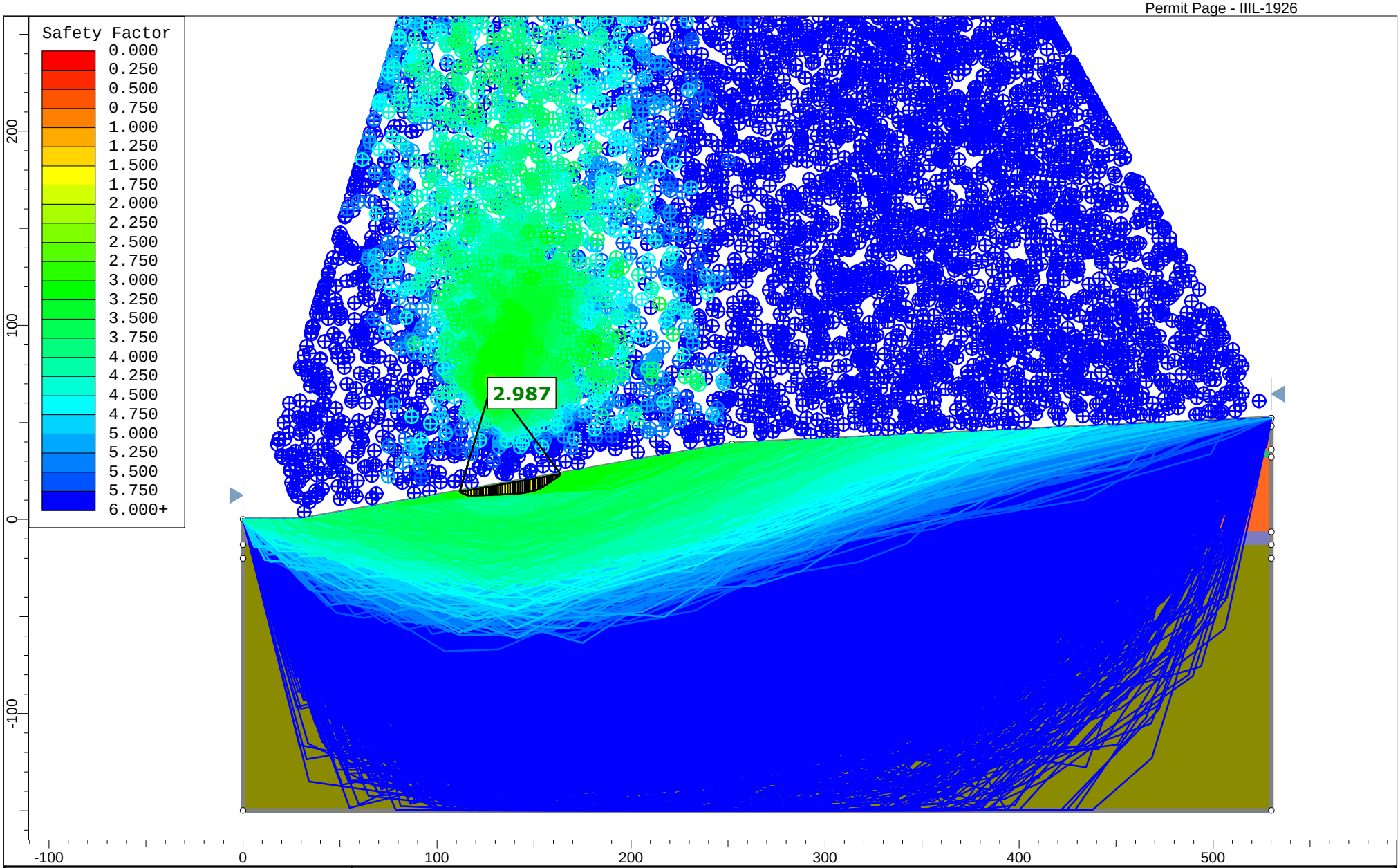
Simplified Janbu Method - Total Stress

Shared Entities

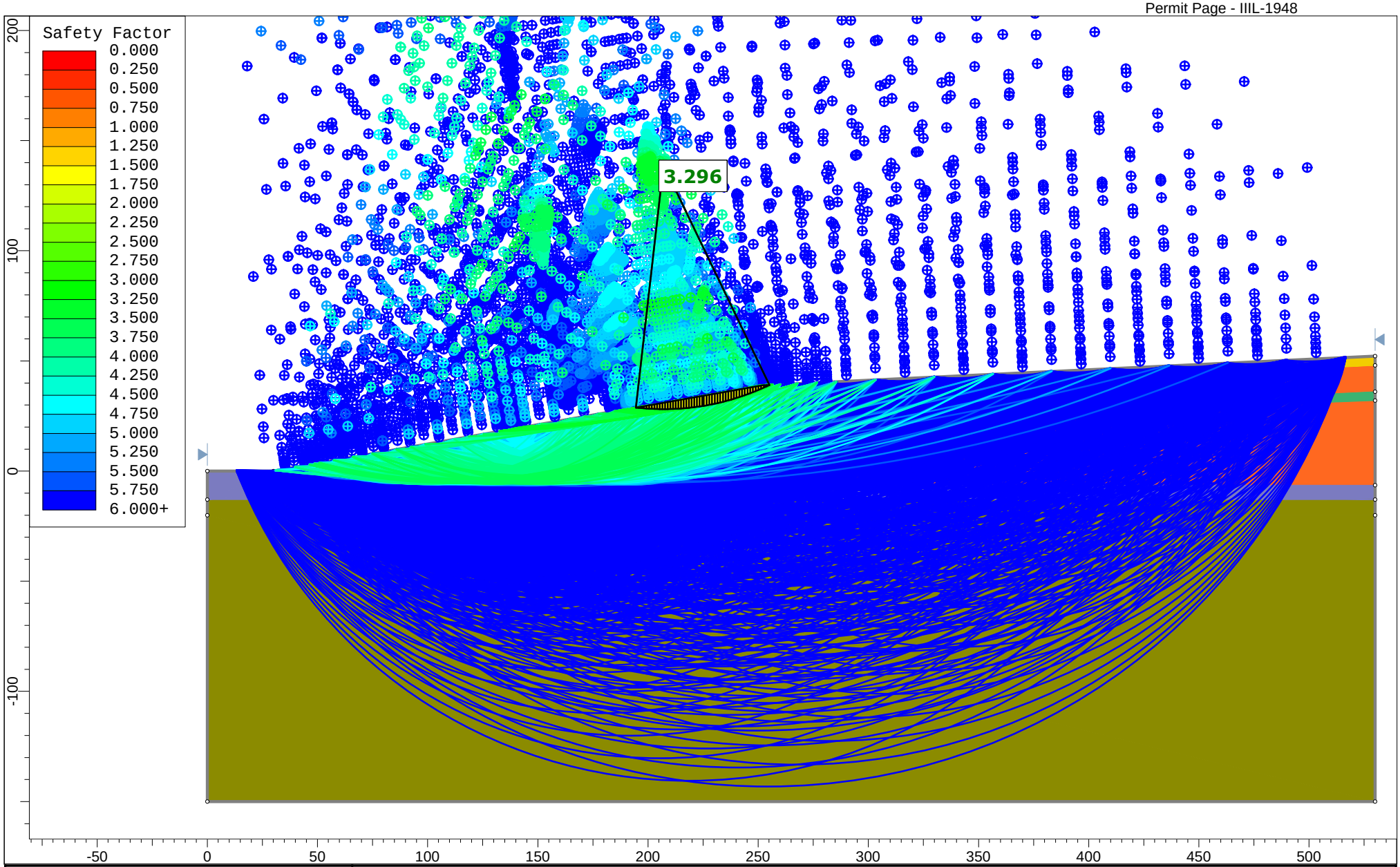
Type	Coordinates (x,y)
External Boundary	0, 0 0, -11 0, -150 532.8, -150 532.8, -30.9 532.8, -27.9 532.8, 49.2 532.8, 53.2 528.8, 53.2 268, 40.2 63, 0
Material Boundary	63, 0 72.5, 0 148, -30.9 532.8, -27.9
Material Boundary	63, 0 90.5811, -11 148, -33.9 532.8, -30.9
Material Boundary	72.5, 0 83.8, 0 268, 36.2 528, 49.2 532.8, 49.2
Material Boundary	0, -11 90.5811, -11



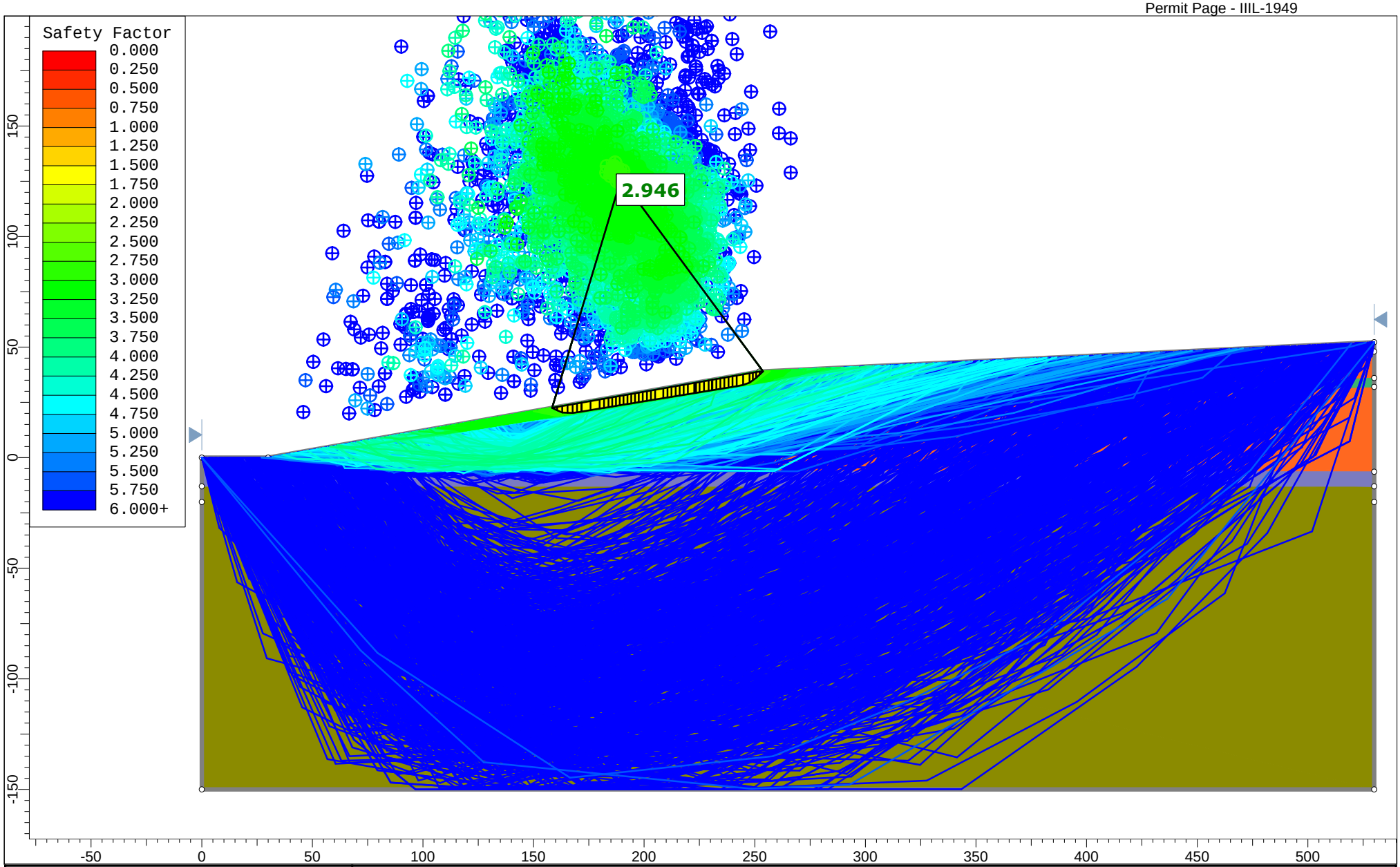
rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Overliner Section E_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Overliner Section E_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Overliner Section E_Total Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Overliner Section E_Total Stress.slmd

Materials

Final Cover	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	16
Water Surface	Assigned per scenario
Ru Value	0
Liner	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Waste	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	47
Cohesion [psf]	288
Friction Angle [deg]	23
Water Surface	Assigned per scenario
Ru Value	0
Stratum II	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110.9
Cohesion [psf]	4000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Stratum III	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	109.7
Cohesion [psf]	2800
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Simplified Janbu Method - Total Stress	Simplified Bishop Method - Total Stress
Final Cover		✓	✓
Liner		✓	✓
Waste		✓	✓
Stratum II		✓	✓
Stratum III		✓	✓

Global Minimums

Simplified Janbu Method - Total Stress

Method: janbu simplified

FS	2.946450
Axis Location:	189.532, 126.139
Left Slip Surface Endpoint:	158.326, 22.486
Right Slip Surface Endpoint:	253.731, 38.983
Resisting Horizontal Force:	22474 lb
Driving Horizontal Force:	7627.49 lb
Total Slice Area:	386.724 ft2
Surface Horizontal Width:	95.4047 ft
Surface Average Height:	4.05351 ft

Simplified Bishop Method - Total Stress

Method: janbu simplified

FS	3.295620
Center:	207.056, 138.940
Radius:	110.828
Left Slip Surface Endpoint:	194.504, 28.825
Right Slip Surface Endpoint:	255.056, 39.046
Resisting Horizontal Force:	12390.2 lb
Driving Horizontal Force:	3759.6 lb
Total Slice Area:	189.419 ft2
Surface Horizontal Width:	60.5516 ft
Surface Average Height:	3.12823 ft

Valid and Invalid Surfaces

Simplified Janbu Method - Total Stress

Method: janbu simplified

Number of Valid Surfaces:	23993
Number of Invalid Surfaces:	1068

Error Codes

Error Code -106 reported for 6 surfaces
Error Code -108 reported for 48 surfaces
Error Code -109 reported for 2 surfaces
Error Code -111 reported for 368 surfaces
Error Code -112 reported for 314 surfaces
Error Code -121 reported for 96 surfaces
Error Code -145 reported for 73 surfaces
Error Code -1000 reported for 161 surfaces

Simplified Bishop Method - Total Stress

Method: janbu simplified

Number of Valid Surfaces:	14112
Number of Invalid Surfaces:	0

Slice Data

Simplified Janbu Method - Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 2.94645

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.33054	201.688	-23.9253	Final Cover	100	16	44.2728	130.448	106.184	0	106.184	86.5413	86.5413
2	2.33054	602.788	-23.5899	Final Cover	100	16	61.7339	181.896	285.605	0	285.605	258.647	258.647
3	2.33138	875.819	-2.84155	Final Cover	100	16	70.8408	208.729	379.182	0	379.182	375.665	375.665
4	2.33138	1022.48	-2.84155	Final Cover	100	16	76.9927	226.855	442.395	0	442.395	438.573	438.573
5	2.01219	950.133	8.94077	Final Cover	100	16	78.6872	231.848	459.809	0	459.809	472.189	472.189
6	2.01219	958.83	8.94077	Final Cover	100	16	79.1016	233.069	464.067	0	464.067	476.511	476.511
7	0.0290263	13.8948	8.94077	Final Cover	100	16	79.311	233.686	466.219	0	466.219	478.697	478.697
8	0.038822	18.5857	9.58045	Final Cover	100	16	79.2286	233.443	465.369	0	465.369	478.742	478.742
9	4.01458	1928.27	9.58045	Final Cover	100	16	79.3789	233.886	466.917	0	466.917	480.315	480.315
10	4.06966	1973.24	9.25465	Final Cover	100	16	79.8595	235.302	471.853	0	471.853	484.866	484.866
11	2.00536	980.915	9.34548	Final Cover	100	16	80.2569	236.473	475.938	0	475.938	489.146	489.146
12	2.00536	986.057	9.34548	Final Cover	100	16	80.5026	237.197	478.461	0	478.461	491.71	491.71
13	1.71558	848.11	9.19947	Final Cover	100	16	80.7765	238.004	481.276	0	481.276	494.358	494.358
14	1.71558	852.797	9.19947	Final Cover	100	16	81.0382	238.775	483.965	0	483.965	497.09	497.09
15	1.71558	857.131	9.31079	Final Cover	100	16	81.2646	239.442	486.293	0	486.293	499.616	499.616
16	1.71558	861.114	9.31079	Final Cover	100	16	81.4869	240.097	488.578	0	488.578	501.937	501.937
17	1.71471	865.239	9.12674	Final Cover	100	16	81.7676	240.924	491.461	0	491.461	504.597	504.597
18	1.71471	870.38	9.12674	Final Cover	100	16	82.055	241.771	494.414	0	494.414	507.596	507.596
19	1.7078	871.462	9.29266	Final Cover	100	16	82.2892	242.461	496.82	0	496.82	510.284	510.284
20	1.7078	875.523	9.29266	Final Cover	100	16	82.5169	243.132	499.159	0	499.159	512.661	512.661
21	1.84922	952.466	9.33007	Final Cover	100	16	82.7416	243.794	501.469	0	501.469	515.063	515.063
22	1.84922	956.952	9.33007	Final Cover	100	16	82.9737	244.478	503.856	0	503.856	517.488	517.488
23	1.84922	961.419	9.33491	Final Cover	100	16	83.2045	245.158	506.227	0	506.227	519.904	519.904
24	1.84922	965.869	9.33491	Final Cover	100	16	83.435	245.837	508.595	0	508.595	522.31	522.31
25	3.71704	1955.43	9.29982	Final Cover	100	16	83.8005	246.914	512.35	0	512.35	526.073	526.073
26	1.85852	984.848	9.29982	Final Cover	100	16	84.1681	247.997	516.127	0	516.127	529.91	529.91
27	1.85852	989.603	9.29982	Final Cover	100	16	84.4131	248.719	518.645	0	518.645	532.468	532.468
28	1.83852	983.664	9.29107	Final Cover	100	16	84.6598	249.446	521.18	0	521.18	535.03	535.03
29	1.83852	988.381	9.29107	Final Cover	100	16	84.9056	250.17	523.706	0	523.706	537.596	537.596

30	1.83852	993.09	9.29343	Final Cover	100	16	85.1506	250.892	526.223	0	526.223	540.157	540.157
31	1.83852	997.789	9.29343	Final Cover	100	16	85.3956	251.614	528.739	0	528.739	542.713	542.713
32	2.87105	1567.56	9.29299	Final Cover	100	16	85.7092	252.538	531.966	0	531.966	545.99	545.99
33	0.805994	442.119	9.29299	Final Cover	100	16	85.9536	253.258	534.474	0	534.474	548.539	548.539
34	1.65613	911.229	9.31393	Final Cover	100	16	86.1111	253.722	536.092	0	536.092	550.215	550.215
35	2.01081	1111.36	9.31393	Final Cover	100	16	86.3483	254.421	538.53	0	538.53	552.692	552.692
36	2.02744	1126.12	9.30027	Final Cover	100	16	86.6134	255.202	541.255	0	541.255	555.438	555.438
37	1.63852	914.217	9.30027	Final Cover	100	16	86.8544	255.912	543.73	0	543.73	557.953	557.953
38	0.0677526	37.8814	9.47143	Final Cover	100	16	86.9399	256.164	544.61	0	544.61	559.114	559.114
39	1.78952	1002.24	9.47143	Final Cover	100	16	87.0302	256.43	545.538	0	545.538	560.057	560.057
40	1.78952	1005.46	9.47143	Final Cover	100	16	87.2029	256.939	547.312	0	547.312	561.86	561.86
41	1.85424	1045.44	9.41366	Final Cover	100	16	87.3984	257.515	549.319	0	549.319	563.809	563.809
42	1.85424	1049.33	9.41366	Final Cover	100	16	87.5993	258.107	551.388	0	551.388	565.912	565.912
43	1.86086	1058.36	9.04574	Final Cover	100	16	87.9268	259.072	554.75	0	554.75	568.748	568.748
44	1.86086	1065.02	9.04574	Final Cover	100	16	88.2696	260.082	558.273	0	558.273	572.326	572.326
45	2.88439	1645.87	11.0588	Final Cover	100	16	87.8009	258.701	553.454	0	553.454	570.614	570.614
46	2.8847	1550.17	19.1389	Final Cover	100	16	83.4187	245.789	508.426	0	508.426	537.376	537.376
47	1.53627	701.513	36.0758	Final Cover	100	16	73.1888	215.647	403.311	0	403.311	456.634	456.634
48	1.53627	544.798	36.0758	Final Cover	100	16	63.9187	188.333	308.055	0	308.055	354.624	354.624
49	1.53637	359.726	42.827	Final Cover	100	16	52.032	153.31	185.913	0	185.913	234.141	234.141
50	1.53637	124.495	42.827	Final Cover	100	16	38.3645	113.039	45.4725	0	45.4725	81.0319	81.0319

Query 1 (janbu simplified) - Safety Factor: 2.94645

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.33054	201.688	-23.9253	Final Cover	100	16	44.2728	130.448	106.184	0	106.184	86.5413	86.5413
2	2.33054	602.788	-23.5899	Final Cover	100	16	61.7339	181.896	285.605	0	285.605	258.647	258.647
3	2.33138	875.819	-2.84155	Final Cover	100	16	70.8408	208.729	379.182	0	379.182	375.665	375.665
4	2.33138	1022.48	-2.84155	Final Cover	100	16	76.9927	226.855	442.395	0	442.395	438.573	438.573
5	2.01219	950.133	8.94077	Final Cover	100	16	78.6872	231.848	459.809	0	459.809	472.189	472.189
6	2.01219	958.83	8.94077	Final Cover	100	16	79.1016	233.069	464.067	0	464.067	476.511	476.511
7	0.0290263	13.8948	8.94077	Final Cover	100	16	79.311	233.686	466.219	0	466.219	478.697	478.697
8	0.038822	18.5857	9.58045	Final Cover	100	16	79.2286	233.443	465.369	0	465.369	478.742	478.742
9	4.01458	1928.27	9.58045	Final Cover	100	16	79.3789	233.886	466.917	0	466.917	480.315	480.315
10	4.06966	1973.24	9.25465	Final Cover	100	16	79.8595	235.302	471.853	0	471.853	484.866	484.866
11	2.00536	980.915	9.34548	Final Cover	100	16	80.2569	236.473	475.938	0	475.938	489.146	489.146
12	2.00536	986.057	9.34548	Final Cover	100	16	80.5026	237.197	478.461	0	478.461	491.71	491.71
13	1.71558	848.11	9.19947	Final Cover	100	16	80.7765	238.004	481.276	0	481.276	494.358	494.358
14	1.71558	852.797	9.19947	Final Cover	100	16	81.0382	238.775	483.965	0	483.965	497.09	497.09
15	1.71558	857.131	9.31079	Final Cover	100	16	81.2646	239.442	486.293	0	486.293	499.616	499.616
16	1.71558	861.114	9.31079	Final Cover	100	16	81.4869	240.097	488.578	0	488.578	501.937	501.937
17	1.71471	865.239	9.12674	Final Cover	100	16	81.7676	240.924	491.461	0	491.461	504.597	504.597
18	1.71471	870.38	9.12674	Final Cover	100	16	82.055	241.771	494.414	0	494.414	507.596	507.596
19	1.7078	871.462	9.29266	Final Cover	100	16	82.2892	242.461	496.82	0	496.82	510.284	510.284
20	1.7078	875.523	9.29266	Final Cover	100	16	82.5169	243.132	499.159	0	499.159	512.661	512.661
21	1.84922	952.466	9.33007	Final Cover	100	16	82.7416	243.794	501.469	0	501.469	515.063	515.063
22	1.84922	956.952	9.33007	Final Cover	100	16	82.9737	244.478	503.856	0	503.856	517.488	517.488
23	1.84922	961.419	9.33491	Final Cover	100	16	83.2045	245.158	506.227	0	506.227	519.904	519.904
24	1.84922	965.869	9.33491	Final Cover	100	16	83.435	245.837	508.595	0	508.595	522.31	522.31
25	3.71704	1955.43	9.29982	Final Cover	100	16	83.8005	246.914	512.35	0	512.35	526.073	526.073
26	1.85852	984.848	9.29982	Final Cover	100	16	84.1681	247.997	516.127	0	516.127	529.91	529.91
27	1.85852	989.603	9.29982	Final Cover	100	16	84.4131	248.719	518.645	0	518.645	532.468	532.468
28	1.83852	983.664	9.29107	Final Cover	100	16	84.6598	249.446	521.18	0	521.18	535.03	535.03
29	1.83852	988.381	9.29107	Final Cover	100	16	84.9056	250.17	523.706	0	523.706	537.596	537.596
30	1.83852	993.09	9.29343	Final Cover	100	16	85.1506	250.892	526.223	0	526.223	540.157	540.157
31	1.83852	997.789	9.29343	Final Cover	100	16	85.3956	251.614	528.739	0	528.739	542.713	542.713
32	2.87105	1567.56	9.29299	Final Cover	100	16	85.7092	252.538	531.966	0	531.966	545.99	545.99
33	0.805994	442.119	9.29299	Final Cover	100	16	85.9536	253.258	534.474	0	534.474	548.539	548.539

34	1.65613	911.229	9.31393	Final Cover	100	16	86.1111	253.722	536.092	0	536.092	550.215	550.215
35	2.01081	1111.36	9.31393	Final Cover	100	16	86.3483	254.421	538.53	0	538.53	552.692	552.692
36	2.02744	1126.12	9.30027	Final Cover	100	16	86.6134	255.202	541.255	0	541.255	555.438	555.438
37	1.63852	914.217	9.30027	Final Cover	100	16	86.8544	255.912	543.73	0	543.73	557.953	557.953
38	0.0677526	37.8814	9.47143	Final Cover	100	16	86.9399	256.164	544.61	0	544.61	559.114	559.114
39	1.78952	1002.24	9.47143	Final Cover	100	16	87.0302	256.43	545.538	0	545.538	560.057	560.057
40	1.78952	1005.46	9.47143	Final Cover	100	16	87.2029	256.939	547.312	0	547.312	561.86	561.86
41	1.85424	1045.44	9.41366	Final Cover	100	16	87.3984	257.515	549.319	0	549.319	563.809	563.809
42	1.85424	1049.33	9.41366	Final Cover	100	16	87.5993	258.107	551.388	0	551.388	565.912	565.912
43	1.86086	1058.36	9.04574	Final Cover	100	16	87.9268	259.072	554.75	0	554.75	568.748	568.748
44	1.86086	1065.02	9.04574	Final Cover	100	16	88.2696	260.082	558.273	0	558.273	572.326	572.326
45	2.88439	1645.87	11.0588	Final Cover	100	16	87.8009	258.701	553.454	0	553.454	570.614	570.614
46	2.8847	1550.17	19.1389	Final Cover	100	16	83.4187	245.789	508.426	0	508.426	537.376	537.376
47	1.53627	701.513	36.0758	Final Cover	100	16	73.1888	215.647	403.311	0	403.311	456.634	456.634
48	1.53627	544.798	36.0758	Final Cover	100	16	63.9187	188.333	308.055	0	308.055	354.624	354.624
49	1.53637	359.726	42.827	Final Cover	100	16	52.032	153.31	185.913	0	185.913	234.141	234.141
50	1.53637	124.495	42.827	Final Cover	100	16	38.3645	113.039	45.4725	0	45.4725	81.0319	81.0319

Simplified Bishop Method - Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 3.29562

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.20542	24.7311	-6.18935	Final Cover	100	16	32.4345	106.892	24.0348	0	24.0348	20.5174	20.5174
2	1.20542	73.2298	-5.56287	Final Cover	100	16	35.9337	118.424	64.2512	0	64.2512	60.7514	60.7514
3	1.20542	119.805	-4.93705	Final Cover	100	16	39.2863	129.473	102.783	0	102.783	99.3895	99.3895
4	1.20542	164.462	-4.31183	Final Cover	100	16	42.4932	140.041	139.641	0	139.641	136.437	136.437
5	1.20542	207.207	-3.68712	Final Cover	100	16	45.5551	150.132	174.832	0	174.832	171.897	171.897
6	1.20542	248.043	-3.06285	Final Cover	100	16	48.4729	159.748	208.367	0	208.367	205.774	205.774
7	1.20542	286.974	-2.43894	Final Cover	100	16	51.2473	168.892	240.253	0	240.253	238.07	238.07
8	1.20542	324.003	-1.81532	Final Cover	100	16	53.8787	177.564	270.497	0	270.497	268.79	268.79
9	1.20542	359.133	-1.19192	Final Cover	100	16	56.3679	185.767	299.105	0	299.105	297.933	297.933
10	1.20542	392.365	-0.568655	Final Cover	100	16	58.7153	193.503	326.084	0	326.084	325.501	325.501
11	1.20542	423.701	0.0545394	Final Cover	100	16	60.9212	200.773	351.439	0	351.439	351.497	351.497
12	1.20542	453.139	0.677741	Final Cover	100	16	62.9863	207.579	375.174	0	375.174	375.919	375.919
13	1.20542	480.681	1.30102	Final Cover	100	16	64.911	213.922	397.292	0	397.292	398.767	398.767
14	1.20542	506.325	1.92446	Final Cover	100	16	66.6952	219.802	417.799	0	417.799	420.04	420.04
15	1.20542	530.068	2.54812	Final Cover	100	16	68.3395	225.221	436.697	0	436.697	439.738	439.738
16	1.20542	551.91	3.17209	Final Cover	100	16	69.8436	230.178	453.986	0	453.986	457.857	457.857
17	1.20542	571.846	3.79643	Final Cover	100	16	71.2085	234.676	469.67	0	469.67	474.395	474.395
18	1.20542	589.873	4.42122	Final Cover	100	16	72.4334	238.713	483.75	0	483.75	489.35	489.35
19	1.20542	605.987	5.04655	Final Cover	100	16	73.5188	242.29	496.226	0	496.226	502.718	502.718
20	1.20542	620.181	5.67247	Final Cover	100	16	74.4649	245.408	507.096	0	507.096	514.493	514.493
21	1.20542	632.451	6.29908	Final Cover	100	16	75.2711	248.065	516.363	0	516.363	524.672	524.672
22	1.20542	642.789	6.92644	Final Cover	100	16	75.9375	250.261	524.023	0	524.023	533.248	533.248
23	1.20542	651.189	7.55464	Final Cover	100	16	76.4642	251.997	530.075	0	530.075	540.216	540.216
24	1.20542	657.642	8.18375	Final Cover	100	16	76.8505	253.27	534.517	0	534.517	545.569	545.569
25	1.20542	662.139	8.81386	Final Cover	100	16	77.0966	254.081	537.345	0	537.345	549.3	549.3
26	0.679171	374.375	9.30707	Final Cover	100	16	77.2031	254.432	538.568	0	538.568	551.22	551.22
27	1.23904	683.775	9.81001	Final Cover	100	16	77.1976	254.414	538.506	0	538.506	551.855	551.855
28	1.23904	683.121	10.4607	Final Cover	100	16	77.075	254.01	537.097	0	537.097	551.327	551.327
29	1.23904	680.302	11.1128	Final Cover	100	16	76.8025	253.112	533.965	0	533.965	549.051	549.051
30	1.23904	675.303	11.7664	Final Cover	100	16	76.3799	251.719	529.107	0	529.107	545.017	545.017
31	1.23904	668.108	12.4215	Final Cover	100	16	75.8061	249.828	522.513	0	522.513	539.21	539.21
32	1.23904	658.702	13.0783	Final Cover	100	16	75.0809	247.438	514.176	0	514.176	531.618	531.618

33	1.23904	647.067	13.7368	Final Cover	100	16	74.203	244.545	504.088	0	504.088	522.228	522.228
34	1.23904	633.185	14.3972	Final Cover	100	16	73.1723	241.148	492.24	0	492.24	511.024	511.024
35	1.23904	617.036	15.0595	Final Cover	100	16	71.9871	237.242	478.621	0	478.621	497.99	497.99
36	1.23904	598.6	15.7239	Final Cover	100	16	70.6471	232.826	463.22	0	463.22	483.11	483.11
37	1.23904	577.853	16.3905	Final Cover	100	16	69.1512	227.896	446.026	0	446.026	466.366	466.366
38	1.23904	554.774	17.0594	Final Cover	100	16	67.4981	222.448	427.027	0	427.027	447.74	447.74
39	1.23904	529.338	17.7306	Final Cover	100	16	65.6866	216.478	406.209	0	406.209	427.211	427.211
40	1.23904	501.518	18.4044	Final Cover	100	16	63.7158	209.983	383.557	0	383.557	404.757	404.757
41	1.23904	471.286	19.0809	Final Cover	100	16	61.5842	202.958	359.056	0	359.056	380.358	380.358
42	1.23904	438.614	19.7601	Final Cover	100	16	59.29	195.397	332.69	0	332.69	353.989	353.989
43	1.23904	403.471	20.4422	Final Cover	100	16	56.8323	187.298	304.443	0	304.443	325.626	325.626
44	1.23904	365.824	21.1274	Final Cover	100	16	54.2092	178.653	274.295	0	274.295	295.242	295.242
45	1.23904	325.638	21.8158	Final Cover	100	16	51.419	169.457	242.227	0	242.227	262.81	262.81
46	1.23904	282.879	22.5074	Final Cover	100	16	48.4601	159.706	208.219	0	208.219	228.299	228.299
47	1.23904	237.506	23.2026	Final Cover	100	16	45.3304	149.392	172.25	0	172.25	191.681	191.681
48	1.23904	186.931	23.9014	Final Cover	100	16	41.8556	137.94	132.314	0	132.314	150.863	150.863
49	1.23904	116.085	24.604	Final Cover	100	16	37.0197	122.003	76.7333	0	76.7333	93.6854	93.6854
50	1.23904	39.1557	25.3105	Final Cover	100	16	31.7847	104.75	16.5664	0	16.5664	31.5981	31.5981

Interslice Data

Simplified Janbu Method - Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 2.94645

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	158.326	22.486	0	0	0
2	160.657	21.452	212.973	0	0
3	162.987	20.4343	647.507	0	0
4	165.319	20.3186	856.542	0	0
5	167.65	20.2029	1087.23	0	0
6	169.662	20.5195	1100.01	0	0
7	171.675	20.836	1112.27	0	0
8	171.704	20.8406	1112.44	0	0
9	171.742	20.8471	1112.47	0	0
10	175.757	21.5247	1114.75	0	0
11	179.827	22.1879	1126.86	0	0
12	181.832	22.5179	1130.73	0	0
13	183.837	22.8479	1134.26	0	0
14	185.553	23.1258	1139.12	0	0
15	187.269	23.4036	1143.68	0	0
16	188.984	23.6849	1146.31	0	0
17	190.7	23.9662	1148.69	0	0
18	192.414	24.2416	1153.51	0	0
19	194.129	24.5171	1158.02	0	0
20	195.837	24.7965	1159.72	0	0
21	197.545	25.076	1161.16	0	0
22	199.394	25.3798	1161.81	0	0
23	201.243	25.6836	1162.17	0	0
24	203.092	25.9876	1162.15	0	0
25	204.942	26.2916	1161.83	0	0
26	208.659	26.9002	1161.47	0	0
27	210.517	27.2046	1160.82	0	0
28	212.376	27.5089	1159.86	0	0
29	214.214	27.8097	1158.75	0	0
30	216.053	28.1105	1157.33	0	0
31	217.891	28.4113	1155.57	0	0
32	219.73	28.7122	1153.5	0	0
33	222.601	29.182	1149.66	0	0
34	223.407	29.3139	1148.45	0	0
35	225.063	29.5855	1145.45	0	0
36	227.074	29.9153	1141.48	0	0
37	229.101	30.2473	1137.38	0	0
38	230.74	30.5156	1133.8	0	0
39	230.807	30.5269	1133.53	0	0
40	232.597	30.8254	1126.41	0	0
41	234.387	31.124	1119.06	0	0
42	236.241	31.4314	1112.24	0	0
43	238.095	31.7388	1105.17	0	0
44	239.956	32.0351	1104.44	0	0
45	241.817	32.3313	1103.31	0	0
46	244.701	32.8951	1044.55	0	0
47	247.586	33.8962	776.198	0	0
48	249.122	35.0155	437.22	0	0
49	250.658	36.1347	190.618	0	0
50	252.195	37.5588	5.81171	0	0
51	253.731	38.9828	0	0	0

Query 1 (janbu simplified) - Safety Factor: 2.94645

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	158.326	22.486	0	0	0
2	160.657	21.452	212.973	0	0
3	162.987	20.4343	647.507	0	0
4	165.319	20.3186	856.542	0	0
5	167.65	20.2029	1087.23	0	0
6	169.662	20.5195	1100.01	0	0
7	171.675	20.836	1112.27	0	0
8	171.704	20.8406	1112.44	0	0
9	171.742	20.8471	1112.47	0	0
10	175.757	21.5247	1114.75	0	0
11	179.827	22.1879	1126.86	0	0
12	181.832	22.5179	1130.73	0	0
13	183.837	22.8479	1134.26	0	0
14	185.553	23.1258	1139.12	0	0
15	187.269	23.4036	1143.68	0	0
16	188.984	23.6849	1146.31	0	0
17	190.7	23.9662	1148.69	0	0
18	192.414	24.2416	1153.51	0	0
19	194.129	24.5171	1158.02	0	0
20	195.837	24.7965	1159.72	0	0
21	197.545	25.076	1161.16	0	0
22	199.394	25.3798	1161.81	0	0
23	201.243	25.6836	1162.17	0	0
24	203.092	25.9876	1162.15	0	0
25	204.942	26.2916	1161.83	0	0
26	208.659	26.9002	1161.47	0	0
27	210.517	27.2046	1160.82	0	0
28	212.376	27.5089	1159.86	0	0
29	214.214	27.8097	1158.75	0	0
30	216.053	28.1105	1157.33	0	0
31	217.891	28.4113	1155.57	0	0
32	219.73	28.7122	1153.5	0	0
33	222.601	29.182	1149.66	0	0
34	223.407	29.3139	1148.45	0	0
35	225.063	29.5855	1145.45	0	0
36	227.074	29.9153	1141.48	0	0
37	229.101	30.2473	1137.38	0	0
38	230.74	30.5156	1133.8	0	0
39	230.807	30.5269	1133.53	0	0
40	232.597	30.8254	1126.41	0	0
41	234.387	31.124	1119.06	0	0
42	236.241	31.4314	1112.24	0	0
43	238.095	31.7388	1105.17	0	0
44	239.956	32.0351	1104.44	0	0
45	241.817	32.3313	1103.31	0	0
46	244.701	32.8951	1044.55	0	0
47	247.586	33.8962	776.198	0	0
48	249.122	35.0155	437.22	0	0
49	250.658	36.1347	190.618	0	0
50	252.195	37.5588	5.81171	0	0
51	253.731	38.9828	0	0	0

Simplified Bishop Method - Total Stress

Global Minimum Query (janbu simplified) - Safety Factor: 3.29562

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	194.504	28.8253	0	0	0
2	195.71	28.6945	42.2481	0	0
3	196.915	28.5771	93.1166	0	0
4	198.12	28.473	151.186	0	0
5	199.326	28.3821	215.112	0	0
6	200.531	28.3045	283.618	0	0
7	201.737	28.24	355.501	0	0
8	202.942	28.1886	429.625	0	0
9	204.147	28.1504	504.921	0	0
10	205.353	28.1253	580.385	0	0
11	206.558	28.1134	655.079	0	0
12	207.764	28.1145	728.128	0	0
13	208.969	28.1288	798.721	0	0
14	210.175	28.1561	866.108	0	0
15	211.38	28.1966	929.6	0	0
16	212.585	28.2503	988.57	0	0
17	213.791	28.3171	1042.45	0	0
18	214.996	28.3971	1090.74	0	0
19	216.202	28.4903	1132.99	0	0
20	217.407	28.5967	1168.81	0	0
21	218.612	28.7165	1197.87	0	0
22	219.818	28.8495	1219.92	0	0
23	221.023	28.996	1234.74	0	0
24	222.229	29.1558	1242.19	0	0
25	223.434	29.3292	1242.19	0	0
26	224.64	29.5161	1234.71	0	0
27	225.319	29.6274	1227.21	0	0
28	226.558	29.8416	1207.52	0	0
29	227.797	30.0704	1180.17	0	0
30	229.036	30.3138	1145.4	0	0
31	230.275	30.5719	1103.5	0	0
32	231.514	30.8448	1054.85	0	0
33	232.753	31.1326	999.898	0	0
34	233.992	31.4355	939.177	0	0
35	235.231	31.7536	873.297	0	0
36	236.47	32.087	802.95	0	0
37	237.709	32.4358	728.916	0	0
38	238.948	32.8002	652.064	0	0
39	240.187	33.1805	573.354	0	0
40	241.426	33.5766	493.838	0	0
41	242.665	33.9889	414.669	0	0
42	243.904	34.4175	337.103	0	0
43	245.143	34.8626	262.5	0	0
44	246.382	35.3244	192.331	0	0
45	247.621	35.8032	128.185	0	0
46	248.861	36.2992	71.7708	0	0
47	250.1	36.8126	24.9255	0	0
48	251.339	37.3437	-10.3807	0	0
49	252.578	37.8928	-31.1617	0	0
50	253.817	38.4602	-28.8192	0	0
51	255.056	39.0462	0	0	0

Query 1 (janbu simplified) - Safety Factor: 3.29562

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	194.504	28.8253	0	0	0
2	195.71	28.6945	42.2481	0	0
3	196.915	28.5771	93.1166	0	0
4	198.12	28.473	151.186	0	0
5	199.326	28.3821	215.112	0	0
6	200.531	28.3045	283.618	0	0
7	201.737	28.24	355.501	0	0
8	202.942	28.1886	429.625	0	0
9	204.147	28.1504	504.921	0	0
10	205.353	28.1253	580.385	0	0
11	206.558	28.1134	655.079	0	0
12	207.764	28.1145	728.128	0	0
13	208.969	28.1288	798.721	0	0
14	210.175	28.1561	866.108	0	0
15	211.38	28.1966	929.6	0	0
16	212.585	28.2503	988.57	0	0
17	213.791	28.3171	1042.45	0	0
18	214.996	28.3971	1090.74	0	0
19	216.202	28.4903	1132.99	0	0
20	217.407	28.5967	1168.81	0	0
21	218.612	28.7165	1197.87	0	0
22	219.818	28.8495	1219.92	0	0
23	221.023	28.996	1234.74	0	0
24	222.229	29.1558	1242.19	0	0
25	223.434	29.3292	1242.19	0	0
26	224.64	29.5161	1234.71	0	0
27	225.319	29.6274	1227.21	0	0
28	226.558	29.8416	1207.52	0	0
29	227.797	30.0704	1180.17	0	0
30	229.036	30.3138	1145.4	0	0
31	230.275	30.5719	1103.5	0	0
32	231.514	30.8448	1054.85	0	0
33	232.753	31.1326	999.898	0	0
34	233.992	31.4355	939.177	0	0
35	235.231	31.7536	873.297	0	0
36	236.47	32.087	802.95	0	0
37	237.709	32.4358	728.916	0	0
38	238.948	32.8002	652.064	0	0
39	240.187	33.1805	573.354	0	0
40	241.426	33.5766	493.838	0	0
41	242.665	33.9889	414.669	0	0
42	243.904	34.4175	337.103	0	0
43	245.143	34.8626	262.5	0	0
44	246.382	35.3244	192.331	0	0
45	247.621	35.8032	128.185	0	0
46	248.861	36.2992	71.7708	0	0
47	250.1	36.8126	24.9255	0	0
48	251.339	37.3437	-10.3807	0	0
49	252.578	37.8928	-31.1617	0	0
50	253.817	38.4602	-28.8192	0	0
51	255.056	39.0462	0	0	0

Discharge Sections

Entity Information

Simplified Janbu Method - Total Stress

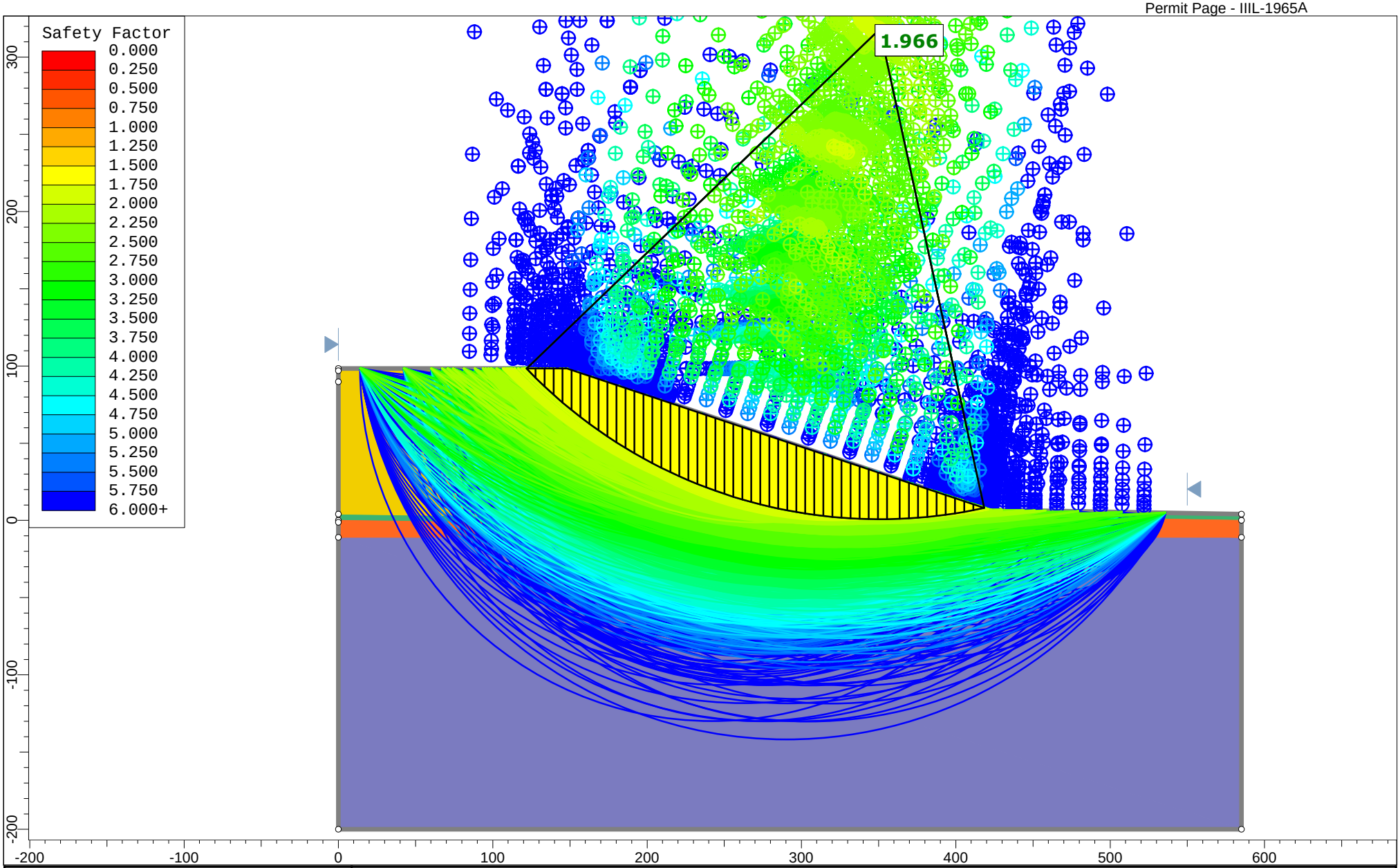
Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0 0, -13 0, -20.047 0, -150 530, -150 530, -20.047 530, -13 530, -6.4 530, 32 530, 36 530, 48 530, 52.2 252, 38.9 30, 0
Material Boundary	30, 0 44.535, 0 119.116, 12.2226 154.932, 18.0923 252, 34 530, 48
Material Boundary	119.116, 12.2226 530, 32
Material Boundary	154.932, 18.0923 530, 36
Material Boundary	30, 0 81, -6 530, -6.4
Material Boundary	0, -13 530, -13

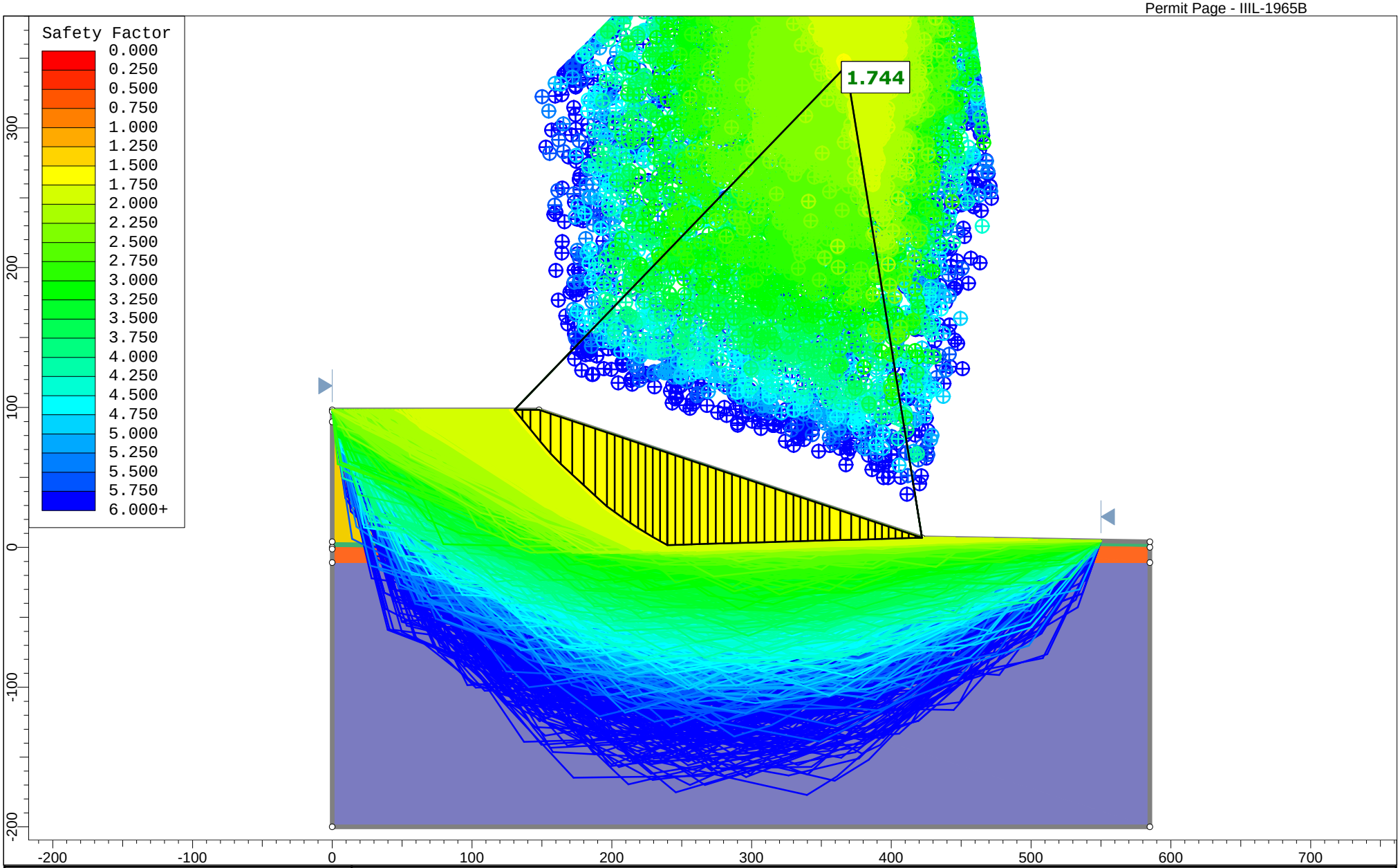
Simplified Bishop Method - Total Stress

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 0 0, -13 0, -20.047 0, -150 530, -150 530, -20.047 530, -13 530, -6.4 530, 32 530, 36 530, 48 530, 52.2 252, 38.9 30, 0
Material Boundary	30, 0 44.535, 0 119.116, 12.2226 154.932, 18.0923 252, 34 530, 48
Material Boundary	119.116, 12.2226 530, 32
Material Boundary	154.932, 18.0923 530, 36
Material Boundary	30, 0 81, -6 530, -6.4
Material Boundary	0, -13 530, -13



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Interim Section FF_Effective Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Effective Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Interim Section FF_Effective Stress.slmd

Materials

Waste	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	47
Cohesion [psf]	288
Friction Angle [deg]	23
Water Surface	None
Ru Value	0
Clay Liner	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	16
Water Surface	None
Ru Value	0
Stratum II	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110.9
Cohesion [psf]	206
Friction Angle [deg]	25
Water Surface	None
Ru Value	0
Stratum III	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	109
Cohesion [psf]	150
Friction Angle [deg]	24
Water Surface	None
Ru Value	0

Global Minimums

Method: bishop simplified

FS	1.965550
Center:	350.760, 318.083
Radius:	317.319
Left Slip Surface Endpoint:	121.879, 98.300
Right Slip Surface Endpoint:	418.301, 8.035
Resisting Moment:	7.95236e+07 lb-ft
Driving Moment:	4.04586e+07 lb-ft
Total Slice Area:	9631.79 ft2
Surface Horizontal Width:	296.422 ft
Surface Average Height:	32.4934 ft

Global Minimum Support Data

No Supports Present

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.96555

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	5.8243	808.745	-45.4127	Waste	288	23	144.796	284.604	-8.00092	0	-8.00092	138.896	138.896
2	5.8243	2385.53	-43.9334	Waste	288	23	194.515	382.33	222.226	0	222.226	409.631	409.631
3	5.8243	3883.79	-42.4901	Waste	288	23	242.56	476.763	444.696	0	444.696	666.884	666.884
4	5.8243	5308.94	-41.0795	Waste	288	23	288.984	568.012	659.668	0	659.668	911.583	911.583
5	5.8243	6595.02	-39.6985	Waste	288	23	331.621	651.817	857.1	0	857.1	1132.4	1132.4
6	5.8243	7417.56	-38.3446	Waste	288	23	360.065	707.726	988.813	0	988.813	1273.63	1273.63
7	5.8243	8116.78	-37.0156	Waste	288	23	384.838	756.418	1103.52	0	1103.52	1393.68	1393.68
8	5.8243	8758.44	-35.7094	Waste	288	23	407.962	801.87	1210.6	0	1210.6	1503.85	1503.85
9	5.8243	9345.39	-34.4244	Waste	288	23	429.489	844.183	1310.28	0	1310.28	1604.63	1604.63
10	5.8243	9880.14	-33.1588	Waste	288	23	449.465	883.446	1402.78	0	1402.78	1696.44	1696.44
11	5.8243	10365	-31.9112	Waste	288	23	467.933	919.745	1488.3	0	1488.3	1779.69	1779.69
12	5.8243	10801.9	-30.6803	Waste	288	23	484.929	953.153	1567	0	1567	1854.71	1854.71
13	5.8243	11192.8	-29.465	Waste	288	23	500.492	983.742	1639.06	0	1639.06	1921.83	1921.83
14	5.8243	11539.4	-28.264	Waste	288	23	514.651	1011.57	1704.63	0	1704.63	1981.32	1981.32
15	5.8243	11843.1	-27.0764	Waste	288	23	527.437	1036.7	1763.83	0	1763.83	2033.46	2033.46
16	5.8243	12105.3	-25.9013	Waste	288	23	538.876	1059.19	1816.81	0	1816.81	2078.49	2078.49
17	5.8243	12327.3	-24.7378	Waste	288	23	548.992	1079.07	1863.65	0	1863.65	2116.6	2116.6
18	5.8243	12510.2	-23.5851	Waste	288	23	557.808	1096.4	1904.47	0	1904.47	2147.99	2147.99
19	5.8243	12655.1	-22.4424	Waste	288	23	565.343	1111.21	1939.36	0	1939.36	2172.87	2172.87
20	5.8243	12762.9	-21.3091	Waste	288	23	571.615	1123.54	1968.41	0	1968.41	2191.37	2191.37
21	5.8243	12834.5	-20.1844	Waste	288	23	576.641	1133.42	1991.67	0	1991.67	2203.66	2203.66
22	5.8243	12870.6	-19.0678	Waste	288	23	580.434	1140.87	2009.24	0	2009.24	2209.87	2209.87
23	5.8243	12872.1	-17.9587	Waste	288	23	583.008	1145.93	2021.17	0	2021.17	2210.13	2210.13
24	5.8243	12839.6	-16.8565	Waste	288	23	584.373	1148.62	2027.48	0	2027.48	2204.54	2204.54
25	5.8243	12773.8	-15.7607	Waste	288	23	584.54	1148.94	2028.25	0	2028.25	2193.22	2193.22
26	5.8243	12675	-14.6708	Waste	288	23	583.515	1146.93	2023.51	0	2023.51	2176.27	2176.27
27	5.8243	12544	-13.5862	Waste	288	23	581.307	1142.59	2013.28	0	2013.28	2153.76	2153.76
28	5.8243	12381	-12.5067	Waste	288	23	577.919	1135.93	1997.6	0	1997.6	2125.79	2125.79
29	5.8243	12186.6	-11.4316	Waste	288	23	573.357	1126.96	1976.46	0	1976.46	2092.4	2092.4
30	5.8243	11961.1	-10.3606	Waste	288	23	567.622	1115.69	1949.91	0	1949.91	2053.68	2053.68
31	5.8243	11704.9	-9.29319	Waste	288	23	560.717	1102.12	1917.94	0	1917.94	2009.69	2009.69
32	5.8243	11418.2	-8.22906	Waste	288	23	552.641	1086.24	1880.54	0	1880.54	1960.47	1960.47
33	5.88997	11420.2	-7.16182	Clay Liner	100	16	327.733	644.175	1897.77	0	1897.77	1938.95	1938.95
34	5.88997	11432.7	-6.0911	Clay Liner	100	16	328.927	646.522	1905.95	0	1905.95	1941.05	1941.05
35	5.88997	11366.5	-5.02251	Clay Liner	100	16	328.2	645.093	1900.97	0	1900.97	1929.81	1929.81
36	5.88997	11222.1	-3.95567	Clay Liner	100	16	325.547	639.879	1882.78	0	1882.78	1905.29	1905.29
37	5.88997	10999.8	-2.89021	Clay Liner	100	16	320.963	630.868	1851.35	0	1851.35	1867.56	1867.56
38	5.88997	10700	-1.82574	Clay Liner	100	16	314.438	618.044	1806.63	0	1806.63	1816.65	1816.65
39	5.88997	10322.8	-0.761903	Clay Liner	100	16	305.963	601.386	1748.55	0	1748.55	1752.62	1752.62
40	5.88997	9868.28	0.301671	Clay Liner	100	16	295.525	580.87	1676.99	0	1676.99	1675.44	1675.44
41	8.22377	12863.1	1.57619	Clay Liner	100	16	280.186	550.72	1571.85	0	1571.85	1564.14	1564.14
42	5.97094	8575.84	2.85868	Clay Liner	100	16	262.316	515.596	1449.36	0	1449.36	1436.26	1436.26
43	5.97094	7837.43	3.93877	Clay Liner	100	16	244.824	481.213	1329.45	0	1329.45	1312.59	1312.59
44	5.97094	7017.94	5.02026	Clay Liner	100	16	225.229	442.698	1195.13	0	1195.13	1175.34	1175.34
45	5.97094	6116.99	6.10355	Clay Liner	100	16	203.504	399.997	1046.21	0	1046.21	1024.45	1024.45
46	5.97094	5134.13	7.18904	Clay Liner	100	16	179.621	353.054	882.502	0	882.502	859.846	859.846
47	5.97094	4068.82	8.27713	Clay Liner	100	16	153.546	301.802	703.768	0	703.768	681.431	681.431
48	5.97094	2920.41	9.36823	Clay Liner	100	16	125.243	246.172	509.761	0	509.761	489.099	489.099
49	5.97094	1688.17	10.4628	Clay Liner	100	16	94.6726	186.084	300.209	0	300.209	282.726	282.726
50	6.93374	610.235	11.6501	Waste	288	23	173.242	340.516	123.719	0	123.719	87.9999	87.9999

Query 1 (bishop simplified) - Safety Factor: 1.96555

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	5.8243	808.745	-45.4127	Waste	288	23	144.796	284.604	-8.00092	0	-8.00092	138.896	138.896
2	5.8243	2385.53	-43.9334	Waste	288	23	194.515	382.33	222.226	0	222.226	409.631	409.631
3	5.8243	3883.79	-42.4901	Waste	288	23	242.56	476.763	444.696	0	444.696	666.884	666.884
4	5.8243	5308.94	-41.0795	Waste	288	23	288.984	568.012	659.668	0	659.668	911.583	911.583
5	5.8243	6595.02	-39.6985	Waste	288	23	331.621	651.817	857.1	0	857.1	1132.4	1132.4
6	5.8243	7417.56	-38.3446	Waste	288	23	360.065	707.726	988.813	0	988.813	1273.63	1273.63
7	5.8243	8116.78	-37.0156	Waste	288	23	384.838	756.418	1103.52	0	1103.52	1393.68	1393.68
8	5.8243	8758.44	-35.7094	Waste	288	23	407.962	801.87	1210.6	0	1210.6	1503.85	1503.85
9	5.8243	9345.39	-34.4244	Waste	288	23	429.489	844.183	1310.28	0	1310.28	1604.63	1604.63
10	5.8243	9880.14	-33.1588	Waste	288	23	449.465	883.446	1402.78	0	1402.78	1696.44	1696.44
11	5.8243	10365	-31.9112	Waste	288	23	467.933	919.745	1488.3	0	1488.3	1779.69	1779.69
12	5.8243	10801.9	-30.6803	Waste	288	23	484.929	953.153	1567	0	1567	1854.71	1854.71
13	5.8243	11192.8	-29.465	Waste	288	23	500.492	983.742	1639.06	0	1639.06	1921.83	1921.83
14	5.8243	11539.4	-28.264	Waste	288	23	514.651	1011.57	1704.63	0	1704.63	1981.32	1981.32
15	5.8243	11843.1	-27.0764	Waste	288	23	527.437	1036.7	1763.83	0	1763.83	2033.46	2033.46
16	5.8243	12105.3	-25.9013	Waste	288	23	538.876	1059.19	1816.81	0	1816.81	2078.49	2078.49
17	5.8243	12327.3	-24.7378	Waste	288	23	548.992	1079.07	1863.65	0	1863.65	2116.6	2116.6
18	5.8243	12510.2	-23.5851	Waste	288	23	557.808	1096.4	1904.47	0	1904.47	2147.99	2147.99
19	5.8243	12655.1	-22.4424	Waste	288	23	565.343	1111.21	1939.36	0	1939.36	2172.87	2172.87
20	5.8243	12762.9	-21.3091	Waste	288	23	571.615	1123.54	1968.41	0	1968.41	2191.37	2191.37
21	5.8243	12834.5	-20.1844	Waste	288	23	576.641	1133.42	1991.67	0	1991.67	2203.66	2203.66
22	5.8243	12870.6	-19.0678	Waste	288	23	580.434	1140.87	2009.24	0	2009.24	2209.87	2209.87
23	5.8243	12872.1	-17.9587	Waste	288	23	583.008	1145.93	2021.17	0	2021.17	2210.13	2210.13
24	5.8243	12839.6	-16.8565	Waste	288	23	584.373	1148.62	2027.48	0	2027.48	2204.54	2204.54
25	5.8243	12773.8	-15.7607	Waste	288	23	584.54	1148.94	2028.25	0	2028.25	2193.22	2193.22
26	5.8243	12675	-14.6708	Waste	288	23	583.515	1146.93	2023.51	0	2023.51	2176.27	2176.27
27	5.8243	12544	-13.5862	Waste	288	23	581.307	1142.59	2013.28	0	2013.28	2153.76	2153.76
28	5.8243	12381	-12.5067	Waste	288	23	577.919	1135.93	1997.6	0	1997.6	2125.79	2125.79
29	5.8243	12186.6	-11.4316	Waste	288	23	573.357	1126.96	1976.46	0	1976.46	2092.4	2092.4
30	5.8243	11961.1	-10.3606	Waste	288	23	567.622	1115.69	1949.91	0	1949.91	2053.68	2053.68
31	5.8243	11704.9	-9.29319	Waste	288	23	560.717	1102.12	1917.94	0	1917.94	2009.69	2009.69
32	5.8243	11418.2	-8.22906	Waste	288	23	552.641	1086.24	1880.54	0	1880.54	1960.47	1960.47
33	5.88997	11420.2	-7.16182	Clay Liner	100	16	327.733	644.175	1897.77	0	1897.77	1938.95	1938.95
34	5.88997	11432.7	-6.0911	Clay Liner	100	16	328.927	646.522	1905.95	0	1905.95	1941.05	1941.05
35	5.88997	11366.5	-5.02251	Clay Liner	100	16	328.2	645.093	1900.97	0	1900.97	1929.81	1929.81
36	5.88997	11222.1	-3.95567	Clay Liner	100	16	325.547	639.879	1882.78	0	1882.78	1905.29	1905.29
37	5.88997	10999.8	-2.89021	Clay Liner	100	16	320.963	630.868	1851.35	0	1851.35	1867.56	1867.56
38	5.88997	10700	-1.82574	Clay Liner	100	16	314.438	618.044	1806.63	0	1806.63	1816.65	1816.65
39	5.88997	10322.8	-0.761903	Clay Liner	100	16	305.963	601.386	1748.55	0	1748.55	1752.62	1752.62
40	5.88997	9868.28	0.301671	Clay Liner	100	16	295.525	580.87	1676.99	0	1676.99	1675.44	1675.44
41	8.22377	12863.1	1.57619	Clay Liner	100	16	280.186	550.72	1571.85	0	1571.85	1564.14	1564.14
42	5.97094	8575.84	2.85868	Clay Liner	100	16	262.316	515.596	1449.36	0	1449.36	1436.26	1436.26
43	5.97094	7837.43	3.93877	Clay Liner	100	16	244.824	481.213	1329.45	0	1329.45	1312.59	1312.59
44	5.97094	7017.94	5.02026	Clay Liner	100	16	225.229	442.698	1195.13	0	1195.13	1175.34	1175.34
45	5.97094	6116.99	6.10355	Clay Liner	100	16	203.504	399.997	1046.21	0	1046.21	1024.45	1024.45
46	5.97094	5134.13	7.18904	Clay Liner	100	16	179.621	353.054	882.502	0	882.502	859.846	859.846
47	5.97094	4068.82	8.27713	Clay Liner	100	16	153.546	301.802	703.768	0	703.768	681.431	681.431
48	5.97094	2920.41	9.36823	Clay Liner	100	16	125.243	246.172	509.761	0	509.761	489.099	489.099
49	5.97094	1688.17	10.4628	Clay Liner	100	16	94.6726	186.084	300.209	0	300.209	282.726	282.726
50	6.93374	610.235	11.6501	Waste	288	23	173.242	340.516	123.719	0	123.719	87.9999	87.9999

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.96555

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	121.879	98.3	0	0	0
2	127.703	92.3912	-890.387	0	0
3	133.527	86.7798	-775.999	0	0
4	139.352	81.4446	184.159	0	0
5	145.176	76.3675	1850.73	0	0
6	151	71.5323	4064	0	0
7	156.824	66.9252	6523.01	0	0
8	162.649	62.5338	9128.21	0	0
9	168.473	58.3471	11821.1	0	0
10	174.297	54.3555	14550.5	0	0
11	180.122	50.5502	17271.4	0	0
12	185.946	46.9233	19944.6	0	0
13	191.77	43.4678	22535.8	0	0
14	197.595	40.1773	25014.9	0	0
15	203.419	37.0459	27356	0	0
16	209.243	34.0685	29536.6	0	0
17	215.067	31.2402	31537.3	0	0
18	220.892	28.5567	33341.8	0	0
19	226.716	26.0139	34936.5	0	0
20	232.54	23.6082	36310.1	0	0
21	238.365	21.3364	37453.6	0	0
22	244.189	19.1952	38360.4	0	0
23	250.013	17.1821	39025.7	0	0
24	255.837	15.2943	39446.5	0	0
25	261.662	13.5295	39621.8	0	0
26	267.486	11.8857	39552.2	0	0
27	273.31	10.3609	39240	0	0
28	279.135	8.95338	38689	0	0
29	284.959	7.66145	37904.7	0	0
30	290.783	6.48373	36893.9	0	0
31	296.608	5.41891	35665.1	0	0
32	302.432	4.46586	34228	0	0
33	308.256	3.62355	32594.2	0	0
34	314.146	2.88346	32068.8	0	0
35	320.036	2.25493	31329.9	0	0
36	325.926	1.73729	30381.4	0	0
37	331.816	1.33	29231.3	0	0
38	337.706	1.03264	27891.8	0	0
39	343.596	0.844891	26379.5	0	0
40	349.486	0.766564	24714.8	0	0
41	355.376	0.797576	22922.6	0	0
42	363.6	1.02387	20263.4	0	0
43	369.571	1.32202	18265.4	0	0
44	375.542	1.73314	16257.4	0	0
45	381.513	2.25766	14286	0	0
46	387.483	2.89614	12403.3	0	0
47	393.454	3.64929	10666.4	0	0
48	399.425	4.51792	9138.5	0	0
49	405.396	5.503	7888.72	0	0
50	411.367	6.60564	6992.56	0	0
51	418.301	8.03525	0	0	0

Query 1 (bishop simplified) - Safety Factor: 1.96555

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	121.879	98.3	0	0	0
2	127.703	92.3912	-890.387	0	0
3	133.527	86.7798	-775.999	0	0
4	139.352	81.4446	184.159	0	0
5	145.176	76.3675	1850.73	0	0
6	151	71.5323	4064	0	0
7	156.824	66.9252	6523.01	0	0
8	162.649	62.5338	9128.21	0	0
9	168.473	58.3471	11821.1	0	0
10	174.297	54.3555	14550.5	0	0
11	180.122	50.5502	17271.4	0	0
12	185.946	46.9233	19944.6	0	0
13	191.77	43.4678	22535.8	0	0
14	197.595	40.1773	25014.9	0	0
15	203.419	37.0459	27356	0	0
16	209.243	34.0685	29536.6	0	0
17	215.067	31.2402	31537.3	0	0
18	220.892	28.5567	33341.8	0	0
19	226.716	26.0139	34936.5	0	0
20	232.54	23.6082	36310.1	0	0
21	238.365	21.3364	37453.6	0	0
22	244.189	19.1952	38360.4	0	0
23	250.013	17.1821	39025.7	0	0
24	255.837	15.2943	39446.5	0	0
25	261.662	13.5295	39621.8	0	0
26	267.486	11.8857	39552.2	0	0
27	273.31	10.3609	39240	0	0
28	279.135	8.95338	38689	0	0
29	284.959	7.66145	37904.7	0	0
30	290.783	6.48373	36893.9	0	0
31	296.608	5.41891	35665.1	0	0
32	302.432	4.46586	34228	0	0
33	308.256	3.62355	32594.2	0	0
34	314.146	2.88346	32068.8	0	0
35	320.036	2.25493	31329.9	0	0
36	325.926	1.73729	30381.4	0	0
37	331.816	1.33	29231.3	0	0
38	337.706	1.03264	27891.8	0	0
39	343.596	0.844891	26379.5	0	0
40	349.486	0.766564	24714.8	0	0
41	355.376	0.797576	22922.6	0	0
42	363.6	1.02387	20263.4	0	0
43	369.571	1.32202	18265.4	0	0
44	375.542	1.73314	16257.4	0	0
45	381.513	2.25766	14286	0	0
46	387.483	2.89614	12403.3	0	0
47	393.454	3.64929	10666.4	0	0
48	399.425	4.51792	9138.5	0	0
49	405.396	5.503	7888.72	0	0
50	411.367	6.60564	6992.56	0	0
51	418.301	8.03525	0	0	0

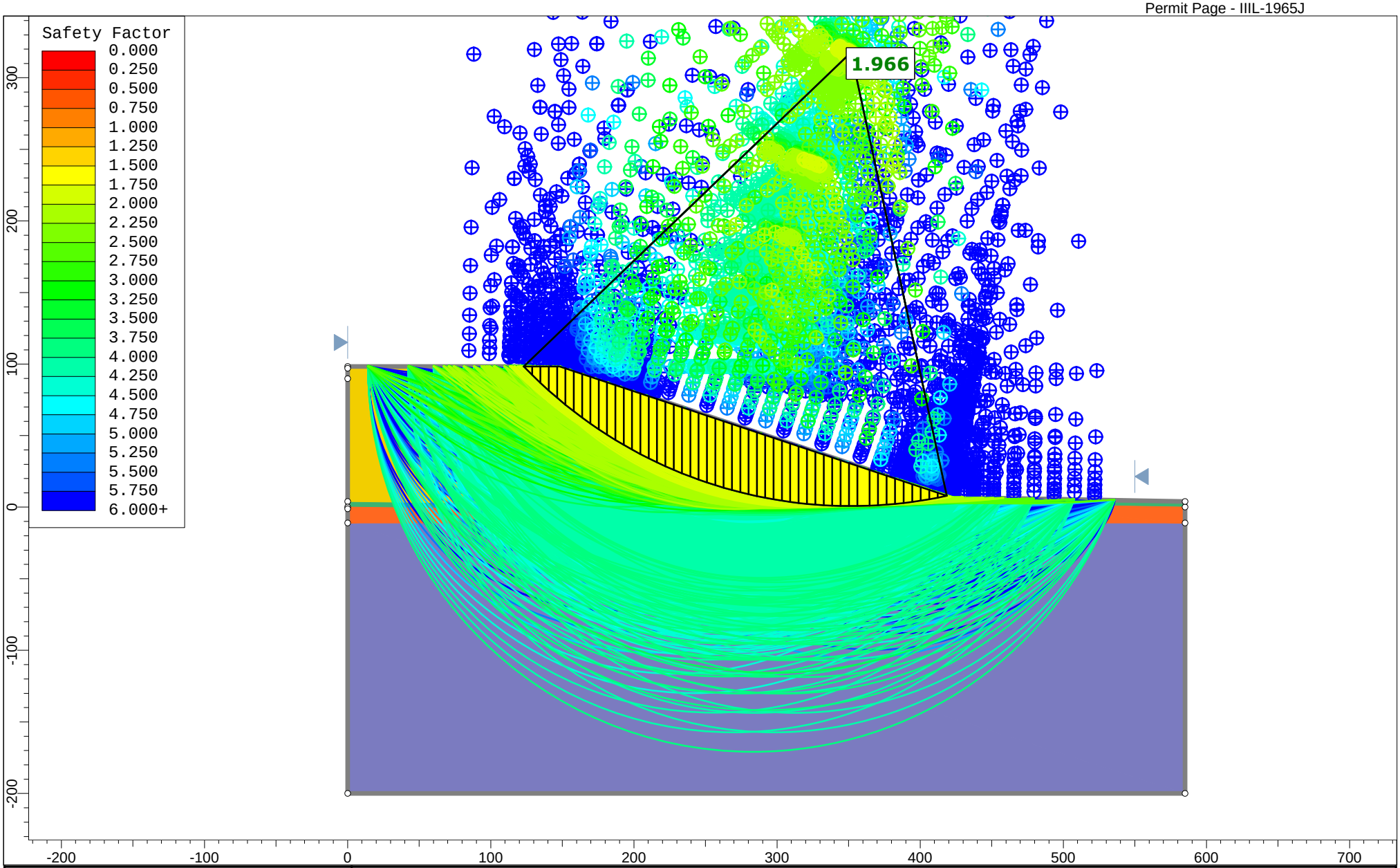
Discharge Sections

Entity Information

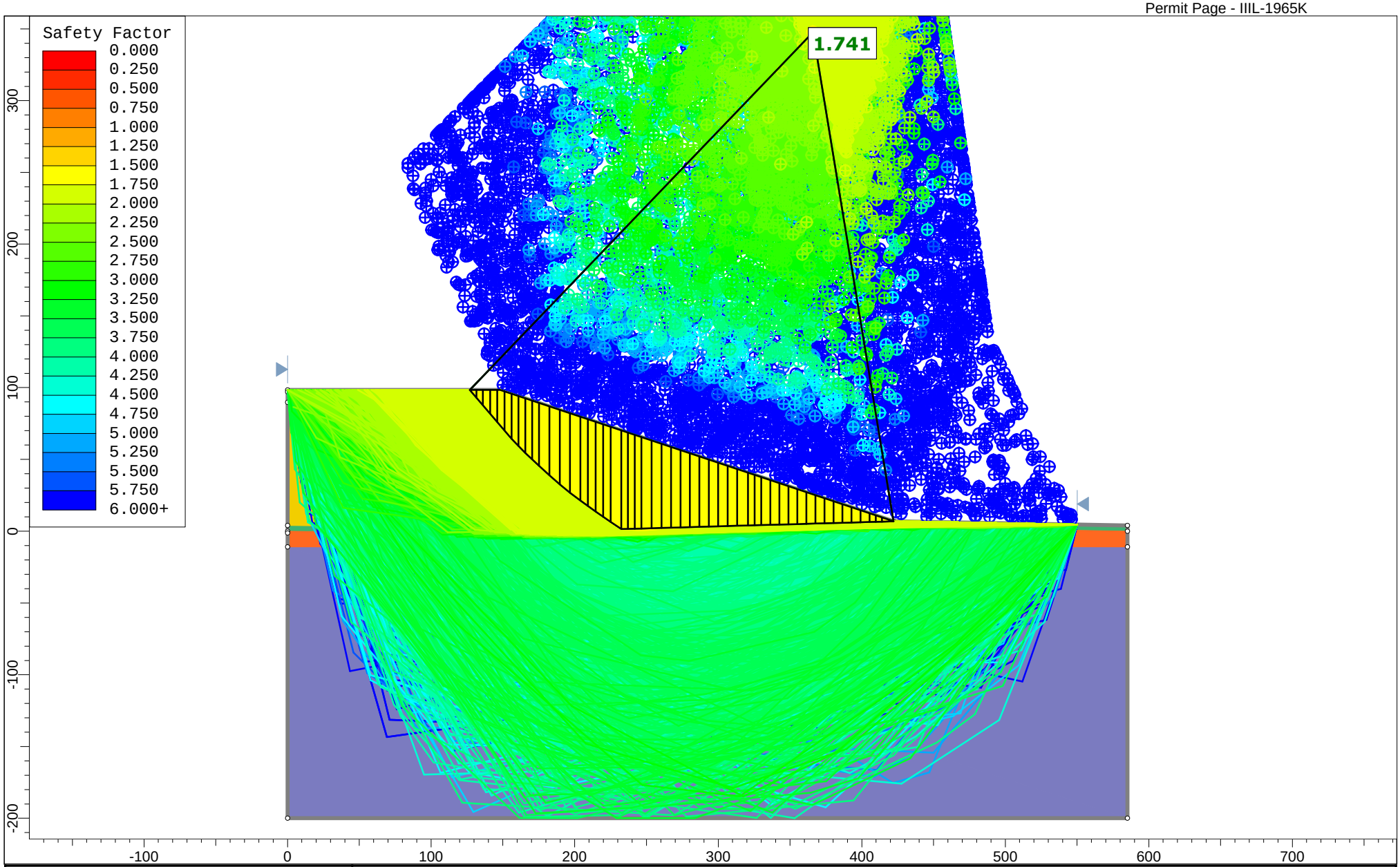
Simplified Bishop Method - Effective Stress

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, -200 585, -200 585, -11 585, 0 585, 4 422, 6.8 148, 98.3 0, 98.3 0, 97 0, 89.7653 0, 4 0, 0 0, -1.23135 0, -11
Material Boundary	0, -11 585, -11
Material Boundary	0, 4 221, 1.1 419.367, 6.837 431, 2.6
Material Boundary	0, 97 147, 97 419.367, 6.837 422, 6.8
Material Boundary	0, 0 221, -2.9 420.879, 2.6 431, 2.6 585, 0



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Bishop Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Interim Section FF_Total Stress.slmd



rocscience	Project	SLIDE - An Interactive Slope Stability Program	
	Group	Simplified Janbu Method - Total Stress	Scenario: Master Scenario
	Drawn By		Company
SLIDEINTERPRET 9.018	Date		File Name: Slide2-Interim Section FF_Total Stress.slmd

Materials

Waste	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	47
Cohesion [psf]	288
Friction Angle [deg]	23
Water Surface	Assigned per scenario
Ru Value	0
Clay Liner	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	16
Water Surface	Assigned per scenario
Ru Value	0
Stratum II	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110.9
Cohesion [psf]	4000
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0
Stratum III	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	109
Cohesion [psf]	2800
Friction Angle [deg]	0
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Simplified Bishop Method - Total Stress	Simplified Janbu Method - Total Stress
Waste		✓	✓
Clay Liner		✓	✓
Stratum II		✓	✓
Stratum III		✓	✓

Global Minimums

Simplified Bishop Method - Total Stress

Method: bishop simplified

FS	1.965580
Center:	351.667, 317.525
Radius:	316.738
Left Slip Surface Endpoint:	123.055, 98.300
Right Slip Surface Endpoint:	418.592, 7.938
Resisting Moment:	7.87062e+07 lb-ft
Driving Moment:	4.00421e+07 lb-ft
Total Slice Area:	9527.21 ft2
Surface Horizontal Width:	295.536 ft
Surface Average Height:	32.237 ft

Simplified Janbu Method - Total Stress

Method: bishop simplified

FS	1.740790
Axis Location:	365.985, 347.580
Left Slip Surface Endpoint:	126.970, 98.300
Right Slip Surface Endpoint:	422.000, 6.800
Resisting Moment:	8.32749e+07 lb-ft
Driving Moment:	4.78373e+07 lb-ft
Total Slice Area:	11010.7 ft2
Surface Horizontal Width:	295.03 ft
Surface Average Height:	37.3208 ft

Global Minimum Coordinates

Simplified Janbu Method - Total Stress

Method: bishop simplified

X	Y
126.97	98.3
135.997	87.7562
146.023	76.0441
156.05	64.332
165.635	54.463
175.051	45.4662
182.333	38.9235
189.616	32.6249
196.763	26.7594
203.911	21.2742
214.497	13.6174
225.083	6.35508
232.399	1.42961
246.451	1.82763
260.502	2.22561
273.655	2.59816
286.807	2.9707
299.96	3.34324
313.112	3.71579
320.733	3.93164
329.98	4.19355
342.531	4.54905
355.106	4.90525
367.684	5.2615
380.24	5.61716
392.796	5.97281
405.352	6.32846
414.044	6.57465
422	6.8

Slice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 1.96558

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	5.81626	807.591	-45.4509	Waste	288	23	144.758	284.534	-8.16472	0	-8.16472	138.89	138.89
2	5.81626	2382.08	-43.97	Waste	288	23	194.465	382.237	222.009	0	222.009	409.605	409.605
3	5.81626	3878.09	-42.5252	Waste	288	23	242.496	476.646	444.423	0	444.423	666.827	666.827
4	5.81626	5301.02	-41.1131	Waste	288	23	288.908	567.871	659.334	0	659.334	911.481	911.481
5	5.81626	6521.28	-39.7308	Waste	288	23	329.524	647.705	847.413	0	847.413	1121.29	1121.29
6	5.81626	7302.73	-38.3757	Waste	288	23	356.686	701.094	973.188	0	973.188	1255.65	1255.65
7	5.81626	8001.38	-37.0455	Waste	288	23	381.447	749.765	1087.85	0	1087.85	1375.77	1375.77
8	5.81626	8642.53	-35.7383	Waste	288	23	404.562	795.199	1194.89	0	1194.89	1486	1486
9	5.81626	9229.04	-34.4522	Waste	288	23	426.08	837.495	1294.53	0	1294.53	1586.84	1586.84
10	5.81626	9763.42	-33.1857	Waste	288	23	446.048	876.744	1386.99	0	1386.99	1678.72	1678.72
11	5.81626	10247.9	-31.9371	Waste	288	23	464.509	913.029	1472.47	0	1472.47	1762.02	1762.02
12	5.81626	10684.7	-30.7054	Waste	288	23	481.5	946.426	1551.15	0	1551.15	1837.11	1837.11
13	5.81626	11075.4	-29.4892	Waste	288	23	497.057	977.005	1623.19	0	1623.19	1904.28	1904.28
14	5.81626	11421.9	-28.2874	Waste	288	23	511.212	1004.83	1688.74	0	1688.74	1963.86	1963.86
15	5.81626	11725.5	-27.099	Waste	288	23	523.995	1029.95	1747.93	0	1747.93	2016.06	2016.06
16	5.81626	11987.8	-25.9232	Waste	288	23	535.432	1052.43	1800.89	0	1800.89	2061.15	2061.15
17	5.81626	12209.9	-24.7589	Waste	288	23	545.547	1072.32	1847.74	0	1847.74	2099.34	2099.34
18	5.81626	12393	-23.6055	Waste	288	23	554.363	1089.64	1888.56	0	1888.56	2130.82	2130.82
19	5.81626	12538.1	-22.4621	Waste	288	23	561.899	1104.46	1923.45	0	1923.45	2155.76	2155.76
20	5.81626	12646.3	-21.3281	Waste	288	23	568.173	1116.79	1952.5	0	1952.5	2174.34	2174.34
21	5.81626	12718.2	-20.2028	Waste	288	23	573.202	1126.67	1975.79	0	1975.79	2186.72	2186.72
22	5.81626	12754.9	-19.0856	Waste	288	23	577	1134.14	1993.38	0	1993.38	2193.02	2193.02
23	5.81626	12756.9	-17.9758	Waste	288	23	579.579	1139.21	2005.32	0	2005.32	2193.36	2193.36
24	5.81626	12725	-16.873	Waste	288	23	580.951	1141.9	2011.68	0	2011.68	2187.88	2187.88
25	5.81626	12659.8	-15.7766	Waste	288	23	581.125	1142.25	2012.48	0	2012.48	2176.66	2176.66
26	5.81626	12561.8	-14.6861	Waste	288	23	580.109	1140.25	2007.78	0	2007.78	2159.82	2159.82
27	5.81626	12431.6	-13.601	Waste	288	23	577.91	1135.93	1997.6	0	1997.6	2137.42	2137.42
28	5.81626	12269.5	-12.5209	Waste	288	23	574.533	1129.29	1981.95	0	1981.95	2109.54	2109.54
29	5.81626	12076	-11.4453	Waste	288	23	569.982	1120.35	1960.88	0	1960.88	2076.28	2076.28
30	5.81626	11851.6	-10.3737	Waste	288	23	564.261	1109.1	1934.39	0	1934.39	2037.69	2037.69
31	5.81626	11596.4	-9.30581	Waste	288	23	557.37	1095.55	1902.48	0	1902.48	1993.81	1993.81
32	5.81626	11310.8	-8.24116	Waste	288	23	549.309	1079.71	1865.15	0	1865.15	1944.71	1944.71
33	5.87103	11291.8	-7.17439	Clay Liner	100	16	325.48	639.756	1882.36	0	1882.36	1923.33	1923.33
34	5.87103	11305.1	-6.10513	Clay Liner	100	16	326.689	642.133	1890.64	0	1890.64	1925.58	1925.58
35	5.87103	11240.4	-5.03799	Clay Liner	100	16	325.986	640.752	1885.83	0	1885.83	1914.57	1914.57
36	5.87103	11098.1	-3.97261	Clay Liner	100	16	323.367	635.604	1867.86	0	1867.86	1890.32	1890.32
37	5.87103	10878.6	-2.90859	Clay Liner	100	16	318.825	626.676	1836.73	0	1836.73	1852.93	1852.93
38	5.87103	10582.1	-1.84559	Clay Liner	100	16	312.352	613.953	1792.37	0	1792.37	1802.43	1802.43
39	5.87103	10208.8	-0.783215	Clay Liner	100	16	303.938	597.414	1734.7	0	1734.7	1738.85	1738.85
40	5.87103	9758.77	0.278887	Clay Liner	100	16	293.57	577.035	1663.62	0	1663.62	1662.19	1662.19
41	8.46863	13118.8	1.57619	Clay Liner	100	16	277.979	546.39	1556.75	0	1556.75	1549.1	1549.1
42	5.95179	8446.78	2.88147	Clay Liner	100	16	259.821	510.698	1432.27	0	1432.27	1419.2	1419.2
43	5.95179	7711.46	3.9601	Clay Liner	100	16	242.337	476.332	1312.43	0	1312.43	1295.65	1295.65
44	5.95179	6895.68	5.04013	Clay Liner	100	16	222.76	437.852	1178.23	0	1178.23	1158.58	1158.58
45	5.95179	5999.06	6.12197	Clay Liner	100	16	201.063	395.205	1029.5	0	1029.5	1007.94	1007.94
46	5.95179	5021.17	7.206	Clay Liner	100	16	177.216	348.333	866.041	0	866.041	843.635	843.635
47	5.95179	3961.46	8.29263	Clay Liner	100	16	151.188	297.172	687.621	0	687.621	665.585	665.585
48	5.95179	2819.28	9.38227	Clay Liner	100	16	122.941	241.651	493.995	0	493.995	473.682	473.682
49	5.95179	1593.92	10.4753	Clay Liner	100	16	92.4366	181.692	284.893	0	284.893	267.802	267.802
50	6.36457	513.474	11.6105	Waste	288	23	171.554	337.203	115.915	0	115.915	80.6675	80.6675

Query 1 (bishop simplified) - Safety Factor: 1.96558

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	5.81626	807.591	-45.4509	Waste	288	23	144.758	284.534	-8.16472	0	-8.16472	138.89	138.89
2	5.81626	2382.08	-43.97	Waste	288	23	194.465	382.237	222.009	0	222.009	409.605	409.605
3	5.81626	3878.09	-42.5252	Waste	288	23	242.496	476.646	444.423	0	444.423	666.827	666.827
4	5.81626	5301.02	-41.1131	Waste	288	23	288.908	567.871	659.334	0	659.334	911.481	911.481
5	5.81626	6521.28	-39.7308	Waste	288	23	329.524	647.705	847.413	0	847.413	1121.29	1121.29
6	5.81626	7302.73	-38.3757	Waste	288	23	356.686	701.094	973.188	0	973.188	1255.65	1255.65
7	5.81626	8001.38	-37.0455	Waste	288	23	381.447	749.765	1087.85	0	1087.85	1375.77	1375.77
8	5.81626	8642.53	-35.7383	Waste	288	23	404.562	795.199	1194.89	0	1194.89	1486	1486
9	5.81626	9229.04	-34.4522	Waste	288	23	426.08	837.495	1294.53	0	1294.53	1586.84	1586.84
10	5.81626	9763.42	-33.1857	Waste	288	23	446.048	876.744	1386.99	0	1386.99	1678.72	1678.72
11	5.81626	10247.9	-31.9371	Waste	288	23	464.509	913.029	1472.47	0	1472.47	1762.02	1762.02
12	5.81626	10684.7	-30.7054	Waste	288	23	481.5	946.426	1551.15	0	1551.15	1837.11	1837.11
13	5.81626	11075.4	-29.4892	Waste	288	23	497.057	977.005	1623.19	0	1623.19	1904.28	1904.28
14	5.81626	11421.9	-28.2874	Waste	288	23	511.212	1004.83	1688.74	0	1688.74	1963.86	1963.86
15	5.81626	11725.5	-27.099	Waste	288	23	523.995	1029.95	1747.93	0	1747.93	2016.06	2016.06
16	5.81626	11987.8	-25.9232	Waste	288	23	535.432	1052.43	1800.89	0	1800.89	2061.15	2061.15
17	5.81626	12209.9	-24.7589	Waste	288	23	545.547	1072.32	1847.74	0	1847.74	2099.34	2099.34
18	5.81626	12393	-23.6055	Waste	288	23	554.363	1089.64	1888.56	0	1888.56	2130.82	2130.82
19	5.81626	12538.1	-22.4621	Waste	288	23	561.899	1104.46	1923.45	0	1923.45	2155.76	2155.76
20	5.81626	12646.3	-21.3281	Waste	288	23	568.173	1116.79	1952.5	0	1952.5	2174.34	2174.34
21	5.81626	12718.2	-20.2028	Waste	288	23	573.202	1126.67	1975.79	0	1975.79	2186.72	2186.72
22	5.81626	12754.9	-19.0856	Waste	288	23	577	1134.14	1993.38	0	1993.38	2193.02	2193.02
23	5.81626	12756.9	-17.9758	Waste	288	23	579.579	1139.21	2005.32	0	2005.32	2193.36	2193.36
24	5.81626	12725	-16.873	Waste	288	23	580.951	1141.9	2011.68	0	2011.68	2187.88	2187.88
25	5.81626	12659.8	-15.7766	Waste	288	23	581.125	1142.25	2012.48	0	2012.48	2176.66	2176.66
26	5.81626	12561.8	-14.6861	Waste	288	23	580.109	1140.25	2007.78	0	2007.78	2159.82	2159.82
27	5.81626	12431.6	-13.601	Waste	288	23	577.91	1135.93	1997.6	0	1997.6	2137.42	2137.42
28	5.81626	12269.5	-12.5209	Waste	288	23	574.533	1129.29	1981.95	0	1981.95	2109.54	2109.54
29	5.81626	12076	-11.4453	Waste	288	23	569.982	1120.35	1960.88	0	1960.88	2076.28	2076.28
30	5.81626	11851.6	-10.3737	Waste	288	23	564.261	1109.1	1934.39	0	1934.39	2037.69	2037.69
31	5.81626	11596.4	-9.30581	Waste	288	23	557.37	1095.55	1902.48	0	1902.48	1993.81	1993.81
32	5.81626	11310.8	-8.24116	Waste	288	23	549.309	1079.71	1865.15	0	1865.15	1944.71	1944.71
33	5.87103	11291.8	-7.17439	Clay Liner	100	16	325.48	639.756	1882.36	0	1882.36	1923.33	1923.33
34	5.87103	11305.1	-6.10513	Clay Liner	100	16	326.689	642.133	1890.64	0	1890.64	1925.58	1925.58
35	5.87103	11240.4	-5.03799	Clay Liner	100	16	325.986	640.752	1885.83	0	1885.83	1914.57	1914.57
36	5.87103	11098.1	-3.97261	Clay Liner	100	16	323.367	635.604	1867.86	0	1867.86	1890.32	1890.32
37	5.87103	10878.6	-2.90859	Clay Liner	100	16	318.825	626.676	1836.73	0	1836.73	1852.93	1852.93
38	5.87103	10582.1	-1.84559	Clay Liner	100	16	312.352	613.953	1792.37	0	1792.37	1802.43	1802.43
39	5.87103	10208.8	-0.783215	Clay Liner	100	16	303.938	597.414	1734.7	0	1734.7	1738.85	1738.85
40	5.87103	9758.77	0.278887	Clay Liner	100	16	293.57	577.035	1663.62	0	1663.62	1662.19	1662.19
41	8.46863	13118.8	1.57619	Clay Liner	100	16	277.979	546.39	1556.75	0	1556.75	1549.1	1549.1
42	5.95179	8446.78	2.88147	Clay Liner	100	16	259.821	510.698	1432.27	0	1432.27	1419.2	1419.2
43	5.95179	7711.46	3.9601	Clay Liner	100	16	242.337	476.332	1312.43	0	1312.43	1295.65	1295.65
44	5.95179	6895.68	5.04013	Clay Liner	100	16	222.76	437.852	1178.23	0	1178.23	1158.58	1158.58
45	5.95179	5999.06	6.12197	Clay Liner	100	16	201.063	395.205	1029.5	0	1029.5	1007.94	1007.94
46	5.95179	5021.17	7.206	Clay Liner	100	16	177.216	348.333	866.041	0	866.041	843.635	843.635
47	5.95179	3961.46	8.29263	Clay Liner	100	16	151.188	297.172	687.621	0	687.621	665.585	665.585
48	5.95179	2819.28	9.38227	Clay Liner	100	16	122.941	241.651	493.995	0	493.995	473.682	473.682
49	5.95179	1593.92	10.4753	Clay Liner	100	16	92.4366	181.692	284.893	0	284.893	267.802	267.802
50	6.36457	513.474	11.6105	Waste	288	23	171.554	337.203	115.915	0	115.915	80.6675	80.6675

Simplified Janbu Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 1.74079

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.51329	559.148	-49.433	Waste	288	23	152.279	265.085	-53.9836	0	-53.9836	123.89	123.89
2	4.51329	1677.44	-49.433	Waste	288	23	199.303	346.945	138.866	0	138.866	371.669	371.669
3	5.01341	3174.36	-49.433	Waste	288	23	248.934	433.341	342.401	0	342.401	633.176	633.176
4	5.01341	4554.22	-49.433	Waste	288	23	301.169	524.272	556.622	0	556.622	908.411	908.411
5	5.01341	5861.72	-49.433	Waste	288	23	350.665	610.434	759.606	0	759.606	1169.21	1169.21
6	5.01341	6877.75	-49.433	Waste	288	23	389.127	677.389	917.342	0	917.342	1371.87	1371.87
7	4.79233	7420.92	-45.8373	Waste	288	23	434.051	755.591	1101.58	0	1101.58	1548.5	1548.5
8	4.79233	8171.89	-45.8373	Waste	288	23	464.593	808.759	1226.83	0	1226.83	1705.2	1705.2
9	4.70827	8721.22	-43.6942	Waste	288	23	500.508	871.28	1374.12	0	1374.12	1852.32	1852.32
10	4.70827	9368.74	-43.6942	Waste	288	23	527.706	918.626	1485.66	0	1485.66	1989.85	1989.85
11	7.28209	15694.5	-41.9387	Waste	288	23	566.796	986.673	1645.97	0	1645.97	2155.22	2155.22
12	7.28209	17059.7	-40.8579	Waste	288	23	608.375	1059.05	1816.49	0	1816.49	2342.7	2342.7
13	7.14787	17979.1	-39.372	Waste	288	23	648.93	1129.65	1982.8	0	1982.8	2515.31	2515.31
14	7.14787	19083.8	-37.5021	Waste	288	23	687.768	1197.26	2142.08	0	2142.08	2669.86	2669.86
15	5.29299	14773.3	-35.8781	Waste	288	23	719.183	1251.95	2270.92	0	2270.92	2791.11	2791.11
16	5.29299	15285.9	-35.8781	Waste	288	23	739.261	1286.9	2353.25	0	2353.25	2887.96	2887.96
17	5.29299	15774.1	-34.4515	Waste	288	23	764.279	1330.45	2455.86	0	2455.86	2980.18	2980.18
18	5.29299	16237.7	-34.4515	Waste	288	23	782.576	1362.3	2530.9	0	2530.9	3067.78	3067.78
19	7.31582	23190.5	-33.9509	Waste	288	23	806.065	1403.19	2627.21	0	2627.21	3169.91	3169.91
20	4.684	14934.8	1.62245	Clay Liner	100	16	585.387	1019.03	3205.05	0	3205.05	3188.47	3188.47
21	4.684	14562.2	1.62245	Clay Liner	100	16	572.222	996.118	3125.13	0	3125.13	3108.92	3108.92
22	4.684	14189.6	1.62245	Clay Liner	100	16	559.057	973.201	3045.21	0	3045.21	3029.38	3029.38
23	7.02541	20584.1	1.62245	Clay Liner	100	16	542.602	944.556	2945.31	0	2945.31	2929.94	2929.94
24	7.02541	19745.9	1.62245	Clay Liner	100	16	522.856	910.183	2825.45	0	2825.45	2810.64	2810.64
25	6.57632	17724.1	1.62245	Clay Liner	100	16	503.742	876.909	2709.41	0	2709.41	2695.14	2695.14
26	6.57632	16989.6	1.62245	Clay Liner	100	16	485.259	844.734	2597.19	0	2597.19	2583.45	2583.45
27	6.57632	16255.1	1.62245	Clay Liner	100	16	466.776	812.559	2484.98	0	2484.98	2471.76	2471.76
28	6.57632	15520.6	1.62245	Clay Liner	100	16	448.292	780.383	2372.78	0	2372.78	2360.08	2360.08
29	6.57632	14786.2	1.62245	Clay Liner	100	16	429.809	748.208	2260.57	0	2260.57	2248.4	2248.4
30	6.57632	14051.7	1.62245	Clay Liner	100	16	411.326	716.032	2148.37	0	2148.37	2136.71	2136.71
31	6.57632	13317.2	1.62245	Clay Liner	100	16	392.843	683.857	2036.14	0	2036.14	2025.02	2025.02
32	6.57632	12582.7	1.62245	Clay Liner	100	16	374.359	651.681	1923.94	0	1923.94	1913.33	1913.33
33	7.62074	13662.3	1.62245	Clay Liner	100	16	354.409	616.951	1802.83	0	1802.83	1792.79	1792.79
34	4.62333	7807.94	1.62245	Clay Liner	100	16	337.202	586.998	1698.36	0	1698.36	1688.81	1688.81
35	4.62333	7444.93	1.62245	Clay Liner	100	16	324.208	564.378	1619.48	0	1619.48	1610.3	1610.3
36	6.27539	9524.47	1.62245	Clay Liner	100	16	308.892	537.716	1526.5	0	1526.5	1517.75	1517.75
37	6.27539	8855.67	1.62245	Clay Liner	100	16	291.255	507.013	1419.42	0	1419.42	1411.17	1411.17
38	6.28786	8202.48	1.62245	Clay Liner	100	16	273.6	476.28	1312.24	0	1312.24	1304.49	1304.49
39	6.28786	7531.02	1.62245	Clay Liner	100	16	255.927	445.516	1204.96	0	1204.96	1197.71	1197.71
40	6.28865	6860.38	1.62245	Clay Liner	100	16	238.254	414.75	1097.66	0	1097.66	1090.91	1090.91
41	6.28865	6188.75	1.62245	Clay Liner	100	16	220.579	383.982	990.362	0	990.362	984.114	984.114
42	6.27815	5508.47	1.62245	Clay Liner	100	16	202.919	353.239	883.152	0	883.152	877.404	877.404
43	6.27815	4839.08	1.62245	Clay Liner	100	16	185.274	322.523	776.029	0	776.029	770.781	770.781
44	6.27815	4169.69	1.62245	Clay Liner	100	16	167.628	291.806	668.908	0	668.908	664.16	664.16
45	6.27815	3500.31	1.62245	Clay Liner	100	16	149.984	261.09	561.786	0	561.786	557.538	557.538
46	6.27815	2830.92	1.62245	Clay Liner	100	16	132.338	230.373	454.665	0	454.665	450.917	450.917
47	6.27815	2161.53	1.62245	Clay Liner	100	16	114.693	199.656	347.543	0	347.543	344.294	344.294
48	4.34586	1104.2	1.62245	Clay Liner	100	16	99.7633	173.667	256.907	0	256.907	254.081	254.081
49	4.34586	783.452	1.62245	Clay Liner	100	16	87.5489	152.404	182.755	0	182.755	180.276	180.276
50	7.95578	592.304	1.62245	Clay Liner	100	16	70.0354	121.917	76.4332	0	76.4332	74.4495	74.4495

Query 1 (bishop simplified) - Safety Factor: 1.74079

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.51329	559.148	-49.433	Waste	288	23	152.279	265.085	-53.9836	0	-53.9836	123.89	123.89
2	4.51329	1677.44	-49.433	Waste	288	23	199.303	346.945	138.866	0	138.866	371.669	371.669
3	5.01341	3174.36	-49.433	Waste	288	23	248.934	433.341	342.401	0	342.401	633.176	633.176
4	5.01341	4554.22	-49.433	Waste	288	23	301.169	524.272	556.622	0	556.622	908.411	908.411
5	5.01341	5861.72	-49.433	Waste	288	23	350.665	610.434	759.606	0	759.606	1169.21	1169.21
6	5.01341	6877.75	-49.433	Waste	288	23	389.127	677.389	917.342	0	917.342	1371.87	1371.87
7	4.79233	7420.92	-45.8373	Waste	288	23	434.051	755.591	1101.58	0	1101.58	1548.5	1548.5
8	4.79233	8171.89	-45.8373	Waste	288	23	464.593	808.759	1226.83	0	1226.83	1705.2	1705.2
9	4.70827	8721.22	-43.6942	Waste	288	23	500.508	871.28	1374.12	0	1374.12	1852.32	1852.32
10	4.70827	9368.74	-43.6942	Waste	288	23	527.706	918.626	1485.66	0	1485.66	1989.85	1989.85
11	7.28209	15694.5	-41.9387	Waste	288	23	566.796	986.673	1645.97	0	1645.97	2155.22	2155.22
12	7.28209	17059.7	-40.8579	Waste	288	23	608.375	1059.05	1816.49	0	1816.49	2342.7	2342.7
13	7.14787	17979.1	-39.372	Waste	288	23	648.93	1129.65	1982.8	0	1982.8	2515.31	2515.31
14	7.14787	19083.8	-37.5021	Waste	288	23	687.768	1197.26	2142.08	0	2142.08	2669.86	2669.86
15	5.29299	14773.3	-35.8781	Waste	288	23	719.183	1251.95	2270.92	0	2270.92	2791.11	2791.11
16	5.29299	15285.9	-35.8781	Waste	288	23	739.261	1286.9	2353.25	0	2353.25	2887.96	2887.96
17	5.29299	15774.1	-34.4515	Waste	288	23	764.279	1330.45	2455.86	0	2455.86	2980.18	2980.18
18	5.29299	16237.7	-34.4515	Waste	288	23	782.576	1362.3	2530.9	0	2530.9	3067.78	3067.78
19	7.31582	23190.5	-33.9509	Waste	288	23	806.065	1403.19	2627.21	0	2627.21	3169.91	3169.91
20	4.684	14934.8	1.62245	Clay Liner	100	16	585.387	1019.03	3205.05	0	3205.05	3188.47	3188.47
21	4.684	14562.2	1.62245	Clay Liner	100	16	572.222	996.118	3125.13	0	3125.13	3108.92	3108.92
22	4.684	14189.6	1.62245	Clay Liner	100	16	559.057	973.201	3045.21	0	3045.21	3029.38	3029.38
23	7.02541	20584.1	1.62245	Clay Liner	100	16	542.602	944.556	2945.31	0	2945.31	2929.94	2929.94
24	7.02541	19745.9	1.62245	Clay Liner	100	16	522.856	910.183	2825.45	0	2825.45	2810.64	2810.64
25	6.57632	17724.1	1.62245	Clay Liner	100	16	503.742	876.909	2709.41	0	2709.41	2695.14	2695.14
26	6.57632	16989.6	1.62245	Clay Liner	100	16	485.259	844.734	2597.19	0	2597.19	2583.45	2583.45
27	6.57632	16255.1	1.62245	Clay Liner	100	16	466.776	812.559	2484.98	0	2484.98	2471.76	2471.76
28	6.57632	15520.6	1.62245	Clay Liner	100	16	448.292	780.383	2372.78	0	2372.78	2360.08	2360.08
29	6.57632	14786.2	1.62245	Clay Liner	100	16	429.809	748.208	2260.57	0	2260.57	2248.4	2248.4
30	6.57632	14051.7	1.62245	Clay Liner	100	16	411.326	716.032	2148.37	0	2148.37	2136.71	2136.71
31	6.57632	13317.2	1.62245	Clay Liner	100	16	392.843	683.857	2036.14	0	2036.14	2025.02	2025.02
32	6.57632	12582.7	1.62245	Clay Liner	100	16	374.359	651.681	1923.94	0	1923.94	1913.33	1913.33
33	7.62074	13662.3	1.62245	Clay Liner	100	16	354.409	616.951	1802.83	0	1802.83	1792.79	1792.79
34	4.62333	7807.94	1.62245	Clay Liner	100	16	337.202	586.998	1698.36	0	1698.36	1688.81	1688.81
35	4.62333	7444.93	1.62245	Clay Liner	100	16	324.208	564.378	1619.48	0	1619.48	1610.3	1610.3
36	6.27539	9524.47	1.62245	Clay Liner	100	16	308.892	537.716	1526.5	0	1526.5	1517.75	1517.75
37	6.27539	8855.67	1.62245	Clay Liner	100	16	291.255	507.013	1419.42	0	1419.42	1411.17	1411.17
38	6.28786	8202.48	1.62245	Clay Liner	100	16	273.6	476.28	1312.24	0	1312.24	1304.49	1304.49
39	6.28786	7531.02	1.62245	Clay Liner	100	16	255.927	445.516	1204.96	0	1204.96	1197.71	1197.71
40	6.28865	6860.38	1.62245	Clay Liner	100	16	238.254	414.75	1097.66	0	1097.66	1090.91	1090.91
41	6.28865	6188.75	1.62245	Clay Liner	100	16	220.579	383.982	990.362	0	990.362	984.114	984.114
42	6.27815	5508.47	1.62245	Clay Liner	100	16	202.919	353.239	883.152	0	883.152	877.404	877.404
43	6.27815	4839.08	1.62245	Clay Liner	100	16	185.274	322.523	776.029	0	776.029	770.781	770.781
44	6.27815	4169.69	1.62245	Clay Liner	100	16	167.628	291.806	668.908	0	668.908	664.16	664.16
45	6.27815	3500.31	1.62245	Clay Liner	100	16	149.984	261.09	561.786	0	561.786	557.538	557.538
46	6.27815	2830.92	1.62245	Clay Liner	100	16	132.338	230.373	454.665	0	454.665	450.917	450.917
47	6.27815	2161.53	1.62245	Clay Liner	100	16	114.693	199.656	347.543	0	347.543	344.294	344.294
48	4.34586	1104.2	1.62245	Clay Liner	100	16	99.7633	173.667	256.907	0	256.907	254.081	254.081
49	4.34586	783.452	1.62245	Clay Liner	100	16	87.5489	152.404	182.755	0	182.755	180.276	180.276
50	7.95578	592.304	1.62245	Clay Liner	100	16	70.0354	121.917	76.4332	0	76.4332	74.4495	74.4495

Interslice Data

Simplified Bishop Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 1.96558

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	123.055	98.3	0	0	0
2	128.872	92.3915	-889.968	0	0
3	134.688	86.7807	-775.072	0	0
4	140.504	81.4463	185.584	0	0
5	146.321	76.3701	1852.59	0	0
6	152.137	71.5361	4032.94	0	0
7	157.953	66.9302	6441.33	0	0
8	163.769	62.5401	8999.12	0	0
9	169.586	58.3547	11647.7	0	0
10	175.402	54.3645	14335.7	0	0
11	181.218	50.5605	17018.1	0	0
12	187.034	46.9349	19655.7	0	0
13	192.851	43.4808	22213.9	0	0
14	198.667	40.1915	24662.7	0	0
15	204.483	37.0614	26976.1	0	0
16	210.299	34.0852	29131.4	0	0
17	216.116	31.2581	31109.4	0	0
18	221.932	28.5757	32893.6	0	0
19	227.748	26.034	34470.4	0	0
20	233.564	23.6293	35828.3	0	0
21	239.381	21.3583	36958.6	0	0
22	245.197	19.218	37854.4	0	0
23	251.013	17.2056	38510.9	0	0
24	256.83	15.3185	38925	0	0
25	262.646	13.5544	39095.8	0	0
26	268.462	11.9111	39023.8	0	0
27	274.278	10.3868	38711.2	0	0
28	280.095	8.97954	38161.9	0	0
29	285.911	7.68788	37381.2	0	0
30	291.727	6.51033	36375.9	0	0
31	297.543	5.44561	35154.5	0	0
32	303.36	4.49255	33726.8	0	0
33	309.176	3.65015	32103.9	0	0
34	315.047	2.91113	31584.6	0	0
35	320.918	2.28317	30854.4	0	0
36	326.789	1.7656	29917.1	0	0
37	332.66	1.35787	28780.7	0	0
38	338.531	1.05958	27457.2	0	0
39	344.402	0.870397	25963	0	0
40	350.273	0.790137	24318.3	0	0
41	356.144	0.818715	22547.6	0	0
42	364.613	1.05174	19831.4	0	0
43	370.565	1.35132	17856.3	0	0
44	376.516	1.76334	15873.6	0	0
45	382.468	2.28826	13929.7	0	0
46	388.42	2.92663	12076.1	0	0
47	394.372	3.67915	10369.9	0	0
48	400.324	4.54664	8873.85	0	0
49	406.275	5.53006	7656.52	0	0
50	412.227	6.63051	6793	0	0
51	418.592	7.93818	0	0	0

Query 1 (bishop simplified) - Safety Factor: 1.96558

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	123.055	98.3	0	0	0
2	128.872	92.3915	-889.968	0	0
3	134.688	86.7807	-775.072	0	0
4	140.504	81.4463	185.584	0	0
5	146.321	76.3701	1852.59	0	0
6	152.137	71.5361	4032.94	0	0
7	157.953	66.9302	6441.33	0	0
8	163.769	62.5401	8999.12	0	0
9	169.586	58.3547	11647.7	0	0
10	175.402	54.3645	14335.7	0	0
11	181.218	50.5605	17018.1	0	0
12	187.034	46.9349	19655.7	0	0
13	192.851	43.4808	22213.9	0	0
14	198.667	40.1915	24662.7	0	0
15	204.483	37.0614	26976.1	0	0
16	210.299	34.0852	29131.4	0	0
17	216.116	31.2581	31109.4	0	0
18	221.932	28.5757	32893.6	0	0
19	227.748	26.034	34470.4	0	0
20	233.564	23.6293	35828.3	0	0
21	239.381	21.3583	36958.6	0	0
22	245.197	19.218	37854.4	0	0
23	251.013	17.2056	38510.9	0	0
24	256.83	15.3185	38925	0	0
25	262.646	13.5544	39095.8	0	0
26	268.462	11.9111	39023.8	0	0
27	274.278	10.3868	38711.2	0	0
28	280.095	8.97954	38161.9	0	0
29	285.911	7.68788	37381.2	0	0
30	291.727	6.51033	36375.9	0	0
31	297.543	5.44561	35154.5	0	0
32	303.36	4.49255	33726.8	0	0
33	309.176	3.65015	32103.9	0	0
34	315.047	2.91113	31584.6	0	0
35	320.918	2.28317	30854.4	0	0
36	326.789	1.7656	29917.1	0	0
37	332.66	1.35787	28780.7	0	0
38	338.531	1.05958	27457.2	0	0
39	344.402	0.870397	25963	0	0
40	350.273	0.790137	24318.3	0	0
41	356.144	0.818715	22547.6	0	0
42	364.613	1.05174	19831.4	0	0
43	370.565	1.35132	17856.3	0	0
44	376.516	1.76334	15873.6	0	0
45	382.468	2.28826	13929.7	0	0
46	388.42	2.92663	12076.1	0	0
47	394.372	3.67915	10369.9	0	0
48	400.324	4.54664	8873.85	0	0
49	406.275	5.53006	7656.52	0	0
50	412.227	6.63051	6793	0	0
51	418.592	7.93818	0	0	0

Simplified Janbu Method - Total Stress

Global Minimum Query (bishop simplified) - Safety Factor: 1.74079

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	126.97	98.3	0	0	0
2	131.483	93.0281	-971.87	0	0
3	135.997	87.7562	-1139.29	0	0
4	141.01	81.9002	-382.168	0	0
5	146.023	76.0441	1367.56	0	0
6	151.037	70.1881	4057.84	0	0
7	156.05	64.332	7479.01	0	0
8	160.842	59.3975	10834.6	0	0
9	165.635	54.463	14661.9	0	0
10	170.343	49.9646	18486.7	0	0
11	175.051	45.4662	22685.3	0	0
12	182.333	38.9235	29327	0	0
13	189.616	32.6249	36338.1	0	0
14	196.763	26.7594	43329.7	0	0
15	203.911	21.2742	50163.4	0	0
16	209.204	17.4458	55050.8	0	0
17	214.497	13.6174	60147.1	0	0
18	219.79	9.98626	65019.5	0	0
19	225.083	6.35508	70067.5	0	0
20	232.399	1.42961	77110.8	0	0
21	237.083	1.56228	73943.6	0	0
22	241.767	1.69495	70848.7	0	0
23	246.451	1.82763	67826.1	0	0
24	253.476	2.02662	63428	0	0
25	260.502	2.22561	59192.5	0	0
26	267.078	2.41188	55375	0	0
27	273.655	2.59816	51700.1	0	0
28	280.231	2.78443	48167.5	0	0
29	286.807	2.9707	44777.4	0	0
30	293.383	3.15697	41529.8	0	0
31	299.96	3.34324	38424.6	0	0
32	306.536	3.52952	35461.9	0	0
33	313.112	3.71579	32641.6	0	0
34	320.733	3.93164	29551.6	0	0
35	325.356	4.0626	27770.2	0	0
36	329.98	4.19355	26059.3	0	0
37	336.255	4.3713	23849.5	0	0
38	342.531	4.54905	21769.5	0	0
39	348.818	4.72715	19815.4	0	0
40	355.106	4.90525	17991.6	0	0
41	361.395	5.08338	16297.8	0	0
42	367.684	5.2615	14734.2	0	0
43	373.962	5.43933	13303.2	0	0
44	380.24	5.61716	12002.1	0	0
45	386.518	5.79498	10830.7	0	0
46	392.796	5.97281	9789.21	0	0
47	399.074	6.15064	8877.52	0	0
48	405.352	6.32846	8095.66	0	0
49	409.698	6.45156	7630.48	0	0
50	414.044	6.57465	7227.51	0	0
51	422	6.8	0	0	0

Query 1 (bishop simplified) - Safety Factor: 1.74079

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	126.97	98.3	0	0	0
2	131.483	93.0281	-971.87	0	0
3	135.997	87.7562	-1139.29	0	0
4	141.01	81.9002	-382.168	0	0
5	146.023	76.0441	1367.56	0	0
6	151.037	70.1881	4057.84	0	0
7	156.05	64.332	7479.01	0	0
8	160.842	59.3975	10834.6	0	0
9	165.635	54.463	14661.9	0	0
10	170.343	49.9646	18486.7	0	0
11	175.051	45.4662	22685.3	0	0
12	182.333	38.9235	29327	0	0
13	189.616	32.6249	36338.1	0	0
14	196.763	26.7594	43329.7	0	0
15	203.911	21.2742	50163.4	0	0
16	209.204	17.4458	55050.8	0	0
17	214.497	13.6174	60147.1	0	0
18	219.79	9.98626	65019.5	0	0
19	225.083	6.35508	70067.5	0	0
20	232.399	1.42961	77110.8	0	0
21	237.083	1.56228	73943.6	0	0
22	241.767	1.69495	70848.7	0	0
23	246.451	1.82763	67826.1	0	0
24	253.476	2.02662	63428	0	0
25	260.502	2.22561	59192.5	0	0
26	267.078	2.41188	55375	0	0
27	273.655	2.59816	51700.1	0	0
28	280.231	2.78443	48167.5	0	0
29	286.807	2.9707	44777.4	0	0
30	293.383	3.15697	41529.8	0	0
31	299.96	3.34324	38424.6	0	0
32	306.536	3.52952	35461.9	0	0
33	313.112	3.71579	32641.6	0	0
34	320.733	3.93164	29551.6	0	0
35	325.356	4.0626	27770.2	0	0
36	329.98	4.19355	26059.3	0	0
37	336.255	4.3713	23849.5	0	0
38	342.531	4.54905	21769.5	0	0
39	348.818	4.72715	19815.4	0	0
40	355.106	4.90525	17991.6	0	0
41	361.395	5.08338	16297.8	0	0
42	367.684	5.2615	14734.2	0	0
43	373.962	5.43933	13303.2	0	0
44	380.24	5.61716	12002.1	0	0
45	386.518	5.79498	10830.7	0	0
46	392.796	5.97281	9789.21	0	0
47	399.074	6.15064	8877.52	0	0
48	405.352	6.32846	8095.66	0	0
49	409.698	6.45156	7630.48	0	0
50	414.044	6.57465	7227.51	0	0
51	422	6.8	0	0	0

Discharge Sections

Entity Information

Simplified Bishop Method - Total Stress

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, -200 585, -200 585, -11 585, 0 585, 4 422, 6.8 148, 98.3 0, 98.3 0, 97 0, 89.7653 0, 4 0, 0 0, -1.23135 0, -11
Material Boundary	0, -11 585, -11
Material Boundary	0, 4 221, 1.1 419.367, 6.837 431, 2.6
Material Boundary	0, 97 147, 97 419.367, 6.837 422, 6.8
Material Boundary	0, 0 221, -2.9 420.879, 2.6 431, 2.6 585, 0

Simplified Janbu Method - Total Stress

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, -200 585, -200 585, -11 585, 0 585, 4 422, 6.8 148, 98.3 0, 98.3 0, 97 0, 89.7653 0, 4 0, 0 0, -1.23135 0, -11
Material Boundary	0, -11 585, -11
Material Boundary	0, 4 221, 1.1 419.367, 6.837 431, 2.6
Material Boundary	0, 97 147, 97 419.367, 6.837 422, 6.8
Material Boundary	0, 0 221, -2.9 420.879, 2.6 431, 2.6 585, 0

CITY OF DEL RIO LANDFILL

VAL VERDE COUNTY, TEXAS
TCEQ PERMIT NO. MSW-207C

MAJOR PERMIT AMENDMENT APPLICATION
PART IV – SITE OPERATING PLAN

Prepared for
City of Del Rio

September 2023
Revision 1 August 2024
Revision 2 March 2025
Revision 3 May 2025

Prepared by
CP&Y an STV Company
TPBE Registration No. F-1741
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214-638-0500

This document is intended for permitting purposes only.

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STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER

Twobista Metaferia
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STATE OF TEXAS
TEWOBISTA METAFERIA
123183
LICENSED
PROFESSIONAL ENGINEER
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LIST OF TABLES

LIST OF FIGURES

8.5 Waste Unloading Procedures

Landfill Attendants, Equipment Operators, Laborers, and Spotters will monitor the incoming waste. Landfill Attendants control site access and monitor incoming vehicles for unauthorized or prohibited wastes by (1) receiving manifests and other shipping documents, (2) recording incoming waste loads, and (3) interviewing the driver, as necessary. Any nonconforming issues will be reported to the Landfill Coordinator or designee. If the non-conforming issues involve Special or Industrial wastes, the Landfill Coordinator or designee will review the SOP to verify that all requirements for acceptance of Special and Industrial waste have been met before the material is accepted for disposal. The procedures for handling prohibited waste that is not discovered until after it is unloaded are discussed in Section 8.2.

Equipment Operators, Spotters, Laborers, or other field personnel will be present at all areas where waste is being unloaded to monitor unloading of waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility and will be trained to identify prohibited wastes before being assigned to this task. The personnel will also be trained and have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. The Spotters and Equipment Operators have the authority and responsibility to reject unauthorized loads, have unauthorized material removed by the transporter, or have the unauthorized material removed by on-site personnel or otherwise properly managed by the facility. In the event an unauthorized load is discovered at an unloading area, the Spotter, Laborer or Equipment Operator (i.e., working face staff) will notify the Landfill Superintendent or Landfill Coordinator immediately. The Landfill Superintendent or Landfill Coordinator will verify that the appropriate action is taken. In addition, if the unauthorized load is discovered at the site entrance, the Landfill Attendant will notify the Landfill Superintendent or Landfill Coordinator immediately to verify that the appropriate action is taken. A record of each unauthorized material removal event will be maintained in the Site Operating Record.

Solid waste unloading will be controlled to prevent disposal in locations other than those specified by site management. For example, random load inspections will be conducted as outlined in Section 8.3 of this SOP. Any allowable waste deposited in an unauthorized area will be immediately removed and disposed of properly at the current working face. The Spotters and Equipment Operators or other site personnel will actively investigate any approved waste haul vehicles that do not dispose of their waste in an authorized area. In the event that an authorized load of waste has been deposited in an unauthorized area, site personnel will notify the Landfill Superintendent and the waste load will be promptly relocated to the authorized working face area.

8.6 Special Waste Acceptance Procedure

In Accordance with 330.171(b),(c) and (d), the following special wastes do not require any further written approval from the Executive Director if they are accepted and handled in accordance with the procedures outlined below. Any other special wastes require written approval from the Executive Director before acceptance. In accordance with current City policy, acceptance procedures for special waste are as follows:

- Water and wastewater treatment plant sludges that have been tested with the Method 9095 Paint Filter Liquids Test and are certified to contain no free liquids, which have been treated or processed, are not hazardous, and are not hauled in vacuum, may be accepted at this landfill. Quantities shall be limited to that which can be adequately handled at the landfill without creating odor problems, and shall be placed in area(s) designated by the city. Such

29.0 WASTE IN ENCLOSED CONTAINERS AT TYPE IV LANDFILLS

There is no waste in enclosed containers at the City of Del Rio Landfill. (This section is not applicable to this site as it is a Type 1 Facility). The facility is not a storage or processing facility. However, recyclables noted in Table 8-2 will be temporarily stored as they are collected prior to pickup for recycling. The containers for collection and temporary storage are noted in Table 8-2 and are located outside of any building and outside of the permit boundary. They are not part of this permit.

30.0 DISPOSAL OF SPECIAL WASTE

The landfill is permitted to receive only municipal solid waste and those special solid waste allowable under §330.171. The site is not authorized to receive hazardous waste regulated by the TCEQ, PCB waste, or prohibited waste as discussed in Section 8.

Special waste will not be handled at this landfill except in accordance with TCEQ Rules & Regulations, and only when appropriate provisions have been made at the site for proper disposal. If other special waste is considered in the future for disposal at this site, approval must be obtained from the TCEQ as outlined in §330.171.

31.0 DISPOSAL OF INDUSTRIAL WASTE

This site does not accept Class I Industrial Waste. Class II and Class III Industrial Waste may be accepted, provided disposal of these waste does not interfere with the proper operations of the facility and the waste acceptance plan required by §330.61(b). The Waste Acceptance Plan is included in Appendix I/IIE. Class 2 industrial solid waste, except special waste as defined in 330.3 may be accepted provided the acceptance of this waste does not interfere with facility operations.

32.0 VISUAL SCREENING OF DEPOSITED WASTE

The landfill site is located in a relatively undeveloped area generally remote from residential property. The setting for the landfill features relatively flat topography with desert vegetative cover. The City's old closed-out landfill and City-owned property borders the landfill to the northwest. Undeveloped desert landscape borders the landfill on the remaining sides. A buffer zone of at least 50 feet wide and, in most areas, several hundred feet wide, surrounds the property. The nearest residence is located approximately 350 feet away from the permit boundary on the south side of the facility. Refer to the Land Use Map on Figure I/II-7.1 located in Parts I/II. If the Executive Director determines that additional screening is necessary, it will be provided.